# Bachelor of Technology (Civil Engineering)

## Programme Code: BTCE

## Duration – 4 Years Full Time

## Programme Structure
## and
## Curriculum & Scheme of Examination

## 2017-18

# AMITY UNIVERSITY
## MADHYA PRADESH

# PREAMBLE

Amity University aims to achieve academic excellence by providing multi-faceted education to students and encourage them to reach the pinnacle of success. The University has designed a system that would provide rigorous academic programme with necessary skills to enable them to excel in their careers.

This booklet contains the Programme Structure, the Detailed Curriculum and the Scheme of Examination. The Programme Structure includes the courses (Core and Elective), arranged semester wise. The importance of each course is defined in terms of credits attached to it. The credit units attached to each course has been further defined in terms of contact hours i.e. Lecture Hours (L), Tutorial Hours (T), Practical Hours (P). Towards earning credits in terms of contact hours, 1 Lecture and 1 Tutorial per week are rated as 1 credit each and 2 Practical hours per week are rated as 1 credit. Thus, for example, an L-T-P structure of 3-0-0 will have 3 credits, 3-1-0 will have 4 credits, and 3-1-2 will have 5 credits.

The Curriculum and Scheme of Examination of each course includes the course objectives, course contents, scheme of examination and the list of text and references. The scheme of examination defines the various components of evaluation and the weightage attached to each component. The different codes used for the components of evaluation and the weightage attached to them are:

| Components | Codes | Weightage (%) |
|---|---|---|
| Case Discussion/ Presentation/ Analysis | C | 05 - 10 |
| Home Assignment | H | 05 - 10 |
| Project | P | 05 - 10 |
| Seminar | S | 05 - 10 |
| Viva | V | 05 - 10 |
| Quiz | Q | 05 - 10 |
| Class Test | CT | 10 - 15 |
| Attendance | A | 05 |
| End Semester Examination | EE | 70 |

It is hoped that it will help the students study in a planned and a structured manner and promote effective learning. Wishing you an intellectually stimulating stay at Amity University.

22- February 2017

# PROGRAMME STRU1CTURE- B.Tech(Civil)

## FIRST SEMESTER

| Course Code | Course Title | Lecture (L) Hours Per Week | Tutorial (T) Hours Per Week | Practical (P) Hours Per Week | Total Credits |
|---|---|---|---|---|---|
| **Compulsory Courses:** | | | | | |
| BTCE 101 | Applied Mathematics - I | 3 | | - | 3 |
| BTCE 102 | Applied Physics - I – Fields & Waves | 2 | 1 | - | 3 |
| BTCE 103 | Elements of Mechanical Engineering | 2 | - | - | 2 |
| BTCE 104 | Introduction to Computers & Programming in C | 2 | 1 | - | 3 |
| BTCE 105 | Electrical Science | 2 | 1 | - | 3 |
| BTCE 106 | Environmental Studies-I | 2 | - | - | 2 |
| BTCE 120 | Applied Physics Lab - I | - | - | 2 | 1 |
| BTCE 121 | Elements of Mechanical Engineering Lab | - | - | 2 | 1 |
| BTCE 122 | Programming in C Lab | - | - | 2 | 1 |
| BTCE 123 | Electrical Science Lab | - | - | 2 | 1 |
| BTCE 124 | Engineering Graphics Lab | - | - | 2 | 1 |
| | **Total** | | | | **21** |
| **Optional Courses - Value Added Courses; Any Three: Hrs/Semester** | | | | | |
| BTB 141 | English Language Usage Essentials | 30 | | | |
| BTCE 143 | Behavioral Sciences - I | 30 | | | |
| <br>BTCE 144<br>BTCE 145<br>BTCE 146<br>BTCE 147<br>BTCE 148 | Foreign Language - I<br>French<br>German<br>Spanish<br>Japanese<br>Chinese | 30 | | | |
| | | | | | |

# PROGRAMME STRU1CTURE- B.Tech(Civil)

## SECOND SEMESTER

| Course Code | Course Title | Lecture (L) Hours Per Week | Tutorial (T) Hours Per Week | Practical (P) Hours Per Week | Total Credits |
|---|---|---|---|---|---|
| **Compulsory Courses:** | | | | | |
| BTCE 201 | Applied Mathematics - II | 3 | | - | 3 |
| BTCE 202 | Applied Physics - II – Modern Physics | 2 | 1 | - | 3 |
| BTCE 203 | Applied Chemistry | 2 | 1 | - | 3 |
| BTCE 204 | Object Oriented Programming in $C^{++}$ | 2 | 1 | - | 3 |
| BTCE 205 | Engineering Mechanics | 2 | 1 | - | 3 |
| BTCE 206 | Environmental Studies II | 2 | - | - | 2 |
| BTCE 220 | Applied Physics Lab - II | - | - | 2 | 1 |
| BTCE 221 | Applied Chemistry Lab | - | - | 2 | 1 |
| BTCE 222 | Object Oriented Programming in $C^{++}$ Lab | - | - | 2 | 1 |
| BTCE 223 | Engineering Mechanics Lab | - | - | 2 | 1 |
| | **Total** | | | | 21 |
| **Optional Courses - Value Added Courses; Any Three: Hrs/Semester** | | | | | |
| BTCE 240 | English | 30 | | | |
| BTCE 243 | Behavioral Science – II | 30 | | | |
| | Foreign Language - II | 30 | | | |
| BTCE 244 | French | | | | |
| BTCE 245 | German | | | | |
| BTCE 246 | Spanish | | | | |
| BTCE 247 | Japanese | | | | |
| BTCE 248 | Chinese | | | | |
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## TERM PAPER DURING SUMMER BREAK

## THIRD SEMESTER

| Course Code | Course Title | Lecture (L) Hours Per Week | Tutorial (T) Hours Per Week | Practical (P) Hours Per Week | Total Credits |
|---|---|---|---|---|---|
| **Compulsory Courses:** | | | | | |
| BTCE 301 | Applied Mathematics - III | 3 | 1 | - | 4 |
| BTCE 302 | Building Design & Drawing | 3 | 1 | - | 4 |
| BTCE 303 | Mechanics of Solids | 2 | 1 | - | 3 |
| BTCE 304 | Mechanics of Fluids | 3 | 1 | - | 4 |
| BTCE 305 | Building Technology | 3 | - | - | 3 |
| BTCE 306 | Geo Informatics-I | 3 | - | - | 3 |
| BTCE 320 | Mechanics of Solids & Fluids Lab | - | - | 2 | 1 |
| BTCE 321 | Civil Engineering Drawing Lab | - | - | 2 | 1 |
| BTCE 322 | Surveying Practical - I | - | - | 2 | 1 |
| BTCE 330 | Term Paper (Evaluation) | - | - | - | 2 |
| | **TOTAL** | | | | 26 |
| **Optional Courses - Value Added Courses; Any Three: Hrs/Semester** | | | | | |
| BTCE 341 | Communication Skills – I | 30 | | | |
| BTCE 343 | Behavioral Science - III | 30 | | | |
| | Foreign Language – III | 30 | | | |
| BTCE 344 | French | | | | |
| BTCE 345 | German | | | | |
| BTCE 346 | Spanish | | | | |
| BTCE 347 | Japanese | | | | |
| BTCE 348 | Chinese | | | | |

## FOURTH SEMESTER

| Course Code | Course Title | Lecture (L) Hours Per Week | Tutorial (T) Hours Per Week | Practical (P) Hours Per Week | Total Credits |
|---|---|---|---|---|---|
| **Compulsory Courses:** | | | | | |
| BTCE 401 | Numerical Analysis & Programming | 3 | - | - | 3 |
| BTCE 402 | Structural Analysis - I | 3 | 1 | - | 4 |
| BTCE 403 | Concrete Technology | 3 | - | - | 3 |
| BTCE 404 | Geo Informatics-II | 3 | - | - | 3 |
| BTCE 405 | Construction Management & Quantity Surveying | 3 | - | - | 3 |
| BTCE 406 | Transportation Engineering - I | 3 | 1 | - | 4 |
| BTCE 420 | Numerical Analysis Lab (Programming Lab) | - | - | 2 | 1 |
| BTCE 421 | Concrete Technology Lab | - | - | 2 | 1 |
| BTCE 422 | Surveying Practical - II | - | - | 2 | 1 |
| | TOTAL | | | | 23 |
| **Optional Courses - Value Added Courses; Any Three: Hrs/Semester** | | | | | |
| BTCE 441 | Communication Skills - II | 30 | | | |
| BTCE 443 | Behavioral Science – IV | 30 | | | |
| | Foreign Language – IV | 30 | | | |
| BTCE 444 | French | | | | |
| BTCE 445 | German | | | | |
| BTCE 446 | Spanish | | | | |
| BTCE 447 | Japanese | | | | |
| BTCE 448 | Chinese | | | | |

## INDUSTRIAL PRACTICAL TRAINING DURING SUMMER BREAK (6-8 WEEKS)

## FIFTH SEMESTER

| Course Code | Course Title | Lecture (L) Hours Per Week | Tutorial (T) Hours Per Week | Practical (P) Hours Per Week | Total Credits |
|---|---|---|---|---|---|
| **Compulsory Courses:** | | | | | |
| BTCE 501 | Structural Analysis - II | 3 | - | - | 3 |
| BTCE 502 | Principles of Structural Design | 3 | 1 | - | 4 |
| BTCE 503 | Geotechnical Engineering - I | 3 | - | - | 3 |
| BTCE 504 | Transportation Engineering - II | 3 | - | - | 3 |
| BTCE 505 | Hydraulic Machines | 3 | - | - | 3 |
| BTCE 506 | Hydro Systems | 3 | - | - | 3 |
| BTCE 520 | Highway Engineering Lab | - | - | 2 | 1 |
| BTCE 521 | Hydraulic Machines Lab | - | - | 2 | 1 |
| BTCE 550 | Industrial Practical Training (Evaluation) | - | - | - | 4 |
| | **TOTAL** | | | | **25** |
| **Optional Courses - Value Added Courses; Any Three: Hrs/Semester** | | | | | |
| BTCE 541 | Communication Skills - III | 30 | | | |
| BTCE 543 | Behavioral Science – V | 30 | | | |
| | Foreign Language – V | 30 | | | |
| BTCE 544 | French | | | | |
| BTCE 545 | German | | | | |
| BTCE 546 | Spanish | | | | |
| BTCE 547 | Japanese | | | | |
| BTCE 548 | Chinese | | | | |

## SIXTH SEMESTER

| Course Code | Course Title | Lecture (L) Hours Per Week | Tutorial (T) Hours Per Week | Practical (P) Hours Per Week | Total Credits |
|---|---|---|---|---|---|
| **Compulsory Courses:** | | | | | |
| BTCE 601 | Environmental Engineering - I | 3 | - | - | 3 |
| BTCE 602 | Structural Concrete Design | 3 | - | - | 3 |
| BTCE 603 | Geotechnical Engineering – II | 3 | 1 | - | 4 |
| BTCE 604 | Computer Application in Civil Engineering | 3 | - | - | 3 |
| BTCE 605 | Engineering Geology | 3 | - | - | 3 |
| BTCE 606 | Irrigation Engineering | 3 | - | - | 3 |
| BTCE 620 | Computer Applications Lab | - | - | 2 | 1 |
| BTCE 621 | Geotechnical Engineering Lab | - | - | 2 | 1 |
| | **TOTAL** | | | | **21** |
| **Optional Courses - Value Added Courses; Any Three: Hrs/Semester** | | | | | |
| BTCE 641 | Communication Skills - IV | 30 | | | |
| BTCE 643 | Behavioural Science – VI | 30 | | | |
| | Foreign Language – VI | 30 | | | |
| BTCE 644 | French | | | | |
| BTCE 645 | German | | | | |
| BTCE 646 | Spanish | | | | |
| BTCE 647 | Japanese | | | | |
| BTCE 648 | Chinese | | | | |

## SUMMER TRAINING (6- 8 WEEKS)

## SEVENTH SEMESTER

| Course Code | Course Title | Lecture (L) Hours Per Week | Tutorial (T) Hours Per Week | Practical (P) Hours Per Week | Total Credits |
|---|---|---|---|---|---|
| **Compulsory Courses:** | | | | | |
| BTCE 701 | Structural Steel Design | 3 | 1 | - | 4 |
| BTCE 702 | Environmental Engineering – II | 3 | - | - | 3 |
| BTCE 703 | Design of Hydraulic structures | 3 | - | - | 3 |
| BTCE 720 | Environmental Engineering Lab | - | - | 2 | 1 |
| BTCE 721 | Structural Detailing Lab | - | - | 2 | 1 |
| BTCE 760 | Project | **-** | **-** | **-** | **6** |
| BTCE 750 | Industrial Training (Evaluation) | **-** | **-** | **-** | 6 |
| **ELECTIVE-I (Any one from the Elective list)** | | | | | **4** |
| BTCE 704 | Prestressed Concrete | 3 | 1 | - | |
| BTCE 705 | Remote Sensing & Geographic Information Systems | 4 | - | - | |
| BTCE 706 | Advanced Structural Analysis | 3 | 1 | - | |
| BTCE 707 | Hydrology & Flood Control | 3 | 1 | - | |
| BTCE 708 | Environmental Pollution Control Engineering | 4 | - | - | |
| BTCE 709 | Computer Aided Analysis & Design in Civil Engineering | 3 | - | 2 | |
| | **TOTAL** | | | | **28** |
| **Optional Courses - Value Added Courses; Any Three: Hrs/Semester** | | | | | |
| BTCE 741 | Communication Skills - V | **30** | | | |
| BTCE 743 | Behavioural Science – VII | **30** | | | |
| | Foreign Language – VI I | **30** | | | |
| BTCE 744 | French | | | | |
| BTCE 745 | German | | | | |
| BTCE 746 | Spanish | | | | |
| BTCE 747 | Japanese | | | | |
| BTCE 748 | Chinese | | | | |

## EIGHTH SEMESTER

| Course Code | Course Title | Lecture (L) Hours Per Week | Tutorial (T) Hours Per Week | Practical (P) Hours Per Week | Total Credits |
|---|---|---|---|---|---|
| **Compulsory Courses:** | | | | | |
| BTCE 801 | Advanced Concrete Design | 3 | 1 | - | 4 |
| BTCE 802 | Engineering Economics & Management | 3 | - | - | 3 |
| BTCE 860 | Project (Dissertation) | - | - | - | **9** |
| **ELECTIVE-I (Any one from the Elective list)** | | | | | **4** |
| BTCE 803 | Finite Element Method | 3 | 1 | - | |
| BTCE 804 | Traffic Engineering & Management | 3 | 1 | - | |
| BTCE 805 | Computer Application in Hydro Engineering | 3 | - | 2 | |
| BTCE 806 | Water Resources Systems Planning & Design | 3 | 1 | - | |
| BTCE 807 | Functional Design of Buildings | 3 | 1 | - | |
| BTCE 808 | Advanced Steel Design | 3 | 1 | - | |
| BTCE 809 | Architecture & Town Planning | 3 | - | 2 | |
| BTCE 810 | Industrial Waste Engineering | 4 | - | - | |
| | **TOTAL** | | | | **20** |
| **Optional Courses - Value Added Courses; Any Three: Hrs/Semester** | | | | | |
| BTCE 841 | Communication Skills - VI | 30 | | | |
| BTCE 843 | Behavioural Science – VIII | 30 | | | |
| | Foreign Language – VIII | 30 | | | |
| BTCE 844 | French | | | | |
| BTCE 845 | German | | | | |
| BTCE 846 | Spanish | | | | |
| BTCE 847 | Japanese | | | | |
| BTCE 848 | Chinese | | | | |

# Curriculum & Scheme of Examination

# APPLIED MATHEMATICS – I

**Course Code: BTCE 101** **Credit Units: 03**

## Course Objective:

The knowledge of Mathematics is necessary for a better understanding of almost all the Engineering and Science subjects. Here our intention is to make the students acquainted with the concept of basic topics from Mathematics, which they need to pursue their Engineering degree in different disciplines.

## Course Contents:

**Module I: Differential Calculus**

Successive differentiation, Leibnitz's theorem (without proof), Mean value theorem, Taylor's theorem (proof), Remainder terms, Asymptote & Curvature, Partial derivatives, Chain rule, Differentiation of Implicit functions, Exact differentials, Tangents and Normals, Maxima, Approximations, Differentiation under integral sign, Jacobians and transformations of coordinates.

**Module II: Integral Calculus**

Fundamental theorems, Reduction formulae, Properties of definite integrals, Applications to length, area, volume, surface of revolution, improper integrals, Multiple Integrals-Double integrals, Applications to areas, volumes.

**Module III: Ordinary Differential Equations**

Formation of ODEs, Definition of order, degree & solutions, ODE of first order : Method of separation of variables, homogeneous and non homogeneous equations, Exactness & integrating factors, Linear equations & Bernoulli equations, General linear ODE of $n^{th}$ order, Solution of homogeneous equations, Operator method, Method of undetermined coefficients, Solution of simple simultaneous ODE.

**Module IV: Vector Calculus**

Scalar and Vector Field, Derivative of a Vector, Gradient, Directional Derivative, Divergence and Curl and their Physical Significance, Arc Length, Tangent, Directional Derivative, Evaluation of Line Integral, Green's Theorem in Plane (without proof), Representation of Surfaces, Tangent Plane and Surface Normal, Surface Integral, Stoke's Theorem (without proof), Gauss Divergence Theorem (without proof).

## Examination Scheme:

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

## Text & References:

***Text:***

- Differential Calculus by Shanti Narain
- Integral Calculus by Shanti Narain

***References:***

- Differential Equation by A.R. Forsyth
- Higher Engineering Mathematics by H.K. Dass

# APPLIED PHYSICS - I - FIELDS AND WAVES

**Course Code:** **BTCE 102** **Credit Units: 03**

## Course Objective:

Aim of this course is to introduce the students to fundamentals of graduate level physics, which form the basis of all applied science and engineering

## Course Contents:

**Module I: Oscillations & Waves**

**Oscillations:** Introduction to S.H.M. Damped Oscillations: Differential Equation and its solution, logarithmic decrement, Quality Factor, Different conditions of damping of harmonic oscillations. Forced oscillations: Amplitude and Frequency Response, Resonance, Sharpness of Resonance

**Plane Progressive Waves:** Differential Equation and Solution, Superposition of Progressive Waves stationary waves.

**Ultrasonics:** Generation and application of ultrasonicwaves.

**Module II: Wave Nature of Light**

**Interference:** Coherent Sources, Conditions of interference, Interference due to division of wavefront, Fresnels biprism Interference due to division of amplitude, Newton’s rings, Interference due to thin films, .

**Diffraction:** Fresnel and Fraunhofer diffraction, Fraunhofer diffraction at a single slit, double slit, N Slits, Transmission grating, Rayleigh criterion and Resolving power of grating.

**Polarization:** Birefringence, Nicol prism, Production and analysis of plane, circularly and elliptically polarized light, Half and quarter wave plates, Optical rotation, Polarimeter.

**Module III: Electromagnetics**

Scalar and vector fields, gradient of a scalar field, physical significance of gradient, equipotential surface. Line, surface and volume integrals, Divergence and curl of vector field and mathematical analysis physical significance, Electric flux, Gauss’ law, Proof and Applications, Gauss divergence and Stokes theorems.

Differential form of Gauss’ Law, Amperes’ Law, Displacement current, Faradays Law, Maxwell equations in free space & isotropic media (Integral form & differential form), EM wave propagation in free space, Poynting vector.

## Examination Scheme:

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Waves & oscillation, A. P. French
- Physics of waves, W. C. Elmore & M. A. Heald
- Introduction to Electrodynamics, D. J. Griffith
- Electrodynamics, Gupta, Kumar & Singh
- Optics, A. K. Ghatak
- Engineering Physics, Satya Prakash

# ELEMENT OF MECHANICAL ENGINEERING

**Course Code: BTCE 103 Credit Units: 02**

## Course Objective:

The objective of this course is to impart the basic knowledge of thermodynamics, stress- strain, materials & their properties and various manufacturing processes to the students of all engineering discipline.

## Course Contents:

**Module I: Fundamental Concepts**

Definition of thermodynamics, system, surrounding and universe, phase, concept of continuum, macroscopic & microscopic point of view, Thermodynamic equilibrium, property, state, path, process, cyclic process, Zeroth, first and second law of thermodynamics, Carnot Cycle, Introduction to I.C. Engines-two &four stoke S.I. and C.I. engines. Otto cycle. Diesel cycle.

**Module II: Stress And Strain Analysis**

Simple stress and strain: introduction, normal shear, and stresses-strain diagrams for ductile and brittle materials. Elastic constants, one-dimensional loadings of members of varying cross-section, Strain Energy, Properties of material-strength, elasticity, stiffness, malleability, ductility, brittleness, hardness and plasticity etc; Concept of stress and strain stress strain diagram, tensile test, impact test and hardness test.

**Module III: Casting & Forging**

Introduction of casting, pattern, mould making procedures, sand mould casting, casting defects, allowances of pattern. Forging-introduction, upsetting & drawing out, drop forging, press forging & m/c forging

**Module IV: Welding & Sheet metal working**

Introduction of welding processes, classification, gas welding, arc welding, resistance welding. Introduction to sheet metal shop, Shearing, trimming, blanking, piercing, shaving, notching, stretch forming, nibbling coining, embossing and drawing.

### Examination Scheme:

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

### Text & References:


- Engineering thermodynamics, by P.K. Nag, Tata McGraw Hill.
- Thermal Engineering, by D.S. Kumar. S.K. Kataria and Sons.
- Thermal Engineering by PL Ballaney; Khanna Publishers, Delhi.
- Engineering Thermodynamics: Work and Heat Transfer, by Rogers and Mayhew, ELBS Publications
- Heine, R.W. C.R. Loper and P.C. Rosenthal, Principles of metal casting McGraw Hill
- Welding Technology by R.S. Parmar, Khanna Publishers.
- Thermodynamics and Heat Engines Volume-I, by R. Yadav: Central Publications.
- Ganesan, V. Internal Combustion Engine, Tata McGraw-Hill.
- Mathur, M.L. and Sharma, R.P. Internal Combustion Engine. Dhanpat Rai Publication

# INTRODUCTION TO COMPUTERS AND PROGRAMMING IN C

**Course Code: BTCE 104 Credit Units: 03**

## Course Objective:

**The objective of this course module is to acquaint the students with the basics of computers system, its components, data representation inside computer and to get them familiar with various important features of procedure oriented programming language i.e. C.**

## Course Contents:

**Module I: Introduction**
Introduction to computer, history, von-Neumann architecture, memory system (hierarchy, characteristics and types), H/W concepts (I/O Devices), S/W concepts (System S/W & Application S/W, utilities). Data Representation: Number systems, character representation codes, Binary, octal, hexadecimal and their interconversions. Binary arithmetic, floating point arithmetic, signed and unsigned numbers, Memory storage unit.

**Module II: Programming in C**
History of C, Introduction of C, Basic structure of C program, Concept of variables, constants and data types in C, Operators and expressions: Introduction, arithmetic, relational, Logical, Assignment, Increment and decrement operator, Conditional, bitwise operators, Expressions, Operator precedence and associativity. Managing Input and output Operation, formatting I/O.

**Module III: Fundamental Features in C**
C Statements, conditional executing using if, else, nesting of if, switch and break Concepts of loops, example of loops in C using for, while and do-while, continue and break. Storage types (automatic, register etc.), predefined processor, Command Line Argument.

**Module IV: Arrays and Functions**
One dimensional arrays and example of iterative programs using arrays, 2-D arrays Use in matrix computations. Concept of Sub-programming, functions Example of user defined functions. Function prototype, Return values and their types, calling function, function argument, function with variable number of argument, recursion.

**Module V: Advanced features in C**
Pointers, relationship between arrays and pointers Argument passing using pointers, Array of pointers. Passing arrays as arguments.
Strings and C string library.
Structure and Union. Defining C structures, Giving values to members, Array of structure, Nested structure, passing strings as arguments.
File Handling.

## Examination Scheme:

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***
- "ANSI C" by E Balagurusamy
- Yashwant Kanetkar, "Let us C", BPB Publications, 2nd Edition, 2001.
- Herbert Schildt, "C:The complete reference", Osbourne Mcgraw Hill, 4th Edition, 2002.
- V. Raja Raman, "Computer Programming in C", Prentice Hall of India, 1995.

*References*:

- **Kernighan & Ritchie, "C Programming Language", The (Ansi C Version), PHI, 2nd Edition.**
- **J. B Dixit, "Fundamentals of Computers and Programming in 'C'.**
- P.K. Sinha and Priti Sinha, "Computer Fundamentals", BPB publication.

# ELECTRICAL SCIENCE

**Course Code: BTCE 105 Credit Units: 03**

## Course Objective:

The objective of the course is to provide a brief knowledge of Electrical Engineering to students of all disciplines. This Course includes some theorems related to electrical, some law's related to flow of current, voltages, basic knowledge of Transformer, basic knowledge of electromagnetism, basic knowledge of electrical network.

## Course Contents:

**Module I: Basic Electrical Quantities**

Basic Electrical definitions-Energy, Power, Charge, Current, Voltage, Electric Field Strength, Magnetic Flux Density, etc., Resistance, Inductance and Capacitance. Ideal Source, Independent Source and Controlled Source

**Module II: Network Analysis Techniques & Theorems**

Circuit Principles: Ohm's Law, Kirchoff's Current Law, Kirchoff's Voltage Law Network Reduction: Star–Delta Transformation, Source Transformation, Nodal Analysis, Loop analysis. Superposition theorem Thevenin's Theorem, Norton's theorem and Reciprocity theorem.

**Module III: Alternating Current Circuits**

Peak, Average and RMS values for alternating currents, Power calculation:
reactive power, active power, Complex power, power factor, impedance, reactance, conductance, susceptance Resonance: series Resonance, parallel resonance, basic definition of Q factor & Band-width.

**Module IV: Transformers**

Basic Transformer Operation principle, Construction, Voltage relations, Current relations, Linear circuit models, Open circuit test, Short circuit test, Transformer Efficiency.

## Examination Scheme:

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- R.J. Smith, R.C. Dorf: Circuits, devices and Systems
- B.L. Thareja: Electrical Technology : Part -1 & 2
- V. Deltoro: Electrical Engineering fundamentals
- Schaum's Series: Electrical Circuits

# ENVIRONMENTAL STUDIES-I

**Course Code:** **BTCE 106** **Credit Units: 02**

**Course Objective:**
The term environment is used to describe, in the aggregate, all the external forces, influences and conditions, which affect the life, nature, behaviour and the growth, development and maturity of living organisms. At present a great number of environment issues, have grown in size and complexity day by day, threatening the survival of mankind on earth. A study of environmental studies is quite essential in all types of environmental sciences, environmental engineering and industrial management. The objective of environmental studies is to enlighten the masses about the importance of the protection and conservation of our environment and control of human activities which has an adverse effect on the environment.

**Course Contents:**

**Module I: The multidisciplinary nature of environmental studies**
Definition, scope and importance
Need for public awareness

**Module II: Natural Resources**
**Renewable and non-renewable resources**
Natural resources and associated problems
Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies.
Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

**Module III: Ecosystems**
Concept of an ecosystem
Structure and function of an ecosystem
Producers, consumers and decomposers
Energy flow in the ecosystem
Ecological succession
Food chains, food webs and ecological pyramids
Introduction, types, characteristic features, structure and function of the following ecosystem:

a. Forest ecosystem
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, ocean estuaries)

**Module IV: Biodiversity and its conservation**
Introduction – Definition: genetic, species and ecosystem diversity
Biogeographical classification of India
Value of biodiversity: consumptive use, productive use, social, ethical aesthetic and option values
Biodiversity at global, national and local levels
India as a mega-diversity nation
Hot-spots of biodiversity
Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts
Endangered and endemic species of India
Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

**Text & References:**


- Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
- Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad 380 013, India, Email:mapin@icenet.net (R)
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- Clark R.S., Marine Pollution, Clanderson Press Oxford (TB)
- Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p
- De A.K., Environmental Chemistry, Wiley Eastern Ltd.
- Down to Earth, Centre for Science and Environment (R)
- Gleick, H.P. 1993. Water in Crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford Univ. Press. 473p
- Hawkins R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R)
- Heywood, V.H & Waston, R.T. 1995. Global Biodiversity Assessment. Cambridge Univ. Press 1140p.
- Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284 p.
- Mckinney, M.L. & School, R.M. 1996. Environmental Science Systems & Solutions, Web enhanced edition. 639p.
- Mhaskar A.K., Matter Hazardous, Techno-Science Publication (TB)
- Miller T.G. Jr. Environmental Science, Wadsworth Publishing Co. (TB)
- Odum, E.P. 1971. Fundamentals of Ecology. W.B. Saunders Co. USA, 574p
- Rao M N. & Datta, A.K. 1987. Waste Water treatment. Oxford & IBH Publ. Co. Pvt. Ltd. 345p.
- Sharma B.K., 2001. Environmental Chemistry. Geol Publ. House, Meerut
- Survey of the Environment, The Hindu (M)
- Townsend C., Harper J, and Michael Begon, Essentials of Ecology, Blackwell Science
- Trivedi R.K., Handbook of Environmental Laws, Rules Guidelines, Compliances and Standards, Vol I and II, Enviro Media (R)
- Trivedi R. K. and P.K. Goel, Introduction to air pollution, Techno-Science Publication (TB)
- Wanger K.D., 1998 Environnemental Management. W.B. Saunders Co. Philadelphia, USA 499p

# APPLIED PHYSICS LAB - I

**Course Code:** **BTCE 120** **Credit Units: 01**

## List of Experiments:

1. To determine the wavelength of sodium light by Newton's rings method.
2. To determine the dispersive power of the material of prism with the help of a spectrometer.
3. To determine the specific rotation of sugar by Bi-quartz or Laurent half shade polarimeter.
4. To determine the speed of ultrasonic waves in liquid by diffraction method.
5. To determine the width of a narrow slit using diffraction phenomena.
6. To determine the temperature coefficient of platinum wire, using a platinum resistance thermometer and a Callender & Griffth's bridge.
7. To determine the value of specific charge (ratio of e/m) of an electron by Thomson method.
8. To determine the internal resistance of Leclanche cell with the help of Potentiometer.
9. To determine the resistance per unit length of a Carey Foster's bridge wire and also to find out the specific resistance of a given wire.
10. To plot graph showing the variation of magnetic field with distance along the aixs of a circular coil carrying current, and hence estimate the radius of the coil.
11. To determine the value of acceleration due to gravity ('g') in the laboratory using bar pendulum.
12. To determine the moment of inertia of a flywheel about its own axis of rotation.
13. To determine the density of material of the given wire with the help of sonometer.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# ELEMENT OF MECHANICAL ENGINEERING LAB

**Course Code: BTCE 121 Credit Units: 01**

1. Welding

   (a) Arc Welding - Butt Joint
   - Lap Joint
   - T Joint

   (b) Gas Welding - Butt Joint
   - Lap Joint
   - Brazing of Broken pieces

2. Foundry - Sand mould casting by single piece pattern& Split pattern bracket with cores

3. Sheet Metal - Dust Bin
   - Mug
   - Funnel
   - Cylindrical Mug with handle-Rectangular

4. Fitting Shop - Male – Female Joint
   - Rectangular piece
   - Filing the job

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# PROGRAMMING IN C LAB

**Course Code:** **BTCE 122** **Credit Units: 01**

**Software Required:** Turbo C

**Course Contents:**

- C program involving problems like finding the nth value of cosine series, Fibonacci series. Etc.
- C programs including user defined function calls
- C programs involving pointers, and solving various problems with the help of those.
- File handling

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# ELECTRICAL SCIENCE LAB

**Course Code: BTCE 123 Credit Units: 01**

## List of Experiments:

1. To verify KVL & KCL in the given network.
2. To verify Superposition Theorem.
3. To verify Maximum Power Transfer Theorem.
4. To verify Reciprocity Theorem.
5. To determine and verify $R_{Th}$, $V_{Th}$, $R_N$, $I_N$ in a given network.
6. To perform open circuit & short circuit test on a single-phase transformer.
7. To study transient response of a given RLC Circuit.
8. To perform regulation, ratio & polarity test on a single-phase transformer.
9. To measure power & power factor in a three phase circuit by two wattmeter method.
10. To measure power & power factor in a three phase load using three ammeter & three voltmeter method.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# ENGINEERING GRAPHICS LAB

**Course Code:** **BTCE 124** **Credit Units: 01**

## Course Objective:

This course will provide students concepts on the drawings of different curves like straight line, parabola, ellipse etc. After completion of this course, students will be able to draw different figures manually and will be capable of using various instruments involved in drawings.

### Course Contents:

**Module I: General**
Importance, Significance and scope of engineering drawing, Lettering, Dimensioning, Scales, Sense of proportioning, Different types of projections, Orthographic Projection, B.I.S. Specifications.

**Module II: Projections of Point and Lines**
Introduction of planes of projection, Reference and auxiliary planes, projections of points and Lines in different quadrants, traces, inclinations, and true lengths of the lines, projections on Auxiliary planes, shortest distance, intersecting and non-intersecting lines.

**Module III: Planes other than the Reference Planes**
Introduction of other planes (perpendicular and oblique), their traces, inclinations etc., Projections of points and lines lying in the planes, conversion of oblique plane into auxiliary Plane and solution of related problems.

**Module IV: Projections of Plane Figures**
Different cases of plane figures (of different shapes) making different angles with one or both reference planes and lines lying in the plane figures making different given angles (with one of both reference planes). Obtaining true shape of the plane figure by projection.

**Module V: Projection of Solids**
Simple cases when solid is placed in different positions, Axis faces and lines lying in the faces of the solid making given angles.

**Module VI: Development of Surface**
Development of simple objects with and without sectioning. Isometric Projection

### Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

### Text & References:


- M.B. Shah & B.C. Rana, Engineering Drawing, Pearson Education, 2007
- PS Gill, Engineering Drawing, Kataria Publication
- ND Bhatt, Engineering Drawing, Charotar publications
- N Sidheshwar, Engineering Drawing, Tata McGraw Hill
- CL tanta, Mechanical Drawing, “Dhanpat Rai”

# ENGLISH

## Course Objective:
The course is intended to give a foundation of English Language. The literary texts are indented to help students to inculcate creative & aesthetic sensitivity and critical faculty through comprehension, appreciation and analysis of the prescribed literary texts. It will also help them to respond form different perspectives.

## Course Contents:
Module I: Vocabulary
Use of Dictionary
Use of Words: Diminutives, Homonyms & Homophones

Module II: Essentials of Grammar - I
Articles
Parts of Speech
Tenses

Module III: Essentials of Grammar - II
Sentence Structure
Subject -Verb agreement
Punctuation

**Module IV: Communication**
The process and importance
Principles & benefits of Effective Communication

**Module V: Spoken English Communication**
Speech Drills
Pronunciation and accent
Stress and Intonation

**Module VI: Communication Skills - I**
Developing listening skills
Developing speaking skills

**Module VII: Communication Skills - II**
Developing Reading Skills
Developing writing Skills

**Module VIII: Written English communication**
Progression of Thought/ideas
Structure of Paragraph
Structure of Essays

**Module IX: Short Stories**
**Of Studies, by Francis Bacon**
**Dream Children, by Charles Lamb**
**The Necklace, by Guy de Maupassant**
**A Shadow, by R.K.Narayan**
**Glory at Twilight, Bhabani Bhattacharya**

**Module X: Poems**

| | |
|---|---|
| All the Worlds a Stage | Shakespeare |
| To Autumn | Keats |
| O! Captain, My Captain. | Walt Whitman |
| Where the Mind is Without Fear | Rabindranath Tagore |
| **Psalm of Life** | **H.W. Longfellow** |

## Examination Scheme:

| **Components** | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

## Text & References:
- Madhulika Jha, Echoes, Orient Long Man
- Ramon & Prakash, Business Communication, Oxford.
- Sydney Greenbaum Oxford English Grammar, Oxford.
- Successful Communications, Malra Treece (Allyn and Bacon)
- Effective Technical Communication, M. Ashraf Rizvi.

*** 30 hrs Programme to be continued for Full year**

# BEHAVIOURAL SCIENCE - I
# (UNDERSTANDING SELF FOR EFFECTIVENESS)

**Course Code: BTCE 143 Credit Units: 01**

## Course Objective:

This course aims at imparting:

- Understanding self & process of self exploration
- Learning strategies for development of a healthy self esteem
- Importance of attitudes and its effective on personality
- Building Emotional Competence

## Course Contents:

**Module I: Self: Core Competency**
Understanding of Self
Components of Self – Self identity
Self concept
Self confidence
Self image

**Module II: Techniques of Self Awareness**
Exploration through Johari Window
Mapping the key characteristics of self
Framing a charter for self
Stages – self awareness, self acceptance and self realization

**Module III: Self Esteem & Effectiveness**
Meaning and Importance
Components of self esteem
High and low self esteem
Measuring your self esteem

**Module IV: Building Positive Attitude**
Meaning and nature of attitude
Components and Types of attitude
Importance and relevance of attitude

**Module V: Building Emotional Competence**
Emotional Intelligence – Meaning, components, Importance and Relevance
Positive and Negative emotions
Healthy and Unhealthy expression of emotions

**Module VI: End-of-Semester Appraisal**
**Viva based on personal journal**
**Assessment of Behavioural change as a result of training**
Exit Level Rating by Self and Observer

## Examination Scheme:

| **Components** | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

## Text & References:


- Organizational Behaviour, Davis, K.
- Hoover, Judhith D. Effective Small Group and Team Communication, 2002,Harcourt College Publishers
- Dick, Mc Cann & Margerison, Charles: Team Management, 1992 Edition, viva books
- Bates, A. P. and Julian, J.: Sociology - Understanding Social Behaviour
- Dressler, David and Cans, Donald: The Study of Human Interaction
- Lapiere, Richard. T – Social Change
- Lindzey, G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology, Addison – Welsley, US.
- Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.
- LaFasto and Larson: When Teams Work Best, 2001, Response Books (Sage), New Delhi
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 2, Group (1996); Pfeiffer & Company
- Smither Robert D.; The Psychology of Work and Human Performance, 1994, Harper Collins College Publishers

# FRENCH - I

**Course Code: BTCE 144 Credit Units: 02**

## Course Objective:

To familiarize the students with the French language

- with the phonetic system
- with the syntax
- with the manners
- with the cultural aspects

## Course Contents:

**Module A: pp. 01 to 37: Unités 1, 2, Unité 3 Objectif 1, 2**
Only grammar of Unité 3: objectif 3, 4 and 5

**Contenu lexical: Unité 1 : Découvrir la langue française : (oral et écrit)**

1. se présenter, présenter quelqu'un, faire la connaissance des autres, formules de politesse, rencontres
2. dire/interroger si on comprend
3. Nommer les choses

**Unité 2: Faire connaissance**

1. donner/demander des informations sur une personne, premiers contacts, exprimer ses goûts et ses préférences
2. Parler de soi: parler du travail, de ses activités, de son pays, de sa ville.

**Unité 3: Organiser son temps**

1. dire la date et l'heure

**Contenu grammatical:**

1. organisation générale de la grammaire
2. article indéfini, défini, contracté
3. nom, adjectif, masculin, féminin, singulier et pluriel
4. négation avec « de », "moi aussi", "moi non plus"
5. interrogation : Inversion, est-ce que, qui, que, quoi, qu'est-ce que, où, quand, comment, quel(s), quelle(s)
   Interro-négatif : réponses : oui, si, non
6. pronom tonique/disjoint- pour insister après une préposition
7. futur proche

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- le livre à suivre : Campus: Tome 1

# GERMAN - I

**Course Code:** **BTCE 145** **Credit Units: 02**

## Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany

## Course Contents:

**Module I: Introduction**
Self introduction: heissen, kommen, wohnwn, lernen, arbeiten, trinken, etc.
All personal pronouns in relation to the verbs taught so far.
Greetings: Guten Morgen!, Guten Tag!, Guten Abend!, Gute Nacht!, Danke sehr!, Danke!, Vielen Dank!, (es tut mir Leid!),
Hallo, wie geht's?: Danke gut!, sehr gut!, prima!, ausgezeichnet!,
Es geht!, nicht so gut!, so la la!, miserabel!

**Module II: Interview spiel**
To assimilate the vocabulary learnt so far and to apply the words and phrases in short dialogues in an interview – game for self introduction.

**Module III: Phonetics**
Sound system of the language with special stress on Dipthongs

**Module IV: Countries, nationalities and their languages**
To make the students acquainted with the most widely used country names, their nationalitie and the language spoken in that country.

**Module V: Articles**
The definite and indefinite articles in masculine, feminine and neuter gender. All Vegetables, Fruits, Animals, Furniture, Eatables, modes of Transport

**Module VI: Professions**
To acquaint the students with professions in both the genders with the help of the verb "sein".

**Module VII: Pronouns**
Simple possessive pronouns, the use of my, your, etc.
The family members, family Tree with the help of the verb "to have"

**Module VIII: Colours**
All the color and color related vocabulary – colored, colorful, colorless, pale, light, dark, etc.

**Module IX: Numbers and calculations – verb "kosten"**
The counting, plural structures and simple calculation like addition, subtraction, multiplication and division to test the knowledge of numbers.
"Wie viel kostet das?"

**Module X: Revision list of Question pronouns**
W – Questions like who, what, where, when, which, how, how many, how much, etc.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation I – Interaction/Conversation Practice

## Text & References:


- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

# APPLIED MATHEMATICS – II

**Course Code: BTCE 201 Credit Units: 03**

## Course Objective:

The knowledge of Mathematics is necessary for a better understanding of almost all the Engineering and Science subjects. Here our intention is to make the students acquainted with the concept of basic topics from Mathematics, which they need to pursue their Engineering degree in different disciplines.

## Course Contents:

**Module I: Linear Algebra**

Hermitian and Skew Hermitian Matrix, Unitary Matrix, Orthogonal Matrix, Elementary Row Transformation, Reduction of a Matrix to Row Echelon Form, Rank of a Matrix, Consistency of Linear Simultaneous Equations, Gauss Elimination Method, Gauss-Jordan Method, Eigen Values and Eigen Vectors of a Matrix, Caley-Hamilton Theorem, Diagonalization of a Matrix, Vector Space, Linear Independence and Dependence of Vectors, Linear Transformations.

**Module II: Infinite Series**

Definition of Sequence, Bounded Sequence, Limit of a Sequence, Series, Finite and Infinite Series, Convergence and Divergence of Infinite series, Cauchy's Principle of Convergence, Positive Term Infinite Series, Comparison test, D'Alembert's Ratio test. Raabe's Test, Cauchy's nth root Test. Logarithmic Test, Alternating Series, Leibnitz's Test, Absolute and conditional convergence, Uniform Convergence, Power Series and its Interval of Convergence.

**Module III: Complex Analysis**

De Moivre's Theorem and Roots of Complex Numbers, Logarithmic Functions, Circular, Hyperbolic Functions and their Inverses.

Functions of a Complex Variables, Limits, Continuity and Derivatives, Analytic Function, Cauchy-Riemann Equations (without proof), Harmonic Function, Harmonic Conjugates, Conformal Mapping, Bilinear Transformations, Complex Line Integral, Cauchy Integral Theorem, Cauchy Integral Formula, Derivative of Analytic Function, Power Series, Taylor Series, Laurent Series, Zeroes and Singularities, Residues, Residue Theorem, Evaluation of Real Integrals of the Form $\int_0^{2\pi} F(\cos\theta, \sin\theta)\, d\theta$ and $\int_{-\infty}^{\infty} \frac{f(x)}{F(x)} dx$.

**Module IV: Statistics and Probability**

Moments, Skewness, Kurtosis, Random Variables and Probability Distribution, Mean and Variance of a Probability Distribution, Binomial Distribution, Poisson Distribution and Normal Distribution.

## Examination Scheme:

| **Components** | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Engineering Mathematics by Erwin Kreyszig.
- Engineering Mathematics by R.K. Jain and S.R.K. Iyengar.
- Higher Engineering Mathematics by H.K. Dass.
- Engineering Mathematics by B.S. Grewal.
- Differential Calculus by Shanti Narain.
- Integral Calculus by Shanti Narain.
- Linear Algebra- Schaum Outline Series.

# APPLIED PHYSICS - II - MODERN PHYSICS

**Course Code:** **BTCE 202** **Credit Units: 03**

## Course Objective:

Aim of this course is to introduce the students to fundamentals of graduate level physics which form the basis of all applied science and engineering.

## Course Contents:

**Module I: Special Theory of Relativity**

Michelson-Morley experiment, Importance of negative result, Inertial & non-inertial frames of reference, Einstein's postulates of Special theory of Relativity, Space-time coordinate system, Relativistic Space Time transformation (Lorentz transformation equation), Transformation of velocity, Addition of velocities, Length contraction and Time dilation, Mass-energy equivalence (Einstein's energy mass relation) & Derivation of Variation of mass with velocity.

**Module II: Wave Mechanics**

Wave particle duality, De-Broglie matter waves, phase and group velocity, Heisenberg uncertainty principle, wave function and its physical interpretation, Operators, expectation values. Time dependent & time independent Schrödinger wave equation for free & bound states, square well potential (rigid wall), Step potential.

**Module III: Atomic Physics**

Vector atom model, LS and j-j coupling, Zeceman effect (normal & anomalous), Paschen-Bach effect, X-ray spectra and energy level diagram, Moseleys Law, Lasers – Einstein coefficients, conditions for light amplification, population inversion, optical pumping, three level and four level lasers, He-Ne and Ruby laser, Properties and applications of lasers.

**Module IV: Solid State Physics**

Sommerfield's free electron theory of metals, Fermi energy, Introduction to periodic potential & Kronig-Penny model (Qualitative) Band Theory of Solids, Semi-conductors: Intrinsics and Extrinsic Semiconductors, photoconductivity and photovotaics, Basic aspects of Superconductivity, Meissner effect.

## Examination Scheme:

| **Components** | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Concept of Modern Physics, A. Beiser
- Applied Physics II, Agarawal & Goel
- Solid State Physics, S. O. Pallai
- Physics of Atom, Wehr & Richards

# APPLIED CHEMISTRY

**Course Code: BTCE 203 Credit Units: 03**

## Course Objective:

Four basic sciences, Physics, Chemistry, Mathematics and Biology are the building blocks in engineering and technology. Chemistry is essential to develop analytical capabilities of students, so that they can characterize, transform and use materials in engineering and apply knowledge in their field. All engineering fields have unique bonds with chemistry whether it is Aerospace, Mechanical, Environmental and other fields the makeup of substances is always a key factor, which must be known. For electronics and computer science engineering, apart from the material, computer modeling and simulation knowledge can be inherited from the molecule designing. The upcoming field of technology like Nanotechnology and Biotechnology depends fully on the knowledge of basic chemistry. With this versatile need in view, course has been designed in such a way so that the student should get an overview of the whole subject.

## Course Contents:

**Module I: Water Technology**

Introduction and specifications of water,
Hardness and its determination (EDTA method only),
Alkalinity,
Boiler feed water, boiler problems – scale, sludge, priming & foaming: causes & prevention, Boiler problems – caustic embitterment & corrosion: causes & prevention,
Carbonate & phosphate conditioning, colloidal conditioning & calgon treatment
Water softening processes: Lime – soda process, Ion exchange method,
Water for domestic use.

**Module II: Fuels**

Classification, calorific value of fuel, (gross and net),
Determination of calorific value of fuels, bomb calorimeter,
Solid fuels - Proximate and ultimate analysis,
Octane & Cetane No. and its significance.
Numericals on combustion

**Module III: Instrumental Methods of analysis**

Introduction; Principles of spectroscopy; Laws of absorbance
IR : Principle, Instrumentation, Application
UV : Principle, Instrumentation, Application
NMR : Principle, Instrumentation, Application

**Module III: Lubricants**

Introduction; Mechanism of Lubrication;
Types of Lubricants; Chemical structure related to Lubrication;
Properties of lubricants; Viscosity and Viscosity Index; Iodine Value; Aniline Point; Emulsion number; Flash Point; Fire Point; Drop Point; Cloud Point; Pour Point.
Selection of Lubricants.

**Module VI: Corrosion**

Introduction, Mechanism of dry and wet corrosion,
Types of corrosion-Galvanic, Concentration cell, soil, pitting, intergranular, waterline. Passivity.
Factors influencing corrosion.
Corrosion control.

## Examination Scheme:

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***

- Engineering Chemistry- Jain and Jain
- Engineering Chemistry - Sunita Rattan
- Engineering Chemistry - Shashi Chawla

***References:***

- Engineering Chemistry – Dara and Dara
- Spectroscopy- Y.R Sharma
- Corrosion Engineering – Fontenna and Greene

# OBJECT ORIENTED PROGRAMMING USING C++

**Course Code: BTCE 204 Credit Units: 03**

## Course Objective:

The objective of this module is to introduce object oriented programming. To explore and implement the various features of OOP such as inheritance, polymorphism, Exceptional handling using programming language C++. After completing this course student can easily identify the basic difference between the programming approaches like procedural and object oriented.

## Course Contents:

**Module I: Introduction**
Review of C, Difference between C and C++, Procedure Oriented and Object Oriented Approach. Basic Concepts: Objects, classes, Principals like Abstraction, Encapsulation, Inheritance and Polymorphism. Dynamic Binding, Message Passing. Characteristics of Object-Oriented Languages. Introduction to Object-Oriented Modeling techniques (Object, Functional and Dynamic Modeling).

**Module II: Classes and Objects**
Abstract data types, Object & classes, attributes, methods, C++ class declaration, Local Class and Global Class, State identity and behaviour of an object, Local Object and Global Object, Scope resolution operator, Friend Functions, Inline functions, Constructors and destructors, instantiation of objects, Types of Constructors, Static Class Data, Array of Objects, Constant member functions and Objects, Memory management Operators.

**Module III: Inheritance**
Inheritance, Types of Inheritance, access modes – public, private & protected, Abstract Classes, Ambiguity resolution using scope resolution operator and Virtual base class, Aggregation, composition vs classification hiérarchies, Overriding inheritance methods, Constructors in derived classes, Nesting of Classes.

**Module IV: Polymorphism**
Polymorphism, Type of Polymorphism – Compile time and runtime, Function Overloading, Operator Overloading (Unary and Binary) Polymorphism by parameter, Pointer to objects, this pointer, Virtual Functions, pure virtual functions.

**Module V: Strings, Files and Exception Handling**
Manipulating strings, Streams and files handling, formatted and Unformatted Input output. Exception handling, Generic Programming – function template, class Template Standard Template Library: Standard Template Library, Overview of Standard Template Library, Containers, Algorithms, Iterators, Other STL Elements, The Container Classes, General Theory of Operation, Vectors.

## Examination Scheme:

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***

- A.R. Venugopal, Rajkumar, T. Ravishanker "Mastering C++", TMH, 1997
- R. Lafore, "Object Oriented Programming using C++", BPB Publications, 2004.
- "Object Oriented Programming with C++" By E. Balagurusamy.
- Schildt Herbert, "C++: The Complete Reference", Wiley Dream Tech, 2005.

***References:***

- Parasons, "Object Oriented Programming with C++", BPB Publication, 1999.
- Steven C. Lawlor, "The Art of Programming Computer Science with C++", Vikas Publication, 2002.
- Yashwant Kanethkar, "Object Oriented Programming using C++", BPB, 2004

# ENGINEERING MECHANICS

**Course Code: BTCE 205 Credit Units: 03**

## Course Objective:

Objective of this course is to provide fundamental knowledge of force system and its effect on the behaviour of the bodies that may be in dynamic or in static state. It includes the equilibrium of different structures like beams, frames, truss etc and the force transfer mechanism in the different components of a body under given loading condition.

## Course Contents:

**Module I: Force system & Structure**
Free body diagram, Equilibrium equations and applications. Plane truss, perfect and imperfect truss, assumption in the truss analysis, analysis of perfect plane trusses by the method of joints, method of section.

**Module II: Friction**
Static and Kinetic friction, laws of dry friction, co-efficient of friction, angle of friction, angle of repose, cone of friction, friction lock, efficiency of screw jack, transmission of power through belt

**Module III: Distributed Force**
Determination of center of gravity, center of mass and centroid by direct integration and by the method of composite bodies, mass moment of inertia and area moment of inertia by direct integration and composite bodies method, radius of gyration, parallel axis theorem, Pappus theorems and its application, polar moment of inertia.

**Module IV: Work -Energy**
Work energy equation, conservation of energy, Virtual work, impulse, momentum conservation, impact of bodies, co-efficient of restitution, loss of energy during impact, D'alembert principle

## Examination Scheme:

| **Components** | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- S.S. Bhavikatti, Engineering Mechanics, New Age International Ltd
- Timoshenko, Engineering Mechanics, McGraw Hill
- R. S. Khurmi, Engineering Mechanics, S. Chand Publication
- I. H. Shames & G. K. M. Rao, Engineering Mechanics, Pearson Education, 2006

# ENVIRONMENTAL STUDIES-II

**Course Code:** **BTCE 206** **Credit Units: 02**

**Course Objective:**
The term environment is used to describe, in the aggregate, all the external forces, influences and conditions, which affect the life, nature, behaviour and the growth, development and maturity of living organisms. At present a great number of environment issues, have grown in size and complexity day by day, threatening the survival of mankind on earth. A study of environmental studies is quite essential in all types of environmental sciences, environmental engineering and industrial management. The objective of environmental studies is to enlighten the masses about the importance of the protection and conservation of our environment and control of human activities which has an adverse effect on the environment.

**Course Contents:**

**Module I: Environmental Pollution**
Definition
Causes, effects and control measures of:
a. Air pollution
b. Water pollution
c. Soil pollution
d. Marine pollution
e. Noise pollution
f. Thermal pollution
g. Nuclear pollution

Solid waste management: Causes, effects and control measures of urban and industrial wastes.
Role of an individual in prevention of pollution.
Pollution case studies.
Disaster management: floods, earthquake, cyclone and landslides.

**Module II: Social Issues and the Environment**
From unsustainable to sustainable development
Urban problems and related to energy
Water conservation, rain water harvesting, watershed management
Resettlement and rehabilitation of people; its problems and concerns. Case studies.
Environmental ethics: Issues and possible solutions
Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
Wasteland reclamation
Consumerism and waste products
Environmental Protection Act
Air (Prevention and Control of Pollution) Act
Water (Prevention and control of Pollution) Act
Wildlife Protection Act
Forest Conservation Act
Issues involved in enforcement of environmental legislation
Public awareness

**Module III: Human Population and the Environment**
Population growth, variation among nations
Population explosion – Family Welfare Programmes

Environment and human health
Human Rights
Value Education
HIV / AIDS
Women and Child Welfare
Role of Information Technology in Environment and Human Health
Case Studies

**Module IV: Field Work**
Visit to a local area to document environmental assets-river / forest/ grassland/ hill/ mountain.
Visit to a local polluted site – Urban / Rural / Industrial / Agricultural
Study of common plants, insects, birds
Study of simple ecosystems-pond, river, hill slopes, etc (Field work equal to 5 lecture hours)

**Examination Scheme:**

| **Components** | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

**Text & References:**


- Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
- Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad 380 013, India, Email:mapin@icenet.net (R)
- Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
- Clark R.S., Marine Pollution, Clanderson Press Oxford (TB)
- Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p
- De A.K., Environmental Chemistry, Wiley Eastern Ltd.
- Down to Earth, Centre for Science and Environment (R)
- Gleick, H.P. 1993. Water in Crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford Univ. Press. 473p
- Hawkins R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R)
- Heywood, V.H & Waston, R.T. 1995. Global Biodiversity Assessment. Cambridge Univ. Press 1140p.
- Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284 p.
- Mckinney, M.L. & School, R.M. 1996. Environmental Science Systems & Solutions, Web enhanced edition. 639p.
- Mhaskar A.K., Matter Hazardous, Techno-Science Publication (TB)
- Miller T.G. Jr. Environmental Science, Wadsworth Publishing Co. (TB)
- Odum, E.P. 1971. Fundamentals of Ecology. W.B. Saunders Co. USA, 574p
- Rao M N. & Datta, A.K. 1987. Waste Water treatment. Oxford & IBH Publ. Co. Pvt. Ltd. 345p.
- Sharma B.K., 2001. Environmental Chemistry. Geol Publ. House, Meerut
- Survey of the Environment, The Hindu (M)
- Townsend C., Harper J, and Michael Begon, Essentials of Ecology, Blackwell Science
- Trivedi R.K., Handbook of Environmental Laws, Rules Guidelines, Compliances and Standards, Vol I and II, Enviro Media (R)
- Trivedi R. K. and P.K. Goel, Introduction to air pollution, Techno-Science Publication (TB)
- Wanger K.D., 1998 Environnemental Management. W.B. Saunders Co. Philadelphia, USA 499p

# APPLIED PHYSICS LAB - II

**Course Code: BTCE 220 Credit Units: 01**

## Course Contents:

## List of Experiments:

1. To determine the wavelength of prominent lines of mercury spectrum using plane transmission grating.
2. To determine the thickness of a given wire by Wedge method.
3. To determine the wavelength of He-Ne laser light using single slit.
4. To determine the frequency of an electrically maintained tunning fork by Melde's method.
5. To study the variation of magnetic field along the axis of Helmholtz coil and to find out reduction factor.
6. To draw the V – I characteristics of a forward and reverse bias PN junction diode.
7. To determine the frequency of AC mains using sonometer.
8. To determine the energy band-gap of Germanium crystal using four probes method.
9. To draw V – I characteristics of a photocell and to verify the inverse square law of radiation.
10. To determine the acceleration due to gravity ('g') using Keter's reversible pendulum.
11. To study the characteristics of photo voltaic cell (solar cell).

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# APPLIED CHEMISTRY LAB

**Course Code: BTCE 221 Credit Units: 01**

## Course Contents:

### LIST OF EXPERIMENTS

**(Any 10 Experiments)**

1. To determine the ion exchange capacity of a given cation exchanger.

2. To determine the temporary, permanent and total hardness of a sample of water by complexometric titration method.

3. To determine the type and extent of alkalinity of given water sample.

4. To determine the number of water molecules of crystallization in Mohr's salt (ferrous ammonium sulphate) provided standard potassium dichromate solution (0.1N) using diphenylamine as internal indicator.

5. To determine the ferrous content in the supplied sample of iron ore by titrimetric analysis against standard $K_2Cr_2O_7$ solution using potassium ferricyanide $[K_3Fe\ (CN)_6]$ as external indicator.

6. (a) To determine the surface tension of a given liquid by drop number method.
   (b) To determine the composition of a liquid mixture A and B (acetic acid and water) by surface tension method.

7. To prepare and describe a titration curve for phosphoric acid – sodium hydroxide titration using pH-meter.

8. (a) To find the cell constant of conductivity cell.
   (b) Determine the strength of hydrochloric acid solution by titrating it against standard sodium hydroxide solution conductometrically

9. Determination of Dissolved oxygen in the given water sample.

10. To determine the total residual chlorine in water.

11. Determination of amount of oxalic acid and $H_2SO_4$ in 1 L of solution using N/10 NaOH and N/10 $KMnO_4$ solution.

12. Determination of viscosity of given oil by means of Redwood viscometer I.

13. To determine flash point and fire point of an oil by Pensky Martin's Apparatus

14. To determine the Iodine value of the oil.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# OBJECT ORIENTED PROGRAMMING USING C++ LAB

**Course Code:** **BTCE 222** **Credit Units: 01**

**Software Required:** Turbo C++

## Course Contents:

- Creation of objects in programs and solving problems through them.
- Different use of private, public member variables and functions and friend functions.
- Use of constructors and destructors.
- Operator overloading
- Use of inheritance in and accessing objects of different derived classes.
- Polymorphism and virtual functions (using pointers).
- File handling.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# ENGINEERING MECHANICS LAB

**Course Code:** **BTCE 223** **Credit Units: 01**

## Course Contents:

## Engineering Mechanics:

- To verify the law of Force Polygon
- To verify the law of Moments using Parallel Force apparatus. (Simply supported type)
- To determine the co-efficient of friction between wood and various surface (like
- Leather, Wood, Aluminum) on an inclined plane.
- To find the forces in the members of Jib Crane.
- To determine the mechanical advantage, Velocity ratio and efficiency of a screw jack.
- To determine the mechanical advantage, Velocity ratio and Mechanical efficiency of the
- Wheel and Axle
- To determine the MA, VR, η of Worm Wheel (2-start)
- Verification of force transmitted by members of given truss.
- To verify the law of moments using Bell crank lever
- To find CG and moment of Inertia of an irregular body using Computation method

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# ENGLISH

**Course Code:** **BTCE 241** **Credit Units: 01**

## Course Objective:

The course is intended to give a foundation of English Language. The literary texts are indented to help students to inculcate creative & aesthetic sensitivity and critical faculty through comprehension, appreciation and analysis of the prescribed literary texts. It will also help them to respond form different perspectives.

## Course Contents:

**Module I: Vocabulary**
Use of Dictionary
Use of Words: Diminutives, Homonyms & Homophones

**Module II: Essentials of Grammar - I**
Articles
Parts of Speech
Tenses

**Module III: Essentials of Grammar - II**
Sentence Structure
Subject -Verb agreement
Punctuation

**Module IV: Communication**
The process and importance
Principles & benefits of Effective Communication

**Module V: Spoken English Communication**
Speech Drills
Pronunciation and accent
Stress and Intonation

**Module VI: Communication Skills-I**
Developing listening skills
Developing speaking skills

**Module VII: Communication Skills-II**
Developing Reading Skills
Developing writing Skills

**Module VIII: Written English communication**
Progression of Thought/ideas
Structure of Paragraph
Structure of Essays

**Module IV: Short Stories**
Of Studies, by Francis Bacon
Dream Children, by Charles Lamb
The Necklace, by Guy de Maupassant
A Shadow, by R.K.Narayan
Glory at Twilight, Bhabani Bhattacharya

**Module V: Poems**

| | |
|---|---|
| All the Worlds a Stage | Shakespeare |
| To Autumn | Keats |
| O! Captain, My Captain. | Walt Whitman |
| Where the Mind is Without Fear | Rabindranath Tagore |
| Psalm of Life | H.W. Longfellow |

## Examination Scheme:

| Components | A | CT | HA | EE |
|---|---|---|---|---|
| Weightage (%) | 05 | 15 | 10 | 70 |

## Text & References:


- Madhulika Jha, Echoes, Orient Long Man
- Ramon & Prakash, Business Communication, Oxford.
- Sydney Greenbaum Oxford English Grammar, Oxford.
- Successful Communications, Malra Treece (Allyn and Bacon)
- Effective Technical Communication, M. Ashraf Rizvi.

# BEHAVIOURAL SCIENCE - II
# (PROBLEM SOLVING AND CREATIVE THINKING)

**Course Code:** **BTCE 243** **Credit Units: 01**

## Course Objective:
To enable the students:
- Understand the process of problem solving and creative thinking.
- Facilitation and enhancement of skills required for decision-making.

## Course Contents:

Module I: Thinking as a tool for Problem Solving
What is thinking: The Mind/Brain/Behaviour
Critical Thinking and Learning:
- Making Predictions and Reasoning
- Memory and Critical Thinking
- Emotions and Critical Thinking

Thinking skills

**Module II: Hindrances to Problem Solving Process**
Perception
Expression
Emotion
Intellect
Work environment

**Module III: Problem Solving**
Recognizing and Defining a problem
Analyzing the problem (potential causes)
Developing possible alternatives
Evaluating Solutions
Resolution of problem
Implementation
Barriers to problem solving:
- Perception
- Expression
- Emotion
- Intellect
- Work environment

**Module IV: Plan of Action**
Construction of POA
Monitoring
Reviewing and analyzing the outcome

**Module V: Creative Thinking**
Definition and meaning of creativity
The nature of creative thinking
- Convergent and Divergent thinking
- Idea generation and evaluation (Brain Storming)
- Image generation and evaluation
- Debating

The six-phase model of Creative Thinking: ICEDIP model

**Module VI: End-of-Semester Appraisal**
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

## Examination Scheme:

| Components | SAP | A | Mid Term Test (CT) | VIVA | Journal for Success (JOS) |
|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 05 | 20 | 30 | 25 |

## Text & References:


- Michael Steven: How to be a better problem solver, Kogan Page, New Delhi, 1999
- Geoff Petty: How to be better at creativity; Kogan Page, New Delhi, 1999
- Richard Y. Chang and P. Keith, Kelly: Wheeler Publishing, New Delhi, 1998.
- Phil Lowe Koge Page: Creativity and Problem Solving, New Delhi, 1996
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 3, Management (1996); Pfeiffer & Company
- Bensley, Alan D.: Critical Thinking in Psychology – A Unified Skills Approach, (1998), Brooks/Cole Publishing Company.

# FRENCH - II

**Course Code:** **BTCE 244** **Credit Units: 02**

## Course Objective:

To enable the students to overcome the fear of speaking a foreign language and take position as a foreigner speaking French.

To make them learn the basic rules of French Grammar.

## Course Contents:

**Module A:** pp.38 – 47: Unité 3: Objectif 3, 4, 5. 6

**Module B:** pp. 47 to 75 Unité 4, 5

**Contenu lexical:** **Unité 3: Organiser son temps**

1. donner/demander des informations sur un emploi du temps, un horaire SNCF – Imaginer un dialogue
2. rédiger un message/ une lettre pour …
   i) prendre un rendez-vous/ accepter et confirmer/ annuler
   ii) inviter/accepter/refuser
3. Faire un programme d'activités
   imaginer une conversation téléphonique/un dialogue
   Propositions- interroger, répondre

**Unité 4**: **Découvrir son environnement**

1. situer un lieu
2. s'orienter, s'informer sur un itinéraire.
3. Chercher, décrire un logement
4. connaître les rythmes de la vie

**Unité 5: s'informer**

1. demander/donner des informations sur un emploi du temps passé.
2. donner une explication, exprimer le doute ou la certitude.
3. découvrir les relations entre les mots
4. savoir s'informer

**Contenu grammatical:**

1. Adjectifs démonstratifs
2. Adjectifs possessifs/exprimer la possession à l'aide de:
   i. « de » ii. A+nom/pronom disjoint
3. Conjugaison pronominale – négative, interrogative - construction à l'infinitif
4. Impératif/exprimer l'obligation/l'interdiction à l'aide de « il faut…. »/ «il ne faut pas… »
5. passé composé
6. Questions directes/indirectes

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- le livre à suivre: Campus: Tome 1

# GERMAN – II

**Course Code: BTCE 245 Credit Units: 02**

## Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany
Introduction to Grammar to consolidate the language base learnt in Semester I

## Course Contents:

**Module I: Everything about Time and Time periods**
Time and times of the day.
Weekdays, months, seasons.
Adverbs of time and time related prepositions

**Module II: Irregular verbs**
Introduction to irregular verbs like to be, and others, to learn the conjugations of the same, (fahren, essen, lessen, schlafen, sprechen und ähnliche).

**Module III: Separable verbs**
To comprehend the change in meaning that the verbs undergo when used as such
Treatment of such verbs with separable prefixes

**Module IV: Reading and comprehension**
Reading and deciphering railway schedules/school time table
Usage of separable verbs in the above context

**Module V: Accusative case**
Accusative case with the relevant articles
Introduction to 2 different kinds of sentences – Nominative and Accusative

**Module VI: Accusative personal pronouns**
Nominative and accusative in comparison
Emphasizing on the universal applicability of the pronouns to both persons and objects

**Module VII: Accusative prepositions**
Accusative propositions with their use
Both theoretical and figurative use

**Module VIII: Dialogues**
Dialogue reading: 'In the market place'
'At the Hotel'

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:


- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

# APPLIED MATHEMATICS – III

**Course Code:** **BTCE 301** **Credit Units: 04**

## Course Objective:

The knowledge of Mathematics is necessary for a better understanding of almost all the Engineering and Science subjects. Here our intention is to make the students acquainted with the concept of basic topics from Mathematics, which they need to pursue their Engineering degree in different disciplines.

## Course Contents:

**Module I: Partial Differential Equations**

Formation of PDE, Equations solvable by direct integration, Linear equations of the first order, Non-linear equations of the first order, Charpit's method, Homogeneous linear equations with constant coefficients, Non homogeneous linear equations.

**Module II: Fourier Series**

Periodic Functions, Fourier Series, Functions having points of discontinuity, Even or Odd Functions, Change of Interval, Half-range series, Parseval's Formula, Complex form of Fourier series, Practical Harmonic Analysis, Fourier Transforms, Sine and Cosine Transforms.

**Module III: Laplace Transformation**

Definition, Transforms of elementary functions, Properties of Laplace transforms, Existence conditions, Transforms of derivatives, Transforms of integrals, Evaluation of integrals by Laplace transform, Inverse transforms, Other methods of finding inverse transforms, Convolution theorem, Application to differential equations, Simultaneous linear equations with constant coefficients, Unit step functions, Periodic functions.

**Module IV: Linear Programming**

Formulation of the problem, Graphical method, Canonical and Standard forms of L.P.P. Simplex Method, Artificial variable Techniques-M-method, Two phase method, Degeneracy, Dual simplex method.

## Examination Scheme:

| **Components** | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***

- Differential Calculus by Shanti Narain
- Integral Calculus by Shanti Narain
- Higher Engineering Mathematics by B.S. Grewal

***References:***

- Differential Equations by A.R. Forsyth
- Higher Engineering Mathematics by H.K. Dass
- Partial Differential Equations by I.N. Snedon

# BUILDING DESIGN AND DRAWING

**Course Code: BTCE 302 Credit Units: 04**

## Course Objective:
The objective of the course is to develop the capability for carrying out independent design. Information in the form of sketch and images to be illustrated as a part of discussion.

## Course Contents:

**PART A: PLANNING**

**Module I: Function, Structure and Appearance**
Evolution of architectural styles. Roman, Greek, Medieval and Modern architecture. Examples.

**Module II: Creative principles**
Design methods. Pragmatic, iconic, canonic and rational design methods. Elements of composition. Point, line, texture and colour etc. Organisation of elements. Proportion, scale, rhythm balance and unity. Architectural examples. Design procedure, brief analysis, synthesis and communication.

**Module III: Functional factors**
Lighting, ventilation, thermal and acoustics factors and their effects on architectural form.

**Module IV: Spaces**
Space planning of buildings such as residential, public and commercial. Design process. Activity areas and linkages. Proximity matrix. Adjacency diagram. Form development with respect to site conditions and functional requirements. Preparation of drawings. Elementary perspective and rendering.

**PART B: DRAWING**

Planning, designing from given requirements of areas and specifications and preparation of sketch design and working drawings for:
1. Residential building- flat and pitched roof, economic domestic units, cottages, bungalows and building flats.
2. Public building – small public utility shelters, dispensaries, banks, schools, offices, libraries, hostels, restaurants, commercial complexes, factories etc.
3. Preparation of site plans and service plans as per Building Rules
4. Septic Tank and Soak Pit – detailed drawings.
5. Plumbing, water supply and drainage for buildings.

## Examination Scheme:

| Components | A | CT | S/V/Q/ HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- SP 7:2005,National Building Code of India
- Local Building Bye-laws
- Callender, John Hancock, Time Saver Standards for Architectural Design Data, McGraw Hill
- Chiara, Callender, John Hancock, Time Saver Standards for Building Type, McGraw Hill
- Chiara, Joseph De, Time Saver Standards for Site Planning, McGraw Hill
- Scott, Robert Gillan, Design Fundamentals, Mc-Graw Hill.
- Tessie Agan M.S., The House, Its Plan & Use, Oxford & IBH Publishing Co.
- IS 5533: 1969, Recommendation for Dimensions of Spaces for Human Activities. B.I.S
- IS 4963: 1987, Recommendation for Buildings and facilities for the Physically Handicapped. B.I.S
- Shaw and Kale, Building Drawing, Tata Mc Graw Hill Publishers
- Balagopal T S Prabhu, Building Drawing and Detailing, Spades Publishers

# MECHANICS OF SOLIDS

**Course Code:** **BTCE 303** **Credit Units: 03**

## Course Objective:

The objective of this course is to make the students understand the concept of stress and strain in different types of structure/machine under different loading conditions. The course also covers the simple and compound stresses due to forces, stresses and deflection in beams due to bending, torsion in circular section, strain energy, different theories of failure, stress in thin cylinder thick cylinder and spheres due to external and internal pressure.

## Course Contents:

**Module I: Simple stresses and strains**
Concept of stress and strain; Hooke's law, Young's modulus, Poisson ratio, stress at a point, stress and strains in bars subjected to axial loading. Modulus of elasticity, stress produced in compound bars subject to axial loading. Temperature stress and strain calculations due to applications of axial loads and variation of temperature in single and compound walls. Impact loading.

**Module II: Compound stress and strains**
The two dimensional system; stress at a point on a plane, principal stresses and principal planes; Mohr's circle of stress. Graphical and Analytical methods for stresses on oblique section of body. Shear force and bending moment diagrams for cantilever, simply supported and overhanging beams.

**Module III**
Theory of bending stresses in beams due to bending, assumptions in the simple bending theory, derivation of formula: its application to beams of rectangular, circular and channel sections, composite / flitched beams, bending and shear stresses in composite beams.

**Module IV: Torsion**
Derivation of torsion equation and its assumptions. Applications of the equation of the hollow and solid circular shafts torsional rigidity, combined torsion and bending of circular shafts principal stress and maximum shear stresses under combined loading of bending and torsion, analysis of close-coiled-helical springs.

**Module V: Thin cylinders and spheres**
Derivation of formulae and calculation of hoop stress, longitudinal stress in a cylinder and sphere subjected to internal pressure.

**Module VI: Columns and struts**
Columns and failure of columns, Euler's formulas; Rankine-Gordon's formula, Johnson's empirical formula for axially loaded columns and their applications.

**Module VII: Slope and deflection** (covered in BTCE402 )
Relationship between moment, slope and deflection, Mohr's theorem; Moment area method; method of integration; Macaulay's method: Use of all these methods to calculate slope and deflection for the following:
a) Cantilevers
b) Simply supported beams with or without overhang
c) Under concentrated loads, uniformly distributed loads or combination of concentrated and uniformly distributed loads

## Examination Scheme:

| **Components** | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


***Text:***
- Jindal U.C., "Strength of Materials", Galgotia Publication, New Delhi, 1998.
- Ryder G.H., "Strength of Materials", Macmillan, Delhi, 2003.
- R.K. Bansal, "Strength of Materials", Laxmi Publication, New Delhi, 2001.

***References:***
- Sadhu Singh, "Strength of Materials", Khanna Publishers, New Delhi, 2000.
- Timoshenko S.P., "Elements of Strength of Materials", East-West affiliated, New Delhi, 2000.
- Hibbler R.C., "Mechanics of Materials", Prentice Hall, New Delhi, 1994.
- Popov Eger P., "Engg. Mechanics of solids", Prentice Hall, New Delhi, 1998.
- Fenner, Roger. T, "Mechanics of Solids", U.K. B.C. Publication, New Delhi, 1990.
- Srinath L.S. et.al., "Strength of Materials", McMillan, New Delhi,2001

# MECHANICS OF FLUIDS

**Course Code:** **BTCE 304** **Credit Units: 04**

## Course Objective:

The objective of Fluid Mechanics subject is that students should understand the, properties of fluids, pressure measurement devices, hydraulic forces on surfaces, bouncy and flotation in fluids, kinematics and static behavior of fluids, dimension and model analysis, laminar and turbulent flow, flow through pipes and orifices, boundary layer theory.

## Course Contents:

**Module I: Fluid Properties and Fluid Statics**
Newtonian and Non-Newtonian Fluids; Viscosity; Incompressible and compressible fluids, compressibility. Forces on plane surfaces, forces on curved surfaces, buoyant forces, and stability of floating bodies, metacentre and metacentre height.

**Module II: Kinematics of Fluid Motion**
Steady and unsteady flow; uniform and non-uniform flow; Laminar and turbulent flow; streamline, path line and streak line; continuity equation, irrotational and rotational flow, velocity potential and stream function, vortex flow, free and forced vortex.

**Module III: Dynamics of Fluid Flow**
Euler's equation of motion and its integration to yield Bernoulli's equation, its practical applications – Pilot tube, Venturi meter; steady flow momentum equation, force exerted on a pipe bend.

**Module IV: Dimensional Analysis and Principles of Similarity**
Buckingham $\pi$-Theorem and its applications, Geometric, Kinematics and Dynamic similarity; Dimensionless numbers-Reynolds, Froude, Euler, Mach, Weber Number and their significance.

**Module V: Laminar and Turbulent Flow**
Reynold's experiment, critical velocity, steady laminar flow through a circular tube, flow between parallel plates, measurement of viscosity. Transition from laminar to turbulent flow, courses of turbulence, velocity distribution law near a solid boundary, velocity distribution in rough pipes, Hazen – Williams's formula.

**Module VI: Analysis of Pipe Flow**
Energy losses, minor losses in pipe lines, concept of equivalent length, flow between two reservoirs, and multiple pipe systems – in series and parallel, siphon.(added Water hammer from BTCE505)

**Module VII: Flow Measurements**
Measurement of flow using Venturi meter, orifice meter, Pitot tube, measurement of flow in open channels – rectangular, triangular, trapezoidal weir, Cipoeletti weir.

## Examination Scheme:

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***

- R.K. Bansal, "Fluid Mechanics & Hydraulic Machines", Laxmi Publications (P) Ltd., 2002.
- Gupta, S. C., Fluid Mechanics and Hydraulic Machines, Pearson Education, 2007
- D.S. Kumar, "Fluid Mechanics and Fluid Power Engineering", S.K. Kataria & Sons, 2000.

***References:***

- F. M. White, Introduction to Fluid Mechanics, McGraw Hill
- I.H. Shames, "Mechanics of Fluids", Tata McGraw Hill
- Douglas, J. F., Gasiorek, J.M. and Swaffield, J., Fluid Mechanics, Pearson Education, 4/e, 2006
- V.L. Streeter and E.B. Wylie, "Fluid Mechanics", Tata McGraw Hill Massey B S, Mechanics of Fluids, Van Nostrand Reinhold Co

# BUILDING TECHNOLOGY

**Course Code: BTCE 305 Credit Units: 03**

## Course Objective:

The course covers building materials and their testing, cement and its applications foundation and structural members of building. Different areas and utilities of building like floors, doors etc.

## Course Contents:

**Module I**

Building stones - Classification of rocks - Quarrying - Dressing - Properties and uses of common type of stones; Timber - Defects - Seasoning - Decay - Preservation - Plywood, fibre board, particle board; Clay products - Bricks - Manufacture - IS classifications - Properties and testing - Types of bricks - Tiles - Manufacture, properties and uses - Types of tiles; Ceramic products - Lime - Classification - Manufacture, properties and uses.

**Module II**

Cement - Ingredients - Manufacture - Types of cement - Properties and testing - Uses; Mortar - Sand - Properties - Types of mortar and uses; Concrete - Properties of fresh concrete and tests - Proportioning of concrete mixes - Properties of hardened concrete and tests – Recent developments in concrete; Iron and steel - Structural sections - Properties and uses of structural steel - Recent developments; Miscellaneous materials - Glass - Plastics - A.C.sheets – Thermocole.

**Module III**

Foundation - Timbering of foundation trenches - Bearing capacity of soils - Improvement of bearing capacity - Settlement of foundation - Description of spread, grillage, raft and pile foundations; Brick and stone masonry - Bonds in brick work - Types of stone masonry -Cavity walls - Lintels and arches; concrete construction - Batching, mixing, placing, compacting and curing of concrete - form work - Precast concrete - Prestressed concrete - Recent developments in concreting; Partition walls - Types and features.

**Module IV**

Floors and flooring – Different types and applications; Doors, windows and ventilators - Different types; Finishing works; Building Failures - Concrete failure - Steel failure -Foundation failure - Other types of failures – Causes and Remedial measures – Building repairs - Shoring - Underpinning – Scaffolding; Tall buildings - Framed structures - Steel and concrete frames – Joints in steel and concrete frames - Introduction to prefabrication – Slip form and lift slab constructions; Fire proof construction - Fire load - Fire resisting properties of building materials – Fire extinguishing methods – Fire proof construction methods.

## Examination Scheme:

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Punmia B. C, Ashok Kr. Jain, Arun Kr. Jain, Building Construction, Laxmi Publications, New Delhi. (2008).
- Shetty M. S, Concrete Technology, S. Chand & Co., New Delhi (2008).

# GEO INFORMATICS - I

**Course Code: BTCE 306** **Credit Units: 03**

## Course Objective:

Surveying is the basic element of mapping areas for civil engineering construction. Methods of surveying including leveling, and leveling methods, contours, estimation of volumes etc are covered.

## Course Contents:

**Module I**

Introduction - classification of surveys - plane surveying - geodetic surveying – topographic surveying - reconnaissance - principle of working from whole to part - provision of control -conventional signs - chain survey - instruments - principles of chain survey - field book - plotting - tie line and check line - chaining and ranging - obstacles - chaining on sloping ground - errors in chain survey - uses of cross staff and optical square

**Module II**

Compass survey - prismatic compass - surveyor's compass - whole circle and reduced bearing- true and magnetic bearing - dip and declination - local attraction - traversing - plotting - error of closure - graphical and analytical adjustments - plane table survey - instruments and accessories - different methods - orientation - advantages and disadvantages of plane tabling -two point problem - three point problem - errors in plane tabling - minor instruments – hand levels - clinometer - Ceylon ghat tracer - hypsometer - pantagraph -ediograph - box sextant -telescopic alidade

**Module III**

Levelling - definition of level surfaces - mean sea level - reduced level - bench marks - levelling instruments - temporary and permanent adjustments - fly leveling - booking - reduction of levels - corrections for refraction and curvature - reciprocal leveling - longitudinal levelling and cross sectioning - contour survey - definition - characteristics of contour - uses of contour - methods of contouring - direct and indirect interpolation – plotting - areas and volumes - trapezoidal rule - Simpson's rule - area from latitude and departure - uses of planimeter - volumes - trapezoidal and prismoidal formula

**Module IV**

Theodolite surveying - study of theodolite - temporary and permanent adjustments -measurement of horizontal angles - method of repetition and reiteration - measurement of vertical angles - theodolite traverse - calculation of co ordinates - corrections - traverse table -omitted measurements - tacheometric surveying - stadia system - fixed and movable hair methods - staff held vertical and normal - instrument constants - analytic lens – tangential system - direct reading tacheometer - subtense bar – trigonometric leveling – various methods– E.D.M – total station.

## Examination Scheme:

| **Components** | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- S.K Duggal, Surveying Vol 1 and II, 2nd ed., Tata - McGraw Hill, New Delhi (2004).
- Arora K.R., Surveying Vol I &II, Standard Book House, New Delhi (2008)
- Punmia, B.C., Ashok Kr. Jain, Arun Kr. Jain, Surveying Vol I & II, Laxmi Publications, New Delhi (2008).

# MECHANICS OF SOLIDS AND FLUIDS LAB

**Course Code:** **BTCE 320** **Credit Units: 01**

## Course Contents:

Experimental work will be based on the following papers:
Mechanics of Solids
Fluid Mechanics

**MECHANICS OF SOLIDS LAB**

**List of Experiments**

- Universal Testing Machine
- Tensile Test (MS)
- Double Shear Test (MS)
- Compression Test (CI)
- Brinell Hardness No.
- Izod Impact
- Testing Machine
- Rockwell Hardness Tester
- Spring Stiffness (Spring Compression Testing machine)
- Torsion testing machine

**FLUID MECHANICS LAB**

**List of Experiments**

- Verification of Bernoulli's Theorem
- Experiment using Venturimeter
- Determination of coefficient of Discharge $C_d$, $C_c$, $C_!$ Using
- Circular/triangular/rectangular orifice
- To find major head losses in a pipe line
- To find minor head losses in a pipe line (sudden expansion/contraction/bend)

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# CIVIL ENGINEERING DRAWING LAB

**Course Code:** **BTCE 321** **Credit Units: 01**

## Course Contents:

Planning, designing from given requirements of areas and specifications and preparation of sketch design and working drawings for:

1. Panelled, doors, windows and ventilators in wood,. Glazed, paneled, wood, Steel or aluminum frames
2. Residential building- flat and pitched roof, -RC and Tiled
3. Public building-, schools, offices, libraries, hostels, restaurants, commercial complexes, factories etc.
4. Reinforced concrete staircase.
6. Plumbing, water supply and drainage for buildings
7. Septic Tank and Soak Pit – detailed drawings.
8. Preparation of site plans and service plans as per Building Rules
9. Roof trusses. Industrial buildings.
10. Foundation Detailing:– Strip ,RCC footing, Pile, Raft, Grillage footing, combined footing

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

## Text & References:


- National Building Code of India
- Local Building Bye-laws
- Callender, John Hancock, Time Saver Standards for Architectural design Data, Tata McGraw Hill.
- Chiara, Callender, John Hancock, Time Saver Standards for Building Type, McGraw Hill
- Chiara, Joseph De, Time Saver Standards for Site Planning, McGraw Hill
- Ching, Francis D K, Architectural Graphics. .John Wiley

# SURVEYING PRACTICAL I

**Course Code:** **BTCE 322** **Credit Units: 01**

## List of Exercices:

1. Chain survey - Traversing and plotting of details.
2. Chain survey – Measurement of Area by offsetting.
3. Compass survey - Traversing with compass and calculation of Interior angles .
4. Plane table survey – Method of Radiation
5. Plane table survey -. Method of Intersection.
6. Levelling Fly leveling – Plane of collimation method.
7. Levelling Fly leveling – Rise and Fall method.
8. Levelling Longitudinal and cross sectioning.
9. Levelling Contour surveying.
10. Theodolite surveying – Measurement of horizontal angle by method of repetition and reiteration.

## Examination Scheme:

| **IA** | | | | **EE** | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

# COMMUNICATION SKILLS - I

**Course Code:** **BTCE 341** **Credit Units: 01**

## Course Objective:
To form written communication strategies necessary in the workplace

## Course Contents:

**Module I: Introduction to Writing Skills**
Effective Writing Skills
Avoiding Common Errors
Paragraph Writing
Note Taking
Writing Assignments

**Module II: Letter Writing**
Types
Formats

**Module III**
Memo
Agenda and Minutes
Notice and Circulars

**Module IV: Report Writing**
Purpose and Scope of a Report
Fundamental Principles of Report Writing
Project Report Writing
Summer Internship Reports

## Examination Scheme:

| Components | CT1 | CT2 | CAF | V | GD | GP | A |
|---|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 25 | 10 | 10 | 10 | 5 |

CAF – Communication Assessment File
GD – Group Discussion
GP – Group Presentation

## Text & References:


- Business Communication, Raman – Prakash, Oxford
- Creative English for Communication, Krishnaswamy N, Macmillan
- Textbook of Business Communication, Ramaswami S, Macmillan
- Working in English, Jones, Cambridge
- A Writer's Workbook Fourth edition, Smoke, Cambridge
- Effective Writing, Withrow, Cambridge
- Writing Skills, Coe/Rycroft/Ernest, Cambridge
- Welcome!, Jones, Cambridge

# BEHAVIOURAL SCIENCE - III
# (INTERPERSONAL COMMUNICATION)

**Course Code: BTCE 343 Credit Units: 01**

## Course Objective:
This course provides practical guidance on
- Enhancing personal effectiveness and performance through effective interpersonal communication
- Enhancing their conflict management and negotiation skills

## Course Contents:

**Module I: Interpersonal Communication: An Introduction**
Importance of Interpersonal Communication
Types – Self and Other Oriented
Rapport Building – NLP, Communication Mode
Steps to improve Interpersonal Communication

**Module II: Behavioural Communication**
Meaning and Nature of behavioural communication
Persuasion, Influence, Listening and Questioning
Guidelines for developing Human Communication skills
Relevance of Behavioural Communication for personal and professional development

**Module III: Interpersonal Styles**
Transactional Analysis
Life Position/Script Analysis
Games Analysis
Interact ional and Transactional Styles

**Module IV: Conflict Management**
Meaning and nature of conflicts
Styles and techniques of conflict management
Conflict management and interpersonal communication

**Module V: Negotiation Skills**
Meaning and Negotiation approaches (Traditional and Contemporary)
Process and strategies of negotiations
Negotiation and interpersonal communication

**Module VI: End-of-Semester Appraisal**
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

## Examination Scheme:

| Components | SAP | A | Mid Term Test (CT) | VIVA | Journal for Success (JOS) |
|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 05 | 20 | 30 | 25 |

## Text & References:


- Vangelist L. Anita, Mark N. Knapp, Inter Personal Communication and Human Relationships: Third Edition, Allyn and Bacon.
- Julia T. Wood. Interpersonal Communication everyday encounter
- Simons, Christine, Naylor, Belinda: Effective Communication for Managers, 1997 1st Edition Cassel
- Goddard, Ken: Informative Writing, 1995 1st Edition, Cassell
- Harvard Business School, Effective Communication: United States of America
- Foster John, Effective Writing Skills: Volume-7, First Edition 2000, Institute of Public Relations (IPR)
  Beebe, Beebe and Redmond; Interpersonal Communication, 1996; Allyn and Bacon Publishers

# FRENCH - III

**Course Code: BTCE 344 Credit Units: 02**

## Course Objective:

To provide the students with the know-how

- To master the current social communication skills in oral and in written.
- To enrich the formulations, the linguistic tools and vary the sentence construction without repetition.

## Course Contents:

**Module B: pp. 76 – 88 Unité 6**

**Module C: pp. 89 to103 Unité 7**

**Contenu lexical:**

**Unité 6: se faire plaisir**

1. acheter: exprimer ses choix, décrire un objet (forme, dimension, poids et matières) payer
2. parler de la nourriture, deux façons d'exprimer la quantité, commander un repas au restaurant
3. parler des différentes occasions de faire la fête

**Unité 7: Cultiver ses relations**

1. maîtriser les actes de la communication sociale courante (Salutations, présentations, invitations, remerciements)
2. annoncer un événement, exprimer un souhait, remercier, s'excuser par écrit.
3. caractériser une personne (aspect physique et caractère)

**Contenu grammatical:**

1. accord des adjectifs qualificatifs
2. articles partitifs
3. Négations avec de, ne…rien/personne/plus
4. Questions avec combien, quel…
5. expressions de la quantité
6. ne…plus/toujours - encore
7. pronoms compléments directs et indirects
8. accord du participe passé (auxiliaire « avoir ») avec l'objet direct
9. Impératif avec un pronom complément direct ou indirect
10. construction avec « que » - Je crois que/ Je pense que/ Je sais que

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- le livre à suivre: Campus: Tome 1

# GERMAN - III

**Course Code:** **BTCE 345** **Credit Units: 02**

## Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany

## Course Contents:

**Module I: Modal verbs**
Modal verbs with conjugations and usage
Imparting the finer nuances of the language

**Module II: Information about Germany (ongoing)**
Information about Germany in the form of presentations or "Referat"– neighbors, states and capitals, important cities and towns and characteristic features of the same, and also a few other topics related to Germany.

**Module III: Dative case**
Dative case, comparison with accusative case
Dative case with the relevant articles
Introduction to 3 different kinds of sentences – nominative, accusative and dative

**Module IV: Dative personal pronouns**
Nominative, accusative and dative pronouns in comparison

**Module V: Dative prepositions**
Dative preposition with their usage both theoretical and figurative use

**Module VI: Dialogues**
In the Restaurant,
At the Tourist Information Office,
A telephone conversation

**Module VII: Directions**
Names of the directions
Asking and telling the directions with the help of a roadmap

**Module VIII: Conjunctions**
To assimilate the knowledge of the conjunctions learnt indirectly so far

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:


- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

# TERM PAPER

**Course Code: BTCE 330 Credit Units: 02**

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

**GUIDELINES FOR TERM PAPER**

The procedure for writing a term paper may consist of the following steps:

1. Choosing a subject
2. Finding sources of materials
3. Collecting the notes
4. Outlining the paper
5. Writing the first draft
6. Editing & preparing the final paper

**1.** Choosing a Subject

The subject chosen should not be too general.

**2.** Finding Sources of materials

a) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
b) Begin by making a list of subject-headings under which you might expect the subject to be listed.
c) The sources could be books and magazine articles, news stories, periodicals, scientific journals etc.

**3.** Collecting the notes

Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

a) Get facts, not just opinions. Compare the facts with author's conclusion.
b) In research studies, notice the methods and procedures, results & conclusions.
c) Check cross references.

**4.** Outlining the paper

a) Review notes to find main sub-divisions of the subject.
b) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

**5.** Writing the first draft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

a) statement of purpose
b) main body of the paper
c) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main idea.

**6.** Editing & Preparing the final Paper

a) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.
b) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
c) Check for proper spelling, phrasing and sentence construction.
d) Check for proper form on footnotes, quotes, and punctuation.
e) Check to see that quotations serve one of the following purposes:
   (i) Show evidence of what an author has said.
   (ii) Avoid misrepresentation through restatement.
   (iii) Save unnecessary writing when ideas have been well expressed by the original author.
f) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

1) Title page

2) Table of contents
3) Introduction
4) Review
5) Discussion & Conclusion
6) References
7) Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

**Discussion**
The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

**Conclusion**
The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:
a) summary of question posed
b) summary of findings
c) summary of main limitations of the study at hand
d) details of possibilities for related future research

**Reference**
From the very beginning of a research project, you should be careful to note all details of articles gathered.
The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.
The key to a good bibliography is consistency. Choose a particular convention and stick to this.

**Conventions**
Monographs
Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

**Edited volumes**
Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.
[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

**Edited articles**
Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

**Journal articles**
McQuarrie, E.F./Mick, D.G. (1992), on resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

**Electronic book**
Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] from the World Wide Web, http://www.aber.ac.uk/media/Documents/S4B/.

**Electronic journal articles**
Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document]. German as a Foreign Language Journal [online] 1. Retrieved [12.09.'00] from the World Wide Web, http://www.gfl-journal.com/.

**Other websites**
Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document]. Retrieved [13.10.'01] from the World Wide Web, http://olaf.hiof.no/~sverrev/eng.html.

**Unpublished papers**
Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

**Unpublished theses/ dissertations**

Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg.

Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

**Appendix**

The appendix should be used for data collected (e.g. questionnaires, transcripts, ...) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

## Assessment Scheme:

| | |
|---|---|
| **Continuous Evaluation:**<br>(Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.) | 40% |
| **Final Evaluation:**<br>(Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/ presented, outcomes vs. objectives, presentation/ viva etc.) | 60% |

# NUMERICAL ANALYSIS AND PROGRAMMING

**Course Code: BTCE 401 Credit Units: 03**

## Course Objective:

This course deals with the techniques of numerical analysis, which gives the solution to applied problem when ordinary analytical method fails. Emphasis is given on computer programming also so that the given techniques can be used in design of engineering and scientific problems.

## Course Contents:

**Module I**

**Solution of Algebraic and Transcendental Equation**

Error in a series approximation, Bisection Method, Iteration method, Method of false position, Newton-Raphson method

**Solutions of Simultaneous equation**

Gauss elimination method, Jacobi iteration method, Gauss Seidal method

**Module II: Interpolation**

Finite Differences, Difference tables

Polynomial Interpolation**:** Newton's forward and backward formula

Central Difference Formulae: Gauss forward and backward formula.

Interpolation with unequal intervals: Lagrange's Interpolation, Newton Divided difference formula

**Module III: Numerical Integration and Differentiation**

Introduction, Numerical differentiation Numerical Integration: Trapezoidal rule, Simpson's 1/3 and 3/8 rules.

**Module IV: Solution of differential Equations**

Euler's Method, Runga-Kutta Methods.

**Module V: Statistical Computation**

Frequency chart, Curve fitting by method of least squares, fitting of straight lines, polynomials, exponential curves etc, Data fitting with Cubic splines.

## Examination Scheme:

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***

- Rajaraman V, "Computer Oriented Numerical Methods", Pearson Education
- Gerald & Whealey, "Applied Numerical Analyses", AW
- Jain, Iyengar and Jain, "Numerical Methods for Scientific and Engineering Computations", New Age Int.
- Grewal B S, "Numerical methods in Engineering and Science", Khanna Publishers, Delhi

***References:***

- T Veerarajan, T Ramachandran, "Theory and Problems in Numerical Methods, TMH
- Pradip Niyogi, "Numerical Analysis and Algorithms", TMH
- Francis Scheld," Numerical Analysis", TMH
- Sastry S. S, "Introductory Methods of Numerical Analysis", Pearson Education.
- Gupta C.B., Vijay Gupta, "Introduction to Statistical Methods", Vikas Publishing.
- Goyal, M, "Computer Based Numerical and Statistical Techniques", Firewall Media, New Delhi.

# STRUCTURAL ANALYSIS - I

**Course Code: BTCE 402 Credit Units: 04**

## Course Objective:

Structural Analysis, being the critical part in designing building and other structures, is important. Elastic theorems fixed and continuous beams, circular beams over simple support and theory of columns are covered in this course.

## Course Contents:

**Module I: Deflection of beams**
Differential equation of the elastic curve - slope and deflection of beams by method of successive integration - Macaulay's method - Moment area method - Conjugate beam method - Deflection due to shear.

**Module II: Elastic theorems and energy principles**
Strain energy and complementary energy - review of strain energy due to axial load - bending, shear and torsion - principle of superposition - principle of virtual work - Castigliano's theorem for deflection - theorem of complementary energy - Betti's theorem - Maxwell's law of reciprocal deflections - principle of least work - application of method of virtual work (unit load method) and strain energy method for determination of deflections of statically determinate beams - pin-joined trusses and rigid frames - temperature effects.

**Module III: Fixed and continuous beams**
Statically indeterminate structures - degree of static and kinematic indeterminacies – brief introduction to force and displacement methods - fixed and continuous beams - force method - analysis by consistent deformation method - application of moment area and conjugate beam methods for fixed beams - theorem of three moments for continuous beams - shear force and bending moment diagrams - deflection and support settlement.

**Module IV: Beams curved in plan**
Analysis of cantilever beam curved in plan - analysis of circular beams over simple supports
**Theory of columns**
Axial loading of short strut - long columns - Euler's Formula - Rankine Formula – Secant Formula - eccentric loading - direct and bending stresses – Buckling Load as an eigen value problem.

## Examination Scheme:

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Texts & References:


- R. Vaidyanathan, P. Perumal, Comprehensive Structural Analysis Vol. I & II, Laxmi Publications, New Delhi
- Reddy C.S., Basic Structural Analysis, 2nd ed., Tata McGraw Hill, New Delhi (2004).

# CONCRETE TECHNOLOGY

**Course Code: BTCE 403 Credit Units: 03**

## Course Objective:

Types of concrete and their manufacture and applications are covered in this course.

## Course Contents:

**Module I: Materials**

Materials: cement - different types - chemical composition and physical properties - tests on cement - I.S. specifications - aggregates - classification - mechanical properties and tests as per I.S. - alkali aggregate reaction - grading requirements - heavy weight - light weight - normal weight - aggregate - sampling of aggregate - water - quality of water - permissible impurities as per I.S - admixtures - accelerators - retarders - water reducing agents – super plasticizers- use of silica fumes.

**Module II: Manufacture**

Manufacture of concrete - measurement of materials - storage and handling - batching plant and equipment - mixing - types of mixers - transportation of concrete - pumping of concrete - placing of concrete - under water concreting - compaction of concrete - curing of concrete - ready mixed concrete - mix design - nominal mixes - design mixes - factors influencing mix design - A.C.I method - I.S method - design for high strength mixes.

**Module III: Properties of Concrete**

Properties of concrete - fresh concrete - workability - factors affecting workability - tests for workability - segregation and bleeding - hardened concrete - factors affecting strength of concrete - strength of concrete in compression, tension and flexure - stress- strain characteristics and elastic properties - shrinkage and creep - durability of concrete - permeability - chemical attack - sulphate attack - resistance to abrasion and cavitaion - resistance to freezing and thawing - resistance to fire - marine atmosphere - quality control - frequency of sampling - test specimens - statistical analysis of test results - standard deviation - acceptance criteria

**Module IV: Special Concretes**

Special concrete - light weight concrete - high density concrete - vacuum concrete - shotcrete - Fibre reinforced concrete-polymer concrete - ferrocement - high performance concrete - self compacting concrete - types of failure - diagnosis of distress in concrete - crack control - leak proofing - guniting and jacketing techniques.

## Examination Scheme:

| Components | A | CT | S/V/Q/ HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Neville A.M., Properties of Concrete, Pitman
- Shetty M.S., Concrete Technology, S I Chand & Company, 1993.
- Gambhir M.L., Concrete Technology, Tata McGraw Hill, 1995.
- Orchard D.F., Concrete Technology Vol. I & II, 1968.
- Krishna Raju N., Design of Concrete Mixes, CBS publishers, 1988.
- Raina V.K., Concrete for Construction-Facts & Practices, Tata McGraw Hill publishing co. 1988.
- John. H. Bungey, The Testing of Concrete in Structures, Urrey University of Press Hall
- Akroyd T.N.W., Concrete: Properties & Manufacture, Pergamon Press, 1962.
- Murdock L.J., Concrete: Materials & Practice, Edward Arnold, 1968.

# GEOINFORMATICS-II

**Course Code: BTCE 404 Credit Units: 03**

## Course Objective:

Geoinformatics is an important data system for all civil engineering activities including construction of structures, dams, water systems etc. Correct and reliable information and geographical data are a requirement today. The course thus addresses this issue.

## Course Contents:

**Module I**

Triangulation - principle - reconnaissance - selection of site for base line - selection of stations - orders of triangulation - triangulation figures - scaffolds and signals - marking of stations - intervisibility and heights of stations - satellite stations - base line measurement - equipment and corrections - adjustment of observations.

**Module II**

Survey adjustments and theory of errors – introduction – laws of accidental errors –probability curve – principle of least squares – laws of weights – probable error – normal equation – most probable value – method of correlates – angle adjustment – station adjustment – figure adjustment – adjustment of triangles – adjustment of a geodetic quadrilateral.

**Module III**

Curves - types of curves - elements of a curve - simple curves - different methods of setting out – introduction to compound curves - reverse curves, transition curves, vertical curves -hydrographic survey - scope - shoreline survey - river survey - soundings – sounding equipment - methods - ranges - locating sounding - plotting - three point problem.

**Module IV**

Photogrammetry – terrestrial and aerial photogrammetry – heights and distances from Photographs – flight planning – elements of stereoscopy – photo mosaic – photo interpretation – applications of photogrammetry. GNSS – GPS – differential GPS.

## Examination Scheme:

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Texts & References:


- S.K Duggal, Sruveying Vol. I and II, 2nd ed., Tata McGraw Hill, New Delhi (2004).
- Arora K.R., Surveying Vol. I & II, Standard Book House, New Delhi (2008)
- Punmia B.C., Ashok Kr. Jain, Arun Kr. Jain, Surveying Vol. I &II, Laxmi Pub, New Delhi (2004)

# CONSTRUCTION MANAGEMENT AND QUANTITY SURVEYING

**Course Code: BTCE 405 Credit Units: 03**

## Course Objective:

The main objective of this course is to train the student construction management and quantity surveying

## Course Contents:

**Module I**

**Construction Management –** Network techniques – introduction – Bar charts – use of CPM and PERT for planning – time estimates – critical path – updating – crashing – resource smoothing – resource leveling – computer applications

**Construction planning:** Preparation of job layout – labour schedule – material schedule – equipment schedule

**Module II:**

Project Implementation **–** Tender – earnest money deposit – security deposit – contract – contract documents – measurements – completion certificate – inspection and quality control – standardization – organisations at national and international level (BIS & ISO) – role of certification

**Module III**

**Quantity surveying** - preparation of detailed estimates for: buildings - reinforced concrete structures - sanitary and water supply works

**Module IV**

Preparation of specification for common materials of construction and items of work as per IS - analysis of rates and preparation of abstract of estimate

Introduction to valuation of real properties: Depreciation – Sinking fund – methods of valuation

## Examination Scheme:

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Vazirani V.N. & Chandola S.P., Heavy Construction, 1978.
- Jha J. & Sinha S.K., Construction & Foundation Engineering, Khanna Publications
- Verma L.C., Standardisation - A New Discipline
- Rangwala, Valuation of Real Properties, Charotar, 1978.
- Peurifoy R.L., & Ledbetter W.B., Construction Planning Equipment & Methods,
- McGraw Hill, 1956.
- Dutta B.N., Estimation & Costing in Civil Engg, UBSPD, 1992.
- Chakrabarthi, Estimation, Costing, Specification in Civil Engg,
- Shah N.A., Quantity Surveying & Specification in Civil Engg**.,**
- I**.**S 1200 (1968), Methods of Measurement of Building & Civil Engg. Works
- Mahajan S.P., Civil Estimating & Costing, Sathyaprakasham, 1988.

# TRANSPORTATION ENGINEERING - I

**Course Code:** **BTCE 406** **Credit Units: 04**

## Course Objective:
This course deals with the design concept of railways, airport and tunnel.

## Course Contents:

**Module I: Components & Geometric Design of Railways**
Introduction. Typical cross-sections. Various gauges. Coning of wheels and tilting of rails. Functions and requirements of component parts of a railway track. Creep of rails. Geometrical design of railway track. Horizontal curves, radius, superelevation, cant deficiency, transition curves, safe speed on curves, different types of gradients, grade compensation. Worked out problems.

**Module II: Railway Operation and Control**
Points and crossings and their design. Track junctions and simple track layouts. Details of different types of stations and yards. Signaling and interlocking. Control of train movements. Absolute block . Automatic block system and CTC system. Railway Construction and Maintenance: Construction of railway track: earthwork, plate laying and packing. Maintenance of track-alignment, gauge, renewal of component parts and drainage, modern methods of track maintenance.

**Module III: Tunneling**
Tunnel alignment and grade. Size and shape of a tunnel. Methods of tunneling in hard rocks. Full face method, heading and bench method, drift method. Methods of tunneling in soft soils. Compressed air and shield tunneling Shafts in tunnels. Ventilation of tunnel and various methods. Lining of tunnels. Drainage and lighting of . Micro Tunneling. Trenchless technology.

**Module IV: Elements of bridge design**
General – IRC Bridge code –loading standards–impact effect – wind load – longitudinal forces – centrifugal forces – force due to water currents – buoyancy effect – temperature effects – secondary stresses – erection – seismic force

## Examination Scheme:

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Antia K.F, Railway Track, New Book Company Pvt. Ltd, 1960.
- Agarwal M.M., Railway Engineering, Prabha and Co
- Khanna S.K & Arora M.G., Airport Planning and Design, Nemchand & Bros.
- Horonjeff R., Planning and Design of Airports, Mc Graw Hill
- Mundrey J.S, Railway Track Engineering, TMGS, 1988.

# NUMERICAL ANALYSIS LAB - I

**Course Code:** **BTCE 420** **Credit Units: 01**

## Course Contents:

**Assignments will be provided for the following:**

- Analysis of various numerical and statistical techniques

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# CONCRETE LAB

**Course Code:** **BTCE 421** **Credit Units: 01**

**Course Contents:**

**List of Exercises:**

1. Tests on aggregate for concrete:(a) Grain size distribution (b) Specific gravity (c) Density (d) Voids
2. Bulking of aggregate ( sand )
3. Aggregate impact value.
4. Aggregate crushing value
5. Tests on cement : (a) Fineness (b) Normal consistency (c) Setting time (d)
6. Compressive strength of cement mortar and concrete by Cube Test.
7. Tests on bricks – Crushing strength, water absorption and efflorescence
7. Test on workability of concrete:-slump-cone, compaction factor, V-bee
8. Demonstration on Non-Destructive test , Rebound hammer.
9. Flexural testing of CC Beam
10. Tests on tiles – Dimension, Transverse Strength, Water Absorption and Crazing

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# SURVEYING PRACTICAL - II

**Course Code:** **BTCE 422** **Credit Units: 01**

## Course Contents:

## List of Exercises:

1. Determination of tacheometric constants.
2. Heights and distances by stadia tacheometry.
3. Heights and distances by tangential tacheometry.
4. Heights and distances by solution of triangles.
5. Setting out of simple curves – linear methods.
6. Setting out of simple curves – angular method.
7. Setting out of transition curve.
8. Permanent adjustments of theodolite.
9. Heights and distances by using subtense bar.
10. Study of modern instruments – Automatic levels and Total station.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# COMMUNICATION SKILLS - II

**Course Code:** **BTCE 441** **Credit Units: 01**

## Course Objective:
To teach the participants strategies for improving academic reading and writing.
Emphasis is placed on increasing fluency, deepening vocabulary, and refining academic language proficiency.

## Course Contents:

**Module I: Social Communication Skills**
Small Talk
Conversational English
Appropriateness
Building rapport

**Module II: Context Based Speaking**
In general situations
In specific professional situations
Discussion and associated vocabulary
Simulations/Role Play

**Module III: Professional Skills**
Presentations
Negotiations
Meetings
Telephony Skills

## Examination Scheme:

| Components | CT1 | CT2 | CAF | V | GD | GP | A |
|---|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 25 | 10 | 10 | 10 | 5 |

CAF – Communication Assessment File
GD – Group Discussion
GP – Group Presentation

## Text & References:


- Essential Telephoning in English, Garside/Garside, Cambridge
- Working in English, Jones, Cambridge
- Business Communication, Raman – Prakash, Oxford
- Speaking Personally, Porter-Ladousse, Cambridge
- Speaking Effectively, Jermy Comfort, et.al, Cambridge
- Business Communication, Raman – Prakash, Oxford

# BEHAVIOURAL SCIENCE - IV
# (RELATIONSHIP MANAGEMENT)

**Course Code: BTCE 443 Credit Units: 01**

## Course Objective:
To understand the basis of interpersonal relationship
To understand various communication style
To learn the strategies for effective interpersonal relationship

## Course Contents:

**Module I: Understanding Relationships**
Importance of relationships
Role and relationships
Maintaining healthy relationships

**Module II: Bridging Individual Differences**
Understanding individual differences
Bridging differences in Interpersonal Relationship – TA
Communication Styles

**Module III: Interpersonal Relationship Development**
Importance of Interpersonal Relationships
Interpersonal Relationships Skills
Types of Interpersonal Relationships

**Module IV: Theories of Interpersonal Relationships**
Theories: Social Exchange, Uncertainty Reduction Theory
Factors Affecting Interpersonal Relationships
Improving Interpersonal Relationships

**Module V: Impression Management**
Meaning & Components of Impression Management
Impression Management Techniques (Influencing Skills)
Impression Management Training-Self help and Formal approaches

**Module VI: End-of-Semester Appraisal**
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

## Examination Scheme:

| Components | SAP | A | Mid Term Test (CT) | VIVA | Journal for Success (JOS) |
|---|---|---|---|---|---|
| Weightage (%) | 20 | 05 | 20 | 30 | 25 |

## Text & References:


- Vangelist L. Anita, Mark N. Knapp, Inter Personal Communication and Human Relationships: Third Edition, Allyn and Bacon
- Julia T. Wood. Interpersonal Communication everyday encounter
- Simons, Christine, Naylor, Belinda: Effective Communication for Managers, 1997 1st Edition Cassell
- Goddard, Ken: Informative Writing, 1995 1st Edition, Cassell
- Harvard Business School, Effective Communication: United States of America
- Foster John, Effective Writing Skills: Volume-7, First Edition 2000, Institute of Public Relations (IPR)
- Beebe, Beebe and Redmond; Interpersonal Communication, 1996; Allyn and Bacon Publishers.

# FRENCH - IV

**Course Code:** **BTCE 444** **Credit Units: 02**

## Course Objective:

To enable students:

- To develop strategies of comprehension of texts of different origin
- To present facts, projects, plans with precision

## Course Contents:

**Module C: pp. 104 – 139: Unités 8, 9**

**Contenu lexical:** **Unité 8: Découvrir le passé**

1. parler du passé, des habitudes et des changements.
2. parler de la famille, raconter une suite d'événements/préciser leur date et leur durée.
3. connaître quelques moments de l'histoire

**Unité 9: Entreprendre**

1. faire un projet de la réalisation: (exprimer un besoin, préciser les étapes d'une réalisation)
2. parler d'une entreprise
3. parler du futur

**Contenu grammatical:**

1. Imparfait
2. Pronom « en »
3. Futur
4. Discours rapporté au présent
5. Passé récent
6. Présent progressif

## Examination Scheme:

| **Components** | **CT1** | **CT2** | **C** | **I** | **V** | **A** |
|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- le livre à suivre: Campus: Tome 1

# GERMAN - IV

**Course Code: BTCE 445 Credit Units: 02**

## Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany.
Introduction to Advanced Grammar Language and Professional Jargon

## Course Contents:

**Module I: Present perfect tense**
Present perfect tense, usage and applicability
Usage of this tense to indicate near past
Universal applicability of this tense in German

**Module II: Letter writing**
To acquaint the students with the form of writing informal letters.

**Module III: Interchanging prepositions**
Usage of prepositions with both accusative and dative cases
Usage of verbs fixed with prepositions
Emphasizing on the action and position factor

**Module IV: Past tense**
Introduction to simple past tense
Learning the verb forms in past tense
Making a list of all verbs in the past tense and the participle forms

**Module V: Reading a Fairy Tale**
Comprehension and narration
- Rotkäppchen
- Froschprinzessin
- Die Fremdsprache

**Module VI: Genitive case**
Genitive case – Explain the concept of possession in genitive
Mentioning the structure of weak nouns

**Module VII: Genitive prepositions**
Discuss the genitive propositions and their usage: (während, wegen, statt, trotz)

**Module VIII: Picture Description**
Firstly recognize the persons or things in the picture and identify the situation depicted in the picture;
Secondly answer questions of general meaning in context to the picture and also talk about the personal experiences which come to your mind upon seeing the picture.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:


- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

# STRUCTURAL ANALYSIS - II

**Course Code: BTCE 501 Credit Units: 03**

## Course Objective:

The course builds upon the earlier course of Structural Analysis I and deals with more advanced methods.

## Course Contents:

**Module I: Force method of analysis of indeterminate structures** Analysis of rigid frames of different geometry by consistent deformation method – settlement effects - analysis of pin-jointed trusses by consistent deformation method - externally and internally redundant trusses - effects of settlement and prestrains.

**Module II: Displacement method of analysis of indeterminate structures** Slope deflection method - analysis of continuous beams - beams with overhang - analysis of rigid frames - frames with sloping legs - gabled frames - frames without sway and with sway - settlement effects - moment distribution method as successive approximation of slope deflection equations - analysis of beams and frames - non-sway and sway analyses - Kani’s method as iterative method of analysis of frames (outline only)

**Module III: Moving Loads & Influence Lines**
Introduction to moving loads - concept of influence lines - influence lines for reaction, shear force and bending moment in simply supported beams - influence lines for forces in trusses – analysis for different types of moving loads - single concentrated load - several concentrated loads - uniformly distributed load shorter and longer than the span.

**Module IV: Cables, suspension bridges and arches**
Analysis of forces in cables - suspension bridges with three-hinged and two-hinged stiffening girders - theory of arches - Eddy’s theorem - analysis of three-hinged and two-hinged arches - settlement and temperature effects.

## Examination Scheme:

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Wang C.K., Statically Indeterminate Structures, McGraw Hill, New York, 1983.
- Wilbur J.B. & Norris C.H., Elementary Structural Analysis, McGraw Hill, 1960.
- Wang C.K., Intermediate Structural Analysis, McGraw Hill, 1983.
- Timoshenko S.P. & Young D.H., Theory of Structures, McGraw Hill, 1965.
- Kinney S.J., Indeterminate Structural Analysis, Oxford & IBH, 1985.
- Matheson J.A.L., Hyperstatic Structures, John Wiley and Sons, 1996.
- Reddy C.S., Basic Structural Analysis, Tata McGraw Hill
- Negi L.S. & Jangid R.S, Structural Analysis, Tata McGraw Hill
- Rajasekaran S. & Sankarasubramanian G., Computational Structural Mechanics, PHI

# PRINCIPLES OF STRUCTURAL DESIGN

**Course Code:** **BTCE 502** **Credit Units: 04**

## Course Objective:

Based on the course Structural Analysis the student should be able to start design of structures using various types of materials.

## Course Contents:

**Module I: Design Philosophy**

Introduction –Structures and structural systems–Internal forces in different types of structural systems such as Trusses, Cables, Arches, Beams and Slabs, Frames. – stability criteria – design considerations – loading standards – working stress method(WSM) – ultimate load method – probabilistic analysis and design – uncertainties in design – classical reliability models – reliability analysis and design – levels of reliability methods – limit state method(LSM) – limit states – multiple safety factor formats – load and resistance factor design format – partial safety factor format.

**Module II: Reinforced Concrete**

Introduction – materials – mix design by IS method – basic properties of concrete and reinforcement – basic design concepts of working stress method (WSM) – analysis of sections by WSM – flexure, shear, torsion and bond – singly reinforced, doubly reinforced and flanged sections – deflection criteria.

**Module III: Steel**

Steel - introduction to connections - analysis and design of riveted, bolted and welded joints for direct force and moment - struts and ties made of single and double angles.

A design project involving the design and detailing of a typical connection is envisaged at this stage.

**Module IV: Timber**

Classification and allowable stresses - design of beams for flexure, shear & bearing – deflection criteria - design of solid and built-up columns-flitched beam – formwork design.

A design project involving the design and specification of the formwork for a typical concrete structure is envisaged at this stage.

## Examination Scheme:

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Pillai S.U. & Menon D, Reinforced Concrete Design Tata McGraw Hill, 2003.
- Varghese P.C., Limit State Design of Reinforced Concrete, Prentice Hall of India, 2003.
- Mallick S.K. & Gupta A.K., Reinforced Concrete, Oxford & IBH, 1982.
- Jain A.K., Reinforced Concrete - Limit State Design, Standard Book House, 1998.
- Shetty M.S., Concrete Technology, S. Chand, 1988.
- Punmia B.C., Reinforced Concrete Structures Vol. I, Standard Book House, 2005
- Jain & Jaikrishna, Plain & Reinforced Concrete Vol. I, Nemchand, 2000.
- Sinha S.N., Reinforced Concrete Design, Tata McGraw Hill, 2005.
- Ram Chandra, Design of Steel Structures Vol. I, Standard Book House, 2005.
- Negi L.S., Design of Steel Structures Vol. I, Tata McGraw Hill, 2005.
- BIS Codes (IS 875, IS 10262, SP 23, IS 456, IS 800, SP 6, IS 883, IS 2750).

# GEOTECHNICAL ENGINEERING - I

**Course Code: BTCE 503 Credit Units: 03**

## Course Objective:

Soil mechanics and related topics are important areas in Civil Engineering and the first part of Geotechnical Engineering deals with soils and their characteristics.

## Course contents:

**Module I: Nature of soil and functional relationships**

Soil type -Concepts of single grained, honey combed and flocculent structure and their effects on the basic soil properties - 3 phase system - void ratio - specific gravity - dry density - porosity - water content - saturated unit weight - submerged unit weight - degree of saturation. Laboratory and field identification of soils: Determination of water content by oven drying -Specific gravity using pycnometer and specific gravity bottle - Grain size analysis by sieve analysis, hydrometer analysis and pipette analysis - Atterberg limits and indices – Visual identification by simple field tests - Field density by core cutter, sand replacement and wax coating methods. Classification of soils: Necessity -Principles of classification - I.S. classification – Plasticity charts - Group index.

**Module II: Soil Water, Permeability and Stress Distribution**

Soil water: Types - Effective stress - Total stress - Pore pressure - Pressure diagrams. Permeability: Definition - Darcy’s law - Factors affecting permeability – Laboratory determination - Stratified soils: average permeability. Stress distribution: Boussinesq’s equations for vertical pressure due to point loads- Assumptions and limitations - pressure bulb – Influence diagram - Vertical pressure due to uniformly distributed loads, line loads and strip loads - Newmark charts and their use - Westergaard’s solution.

**Module III: Consolidation and Compa tion**

Consolidation: Definition - Concepts of coefficient of compressibility - Coefficient of volume change and compression index - e-log p curves - Terzaghi’s theory of one dimensional consolidation – Determination of coefficient of consolidation- pre-consolidation pressure difference between consolidation and compaction. Compaction: Definition and objectives of compaction - Proctor test and modified proctor test - Concept of OMC and maximum dry density - Zero air voids line -Factors influencing compaction.- Effect of compaction on soil properties - Field compaction methods - Proctor needle for field control.

**Module IV: Shear Strength and Stability of Slopes**

Shear Strength: Definition - Mohr’s strength and stress circles - origin of planes - Mohr’s envelope - Mohr-Coulomb strength theory -Direct, triaxial and UCC tests - Drainage conditions - Measurement of pore pressure - Vane shear tests -Total and effective stress -strength parameters – Stress path, Liquefaction of sand - Choice of test conditions for field problems. Stability of slopes: Slope failure, base failure and toe failure - Swedish circle method - $\varphi=0$ analysis and $c=0$ analysis - Friction circle method - Taylor’s stability number -Stability charts - Sliding block analysis.

## Examination Scheme:

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Terzaghi K. & Peck R.B., Soil Mechanics in Engineering Practice, John Wiley Sons, 1967.
- Alam Singh, Soil Engineering-Theory and Practice, Asia Pub, 1967.
- Punmia B.C., Soil Mechanics and Foundations, Saurabh,1992.
- Murthy V.N.S., Soil Mechanics and Foundation Engineering, Dhanpat Rai, 1984
- Khan I.H., Text Book of Geotechnical Engineering, Prentice Hall of India

# TRANSPORTATION ENGINEERING - II

**Course Code: BTCE 504** **Credit Units: 03**

## Course Objective:

Modern road design and construction are covered in the syllabus.

## Course Contents:

**Module I: Highway Classification, Alignment and Geometrical Design**

Introduction – Highway development in India - Classification of roads - Typical cross sections of roads in urban and rural area - Requirements and factors controlling alignment of roads - Engineering surveys for highway location - Pavement surface characteristics - Camber and width requirements – Sight distances - stopping and overtaking sight distances, overtaking zone requirements - Design of horizontal alignment - speed, radius, super elevation, methods of providing super elevation, extra widening of pavements, transition curves - Design of vertical alignment - gradient, grade compensation, summit curves and valley curves - worked out problems on all the above topics.

**Module II: Traffic engineering**

Introduction - Road user, vehicle and traffic characteristics - Speed and volume studies - Simple worked out problems - Principles of design of at-grade intersections -Simple layouts - Objectives, classification and uses of traffic signs and markings - Design of isolated signals by Webster's method.

**Module III: Pavement Materials and Design**

Desirable properties and testing of highway materials: road aggregates, bituminous materials and subgrade soil - Factors influencing the design of pavements - CBR method and IRC guidelines of flexible pavements design - Design of rigid pavements using IRC charts - worked out problems.

**Module IV: Airport planning and Design**

Introduction. Aircraft characteristics and their influence on planning of airports. Airport obstructions and zoning. Component parts of airport and site selection. Runway design. Orientation, basic runway length, corrections and geometric.

## Examination Scheme:

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Papacostas, C.S., Transportation Engineering and Planning, 3rd ed., Pearson Education, New Delhi (2008)
- O' Flaherty Coleman. A., Transport Planning and Traffic Engineering, Elsevier, New Delhi (2008).
- Slinn, Mike, Traffic Engineering Design (Principles and Practice), Elsevier, New Delhi (2008), O'Flaherty, Coleman A., Highways (The Location, Design, Construction and Maintenance of Pavement) 4th ed, Elsevier, New Delhi (2008).

# HYDRAULIC MACHINES

**Course Code: BTCE 505 Credit Units: 03**

## Course Objective:

Fluid power systems cover generation, transmission, and control applications of power by using pressurized fluids. This course imparts the knowledge of different fluid power systems which are used in industries and hydropower plants.

## Course Contents: (module 1 and 2 of BTCE506 hydrosystem )

**Module I: Introduction**
Euler's equations for turbo machines; impulse and reaction forces due to fluid systems on stationery and moving system of vanes; jet propulsion.

**Module II: Water Turbines**
Classification: Pelton, Francis, Propeller and Kaplan turbines; velocity triangles; efficiency; draft tubes, governing.

**Module III: Pumps**
Centrifugal pumps, velocity triangles, efficiency, turbine pumps, axial and mixed flow pumps.

**Module IV: Performance of Fluid Machines**
Similarity laws applied to rotodynamic machines; specific speed, unit quantities; characteristic curves; use of models; cavitations and attendant problems in turbo machines; selection of turbines hydroelectric plants.

**Module V: Hydraulic Power Transmission**
Transmission of hydraulic power through pipe lines; water hammer; precautions against water hammer in turbine and pump installations: hydraulic ram.(added to FM-1)

**Module VI: Power Hydraulics**
Positive pumps: gear, vane, screw, pump, variable delivery valves: flow control, pressure control, direction control, solenoid operated valve, hydraulic circuits, fluid coupling and torque converter.
Pneumatic Power: Basic principles, comparison of pneumatic and hydraulic Systems.

## Examination Scheme:

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


***Text:***

- Gupta, S. C., Fluid Mechanics and Hydraulic Machines, Pearson Education, 2007
- R.K. Bansal, "Fluid Mechanics & Hydraulic Machines", Laxmi Publications (P) Ltd., 2002.

***References:***

- Dr. D.S. Kumar, "Fluid Mechanics & Fluid Power Engineering", S.K. Kataria & Sons,2001
- D.R. Malhotra & N.K. Malhotra, "The Fluid Mech. & Hydraulics", Satya Prakashan, 2001
- V.P. Gupta, Alam Singh, Manish Gupta, "Fluid Mechanics, Fluid Mechanics & Hydraulics", CBS Publishers; 1999

# HYDRO SYSTEMS

**Course Code: BTCE 506** **Credit Units: 03**

## Course Objective:

Water flowing in various conditions like open channels weirs, canals systems are covered in this syllabus.

## Course Contents:

**Module I**

Open channel flow in rigid boundary channels- Comparison with pipe flow, Classification of flow, uniform flow – Equations for uniform flow such as Chezy's and Manning's formula, Most efficient channel section – Circular. Rectangular, and Trapezoidal channel sections, Velocity distribution in open channels, Conveyance, Normal depth, Hydraulic exponent for uniform flow, Determination of normal depth and velocity, Specific energy and Specific force diagrams, Critical flow, Hydraulic exponent for critical flow, Channel transitions, Venturi, Standing wave and Parshall flumes.

**Module II**

Non-uniform flow, Basic assumptions, Gradually Varied Flow, Dynamic equation for gradually varied flow, Different forms of the dynamic equation, Flow profiles in prismatic channels, Computation of the length of the backwater curve - Graphical Integration and Direct Step Methods. Rapidly Varied Flow- Hydraulic Jump, Hydraulic jump equations for a rectangular channel, Practical applications, Energy loss and efficiency of a jump, Stilling Basins, Selection of Stilling Basins, Rapidly varied unsteady flow – Surges.(1,2Moved to BTCE505)

**Module III**

Distribution works - Classification of canals, Canal alignment, Considerations for fixing longitudinal slope, Typical canal cross sections in embankment and filling, Cross sections of irrigation canals as per BIS codes, Maintenance of canals, Canals in alluvial soils – Regime Theory - Kennedy's and Lacey's Theories, Silting in canals, Scour and protection against scour. Canal lining - losses in irrigation canals, Advantages and disadvantages of lining, Types of lining. Water logging- Causes & preventive measures. Drainage – Open and Closed Drains.

**Module IV**

Components of a distribution system (no detailed design) - Head and Cross Regulator, Canal Falls, Canal Outlets, Cross Drainage Works, Canal Escapes- Surplussing arrangements in minor irrigation tanks.(3,4 moved to BTCE606)

## Examination Scheme:

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Texts & References:


- K. Subramanya, Flow in Open Channels, 3rd ed., Tata McGraw Hill, New Delhi (2008).
- P. N. Modi, Irrigation, Water Resources &Water Power Engineering, 2nd ed., Standard Book House, New Delhi (2009)
- Srivastava, Flow through Open Channels, Oxford University Press, New Delhi (2008).
- Todd, D.K., Ground Water Hydrology, 2nd ed., Wiley India, New Delhi (2008)

## HIGHWAY ENGINEERING LAB

**Course Code: BTCE 520** **Credit Units: 01**

**List of Exercises**

**1.**Determination of Aggregates crushing value test

2. Determination of Aggregates impact value

3. Determination of Los Angles Abrasion value

4. Determination of Calefornia Bearing Ratio value

5.Determination of Shape test on aggregates.

6. Determination of Penetration test value of Bitumen

7. Determination of Softneing point of Bitumen

8. Determination of Viscosity of Bitumen

9. Determination of Ductility of the Bitumen

10. Determination of flash point and fire point of bitumen.

11. Determination of Bitumen content by Centrifuge extractor

12. Determination of Stripping value of Bituminous Mix

13. Determination of Marshal stability of bituminous Mix.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# HYDRAULIC MACHINES LAB

**Course Code:** **BTCE 521** **Credit Units: 01**

## Name of Experiments

1. To conduct a test on Centrifugal Pump and plot its characteristics.
2. To Plot the characteristics of Pelton turbine.
3. To conducts an experiment on Francis turbine.
4. To study the effect of a draft tube on reaction turbines.
5. To find the friction factor for flow through pipes.
6. To study the hydraulic controls rig.
7. To conduct an experiment for verifying model laws.
8. To study the cavitations phenomenon in turbines.
9. Study of hydraulic couplings and torque converters.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# COMMUNICATION SKILLS - III

**Course Code: BTCE 541 Credit Units: 01**

## Course Objective:
To equip the participant with linguistic skills required in the field of science and technology while guiding them to excel in their academic field.

## Course Contents:

**Module I**
Reading Comprehension
Summarising
Paraphrasing

**Module II**
Essay Writing
Dialogue Report

**Module III**
Writing Emails
Brochure
Leaflets

**Module IV: Introduction to Phonetics**
Vowels
Consonants
Accent and Rhythm
Accent Neutralization
Spoken English and Listening Practice

## Examination Scheme:

| **Components** | **CT1** | **CT2** | **CAF** | **V** | **GD** | **GP** | **A** |
|---|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 25 | 10 | 10 | 10 | 5 |

CAF – Communication Assessment File
GD – Group Discussion
GP – Group Presentation

## Text & References:


- Effective English for Engineering Students, B Cauveri, Macmillan India
- Creative English for Communication, Krishnaswamy N, Macmillan
- A Textbook of English Phonetics, Balasubramanian T, Macmillan

# BEHAVIOURAL SCIENCE - V
# (GROUP DYNAMICS AND TEAM BUILDING)

**Course Code: BTCE 543 Credit Units: 01**

## Course Objective:
To inculcate in the students an elementary level of understanding of group/team functions.
To develop team spirit and to know the importance of working in teams.

## Course Contents:

**Module I: Group formation**
Definition and Characteristics
Importance of groups
Classification of groups
Stages of group formation
Benefits of group formation

**Module II: Group Functions**
External Conditions affecting group functioning: Authority, Structure, Org. Resources, Organizational policies etc.
Internal conditions affecting group functioning: Roles, Norms, Conformity, Status, Cohesiveness, Size, Inter group conflict.
Group Cohesiveness and Group Conflict
Adjustment in Groups

**Module III: Teams**
Meaning and nature of teams
External and internal factors effecting team
Building Effective Teams
Consensus Building
Collaboration

**Module IV: Leadership**
Meaning, Nature and Functions
Self leadership
Leadership styles in organization
Leadership in Teams

**Module V: Power to empower: Individual and Teams**
Meaning and Nature
Types of power
Relevance in organization and Society

**Module VI: End-of-Semester Appraisal**
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

## Examination Scheme:

| Components | SAP | A | Mid Term Test (CT) | VIVA | Journal for Success (JOS) |
|---|---|---|---|---|---|
| Weightage (%) | 20 | 05 | 20 | 30 | 25 |

## Text & References:

- Organizational Behaviour, Davis, K.
- Hoover, Judhith D. Effective Small Group and Team Communication, 2002, Harcourt College Publishers.
- Dick, Mc Cann & Margerison, Charles: Team Management, 1992 Edition, viva books.
- Bates, A. P. and Julian, J.: Sociology - Understanding Social Behaviour.
- Dressers, David and Cans, Donald: The Study of Human Interaction.
- Lapiere, Richard. T – Social Change.
- Lindzey, G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology, Addison – Welsley, US.
- Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.
- LaFasto and Larson: When Teams Work Best, 2001, Response Books (Sage), New Delhi
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 2, Group (1996); Pfeiffer & Company.
- Smither Robert D.; The Psychology of Work and Human Performance, 1994, Harper Collins College Publishers.

# FRENCH - V

**Course Code:** **BTCE 544** **Credit Units: 02**

## Course Objective:

To furnish some basic knowledge of French culture and civilization for understanding an authentic document and information relating to political and administrative life

## Course Contents:

**Module D: pp. 131 – 156 Unités 10, 11**

**Contenu lexical:**

**Unité 10:** Prendre des décisions

1. Faire des comparaisons
2. décrire un lieu, le temps, les gens, l'ambiance
3. rédiger une carte postale

**Unité 11: faire face aux problèmes**

1. Exposer un problème.
2. parler de la santé, de la maladie
3. interdire/demander/donner une autorisation
4. connaître la vie politique française

**Contenu grammatical:**

1. comparatif - comparer des qualités/ quantités/actions
2. supposition: Si + présent, futur
3. adverbe - caractériser une action
4. pronom "Y"

## Examination Scheme:

| **Components** | **CT1** | **CT2** | **C** | **I** | **V** | **A** |
|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:


- le livre à suivre: Campus: Tome 1

# GERMAN - V

**Course Code:** **BTCE 545** **Credit Units: 02**

## Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany
Introduction to Advanced Grammar and Business Language and Professional Jargon.

## Course Contents:

**Module I: Genitive case**
Genitive case – Explain the concept of possession in genitive
Mentioning the structure of weak nouns

**Module II: Genitive prepositions**
Discuss the genitive propositions and their usage: (während, wegen, statt, trotz)

**Module III: Reflexive verbs**
Verbs with accusative case
Verbs with dative case
Difference in usage in the two cases

**Module IV: Verbs with fixed prepositions**
Verbs with accusative case
Verbs with dative case
Difference in the usage of the two cases

**Module V: Texts**
A poem 'Maxi'
A text Rocko

**Module VI: Picture Description**
Firstly recognize the persons or things in the picture and identify the situation depicted in the picture;
Secondly answer questions of general meaning in context to the picture and also talk about the personal experiences which come to your mind upon seeing the picture.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:


- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant - 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

# INDUSTRIAL PRACTICAL TRAINING - I

**Course Code:** **BTCE 550** **Credit Units: 04**

## Methodology:

Practical training is based on the theoretical subjects studied by students. It can be arranged within the college or in any related industrial unit. The students are to learn various industrial, technical and administrative processes followed in the industry. In case of on-campus training the students will be given specific task of fabrication/assembly/testing/analysis. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation on same.

## Examination Scheme:

| | |
|---|---|
| Feedback from industry/work place | 20 |
| Training Report | 40 |
| Viva | 15 |
| Presentation | 25 |
| **Total** | **100** |

# ENVIRONMENTAL ENGINERING - I

**Course Code: BTCE 601 Credit Units: 03**

## Course Objective:

Based on course Environmental studies, the water resources and their management for environmental suitability are studied in this course.

## Course Contents:

**Module I: Scope of Environmental Engineering**
Water Supply Engineering. Quantity of water. Types of water demand. Fluctuation in demand. Factors affecting consumption. Forecasting population. Design period.

**Module II: Sources of water**
Surface water sources. Intakes. Ground water Sources. Estimation of yield from various ground water sources. Quality of water. Drinking water standards – Water quality parameters- effects on human health- Methods of Physical, Chemical and Bacteriological analysis of water.

**Module III: Treatment of water**
Process details and design considerations. Aeration. Coagulation. Flocculation. Sedimentation. Filtration. Disinfection. Miscellaneous and advanced treatments. Iron and manganese removal. Fluoridation and defluoridation. Water Softening. Arsenic removal. Desalination. Membrane filtration.

**Module IV: Water supply schemes**
Gravitational, pumping and combined schemes. Pumps. Pumping stations. Transmission of water. Materials of water supply pipes. Design of gravity and pumping main. Distribution systems. Different layout of pipe networks.House connection from mains. Different valves, meters and hydrants. Storage reservoirs. Balancing reservoir. Detection and prevention of leaks in the distribution systems. Maintenance of distribution systems.

## Examination Scheme:

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Garg S. K, Environmental Engineering, Vol. I, Khanna Publications, 2001, New Delhi.
- Birdie G.S & Birdie J.S, Water Supply and Sanitary Engineering, Dhanpat Rai & Sons, 1998, New Delhi.
- Duggal, K.N., Elements of Environmental Engineering, S Chand & Co. Ltd., 2000, New Delhi.
- Mark J. Hammer & Mark J. Hammer Jr., Water and Waste Water Technology, Prentice Hall of India Pvt. Ltd., 1998, New Delhi.
- Fair, Geyer & Okun, Water & Waste Water Engineering, John Wiley, 1966, New York.
- Ernest W. Steel & Terence J. Mc Ghee, Water Supply & Sewage, McGraw Hill, 1990, New York.
- Relevant BIS Codes.

# STRUCTURAL CONCRETE DESIGN

**Course Code:** **BTCE 602** **Credit Units: 03**

## Course Objective:
This course deals with the design concept of designing concrete structure. As a prerequisite the students should have knowledge of principal of structural design.

## Course Contents:

**Module I: Introduction to limit state method of design**
Review of partial safety factors. Limit state of collapse. Limit state of serviceability.
**Limit State of Collapse: Flexure.** Limit state of collapse for flexure as per IS. Assumptions. Moment capacity of rectangular and flanged sections. Singly and doubly reinforced sections. Design tables and charts. Critical sections for bending in important structural elements such as slabs, beams, retaining
wall, footings, staircase etc. Design project for the design and detailing of a floor slab system and staircase of aresidence (load bearing masonry walls).

**Module II: Shear and Torsion**
**Limit State of Collapse: Shear.** Nominal shear stress. Design shear strength of concrete. Design of shear reinforcement. Use of SP16 for shear design. Critical sections for shear in important structural elements such as slabs, beams, retaining walls, footings etc. Design project for the design and detailing the beams of a framed system.
**Limit State of Collapse: Torsion.** General. Critical section.Shear and torsion. Equivalent . Reinforcement for torsion. Equivalent longitudinal moment. Design project for the design and detailing of a water tank with curved beams.

**Module III: Compression**
**Limit State of Collapse: Compression.** Analysis and design of columns of rectangular and circular cross sections. Axially loaded columns Columns with uniaxial and biaxial eccentricity using SP 16 design charts. Short and slender columns. Design project for the design and detailing the columns of a framed system and isolated and combined footings.

**Module IV: Limit State of Serviceability**
Deflection. Short term deflection. Long term deflection. Cracking. Control of cracking. Estimation of width of cracks.

## Examination Scheme:

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Pillai S.U. & Menon D., Reinforced Concrete Design Tata McGraw Hill, 2003
- Varghese P.C., Limit State Design of Reinforced Concrete, Prentice Hall of India, 2003
- Mallick S.K. & Gupta A.K., Reinforced Concrete, Oxford & IBH, 1982
- Jain A.K., Reinforced Concrete - Limit State Design, Standard Book House, 1998
- Punmia B.C., Reinforced Concrete Structures Vol. I, Standard Book House,2005
- Jain & Jaikrishna, Plain & Reinforced Concrete Vol. I, Nemchand, 2000
- Sinha S.N., Reinforced Concrete Design, Tata McGraw Hill, 2005
- BIS codes ( IS 456, SP 16, SP 24, SP 34)

# GEOTECHNICAL ENGINEERING - II

**Course Code:** **BTCE 603** **Credit Units: 04**

## Course Objective:
Advanced topics of soil mechanics and the design of foundations are covered in this course.

## Course Contents:

**Module I: Earth pressure**
Earth pressure at rest. Active and passive earth pressure for cohesionless and cohesive soils. Coulomb's and Rankine's theories. Point of application of earth pressure for cases of with and without surcharge in cohesionless and cohesive soils. Culmann's and Rebhan's graphical construction for active earth pressure. Friction circle method for active earth pressure. **Site investigation and soil exploration:** Objectives. Planning. Reconnaissance. Depth of exploration. Methods of subsurface exploration. Test pits. Auger borings. Wash boring. Rotary drilling. Percussion drilling. Core drilling. Sampling. Types of soil samples. Splitspoon sampler. Thin walled sampler. Piston sampler. Denison sampler. Hand cut samples. Location of water table. S.P.T. Field vane shear test. Introduction to geophysical methods. Boring log. Soil profile.

**Module II: Bearing capacity**
Ultimate and allowable bearing capacity. Terzaghi's equation for bearing capacity for continuous circular and square footings. Types of shear failures. Bearing capacity factors and charts. Effect of water table on bearing capacity. Meyerhoff's bearing capacity heory. Skempton's formulae. Bearing capacity from field tests. Bearing capacity from building codes. Net bearing pressure. Methods of improvement of soil bearing capacity: vibro flotation and sand drains.
**Settlement analysis:** Distribution of contact pressure. Immediate and consolidation settlement. Estimation of initial and final settlement under building loads. Limitations in settlement computation. Causes of . Permissible, total and differential settlements. Cracks and effects of settlement.

**Module III: Foundations**
General considerations: Functions of foundations. Requisites of satisfactory foundations. Different types of foundations. Definition of shallow and deep foundation. Selection of type of foundation. Advantages and limitations of various types of foundations. Design considerations . Footings subjected to eccentric loading. Conventional procedure for proportioning footings for equal settlements.
**Open excavation:** Open foundation excavations with unsupported slopes. Supports for shallow and deep excavations. Stress distribution in sheeting and bracing of shallow and deep excavations. Stability of bottom of excavations. **Raft foundations**: Bearing capacity equations. Design considerations. Conventional design procedure for rigid mat. Uplift pressures. Methods of resisting uplift. Floating foundations.

**Module IV: Pile foundations**
Uses of piles. Classification of piles based on purpose and material. Determination of type and length of piles. Determination of bearing capacity of axially loaded. Single vertical pile. Static and dynamic formulae. Determination of bearing capacity by penetration tests and pile load tests (IS methods). Negative skin friction. Group action and pile spacing. Analysis of pile groups. Load distribution by Culmann's method. **Caissons and piers:** Open (well) caissons. Box (floating) caissons. Pneumatic caissons. Construction details and design considerations of well foundations. Drilled piers and their
construction details.

## Examination Scheme:

| **Components** | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

- Joseph E. & Bowles, *Foundation Analysis & Design*, McGraw Hill
- Leonards G.A., *Foundation Engineering*, McGraw Hill
- Teng W.C., Foundation Design, PHI, 1984
- Tomlinson M.J., Foundation Design & Construction, Pitman, 1963.
- Terzaghi & Peck, Soil Mechanics in Engineering Practice, Asia Publishing
- Arora K.R., *Soil Mechanics & Foundation Engg.*, Standard Publications, 1987.
- Murthy V.N.S., Soil Mechanics & Foundations.
- Punmia B.C., Soil Mechanics & Foundations, Laxmi, 1988.

# COMPUTER APPLICATION IN CIVIL ENGINEERING

## Course Code: BTCE 604 Credit Units: 03

**Course Objective:** Application of this course is to familiar the students with the civil engineering softwares and its application.

**Course Contents:**

**Module I: Introduction of Computer applications in Civil Engineering**
Introduction and application of computer in structural engineering, geotechnical engineering, water resources engineering, project management, surveying, highway, estimating and costing, Introduction to MATLAB.

**Module II: Introduction to CAD**
Computer Aided drafting, 2-D drawings, Introduction to CAD software, Planning and drawing of buildings, 2-D modeling, Problems in civil engineering.

**Module III: Auto CAD**
Introduction to computer graphics, 3-D drawings, 3-D modeling software and analysis software Learning of civil engineering drawing.

**Module IV: Stadd Pro**
Introduction to structural Analysis:- Loading system, Dead Load, Live Load, Imposed Load. Design of structural members:- Beam Design, Column Design, Slab Design, Foundation Design
Residential Building, Design of Multistoried Building.\

**Examination Scheme:**

| Components | A | CT | S/V/Q/ HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

**Text & References:**

Groover M.P. and Zimmers E.W. Jr., "CAD/CAM, Computer Aided Design and Manufacturing", Prentice Hall of India Ltd, New Delhi, 1993.
Krishnamoorthy C.S. Rajeev S., "Computer Aided Design", Narosa Publishing House, New Delhi, 1993, Harrison H.B., "Structural Analysis and Design", Part I and II Pergamon Press, Oxford, 1990. Comptter Application in Civil Engineering:Paul D. Spindel, publisher: Van Nostrand Reinhold Co.
AutoCAD Civil 3D 2015 Essentials: Autodesk Official, Eric Chappel
T.S Sarma, "Stadd Pro V8i for Beginners", Notion Press 2014

# ENGINEERING GEOLOGY

**Course Code:** **BTCE 605** **Credit Units: 03**

## Course Objective:

The student is given an introduction to basics of Geology genesis and characteristic of rocks: Geological structure and other effects of civil engineering structures. Geology of India is introduced.

## Course Contents:

**Module I: Branches and scope of geology**
**Physical geology**
Geological agents and their action, weathering, volcanism, earthquake and plate tectonics

**Module II: Elements of crystallography and mineralogy**
**Petrology**
Types of rocks, genesis and physical and chemical characters, Building stones

**Module III: Structural geology**
Types of structures and classification and their effect on civil engineering projects and Geological mapping
**Hydrogeology**
Groundwater and occurrence, investigations, quality, artificial recharge

**Module IV: Geology in Civil Engineering**
Tunnels, dams, reservoirs, bridges, Runways, Roads and Buildings.
Slope failures and landslides. Investigations, Remote sensing and GIS applications
**Geology of India**
Types, age and occurrence of rock formations and economic importance

## Examination Scheme:

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Parbin Singh, Engineering & General Geology, S.K. Kataria & Sons, New Delhi (2008)
- Bangar, K.M., Principles of Engineering Geology, Standard Publishers Distributors, Delhi (2009)
- Billings, Marland P., Structural Geology, 3rd ed., Prentice-Hall India, New Delhi.
- Todd, D.K., Ground Water Hydrology, 2nd ed., Wiley India, New Delhi (2008)

# IRRIGATION ENGINEERING

## Course Code: BTCE 606 Credit Units: 03

**Course Objective:**
This course deals with various concepts of water resources engineering. The course introduces the concept of hydrology, ground water and then deals with irrigation engineering. It also deals with design of dam.

**Course Contents:**

**Moduls I : Precipitation Measurement**
Hydrologic cycle- Precipitation, rainfall variations, measurement, presentation of RF data, Mean precipitation, Abstractions from precipitation (BTCE-707-New BTCE 502)

**Moduls II : Flow Measurement (ground water m2)**
Runoff-Long term runoff, empirical formulae, short term runoff- hydrograph analysis. Flood-Rational and Empirical methods for prediction – Design floods. Ground water – Aquifer types – flow of ground water – Well hydraulics- Types of wells –Other sources of ground water.
(

**Moduls III : Irrigation(1)**
Necessity of irrigation and type of irrigation systems. – Total planning concept- Water requirements of crops- Command area- duty-delta. Consumptive use of water – Irrigation efficiency – Irrigation requirement of crops- Reservoir planning – Site investigation- Zone of storage- Reservoir yield- Reservoir losses and Control- Life of reservoir.
M-3, M-4 from BTCE506 of removed hydrosystem)

**Moduls IV : Reservoir(5)**
Reservoir planning – Site investigation – Zone of storage-Reservoir yield- Reservoir losses and Control- Life of reservoir.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

**Text & References:**


- Irrigation Engg and Hydraulic Structures by S.K.Garg, Khanna Publishers.
- Irrigation. Water Resources, and water power Engineering By Dr.P.N.Modi, Standard Book House 1990
- Engineering Hydrology by K. Subramanya, TMH.
- Irrigation Water Power and Water Resource Engg. By K.R. Arora.
- Water Resources Engg. By Larry W. Mays, John Wiley India
- Water Resources Engg. By Wurbs and James, John wiley India
- Water Resources Engg. By R.K.Linsely, McGraw Hill
- Irrigation and water Resources Engg.By G L Asawa, New age International Publishers
- Irrigation Theory and practices by A.M.Michel.
- Irrigation and water Power engineering by B.C.Punmia, Laxmi Publishers.

# COMPUTER APPLICATIONS LAB

**Course Code:** **BTCE 620** **Credit Units: 01**

**Course Objective:**
To familiarize and give hands on training to students in the following areas of Civil Engineering Application software.

**Course Contents:**

Computer applications in civil engineering by using two dimensional and three dimensional modeling through auto Cadd and Stadd Pro.

1 – Introduction of Staad Pro and its applications.
2 – Study of various commands for modelling and analysis of a beam
3 – Modelling and analysis of continuous beams for different loading conditions.
4 - Modelling of frame structure for different loading conditions.
5 – Modelling and analysis of frame structure for different loading conditions.
6 – Seismic Analysis of a frame structure.
7 – Wind Analysis of a frame structure.
8 – Design of beams according to Indian Standards.
9 - Design of columns according to Indian Standards.
10 – Introduction of different software used in various fields of Civil Engineering.
11 – Introduction of Auto cad used in various types of building planning.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# GEOTECHNICAL ENGINEERING LAB

**Course Code:** **BTCE 621** **Credit Units: 01**

## Course Contents:

1. Specific gravity of coarse and fine grained soils.
2. Grain size analysis (a) Sieve analysis (b) Pipette analysis
3. Atterberg's limits and indices
4. Determination of field density (a) sand replacement method (b) core cutter method
5. Determination of coefficient of permeability by
   (a) Constant head method (b) Variable head method
6. Consolidation test
7. Compaction test (a) IS light compaction test (b) IS heavy compaction test
8. California Bearing Ratio test
9. Direct shear test
10. Triaxial shear test
11. Unconfined compressive strength test
12. Laboratory vane shear test

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# COMMUNICATION SKILLS - IV

**Course Code:** **BTCE 641** **Credit Units: 01**

## Course Objective:
To enhance the skills needed to work in an English-speaking global business environment.

## Course Contents:

**Module I: Business/Technical Language Development**
Advanced Grammar: Syntax, Tenses, Voices
Advanced Vocabulary skills: Jargons, Terminology, Colloquialism
Individualised pronunciation practice

**Module II: Social Communication**
Building relationships through Communication
Communication, Culture and Context
Entertainment and Communication
Informal business/ Technical Communication

**Module III: Business Communication**
Reading Business/ Technical press
Listening to Business/ Technical reports (TV, radio)
Researching for Business /Technology

**Module IV: Presentations**
Planning and getting started
Design and layout of presentation
Information Packaging
Making the Presentation

## Examination Scheme:

| Components | CT1 | CT2 | CAF | V | GD | GP | A |
|---|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 25 | 10 | 10 | 10 | 5 |

CAF – Communication Assessment File
GD – Group Discussion
GP – Group Presentation

## Text & References:


- Business Vocabulary in Use: Advanced Mascull, Cambridge
- Business Communication, Raman – Prakash, Oxford
- Business Communications, Rodgers, Cambridge
- Working in English, Jones, Cambridge
- New International Business English, Jones/Alexander, Cambridge

# BEHAVIOURAL SCIENCE - VI
# (STRESS AND COPING STRATEGIES)

**Course Code:** **BTCE 643** **Credit Units: 01**

## Course Objective:
To develop an understanding the concept of stress its causes, symptoms and consequences.
To develop an understanding the consequences of the stress on one's wellness, health, and work performance.

## Course Contents:

**Module I: Stress**
Meaning & Nature
Characteristics
Types of stress

**Module II: Stages and Models of Stress**
Stages of stress
The physiology of stress
Stimulus-oriented approach.
Response-oriented approach.
The transactional and interact ional model.
Pressure – environment fit model of stress.

**Module III: Causes and symptoms of stress**
Personal
Organizational
Environmental

**Module IV: Consequences of stress**
Effect on behaviour and personality
Effect of stress on performance
Individual and Organizational consequences with special focus on health

**Module V: Strategies for stress management**
Importance of stress management
Healthy and Unhealthy strategies
Peer group and social support
Happiness and well-being

**Module VI: End-of-Semester Appraisal**
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

## Examination Scheme:

| Components | SAP | A | Mid Term Test (CT) | VIVA | Journal for Success (JOS) |
|---|---|---|---|---|---|
| Weightage (%) | 20 | 05 | 20 | 30 | 25 |

## Text & References:


- Blonna, Richard; Coping with Stress in a Changing World: Second edition
- Pestonjee, D.M, Pareek, Udai, Agarwal Rita; Studies in Stress And its Management
- Pestonjee, D.M.; Stress and Coping: The Indian Experience
- Clegg, Brian; Instant Stress Management – Bring calm to your life now

# FRENCH - VI

**Course Code:** **BTCE 644** **Credit Units: 02**

## Course Objective:

To strengthen the language of the students both in oral and written so that they can:
i) express their sentiments, emotions and opinions, reacting to information, situations;
ii) narrate incidents, events;
iii) perform certain simple communicative tasks.

## Course Contents:

**Module D: pp. 157 – 168 – Unité 12**

**Unité 12: s'évader**

1. présenter, caractériser, définir
2. parler de livres, de lectures
3. préparer et organiser un voyage
4. exprimer des sentiments et des opinions
5. téléphoner
6. faire une réservation

**Contenu grammatical:**

1. proposition relative avec pronom relatif "qui", "que", "où" - pour caractériser
2. faire + verbe

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- le livre à suivre: Campus: Tome 1

# GERMAN - VI

**Course Code: BTCE 645 Credit Units: 02**

## Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany
Introduction to Advanced Grammar and Business Language and Professional Jargon

## Course Contents:

**Module I: Adjective endings**
Adjective endings in all the four cases discussed so far
Definite and indefinite articles
Cases without article

**Module II: Comparative adverbs**
Comparative adverbs as and like

**Module III: Compound words**
To learn the structure of compound words and the correct article which they take
Exploring the possibility of compound words in German

**Module IV: Infinitive sentence**
Special usage of 'to' sentences called zu+ infinitive sentences

**Module V: Texts**
A Dialogue: 'Ein schwieriger Gast'
A text: 'Abgeschlossene Vergangenheit'

**Module VI: Comprehension texts**
Reading and comprehending various texts to consolidate the usage of the constructions learnt so far in this semester.

**Module VII: Picture Description**
Firstly recognize the persons or things in the picture and identify the situation depicted in the picture;
Secondly answer questions of general meaning in context to the picture and also talk about the personal experiences which come to your mind upon seeing the picture.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:


- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

# STRUCTURAL STEEL DESIGN

**Course Code:** **BTCE 701** **Credit Units: 04**

## Course Objective:

This course deals with design of various steel structures. The prerequisite of this course is that the students should have good understanding of principles of structural design.

## Course Contents:
## (Introduction of steel connection from BTCE502 M3)

**Module I: Design of steel girders**
Analysis and design of laterally restrained – unrestrained – simple and compound beams – open web girders – castellated beams–deflection criteria - check for shear.

**Module II: Design of compression members**
Axially and eccentrically loaded compression members - built up columns - lacings and battens - design of column bases.
A project involving the design and detailing of a Mill bent is envisaged at this stage.

**Module III: Roof truss**
Introduction to steel roof systems - design of roof trusses – design of roofing elements and purlin – wind bracings.
A project involving the design and detailing of a roof truss is envisaged at this stage.

**Module IV: Plastic Analysis**
Plastic theory: introduction - plastic hinge concept - plastic modulus - shape factor - redistribution of moments - collapse mechanism - plastic analysis of beams and portal frames by equilibrium and mechanism methods

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Ramchandra, Design of Steel Structures Vol I and II, Standard book house, 1991
- P. Dayaratnam, Design of Steel Structures, (Wheeler), 1998
- M. Raghupathi, Design of Steel Structures, Tata McGraw Hill, 1985
- Lin & Breslar, Design of Steel Structures, John Wiley & Sons, 1963
- BIS codes (IS 800, SP: 6 – Part 1 to 6).

# ENVIRONMENTAL ENGINEERING - II

**Course Code:** **BTCE 702** **Credit Units: 03**

## Course Objective:

This course deals with advanced environmental engineering concepts. It explains the design of various plumbing, treatment plant and solid waste management.

## Course Contents:

**Module I**

Sanitary plumbing – sanitary fixtures – systems of piping – house drainage– connection of house drains and street sewers. Systems of sewerage– Dry weather flow and wet weather flow– sewers and sewer appurtenances – sewage pumping – maintenance of sewers.

**Module II**

Waste water- Characteristics– sampling – population equivalent — preliminary treatment of waste water – screens – grit chamber – detritus tank – Sedimentation tank.
Biological treatment (process details and design considerations) - Aerobic- Activated Sludge Process- Trickling Filter- Oxidation Ponds

**Module III**

Anaerobic treatment- Anaerobic digesters- Septic Tanks- Soak pits
Waste water disposal – disposal into stream –fundamentals of stream sanitation- disposal by irrigation – sludge treatment and disposal

**Module IV**

Solid waste management: Generation- on site handling and storage- transfer and transportprocessing- resource recovery- treatment and disposal.
Air pollution and control – sources –pollutants and their health effects– particulate and gaseous pollution control devices (fundamentals)-Settling chambers- Electrostatic precipitators- Cyclones- Wet Collectors-Gas absorption by tray and packed towers

## Examination Scheme:

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Birdie G. S and Birdie J.S, Water Supply and Sanitary Engineering, Dhanpat Rai and Sons (1998), New Delhi
- Duggal K.N., Elements of Environmental Engineering, S. Chand and Co. Ltd. (2000), New Delhi
- Garg S.K, Environmental Engineering Vol. II¸ Khanna Publications (2001) New Delhi
- Ehlers VM & Steel EW, Municipal & Rural Sanitation, 6th Edn.(1965)McGraw Hill.
- Sawyer and McCarte, Chemistry for Environmental Engineering, Tata McGraw-Hill, (2003) New Delhi,.
- Fair, Geyer & Okun, Water and Waste water Engineering, John Wiley & sons, Inc (1966)
- Metcalf & Eddy, Waste Water Engineering Treatment, Disposal & Reuse, Tata McGraw Hill (1979)

# DESIGN OF HYDRAULIC STRUCTURES

**Course Code:** **BTCE 703** **Credit Units: 03**

**Course Objective:**
This course deals with various concepts of water resources engineering. The course introduces the concept of hydrology, ground water and then deals with irrigation engineering. It also deals with design of dam.

**Course Contents:**

**Moduls I : Diversion head work**
Diversion head works-Location – Essential components of Weir and Barrage – Weirs on permeable foundations- Blighs and khoslas seepage theories – Design procedure.

**Moduls II : Earthen Dams and Rock fill Dams**
Dams – Types of dams and their selection
Types, causes of failure and design criteria, soils suitable for earth dam construction, construction methods, foundation requirements, typical earth dam sections, estimation of seepage through and below the dam, seepage control, stability of slopes by slip circle method of analysis, pore pressure, sudden draw down, steady seepage and construction pore pressure condition. Rock fill dams: Types, merits and demerits, conditions favourable for their adoption.

**Moduls III : Gravity dams**
Gravity dam- Analysis and design.
Gravity dams: Design Criteria, forces acting on gravity dams, elementary profile, low and high gravity dams, stability analysis, evaluation of profile by method of zoning, practical profile, foundation treatment, construction joints, galleries in gravity dam

**Moduls IV : Spillways**
Different types and suitability
Ogee spill way and its design, details of syphon, shaft, chute and side channel spillways, emergency spillways.
Energy dissipatiors and gates: Principles of energy dissipation Energy dissiptors based on tail water rating curve and jump height curves Spillway crest gates- vertical lift and radial gates, their design principles and details. Design of canal regulating structures, Detailed design of Sarda Falls, design of cross drainage works,sphypon aquaduct.

**Moduls V : Regulation and control of canal system**
Purpose, Types of canal regulation works and their function aspects. Irrigation Outlets- Requirements, Types, non-moular, semi- module and rigid module, selection criterion. River Training – Objective and need, classification of rivers and rivers, and river training works, meandering, stages, methods of river training, bank protection, Methods for measurement of discharge.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

**CT:** Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

**Text & References:**


- Irrigation Engg and Hydraulic Structures by S.K.Garg, Khanna Publishers.
- Irrigation. Water Resources, and water power Engineering By Dr.P.N.Modi, Standard Book House 1990
- Engineering Hydrology by K. Subramanya, TMH.
- Irrigation Water Power and Water Resource Engg. By K.R. Arora.
- Water Resources Engg. By Larry W. Mays, John Wiley India
- Water Resources Engg. By Wurbs and James, John wiley India
- Water Resources Engg. By R.K.Linsely, McGraw Hill
- Irrigation and water Resources Engg.By G L Asawa, New age International Publishers
- Irrigation Theory and practices by A.M.Michel.
- Irrigation and water Power engineering by B.C.Punmia, Laxmi Publishers.

# ENVIRONMENTAL ENGINEERING LAB

**Course Code:** **BTCE 720** **Credit Units: 01**

## Course Contents:

1. Determination of solids (total, dissolved, organic, inorganic and settleable) in water
2. Determination of turbidity and the optimum coagulant dose
3. Determination of alkalinity and pH of water
4. Determination of hardness and chlorides in water
5. Determination of iron and manganese in water
6. Determination of sulphates and sulphides in water
7. Determination of D.O and B.O.D of waste water
8. Determination of available chlorine in bleaching powder and the chlorine dose required to treat the given water sample
9. Determination of coliforms in water
10. Demonstration of Instrumental methods of pollutant analysis

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

## Text & References:

- Standard method for the examination of water and waste water, 2005, APHA, AWWA, WPCF Publication

# STRUCTURAL DETAILING LAB

**Course Code:** **BTCE 721** **Credit Units: 01**

## Course Contents:

Preparation of working drawings for the following using any drafting software:

RC Beams- Simply supported, Continuous, Cantilever

T – beam / L-beam floor

Slabs – Simply supported, Continuous, One way and two way slabs.

Columns – Tied Columns and Spirally reinforced columns.

Isolated footings for RC Columns.

Combined rectangular and trapezoidal footings.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# COMMUNICATION SKILLS - V

**Course Code:** **BTCE 741** **Credit Units: 01**

## Course Objective:
To facilitate the learner with Academic Language Proficiency and make them effective users of functional language to excel in their profession.

## Course Contents:

**Module I**
Introduction to Public Speaking
Business Conversation
Effective Public Speaking
Art of Persuasion

**Module II: Speaking for Employment**
Types of Interview
Styles of Interview
Facing Interviews-Fundamentals and Practice Session
Conducting Interviews- Fundamentals and Practice Session
Question Answer on Various Dimensions

**Module III**
Resume Writing
Covering Letters
Interview Follow Up Letters

**Module IV: Basic Telephony Skills**
Guidelines for Making a Call
Guidelines for Answering a Call

**Module V: Work Place Speaking**
Negotiations
Participation in Meetings
Keynote Speeches

## Examination Scheme:

| Components | CT1 | CT2 | CAF | V | GD | GP | A |
|---|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 25 | 10 | 10 | 10 | 5 |

CAF – Communication Assessment File
GD – Group Discussion
GP – Group Presentation

## Text & References:

Jermy Comfort, Speaking Effectively, et.al, Cambridge
Krishnaswamy, N, Creative English for Communication, Macmillan
Raman Prakash, Business Communication, Oxford.
Taylor, Conversation in Practice,

# BEHAVIOURAL SCIENCE - VII
# (INDIVIDUAL, SOCIETY AND NATION)

**Course Code:** **BTCE 743** **Credit Units: 01**

## Course Objective:

This course aims at enabling students towards:
Understand the importance of individual differences
Better understanding of self in relation to society and nation
Facilitation for a meaningful existence and adjustment in society
Inculcating patriotism and national pride

## Course Contents:

**Module I: Individual differences & Personality**
Personality: Definition& Relevance
Importance of nature & nurture in Personality Development
Importance and Recognition of Individual differences in Personality
Accepting and Managing Individual differences (adjustment mechanisms)
Intuition, Judgment, Perception & Sensation (MBTI)
BIG5 Factors

**Module II: Managing Diversity**
Defining Diversity
Affirmation Action and Managing Diversity
Increasing Diversity in Work Force
Barriers and Challenges in Managing Diversity

**Module III: Socialization**
Nature of Socialization
Social Interaction
Interaction of Socialization Process
Contributions to Society and Nation

**Module IV: Patriotism and National Pride**
Sense of pride and patriotism
Importance of discipline and hard work
Integrity and accountability

**Module V: Human Rights, Values and Ethics**
Meaning and Importance of human rights
Human rights awareness
Values and Ethics- Learning based on project work on Scriptures like- Ramayana, Mahabharata, Gita etc.

**Module VI: End-of-Semester Appraisal**
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

## Examination Scheme:

| Components | SAP | A | Mid Term Test (CT) | VIVA | Journal for Success (JOS) |
|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 05 | 20 | 30 | 25 |

## Text & References:


- Davis, K. Organizational Behaviour,
- Bates, A. P. and Julian, J.: Sociology - Understanding Social Behaviour
- Dressler, David and Cans, Donald: The Study of Human Interaction
- Lapiere, Richard. T – Social Change
- Lindzey, G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology, Addison – Welsley, US.
- Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.
- Robbins O.B.Stephen;. Organizational Behaviour

# FRENCH - VII

**Course Code:** **BTCE 744** **Credit Units: 02**

## Course Objective:
Revise the portion covered in the first volume, give proper orientation in communication and culture.

## Course Contents:

**Module A: Unités 1 – 3: pp. 06 - 46**

**Contenu lexical:**

**Unité 1:** Rédiger et présenter son curriculum vitae
Exprimer une opinion
Caractériser, mettre en valeur
Parler des rencontres, des lieux, des gens

**Unité 2:** Imaginer - Faire des projets
Proposer - conseiller
Parler des qualités et des défauts
Faire une demande écrite
Raconter une anecdote
Améliorer son image

**Unité 3:** Exprimer la volonté et l'obligation
Formuler des souhaits
Exprimer un manque/un besoin
Parler de l'environnement, des animaux, des catastrophes naturelles

**Contenu grammatical:**

1. Le passé: passé composé/imparfait
2. Pronoms compléments directs/indirects, y/en (idées/choses)
3. Propositons relatives introduites par qui, que, où
4. Comparatif et superlatif
5. Le conditionnel présent
6. Situer dans le temps
7. Féminin des adjectifs
8. La prise de paroles: expressions
9. Le subjonctif: volonté, obligation

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- le livre à suivre: Campus: Tome 2

# GERMAN - VII

**Course Code:** **BTCE 745** **Credit Units: 02**

## Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany
Introduction to Advanced Grammar and Business Language and Professional Jargon

## Course Contents:

**Module I: Dass- Sätze**
Explain the use of the conjunction "-that", where verb comes at the end of the sentence

**Module II: Indirekte Fragesätze**
To explain the usage of the "Question Pronoun" as the Relative Pronoun in a Relative Sentence, where again the verb falls in the last place in that sentence.

**Module III: Wenn- Sätze**
Equivalent to the conditional "If-" sentence in English. Explain that the verb comes at the end of the sentence.

**Module IV: Weil- Sätze**
Explain the use of the conjunction "because-" and also tell that the verb falls in the last place in the sentence.

**Module V: Comprehension texts**
Reading and comprehending various texts to consolidate the usage of the constructions learnt so far in this semester.

**Module VI: Picture Description**
Firstly recognize the persons or things in the picture and identify the situation depicted in the picture;
Secondly answer questions of general meaning in context to the picture and also talk about the personal experiences which come to your mind upon seeing the picture.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:


- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant - 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

# PROJECT

**Course Code: BTCE 760 Credit Units: 6**

## Methodology

The topic for the project work can be a design/experimental/field surveying/ analytical/simulation project in any topic of Civil Engineering arena. The work can be done individually or by a group of students under the guidance of a faculty of the Department. On completion of the project, the students are to present a report covering various aspects learnt by them and give a presentation on same.

## Examination Scheme:

| | |
|---|---|
| Literature study/ Fabrication/ Experimentation | 40 |
| Written Report | 20 |
| Viva | 15 |
| Presentation | 25 |
| **Total** | **100** |

# INDUSTRIAL TRAINING

**Course Code:** **BTCE 750** **Credit Units: 06**

## Methodology:

Practical training is based on the theoretical subjects studied by students. An industry visit will be planned for each student and on-site practical training will be imparted with the help of the industry guide. The students are to learn various industrial, technical and administrative processes followed in the industry. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation on same.

## Examination Scheme:

| | |
|---|---|
| Feedback from industry/work place | 20 |
| Training Report | 40 |
| Viva | 15 |
| Presentation | 25 |
| **Total** | **100** |

# PRESTRESSED CONCRETE

**Course Code:** **BTCE 704** **Credit Units: 04**

## Course Objective:

This course deals with advanced concept of structural concrete design.

**Course Contents:**

**Module I: Materials for prestressed concrete and prestressing systems**
High strength concrete and high tensile steel – tensioning devices – pretensioning systems – post tensioning systems.

**Module II: Analysis of prestress and bending stresses**
Analysis of prestress – resultant stresses at a sector – pressure line or thrust line and internal resisting couple – concept of load balancing – losses of prestress – deflection of beams.

**Module III: Strength of prestressed concrete sections in flexure, shear and torsion**
Types of flexural failure – strain compatibility method – IS code procedure – design for limit state of shear and torsion.

**Module IV: Design of prestressed concrete beams and slabs**
Transfer of prestress in pre tensioned and post tensioned members – design of anchorage zone reinforcement – design of simple beams – cable profiles – design of slabs.
*A design project for the design and detailing of a large span beam is envisaged at this stage.*

## Examination Scheme:

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

N. Krishna Raju, Prestressed concrete, Tata McGraw Hill, 2000
T.Y. Lin, Ned H. Burns, Design of Prestressed Concrete Structures, John Wiley & Sons, 2004.
P. Dayaratnam, Prestressed Concrete, Oxford & IBH,1982
R. Rajagopalan, Prestressed Concrete, Narosa publishers, 2004.
BIS codes ( IS 1343 )

# REMOTE SENSING AND GEOGRAPHIC INFORMATION SYSTEMS

**Course Code:** **BTCE 705** **Credit Units: 04**

## Course Objective:
This course deals with remote sensing and geographic information systems.

## Course Contents:

**Module I**
Concepts and foundations of remote sensing- electromagnetic spectrum, energy sources and radiation principles, energy interactions in the atmosphere and with earth surface features, data acquisition and interpretation, reference data, ideal remote sensing systems, characteristics of real remote sensing systems. Classification of maps, map scale, spatial reference system, map projections, grid systems, linkage of GIS to remote sensing. Radar principle- Factors affecting microwave measurements, radar wavebands, SLAR systems, interaction between microwaves and earth's surface. Elements of photographic systems - film exposure, film density and characteristic curves, spectral sensitivity of black and white films, colour film and colour infrared film, filters, aerial cameras, film resolution, electronic and multi band imaging, aerial videography. Basic principles of photogrammetry – geometrical characteristics of aerial photographs, photographic scale, ground coverage, area measurement, relief displacement of vertical features, image parallax, ground control, mapping.

**Module II**
Remote sensing platforms and sensors - Satellite system parameters, sensor parameters, imaging sensor systems, earth resources and meteorological satellites with microwave sensors, scanners, radiometers. The Indian Remote Sensing Program. Data types and format, scale and legend.
Visual Image Interpretation - types of pictorial data products, fundamentals of visual image interpretation, equipment, image interpretation strategy, process of image interpretation, key elements of visual image interpretation, false colour composites, application in natural resources management. Digital Image Processing - Basic character of a digital image, image rectification & restoration, preprocessing, registration, enhancement, contrast, spatial feature and multi image manipulation, spatial filtering, image transformations, image classification, performance analysis, data merging and GIS integration.

**Module III**
GIS overview – what is GIS, components, definitions & terminology, uses, GIS queries & architecture, theoretical models & framework, GIS technology trends, data sources, collection, and entry, data formats & standards, types of analysis, spatial data modeling, GIS data management, database models, storage of data, object based GIS models, data input & editing, data quality issues. Data analysis & modeling – Integration of remote sensing & GIS.

**Module IV**
Application of Remote Sensing& GIS in natural resources management with specific reference to impact of mining activities on environment, biodiversity, coastal zone protection, flood management, forest protection, monitoring urban growth, managing watersheds & water resources, hydrologic modeling, preventing natural disasters etc.

## Examination Scheme:

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

- Thomas. M. Lillesand and Ralph. W. Kiefer, Remote Sensing and Image Interpretation:, John Wiley and Sons, Inc., 2002
- M. Anji Reddy, Text Book of Remote Sensing and Geographical Information Systems:, B.S. Publications, 2001
- Ian Heywood, Sarah Cornelius, and Steve Carver, An Introduction to Geographical Information Systems, Pearson Education Asia, 2001
- George. B. Korte, The GIS Book:, Onward Press, Thomson Learning, 2001
- D. P. Rao, Association of Exploration Geophysicists, 1995, Remote Sensing for Earth Resources.
- L.R.A. Narayan, Remote Sensing and its Application, Universities Press, 1999.
- P.A. Borrough, Rachel A. MsDonnel., Principles of Geographic Information System. Oxford University Press, 1998.
- E.T. Engman., R.J. Gurney, Remote Sensing in Hydrology, Chapman & hall, 1991.

# ADVANCED STRUCTURAL ANALYSIS

**Course Code:** **BTCE 706** **Credit Units: 04**

## Course Objective:
This course deals with advanced concept of structural concrete design.

## Course Contents:

**Module I: Approximate methods of analysis of multistorey frames**
Analysis for vertical load - substitute frames - loading condition for maximum positive and negative bending moment in beams and maximum bending moment in column - analysis for lateral load - portal method - cantilever method and factor method
**Matrix analysis of structures**
Static and kinematic indeterminacy - force and displacement methods of analysis - definition of flexibility and stiffness influence coefficients - development of flexibility matrices by physical approach

**Module II**
**Flexibility method:** flexibility matrices for truss and frame elements - load transformation matrix - development of total flexibility matrix of the structure - analysis of simple structures - plane truss and plane frame - nodal loads and element loads - lack of fit and temperature effects
**Stiffness method:** development of stiffness matrices by physical approach - stiffness matrices for truss and frame elements - displacement transformation matrix - development of total stiffness matrix - analysis of simple structures - plane truss and plane frame - nodal loads and element loads - lack of fit and temperature effects

**Module III: Direct stiffness method**
Introduction - element stiffness matrix - rotation transformation matrix - transformation of displacement and load vectors and stiffness matrix - equivalent nodal forces and load vectors - assembly of stiffness matrix and load vector - determination of nodal displacements and element forces - analysis of plane truss - plane frame (with numerical examples) - analysis of grid - space-truss and space-frame (without numerical examples)

**Module IV**
**Computer Implementation**
A project on development of an analysis program using some of the above method is envisaged at this stage
**Introduction to Analysis Packages**
The numerical examples solved using the analysis program developed in the above to be verified using common commercial packages.

## Examination Scheme:

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Wang C.K., Matrix Methods of Structural Analysis, International Textbook Company, 1970.
- Przemeineicki J.S., Theory of Matrix Structural Analysis, McGraw Hill, New York, 1985.

# HYDROLOGY AND FLOOD CONTROL

**Course Code:** **BTCE 707** **Credit Units: 04**

## Course Objective:
This course deals with advanced concept of hydrology.

## Course Contents:

**Module I**
Introduction hydrologic cycle, water budget equations, world water balance, application in engineering. Precipitation: Forms of precipitation, measurement, depth-area-duration & intensity- duration- frequency relationships, probable maximum precipitation.

**Module II**
Abstraction from Precipitation: Evaporation – process, measurement and estimation; Evapotranspiration- measurement and estimation; Initial Losses- Interception & Depression storage; Infiltration- process, capacities, indices, measurement & estimation

**Module III: Runoff and Hydrographs**
Hydrograph, runoff characteristics of stream, Yield, Rainfall-runoff correlations, flow duration curve, mass curve, droughts and floods. Factors affecting flood hydrographs, unit hydrograph and its analysis, s-curve hydrograph, synthetic and instantaneous unit hydrographs.

**Module IV: Flood**
Rational method, empirical formulae, unit hydrograph method, flood frequency studies, statistical analysis, regional flood frequency analysis, design storm & design flood, risk/reliability and safety factor; Flood Routing: Basic equation, hydrologic storage routing & attenuation, hydrologic channel routing, flood forecasting & control, hydraulic method of flood routing.

## Examination Scheme:

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

**Text & References:**


‘Hydrology for Engineers’ by Linsley R. K., Kohler M. A. and Paulhus J. L. H.
‘Engineering Hydrology’ by K. Subramanya
‘Hydrology: Principles. Analysis. Design’ by Raghunath H. M.
‘Handbook of Applied Hydrology’ by Chow V. T.
‘Irrigation: Theory & Practice’ by Michael A. M.

# ENVIRONMENTAL POLLUTION CONTROL ENGINEERING

**Course Code:** **BTCE 708** **Credit Units: 04**

## Course Objective:
This course deals with advanced concept of environmental pollution and its control.

## Course Contents:

**Module I**
Environmental pollution - interrelationship between various forms of pollution - surface water pollution surveys - integrated river basin water management - restoration of water bodies - water quality changes by domestic use - radioactive materials - thermal pollution and underground disposal - types of water pollutants and their effects - instrumentation for water quality and treatment

**Module II**
Air pollution control strategy – air pollution control technology – methodological factors affecting air pollution – air pollution surveys – instrumentation for air quality measurement – air quality standards

**Module III**
Land pollution – land pollution surveys - ecological aspects of vegetation control
Noise pollution - effects of noise - sources – noise control techniques - instruments for noise measurement
Light and glare pollution – outside lighting and glare sources - corrective procedures

**Module IV**
Water pollution laws and regulations
Air pollution control Act of India
Land pollution laws and regulations
The Environment (Protection) act, 1986

## Examination Scheme:

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

Rao C.S., Environmental Pollution Control Engineering, New Age International (P) Ltd, 1993.
Goel P.K., Water Pollution Causes, Effects & Control, New Age International (P) Ltd.
Birdie G.S. & Birdie J.S., Water Supply & Sanitary Engineering, Dhanapat Raj & Sons, 1997.
Liptak Bela G., Environmental Engineers Hand Book Vols I, II & III

# COMPUTER AIDED ANALYSIS AND DESIGN IN CIVIL ENGINEERING

**Course Code:** **BTCE 709** **Credit Units: 04**

## Course Objective:

The main objective of this programme is to train the student in the use of computers and creating a computer code as well as using commercially available software for the design of Civil Engineering structures.

## Course Contents:

**Module I: Introduction**

Fundamentals of CAD - Hardware and software requirements -Design process – Applications and benefits.

**Module II: Computer Graphics**

Graphic primitives - Transformations -Wire frame modeling and solid modeling –Graphic standards –Drafting packages

**Module III: Structural Analysis**

Fundamentals of finite element analysis - Principles of structural analysis -Analysis packages and applications.

**Module IV: Design & Optimisation**

Principles of design of steel and RC Structures -Applications to simple design problems – Optimisation techniques - Algorithms - Linear Programming – Simplex method

**Module V: Expert Systems**

Introduction to artificial intelligence - Knowledge based expert systems -Rules and decision tables – Inference mechanisms - Simple applications.

## Examination Scheme:

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

Groover M.P. and Zimmers E.W. Jr., “CAD/CAM, Computer Aided Design and Manufacturing”, Prentice Hall of India Ltd, New Delhi, 1993.
Krishnamoorthy C.S. Rajeev S., “Computer Aided Design”, Narosa Publishing House, New Delhi, 1993
Harrison H.B., “Structural Analysis and Design”, Part I and II Pergamon Press, Oxford, 1990.
Rao S.S., “Optimisation Theory and Applications”, Wiley Eastern Limited, New Delhi, 1977.
Richard Forsyth (Ed), “Expert System Principles and Case Studies”, Chapman and Hall, London, 1989.

# ADVANCED CONCRETE DESIGN

**Course Code: BTCE 801 Credit Units: 04**

## Course Objective:
This course deals with advanced design of concrete structures.

## Course Contents:

**Module I**
**Large span concrete roofs**
Introduction– classification- behaviour of flat slabs - direct design and equivalent frame method- codal provisions - waffle slabs.
**Module II**
**Deep beams**
Analysis of deep beams- design as per BIS - design using strut and tie method.
**Chimneys**
Analysis of stresses in concrete chimneys - uncracked and cracked sections- codal provisions- design of chimney.
A project involving the design of a deep beam and concrete chimney is envisaged at this stage.

**Module III: Water tanks /Bunkers/Silos**
Introduction- rectangular and circular with flat bottom- spherical and conical tank roofs- staging- design as per BIS.
A project involving the design and detailing of a water tank is envisaged at this stage.

**Module IV: Bridges**
Design of slab culvert – R.C box culverts –T-beam bridges – Concept on design of continuous bridges, balanced cantilever bridges, arch bridges and rigid frame bridges.
A project involving the design and detailing of a slab culvert/ T-beam bridge is envisaged at this stage.

## Examination Scheme:

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Purushothaman. P, Reinforced Concrete Structural Elements-, Tata McGraw Hill, 1986
- G.S. Ramaswamy, Design and Construction of Concrete Shell Roofs-CBS publishers, 1986
- Ashok K Jain, Reinforced Concrete –Nem Chand Bros. Roorkee, 1998
- Jain & Jaikrishna, Plain and Reinforced Concrete – Vol I & II, Nem Chand Bros., Roorkee, 2000.
- Taylor C Pere, Reinforced Concrete Chimneys, Concrete publications, 1960
- Design of deep girders, Concrete Association of India, 1960
- Mallick & Gupta, Reinforced Concrete, - Oxford & IBH, 1982
- BIS codes (IS 456, IS 2210, IS 4998, IS 3370, SP 16, SP 24, SP 34).
- IRC Codes (IRC 5, IRC 6, IRC 21)

# ENGINEERING ECONOMICS AND MANAGEMENT

**Course Code: BTCE 802 Credit Units: 03**

## Course Objective:
The main objective of this course is to train the student construction management and quantity surveying

## Course Contents:

**Module I: Organisations and their Economic Environment**
Definition of Economics and Managerial Economics – Nature and Scope – Definition and Concept of Good, Want, Value, Wealth, Utility – Utility and Demand – Law of Diminishing Marginal Utility – Assumptions and Importance. Demand and Supply – Law of Demand and Law of Supply. Market price and natural price. Standard market forms- Monopoly, Perfect competition. Organisational forms- Proprietorship, partnership, Joint Stock Company – Cooperative organisation.

**Module II: Macroeconomics**
Money- nature and functions – Inflation and Deflation – Kinds of Banking - commercial banks – Central banking – Credit instrument - Monetary Policy – International trade – Balance of trade and Balance of Payments – taxation – Direct and Indirect taxes – Impact and Incidence of tax- Concept of National Income – Features with reference to developing countries.

**Module III: Introduction to Management**
Management Theory- Characteristics of management – Systems Approach to management – Concepts of goal, objective, strategies, programmes. Decision making under certainty, uncertainty and risk – Introduction to functional areas of management – Operations management, Human resources management, marketing management.

**Module IV: Financial and Inventory Management**
Need for Financial Management – Types of financing – Short term and long term Borrowing – Equity financing – Analysis of Financial Statement – balance sheet – Profit and Loss account – Fund flow statement – Ratio Analysis . Investment and Financial decision – Financial control and Job control.
Functions and objectives of Inventory management – Decision models – Economic Order Quantity (EOQ) model – sensitivity analysis of EOQ model, Economic production lot size model – inventory model with planned shortages – Periodic order quantity – single period Inventory models – Simulation model for inventory analysis.

## Examination Scheme:

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Konni, Donnel C.O. and Weighnrich. H., Management, Eight Edition, McGraw Hill International Book Company, 1997.
- Philip Kotler, Marketing Management, Prentice-Hall of India, Edition 1998.
- G.W. Plossl, Production and inventory control by, Prentice Hall.
- Paul A Samuelson and William D Nardhaus, Economics, McGraw Hill International Edition.
- Barthwal R R, Industrial Economics – An Introductory Text Book, New Age International Pvt Ltd, 2000.
- Aninnya Sen, Microeconomics – Theory and Applications, OUP.
- Sharma J.L., Construction management and accounts, Sathya Prakashan, New Delhi, 1994.
- Srinath,L.S. An Introduction to Project Management, Tata McGraw Hill publications, 1995.

# PROJECT

**Course Code:** **BTCE 860** **Credit Units: 9**

## Methodology

Topics of project are to be based on the latest trends, verifying engineering concepts /principals and should involve elementary research work. The projects may involve design, fabrications, testing, computer modeling, and analysis of any engineering problem. On completion of the project, the students are to present a report covering various aspects learnt by them and give a presentation on same.

## Examination Scheme:

| | |
|---|---|
| Literature study/ Fabrication/ Experimentation | 40 |
| Written Report | 20 |
| Viva | 15 |
| Presentation | 25 |
| **Total** | **100** |

# COMMUNICATION SKILLS - VI

**Course Code:** **BTCE 841** **Credit Units: 01**

## Course Objective:

The modules are designed to enhance the communicative competence of the learners to equip them with efficient interpersonal communication.

## Course Contents:

**Module I: Dynamics of Group Discussion**
Introduction,
Methodology
Role Functions
Mannerism
Guidelines

**Module II: Communication through Electronic Channels**
Introduction
Technology based Communication Tools
Video Conferencing
Web Conferencing
Selection of the Effective Tool
E-mails, Fax etc.

**Module III: Effective Public Speaking**
Types
Essentials
Success in Public Speaking
Dos and Don'ts

## Examination Scheme:

| Components | CT1 | CT2 | CAF | V | GD | GP | A |
|---|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 25 | 10 | 10 | 10 | 5 |

CAF – Communication Assessment File
GD – Group Discussion
GP – Group Presentation

## Text & References:


- Jermy Comfort, Speaking Effectively, et.al, Cambridge
- Krishnaswamy, N, Creative English for Communication, Macmillan
- Raman Prakash, Business Communication, Oxford.
- Taylor, Conversation in Practice,

# BEHAVIOURAL SCIENCE - VIII
# (PERSONAL AND PROFESSIONAL EXCELLENCE)

**Course Code:** **BTCE 843** **Credit Units: 01**

## Course Objective:
Importance of Personal and Professional excellence
Inculcating the components of excellence

## Course Contents:

**Module I: Components of Excellence**
Personal Excellence:
Identifying long-term choices and goals
Uncovering the talent, strength & style
Analyzing choke points in your personal processes by analysis in area of placements, events, seminars, conference, extracurricular activities, projects etc.

**Module II: Managing Personal Effectiveness**
Setting goals to maintain focus
Dimensions of personal effectiveness ( self disclosure, openness to feedback and perceptiveness)
Integration of personal and organizational vision for effectiveness
A healthy balance of work and play
Managing Stress creatively and productively

**Module III: Personal Success Strategy**
Time management
Handling criticism and interruptions
Dealing with difficult people
Mapping and evaluating the situations
Identifying long-term goals

**Module IV: Positive Personal Growth**
Understanding & Developing positive emotions
Positive approach towards future
Resilience during loss and challenge

**Module V: Professional Success**
Building independence & interdependence
Reducing resistance to change
Continued reflection (Placements, events, seminars, conferences, projects extracurricular Activities etc.)

**Module VI: End-of-Semester Appraisal**
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

## Examination Scheme:

| Components | SAP | A | Mid Term Test (CT) | VIVA | Journal for Success (JOS) |
|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 05 | 20 | 30 | 25 |

# FRENCH - VIII

**Course Code:** **BTCE 844** **Credit Units: 02**

## Course Objective:
Provide students with the necessary linguistic tools
- to face up to different situations of communication
- to enhance their capacity in oral/written comprehension/expression

## Course Contents:

**Module B: Unités 4, 5, 6: PP. 48 - 86**

**Contenu lexical:**

**Unité 4:**
1. Présenter une information/les circonstances d'un événement
2. Exprimer la possibilité/la probabilité
3. Exprimer une quantité indéfinie
4. Comprendre et raconter un fait div

**Unité 5:**
1. Parler d'une passion, d'une aventure
2. Choisir/créer
3. Exprimer la surpirse/des sentiments

**Unité 6:**
1. Exprimer la cause et la conséquence
2. Exprimer la crainte et rassurer
3. Faire une démonstration

**Contenu grammatical:**

la construction passive
la forme impersonnelle
l'interrogation
les adjectifs et les pronoms indéfinis
les pronoms interrogatifs et démonstratifs
la construction avec deux pronoms
le subjonctif dans l'expression des sentiments, de la crainte, du but
constructions permettant l'expression de la cause et de la conséquence
l'enchaînement des idées: succession et opposition

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- le livre à suivre: Campus: Tome 2

# GERMAN - VIII

**Course Code: BTCE 845 Credit Units: 02**

## Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany
Introduction to Advanced Grammar and Business Language and Professional Jargon

## Course Contents:

**Module I: Reading and comprehension**
Reading texts and comprehending them

**Module II: Information about German History**
Acquiring information about German History through appropriate texts and stories

**Module III: Bio data/Curriculam vitae**
Writing a bio-data in the proper format with all essential components

**Module IV: Informal letters**
Reading and writing informal letters

**Module V: Business etiquette**
Business etiquette in Germany and types of companies

**Module VI: Interview skills**
To learn to face interviews
Read a text 'Interviewspiel'

**Module VII: Picture Description**
Firstly recognize the persons or things in the picture and identify the situation depicted in the picture;
Secondly answer questions of general meaning in context to the picture and also talk about the personal experiences which come to your mind upon seeing the picture.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:


- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant - 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

# FINITE ELEMENT METHOD

**Course Code:** **BTCE 803** **Credit Units: 04**

## Course Objective:

At the end of this course the student shall have a basic knowledge of finite element method and shall be able to analyse linear elastic structures, that he has studied about in core courses, using finite element method.

## Course Contents:

**Module I: Boundary value problems and the need for numerical discretisation**
Introduction, examples of continuum problems, history of finite element method.
**Weighted residual methods**
Approximation by trial functions, weighted residual forms, piecewise trial functions, weak formulation, Galerkin method, examples of one-, two- and three-dimensional problems.

**Module II: Higher order finite element approximation**
Degree of polynomial in trial functions and rate of convergence, the patch test, shape functions for *C*0 and *C*1 continuity, one-, two- and three-dimensional shape functions.
**Isoparametric formulation**
The concept of mapping, isoparametric formulation, numerical integration, mapping and its use in mesh generation.

**Module III: Variational methods**
Variational principles, establishment of natural variational principles, approximate solution of differential equations by Rayleigh-Ritz method, the use of Lagrange multipliers, general variational principles, penalty functions, least-square method.
**Partial discretisation and time-dependent problems**
Partial discretisation applied to boundary value problems, time-dependent problems via partial discretisation, analytical solution procedures, finite element solution procedures in time domain.

**Module IV: Generalised finite elements and error estimates**
The generalised finite element method, the discretisation error in a numerical solution, measure of discretisation error, estimate of discretisation error.
**Coordinate Transformation:** Transformation of vectors and tensors, transformation of stiffness matrices, degree of freedom within elements, condensation, condensation and recovery algorithm, substructuring, structural symmetry.

## Examination Scheme:

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Zienkiewicz, O.C., and Morgan, K., Finite Element Approximation, John Wiley & Sons, 1983.
- Reddy, J.N., An Introduction to the Finite Element Method, McGraw Hill, 2006.
- Huebner, K.H., Thornton, E.A., and Byrom, T.G., The Finite Element Method for Engineers, John Wiley & Sons, 1995.
- Hutton, D.V., Fundamentals of Finite Element Analysis, McGraw Hill, 1991.
- Kikuchi, N., Finite Element Methods in Mechanics, Cambridge University Press, 1986.
- Cook, R.D., Malkus, D.S., Plesha, M.E., and Witt, R.J., Concepts and Applications of Finite Element Analysis, John Wiley & Sons, 2003.
- Zienkiewicz, O.C., and Taylor, R.L., The Finite Element Method, Vols I to III, McGraw Hill, 1999.

# TRAFFIC ENGINEERING AND MANAGEMENT

**Course Code: BTCE 804 Credit Units: 04**

## Course Objective:

The students acquire comprehensive knowledge of traffic surveys and studies such as 'Volume Count', 'Speed and delay', 'Origin and destination', 'Parking', 'Pedestrian' and 'Accident surveys'. They achieve knowledge on design of 'at grade' and 'grade separated' intersections. They also become familiar with various traffic control and trafficmanagement measures.

## Course Contents:

**Module I: Introduction**

Significance and scope, Characteristics of Vehicles and Road Users, Skid Resistance and Braking Efficiency (Problems), Components of Traffic Engineering- Road, Traffic and Land Use Characteristics

**Module II: Traffic Surveys and Analysis**

Surveys and Analysis - Volume, Capacity, Speed and Delays, Origin and Destination, Parking, Pedestrian Studies, Accident Studies and Safety Level of Services- Basic principles of Traffic Flow.

**Module III: Traffic Control**

Traffic signs, Road markings, Design of Traffic signals and Signal co-ordination (Problems), Traffic control aids and Street furniture, Street Lighting, Computer applications in Signal design

**Module IV: Geometric Design of Intersections**

Conflicts at Intersections, Classification of 'At Grade Intersections, - Channallised Intersections - Principles of Intersection Design, Elements of Intersection Design, Rotary design, Grade Separation and interchanges - Design principles.

**Module V: Traffic Management**

Traffic Management- Transportation System Management (TSM) - Travel Demand Management (TDM), Traffic Forecasting techniques, Restrictions on turning movements, Oneway Streets, Traffic Segregation, Traffic Calming, Tidal flow operations, Exclusive Bus Lanes, Introduction to Intelligent Transportation System (ITS).

## Examination Scheme:

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Kadiyali L R, Traffic Engineering and Transport Planning, Khanna Technical Publications, Delhi, 2000.
- Khanna K and Justo C E G, Highway Engineering, Khanna Publishers, Roorkee, 2001.
- Indian Roads Congress (IRC) specifications: Guidelines and special publications on Traffic Planning and Management
- Guidelines of Ministry of Road Transport and Highways, Government of India.
- Subhash C. Saxena, A Course in Traffic Planning and Design, Dhanpat Rai Publications, New Delhi, 1989.
- Transportation Engineering – An Introduction, C.Jotin Khisty, B.Kent Lall, Prentice Hall of India Pvt Ltd, 2006.

# COMPUTER APPLICATION IN HYDRO ENGINEERING

**Course Code:** **BTCE 805** **Credit Units: 04**

## Course Objective:

This course deals with computer application in hydro engineering.

## Course Contents:

**Module I**

Review of Basic Hydraulic Principles – General flow characteristics, Energy and momentum principles and Equations, Pressure and free surface flows, HGL and TEL, Major and minor losses, Computer applications to simple flow problems, Introduction to SAP.

Storm Sewer Design and Gravity Piping Systems – Review of basic hydrologic principles, Gradually varied flow, Mixed flow profiles, Storm Sewer Applications.

**Module II**

Drainage Inlet Design, Culvert Hydraulics and Design.

Pressure Piping Systems & Water Quality Analysis – Analysis and design of water distribution systems

Introduction to Some Packages such as Flow Master, Storm CAD, Culvert Master, Water CAD, and Sewer CAD and EPANET.

**Module III**

Flow Routing - Hydrologic and hydraulic methods of routing, Sanitary sewer design including extended period simulation and routing.

Watershed modeling – Basic principles – Introduction to SWMM

**Module IV**

Water quality modeling in streams- Basic models, Introduction to software packages.

Ground water quality modeling

Introduction to remote sensing and GIS applications and web based applications

## Examination Scheme:

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Michael. M. Meadows & Thomas M Walski, Computer Applications in Hydraulic Engineering, Haestad Press, 2001.
- QIP short term course notes advanced IT applications in Civil Engineering: IIT, Kharagpur, 2001.
- L.W. Mays, Water Resources Engineering, John Wiley and Sons, 2001.
- S.C. Chapra, Surface Water Quality Modeling, McGraw Hill, Inc., 1997.

# WATER RESOURCES SYSTEM PLANNING AND DESIGN

**Course Code:** **BTCE 806** **Credit Units: 04**

## Course Objective:
This course deals with design and planning of water resources system.

## Course Contents:

**Module I**
Introduction: Water systems engineering –scope and approach.
Issues and the systems planning approach- water system dynamics- water resource development alternatives – Water systems planning objectives- Constraints and Criteria – Economic and Econometric principles

**Module II**
Hydrologic input analysis, Demand analysis, System elements & Subsystem planning - Stochastic planning and management - Design and management issues.

**Module III**
Optimization methods and their application in W.R. systems. Linear programming and Dynamic programming models. Problem formulation for W.R systems – Multi objective planning – Large scale system analysis- Case studies.

**Module IV**
Ground water system planning – Conjunctive surface and G.W development- Hierarchical approach- Water quality management planning- Regional planning- Policy issues.

## Examination Scheme:

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- M. C. Chathurvedi, W.R. Systems – Planning & Management, Tata McGarw Hill Publications, New Delhi
- Louks D P etal W.R System Planning & Analysis, Prentice Hall - 1981.
- Maass. A. etal – Design Water Resources Systems – Mc. Millan. 1968
- Goodman. A.S. Principles of Water Resources planning, Prentice – Hall, 1984

# FUNCTIONAL DESIGN OF BUILDING

**Course Code:** **BTCE 807** **Credit Units: 04**

## Course Objective:

Modern buildings are not mere load bearing structures. They have to be provided with all facilities and amenities for the purposes for which they are meant, be it office space, residential building, warehouses or large shopping malls. Consideration of comfort and functional requirements are significant and energy efficiency is now a critical factors. The course exposes the students these aspects of modern building design and construction.

## Course Contents:

**Module I: Building Physics**
**Climate:** Global climatic factors – Elements of climate – Data and measurement of elements of climate – Graphical representation methods - Site climate - Classification of climates.
**Thermal comfort:** Thermal balance of human body - Subjective variables - Thermal comfort indices and uses - Comfort zone.
**Thermo-physical properties of building materials:** Thermal quantities and their units - Periodic heat flow and its characteristics - Heat flow calculations.
**Sun's movement and building:** Solar temperature concept - Solar gain factor – Apparent movement of sun - Solar charts and its use - Sun control devices – External shading devices, Internal blinds and curtains and Special glasses
**Heat flow and thermal insulation**
Heat flow through buildings - Thermal gradient; Insulating materials - Properties – Thermal insulation of roofs, Exposed walls and Openings

**Module II: Building services**
**Vertical transportation:** Stairs - Types and design considerations; Elevators - Types and design considerations; Escalators - features, operation & arrangement; Ramps.
**Ventilation and air conditioning:** Ventilation requirements - Natural and mechanical ventilation; Air conditioning - Heat exchange of building - Calculation of air conditioning load - Summer and winter air conditioning - Parts and operation of a/c plant - Systems of air conditioning.
**Plumbing services:** Typical details of water supply and sewage disposal arrangements for buildings - Standard requirements.

**Module III: Lighting**
Photometric quantities - Day lighting - Day light factor and components - Artificial lighting - Lamps and luminaries - Polar distribution curves - Design of artificial lighting – Lumen method - Point by point method - Glare - Illumination requirements for various buildings -Measurement of illumination.
**Acoustics**
Properties of sound - Frequency - Pitch - Intensity - Power- Pressure - Loudness – Decibel scale; Room acoustics - Reverberation - Sabine's formula - Acoustical defects – Sound absorbing materials and constructions; Requirements for good acoustics - General principles of acoustic design; Sound insulation -Transmission loss – Methods of sound insulation construction of walls, floors and roofs.

**Module IV: Environment**
Introduction to environment – site and built up space relationships – Design as a human activity – principles of architectural design.
Functional planning – Introduction to anthropometrics and ergonomics – Occupancy classification of buildings – Essentials of National Building Code – Essentials of Building and development rules.

## Examination Scheme:

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Texts & References:


- Punmia B.C., Ashok Kr. Jain, Arun Kr. Jain, Building Construction, Laxmi Publications, New Delhi (2008).
- Duggal, S. K, Building Materials, 2nd ed., New Age (New Delhi) 2008.
- K. S. Jagadish, B. V. Venkatarama Reddy, K. S. Nanjunda Rao, Alternative Building Materials and Technologies, New Age, New Delhi (2008)

# ADVANCED STEEL DESIGN

**Course Code:** **BTCE 808** **Credit Units: 04**

## Course Objective:
This course deals with advanced design of steel structures.

## Course Contents:

**Module I: Plate girder bridges**
Plate girders – loads – equivalent uniformly distributed loads – Indian railway code of practice – design of plate girder bridges – bearings.
*A design project involving the design of a plate girder is envisaged at this stage*

**Module II**
**Bunkers, Silos**
Introduction– Janssen's theory– Airy's theory– design criteria.
**Transmission Towers**
Introduction–loads on towers– analysis–design of members and foundation.
*A design project involving the design of any of the above structures is envisaged at this stage*

**Module III**
**Gantry Girder**
Design of gantry girder – gantry to column connection.
**Water Tanks**
Design of rectangular, pressed steel tanks – design of suspended bottom tanks – cylindrical tank with hemispherical bottom – design of staging.
*A design project involving the design and detailing of a gantry girder and water tank is envisaged at this stage*

**Module IV**
**Light gauge members** – Light gauge sections – design considerations – allowable stresses – buckling, design of compression members, tension members and laterally supported beams – connections.
*A design project involving the design of a light gauge structure is envisaged at this stage*

## Examination Scheme:

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Ramchandra, Design of Steel Structures Vol I and II, Standard book house, 1991
- P. Dayaratnam, Design of Steel Structures, (Wheeler),1998
- M. Raghupathi, Design of Steel Structures, Tata McGraw Hill, 1985
- Lin & Breslar, Design of Steel Structures, John Wiley & Sons, 1963
- BIS codes ( IS 800, SP 6, IS 804, IS 805,IS 6533, IS 9178, IS 801, IS 811 )

# ARCHITECTURE AND TOWN PLANNING

**Course Code: BTCE 809 Credit Units: 04**

## Course Objective:

To provide the basic knowledge on the principles of design of buildings relating to the environment and climate.

## Course Contents:

**Module I: Architectural Design**

Architectural Design – an analysis – integration of function and aesthetics – Introduction to basic elements and principles of design.

**Module II: Site Planning**

Surveys – Site analysis – Development Control – Layout regulations- Layout design concepts.

**Module III: Building Types**

Residential, institutional, commercial and Industrial – Application of anthropometry and space standards-Inter relationships of functions – Safety standards – Building rules and regulations – Integration of building services – Interior design

**Module IV: Climate and Environmental Responsive Design**

Man and environment interaction- Factors that determine climate – Characteristics of climate types – Design for various climate types – Passive and active energy controls – Green building concept

**Module V: Town Planning**

Planning – Definition, concepts and processes- Urban planning standards and zoning regulations- Urban renewal – Conservation – Principles of Landscape design

## Examination Scheme:

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Francis D.K. Ching, "Architecture: Form, Space and Order", VNR, N.Y., 1999.
- Givoni B., "Man Climate and Architecture", Applied Science, Barking ESSEX, 1982
- Edward D.Mills, "Planning and Architects Handbook", Butterworth London, 1995.
- Gallian B.Arthur and Simon Eisner, "The Urban Pattern – City Planning and Design", Affiliated Press Pvt. Ltd., New Delhi, 1995.
- Margaret Robert, "An Introduction to Town Planning Techniques", Hutchinso London, 1990.

# INDUSTRIAL WASTE ENGINEERING

**Course Code:** **BTCE 810** **Credit Units: 04**

## Course Objective:

To provide the basic knowledge on the principles of design of buildings relating to the environment and climate.

## Course Contents:

**Module I**

Nature and characteristics of Industrial wastes- prevention versus control of industrial pollution- Linkage between technology and pollution prevention- tools for clean processes- reuse, recycle, recovery, source reduction, raw material substitution, toxic use reduction and process modification- separation technologies as tools for waste minimization- Flow sheet analysis- Energy and resource audits-waste audits

**Module II**

Preliminary treatment of industrial waste water – volume reduction – strength reduction – neutralization – equalization and proportioning

Treatment of industrial waste- suitability of different techniques- disposal of industrial waste

**Module III**

Effluent generation from textile industry – paper industry – dairy – fertilizer – thermal power plants - effluent characteristics- treatment

**Module IV**

Environmental impact of textile industry – paper industry - dairy - fertilizer – thermal power plant

Study of damages caused by industrial pollution in India and Kerala (typical problems).

## Examination Scheme:

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Nemerow, N, Theory and Practices of Industrial Waste Treatment, Addison Wiley (1963)
- Agardy, Franklin J. Strategies of Industrial and Hazardous Waste Management, John Wiley & Sons (1998)
- Nemerow Nelson Leonard Industrial Waste Treatment: Contemporary Practice and Vision for the Future, Butterworth-Heinemann (2006)
- Larry W Canter, Environmental Impact Assessment, McGraw Hill, Inc., (1996)

**Bachelor of Technology (Information Technology)**

**Programme Code: BTI**

**Duration – 4 Years Full Time**

**Programme Structure**
**and**
**Curriculum & Scheme of Examination**

**2017-18**

# AMITY UNIVERSITY

## MADHYA PRADESH

# PREAMBLE

Amity University aims to achieve academic excellence by providing multi-faceted education to students and encourage them to reach the pinnacle of success. The University has designed a system that would provide rigorous academic programme with necessary skills to enable them to excel in their careers.

This booklet contains the Programme Structure, the Detailed Curriculum and the Scheme of Examination. The Programme Structure includes the courses (Core and Elective), arranged semester wise. The importance of each course is defined in terms of credits attached to it. The credit units attached to each course has been further defined in terms of contact hours i.e. Lecture Hours (L), Tutorial Hours (T), Practical Hours (P). Towards earning credits in terms of contact hours, 1 Lecture and 1 Tutorial per week are rated as 1 credit each and 2 Practical hours per week are rated as 1 credit. Thus, for example, an L-T-P structure of 3-0-0 will have 3 credits, 3-1-0 will have 4 credits, and 3-1-2 will have 5 credits.

The Curriculum and Scheme of Examination of each course includes the course objectives, course contents, scheme of examination and the list of text and references. The scheme of examination defines the various components of evaluation and the weightage attached to each component. The different codes used for the components of evaluation and the weightage attached to them are:

| Components | Codes | Weightage (%) |
|---|---|---|
| Case Discussion/ Presentation/ Analysis | C | 05 - 10 |
| Home Assignment | H | 05 - 10 |
| Project | P | 05 - 10 |
| Seminar | S | 05 - 10 |
| Viva | V | 05 - 10 |
| Quiz | Q | 05 - 10 |
| Class Test | CT | 10 - 15 |
| Attendance | A | 05 |
| End Semester Examination | EE | 70 |

It is hoped that it will help the students study in a planned and a structured manner and promote effective learning. Wishing you an intellectually stimulating stay at Amity University.

June, 2017

# PROGRAMME STRUCTURE-B.Tech(IT)

## FIRST SEMESTER

| New Course Code | Course Title | Lecture (L) Hours Per week | Tutorial (T) Hours Per week | Practical (P) Hours Per week | Total Credits |
|---|---|---|---|---|---|
| **Compulsory Courses - 2017-18** | | | | | |
| BTI 101 | Applied Mathematics – I | 3 | 1 | - | 4 |
| BTI 102 | Applied Physics - I – Fields & Waves | 2 | 1 | - | 3 |
| BTI 103 | Element of Mechanical Engineering | 2 | - | - | 2 |
| BTI 104 | Introduction to Computers & Programming in C | 2 | 1 | - | 3 |
| BTI 105 | Applied Chemistry | 2 | 1 | - | 3 |
| BTI 106 | Environmental Studies - I | 2 | | - | 2 |
| BTI 120 | Applied Physics Lab – I | - | - | 2 | 1 |
| BTI 121 | Element of Mechanical Engineering Lab | - | - | 2 | 1 |
| BTI 122 | Programming in C Lab | - | - | 2 | 1 |
| BTI 123 | Applied Chemistry Lab | - | - | 2 | 1 |
| BTI 124 | Engineering Graphics Lab | - | - | 2 | 1 |
| | | **Total** | | | **22** |

**Optional Courses - Value Added Courses;**

| Course Code | Course Title | Teaching/ Instructional Hours/Semester |
|---|---|---|
| BTI 141 | English | 30 |
| BTI 143 | Behavioural Science - I | 30 |
| | Foreign Language – I | 30 |
| BTI 144 | French | 30 |
| BTI 145 | German | 30 |
| BTI 146 | Spanish | 30 |
| BTI 147 | Japanese | 30 |
| BTI 148 | Chinese | 30 |

## SECOND SEMESTER

| New Course Code | Course Title | Lecture (L) Hours Per week | Tutorial (T) Hours Per week | Practical (P) Hours Per week | Total Credits |
|---|---|---|---|---|---|
| **Compulsory Courses - 2017-18** | | | | | |
| BTI 201 | Applied Mathematics - II | 3 | 1 | - | 4 |
| BTI 202 | Applied Physics - II – Modern Physics | 2 | 1 | - | 3 |
| BTI 203 | Electrical Science | 2 | 1 | - | 3 |
| BTI 204 | Object oriented programming using C++ | 2 | 1 | - | 3 |
| BTI 205 | Engineering Mechanics | 2 | 1 | - | 3 |
| BTI 206 | Environmental Studies-II | 2 | - | - | 2 |
| BTI 220 | Applied Physics Lab - II | - | - | 2 | 1 |
| BTI 221 | Electrical Science Lab | - | - | 2 | 1 |
| BTI 222 | Object oriented programming using C++ Lab | - | - | 2 | 1 |
| BTI 223 | Engineering Mechanics Lab | - | - | 2 | 1 |
| | | **Total** | | | **22** |

| Course Code | Course Title | Teaching/ Instructional Hours/Semester |
|---|---|---|
| **Optional Courses - Value Added Courses;** | | |
| BTI 240 | English | 30 |
| BTI 243 | Behavioural science - II | 30 |
| | Foreign Language - II | |
| BTI 244 | French | 30 |
| BTI 245 | German | 30 |
| BTI 246 | Spanish | 30 |
| BTI 247 | Japanese | 30 |
| BTI 248 | Chinese | 30 |

**TERM PAPER – 6 – 8 WEEKS**

## THIRD SEMESTER

| New Course Code | Course Title | Lecture (L) Hours Per week | Tutorial (T) Hours Per week | Practical (P) Hours Per week | Total Credits |
|---|---|---|---|---|---|
| **Compulsory Courses - 2017-18** | | | | | |
| BTI 301 | Applied Mathematics – III | 3 | 1 | - | 4 |
| BTI 302 | Analog Electronics | 3 | 1 | - | 4 |
| BTI 303 | Operating Systems | 2 | 1 | - | 3 |
| BTI 304 | Data Structure Using C | 2 | 1 | - | 3 |
| BTI 305 | Database Management Systems | 2 | 1 | - | 3 |
| BTI 320 | Analog Electronics Lab | - | - | 2 | 1 |
| BTI 321 | Data Base Management Systems Lab | - | - | 2 | 1 |
| BTI 322 | UNIX Programming Lab-I | - | - | 2 | 1 |
| BTI 323 | Data Structure Lab | - | - | 2 | 1 |
| BTI 330 | Term Paper (Evaluation) | - | - | - | 2 |
| | | **Total** | | | 23 |
| **Optional Courses - Value Added Courses;** | | | | | |
| **Course Code** | **Course Title** | **Teaching/ Instructional Hours/Semester** | | | |
| BTI 341 | Communication Skills – I | 30 | | | |
| BTI 343 | Behavioural Science - III | 30 | | | |
| | Foreign Language – III | | | | |
| BTI 344 | French | 30 | | | |
| BTI 345 | German - III | 30 | | | |
| BTI 346 | Spanish – III | 30 | | | |
| BTI 347 | Japanese - III | 30 | | | |
| BTI 348 | Chinese – III | 30 | | | |

## FOURTH SEMESTER

| New Course Code | Course Title | Lecture (L) Hours Per week | Tutorial (T) Hours Per week | Practical (P) Hours Per week | Total Credits |
|---|---|---|---|---|---|
| **Compulsory Courses - 2017-18** | | | | | |
| BTI 401 | Theory of Automata & Computation | 3 | 1 | - | 4 |
| BTI 402 | Digital Electronics | 2 | 1 | - | 3 |
| BTI 403 | Discrete Mathematics | 3 | 1 | - | 4 |
| BTI 404 | Communication Systems | 3 | 1 | - | 4 |
| BTI 405 | Computer Graphics | 3 | 1 | - | 4 |
| BTI 420 | Digital Electronics Lab | - | - | 2 | 1 |
| BTI 421 | Communication Systems Lab | - | - | 2 | 1 |
| BTI 422 | Computer Graphics Lab | - | - | 2 | 1 |
| | | Total | | | 22 |

**Optional Courses - Value Added Courses;**

| Course Code | Course Title | Teaching/ Instructional Hours/Semester |
|---|---|---|
| BTI 441 | Communication Skills - II | 30 |
| BTI 443 | Behavioural Science - IV | 30 |
| | Foreign Language – IV | |
| BTI 444 | French | 30 |
| BTI 445 | German | 30 |
| BTI 446 | Spanish | 30 |
| BTI 447 | Japanese | 30 |
| BTI 448 | Chinese | 30 |

## PRACTICAL TRAINING - I: 6 – 8 WEEKS

## FIFTH SEMESTER

| New Course Code | Course Title | Lecture (L) Hours Per week | Tutorial (T) Hours Per week | Practical (P) Hours Per week | Total Credits |
|---|---|---|---|---|---|
| **Compulsory Courses - 2017-18** | | | | | |
| BTI 501 | Introduction to Open Source Technologies (PHP, MySql) | 2 | 1 | - | 3 |
| BTI 502 | Software Engineering | 2 | 1 | - | 3 |
| BTI 503 | Advance Computer Architecture | 2 | 1 | - | 3 |
| BTI 504 | Data Communication & Computer Networks | 2 | 1 | - | 3 |
| BTI 505 | Java Programming | 3 | 1 | - | 4 |
| BTI 520 | Introduction to Open Source Technologies (PHP, MySql) Lab | - | - | 2 | 1 |
| BTI 521 | Software Engineering Lab | - | - | 2 | 1 |
| BTI 522 | Advance Computer Architecture Lab | - | - | 2 | 1 |
| BTI 523 | Data Communication & Computer Networks Lab | - | - | 2 | 1 |
| BTI 524 | Java Programming Lab | - | - | 2 | 1 |
| BTI 550 | Practical Training - I (Evaluation) | - | - | - | 3 |
| | | **Total** | | | 24 |

| **Optional Courses - Value Added Courses;** | | |
|---|---|---|
| **Course Code** | **Course Title** | **Teaching/ Instructional Hours/Semester** |
| BTI 541 | Communication Skills - III | 30 |
| BTI 543 | Behavioural Science - V | 30 |
| | Foreign Language – V | |
| BTI 544 | French | 30 |
| BTI 545 | German | 30 |
| BTI 546 | Spanish | 30 |
| BTI 547 | Japanese | 30 |
| BTI 548 | Chinese | 30 |

## SIXTH SEMESTER

| New Course Code | Course Title | Lecture (L) Hours Per week | Tutorial (T) Hours Per week | Practical (P) Hours Per week | Total Credits |
|---|---|---|---|---|---|
| **Compulsory Courses - 2017-18** | | | | | |
| BTI 601 | Advanced Microprocessor | 2 | 1 | - | 3 |
| BTI 602 | System Programming | 2 | 1 | - | 3 |
| BTI 603 | Introduction to Android Application Development | 3 | | - | 3 |
| BTI 604 | Advanced Networking | 2 | 1 | - | 3 |
| BTI 605 | Advanced Java Programming | 2 | 1 | - | 3 |
| BTI 606 | Problem Solving and Placement Practices | 4 | | - | 4 |
| BTI 620 | Microprocessor Lab | - | - | 2 | 1 |
| BTI 621 | Introduction to Android Application Development Lab | - | - | 2 | 1 |
| BTI 622 | Advanced Networking Lab | - | - | 2 | 1 |
| BTI 623 | Advanced Java Programming Lab | - | - | 2 | 1 |
| | | **Total** | | | 23 |
| **Optional Courses - Value Added Courses;** | | | | | |
| **Course Code** | **Course Title** | **Teaching/ Instructional Hours/Semester** | | | |
| BTI 641 | Communication Skills - IV | 30 | | | |
| BTI 643 | Behavioural Science - VI | 30 | | | |
| | Foreign Language – VI | | | | |
| BTI 644 | French | 30 | | | |
| BTI 645 | German | 30 | | | |
| BTI 646 | Spanish | 30 | | | |
| BTI 647 | Japanese | 30 | | | |
| BTI 648 | Chinese | 30 | | | |

**PRACTICAL TRAINING – II: 6 – 8 WEEKS**

## SEVENTH SEMESTER

| New Course Code | Course Title | Lecture (L) Hours Per week | Tutorial (T) Hours Per week | Practical (P) Hours Per week | Total Credits |
|---|---|---|---|---|---|
| **Compulsory Courses - 2017-18** | | | | | |
| BTI 701 | Artificial Intelligence | 3 | | - | 3 |
| BTI 702 | Programming with ASP.Net | 3 | 1 | - | 4 |
| BTI 720 | Artificial Intellignece Lab | - | - | 2 | 1 |
| BTI 721 | Programming with ASP.Net Lab | - | - | 2 | 1 |
| BTI 750 | Practical Training - II (Evaluation) | - | - | - | 6 |
| BTI 760 | Project (Dissertation) | - | - | - | 6 |
| **ELECTIVES (Any one from each group)** | | | | | |
| **Group I (With Practical)** | | | | | |
| BTI 703 | Software Project Management | 3 | 1 | - | 4 |
| BTI 704 | Advance DBMS | 3 | 1 | | 4 |
| BTI 705 | Operational Research | 3 | 1 | - | 4 |
| BTI 706 | Numerical Methods & Statistical Techniques | 3 | 1 | - | 4 |
| BTI 707 | Compiler Construction | 3 | 1 | | 4 |
| BTI 722 | Software Project Management Lab | - | - | 2 | 1 |
| BTI 723 | Advance DBMS Lab | - | - | 2 | 1 |
| BTI 724 | Operational Research Lab | - | - | 2 | 1 |
| BTI 725 | Numerical Methods & Statistical Techniques Lab | - | - | 2 | 1 |
| BTI 726 | Compiler Construction Lab | | | 2 | 1 |
| **Group II (Without Practical)** | | | | | |
| BTI 708 | Grid Computing | 3 | - | - | 3 |
| BTI 709 | Mobile Computing | 3 | - | - | 3 |
| BTI 710 | Information Security | 3 | - | - | 3 |
| BTI 711 | Marketing Management | 3 | - | - | 3 |
| BTI 712 | E-Commerce & ERP | 2 | 1 | | 3 |

| **Optional Courses - Value Added Courses;** | | | | |
|---|---|---|---|---|
| **Course Code** | **Course Title** | **Teaching/ Instructional Hours/Semester** | | |
| BTI 741 | Communication Skills – V | 30 | | |
| BTI 743 | Behavioural Science – VII | 30 | | |
| | Foreign language - VII | | | |
| BTI 744 | French | 30 | | |
| BTI 745 | German | 30 | | |
| BTI 746 | Spanish | 30 | | |
| BTI 747 | Japanese | 30 | | |
| BTI 748 | Chinese | 30 | | |

## EIGHTH SEMESTER

| New Course Code | Course Title | Lecture (L) Hours Per week | Tutorial (T) Hours Per week | Practical (P) Hours Per week | Total Credits |
|---|---|---|---|---|---|
| **Compulsory Courses - 2017-18** | | | | | |
| BTI 801 | Digital Image Processing | 3 | | - | 3 |
| BTI 802 | Real Time Systems | 2 | - | - | 2 |
| BTI 803 | Management Information System | 3 | 1 | - | 4 |
| BTI 820 | Digital Image Processing Lab | - | - | 2 | 1 |
| BTI 860 | Project | - | - | - | 9 |
| **ELECTIVES (Any one from each group)** | | | | | |
| **Group I (Without Practical)** | | | | | |
| BTI 804 | Windows Programming in VC++ | 3 | 1 | - | 4 |
| BTI 805 | Network Operating System | 3 | 1 | - | 4 |
| BTI 806 | Software Testing & Quality Assurance | 3 | 1 | - | 4 |
| BTI 807 | Linux Administration | 3 | 1 | - | 4 |
| BTI 808 | VLSI Design | 3 | 1 | - | 4 |
| **Group II (With Practical)** | | | | | |
| BTI 809 | Simulation & Modeling | 3 | - | - | 3 |
| BTI 810 | Soft Computing | 3 | - | - | 3 |
| BTI 811 | Data Ware housing and Data Mining | 3 | - | - | 3 |
| BTI 812 | Personnel Management | 3 | - | - | 3 |
| BTI 813 | Financial Management | 3 | - | - | 3 |
| BTI 821 | Windows Programming in C++ Lab | - | - | 2 | 1 |
| BTI 822 | Network Operating System Lab | - | - | 2 | 1 |
| BTI 823 | Software Testing & Quality Assurance Lab | - | - | 2 | 1 |
| BTI 824 | Linux Administration Lab | - | - | 2 | 1 |
| BTI 825 | VLSI Design Lab | - | - | 2 | 1 |
| | | | | | |
| **Optional Courses - Value Added Courses;** | | | | | |
| **Course Code** | **Course Title** | **Teaching/ Instructional Hours/Semester** | | | |
| BTI 841 | Communication Skills – VI | 30 | | | |
| BTI 843 | Behavioural Science –VIII | 30 | | | |
| | Foreign language - VIII | | | | |
| BTI 844 | French | 30 | | | |
| BTI 845 | German | 30 | | | |
| BTI 846 | Spanish | 30 | | | |
| BTI 847 | Japanese | 30 | | | |
| BTI 848 | Chinese | 30 | | | |

# Curriculum & Scheme of Examination
# APPLIED MATHEMATICS - I

**Course Code: BTI 101** **Credit Units: 04**

## Course Objective:
The knowledge of Mathematics is necessary for a better understanding of almost all the Engineering and Science subjects. Here our intention is to make the students acquainted with the concept of basic topics from Mathematics, which they need to pursue their Engineering degree in different disciplines.

## Course Contents:

**Module I: Differential Calculus**
Successive differentiation, Leibnitz's theorem (without proof), Mean value theorem, Taylor's theorem (proof), Remainder terms, Asymptote & Curvature, Partial derivatives, Chain rule, Differentiation of Implicit functions, Exact differentials, Tangents and Normals, Maxima, Approximations, Differentiation under integral sign, Jacobians and transformations of coordinates.

**Module II: Integral Calculus**
Fundamental theorems, Reduction formulae, Properties of definite integrals, Applications to length, area, volume, surface of revolution, improper integrals, Multiple Integrals-Double integrals, Applications to areas, volumes.

**Module III: Ordinary Differential Equations**
Formation of ODEs, Definition of order, degree & solutions, ODE of first order : Method of separation of variables, homogeneous and non homogeneous equations, Exactness & integrating factors, Linear equations & Bernoulli equations, General linear ODE of $n^{th}$ order, Solution of homogeneous equations, Operator method, Method of undetermined coefficients, Solution of simple simultaneous ODE.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***
- Differential Calculus by Shanti Narain
- Integral Calculus by Shanti Narain

***References:***
- Differential Equation by A.R. Forsyth
- Higher Engineering Mathematics by H.K. Dass

# APPLIED PHYSICS - I - FIELDS AND WAVES

**Course Code:** **BTI 102** **Credit Units: 03**

## Course Objective:

Aim of this course is to introduce the students to fundamentals of graduate level physics, which form the basis of all applied science and engineering

## Course Contents:

**Module I: Oscillations & Waves**

**Oscillations:** Introduction to S.H.M. Damped Oscillations: Differential Equation and its solution, logarithmic decrement, Quality Factor, Different conditions of damping of harmonic oscillations. Forced oscillations: Amplitude and Frequency Response, Resonance, Sharpness of Resonance

**Plane Progressive Waves:** Differential Equation and Solution, Superposition of Progressive Waves stationary waves.

**Ultrasonics**: Generation and application of ultrasonicwaves.

**Module II: Wave Nature of Light**

Interference: Coherent Sources, Conditions of interference, Interference due to division of wavefront, Fresnels biprism Interference due to division of amplitude, Newton's rings, Interference due to thin films, .

Diffraction: Fresnel and Fraunhofer diffraction, Fraunhofer diffraction at a single slit, double slit, N Slits, Transmission grating, Rayleigh criterion and Resolving power of grating.

Polarization: Birefringence, Nicol prism, Production and analysis of plane, circularly and elliptically polarized light, Half and quarter wave plates, Optical rotation, Polarimeter.

**Module III: Electromagnetics**

Scalar and vector fields, gradient of a scalar field, physical significance of gradient, equipotential surface. Line, surface and volume integrals, Divergence and curl of vector field and mathematical analysis physical significance, Electric flux, Gauss' law, Proof and Applications, Gauss divergence and Stokes theorems.

Differential form of Gauss' Law, Amperes' Law, Displacement current, Faradays Law, Maxwell equations in free space & isotropic media (Integral form & differential form), EM wave propagation in free space, Poynting vector.

## Examination Scheme:

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Waves & oscillation, A. P. French
- Physics of waves, W. C. Elmore & M. A. Heald
- Introduction to Electrodynamics, D. J. Griffith
- Electrodynamics, Gupta, Kumar & Singh
- Optics, A. K. Ghatak
- Engineering Physics, Satya Prakash

# ELEMENTS OF MECHANICAL ENGINEERING

**Course Code:** **BTI 103** **Credit Units: 02**

## Course Objective:

The objective of this course is to impart the basic knowledge of thermodynamics, stress- strain, materials & their properties and various manufacturing processes to the students of all engineering discipline.

## Course Contents:

**Module I: Fundamental Concepts**

Definition of thermodynamics, system, surrounding and universe, phase, concept of continuum, macroscopic & microscopic point of view, Thermodynamic equilibrium, property, state, path, process, cyclic process, Zeroth, first and second law of thermodynamics, Carnot Cycle, Introduction to I.C. Engines-two & four stoke S.I. and C.I. engines. Otto cycle. Diesel cycle.

**Module II: Stress And Strain Analysis**

Simple stress and strain: introduction, normal shear, and stresses-strain diagrams for ductile and brittle materials. Elastic constants, one-dimensional loadings of members of varying cross-section, Strain Energy, Properties of material-strength, elasticity, stiffness, malleability, ductility, brittleness, hardness and plasticity etc; Concept of stress and strain stress strain diagram, tensile test, impact test and hardness test.

**Module III: Casting & Forging**

Introduction of casting, pattern, mould making procedures, sand mould casting, casting defects, allowances of pattern. Forging-introduction, upsetting & drawing out, drop forging, press forging & m/c forging

**Module IV: Welding & Sheet metal working:**

Introduction of welding processes, classification, gas welding, arc welding, resistance welding. Introduction to sheet metal shop, Shearing, trimming, blanking, piercing, shaving, notching, stretch forming, nibbling coining, embossing and drawing.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Engineering thermodynamics, by P.K. Nag, Tata McGraw Hill.
- Thermal Engineering, by D.S. Kumar. S.K. Kataria and Sons.
- Thermal Engineering by PL Ballaney; Khanna Publishers, Delhi.
- Engineering Thermodynamics: Work and Heat Transfer, by Rogers and Mayhew, ELBS Publications
- Heine, R.W. C.R. Loper and P.C. Rosenthal, Principles of metal casting McGraw Hill
- Welding Technology by R.S. Parmar, Khanna Publishers.
- Thermodynamics and Heat Engines Volume-I, by R. Yadav: Central Publications.
- Ganesan, V. *Internal Combustion Engine*, Tata McGraw-Hill.

# INTRODUCTION TO COMPUTERS AND PROGRAMMING IN C

**Course Code: BTI 104 Credit Units: 03**

## Course Objective:

The objective of this course module is to acquaint the students with the basics of computers system, its components, data representation inside computer and to get them familiar with various important features of procedure oriented programming language i.e. C.

## Course Contents:

**Module I: Introduction**

Introduction to computer, history, von-Neumann architecture, memory system (hierarchy, characteristics and types), H/W concepts (I/O Devices), S/W concepts (System S/W & Application S/W, utilities). Data Representation: Number systems, character representation codes, Binary ,octal, hexadecimal and their interconversions. Binary arithmetic, floating point arithmetic, signed and unsigned numbers, Memory storage unit.

**Module II: Programming in C**

History of C, Introduction of C, Basic structure of C program, Concept of variables, constants and data types in C, Operators and expressions: Introduction, arithmetic, relational, Logical, Assignment, Increment and decrement operator, Conditional, bitwise operators, Expressions, Operator precedence and associativity. Managing Input and output Operation, formatting I/O.

**Module III: Fundamental Features in C**

C Statements, conditional executing using if, else, nesting of if, switch and break Concepts of loops, example of loops in C using for, while and do-while, continue and break. Storage types (automatic, register etc.), predefined processor, Command Line Argument.

**Module IV: Arrays and Functions**

One dimensional arrays and example of iterative programs using arrays, 2-D arrays Use in matrix computations. Concept of Sub-programming, functions Example of user defined functions. Function prototype, Return values and their types, calling function, function argument, function with variable number of argument, recursion.

**Module V: Advanced features in C**

Pointers, relationship between arrays and pointers Argument passing using pointers, Array of pointers. Passing arrays as arguments.
Strings and C string library.
Structure and Union. Defining C structures, Giving values to members, Array of structure, Nested structure, passing strings as arguments.
File Handling.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***


- “ANSI C” by E Balagurusamy
- Yashwant Kanetkar, “Let us C”, BPB Publications, 2nd Edition, 2001.
- Herbert Schildt, “C: The complete reference”, Osbourne Mcgraw Hill, 4th Edition, 2002.
- V. Raja Raman, “Computer Programming in C”, Prentice Hall of India, 1995.


***References*:**


- Kernighan & Ritchie, “C Programming Language”, The (Ansi C Version), PHI, 2nd Edition.
- J. B Dixit, “Fundamentals of Computers and Programming in ‘C’.
- P.K. Sinha and Priti Sinha, “Computer Fundamentals”, BPB publication.

# APPLIED CHEMISTRY

**Course Code: BTI 105 Credit Units: 03**

## Course Objective:

Four basic sciences, Physics, Chemistry, Mathematics and Biology are the building blocks in engineering and technology. Chemistry is essential to develop analytical capabilities of students, so that they can characterize, transform and use materials in engineering and apply knowledge in their field. All engineering fields have unique bonds with chemistry whether it is Aerospace, Mechanical, Environmental and other fields the makeup of substances is always a key factor, which must be known. For electronics and computer science engineering, apart from the material, computer modeling and simulation knowledge can be inherited from the molecule designing. The upcoming field of technology like Nanotechnology and Biotechnology depends fully on the knowledge of basic chemistry. With this versatile need in view, course has been designed in such a way so that the student should get an overview of the whole subject.

## Course Contents:

**Module I: Water Technology**

Introduction and specifications of water,
Hardness and its determination (EDTA method only),
Alkalinity,
Boiler feed water, boiler problems – scale, sludge, priming & foaming: causes & prevention, Boiler problems – caustic embrittlement & corrosion : causes & prevention,
Carbonate & phosphate conditioning, colloidal conditioning & calgon treatment
Water softening processes : Lime – soda process, Ion exchange method,
Water for domestic use.

**Module II: Fuels**

Classification, calorific value of fuel, (gross and net),
Determination of calorific value of fuels, bomb calorimeter,
Solid fuels - Proximate and ultimate analysis,
Octane & Cetane No. and its significance.
Numericals on combustion

**Module III: Instrumental Methods of analysis**

Introduction; Principles of spectroscopy; Laws of absorbance
IR : Principle, Instrumentation, Application
UV : Principle, Instrumentation, Application
NMR : Principle, Instrumentation, Application

**Module III : Lubricants:**

Introduction; Mechanism of Lubrication;
Types of Lubricants; Chemical structure related to Lubrication;
Properties of lubricants; Viscosity and Viscosity Index; Iodine Value; Aniline Point; Emulsion number; Flash Point; Fire Point; Drop Point; Cloud Point; Pour Point.
Selection of Lubricants.

**Module VI: Corrosion**

Introduction, Mechanism of dry and wet corrosion,
Types of corrosion-Galvanic, Concentration cell, soil, pitting, intergranular, waterline. Passivity.
Factors influencing corrosion.
Corrosion control.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***


- Engineering Chemistry- Jain and Jain
- Engineering Chemistry- Sunita Rattan
- Engineering Chemistry-Shashi Chawla


***References:***


- Engineering Chemistry –Dara and Dara
- Spectroscopy- Y.R Sharma
- Corrosion Engineering – Fontenna and Greene

# ENVIRONMENTAL STUDIES

**Course Code:** **BTI 106** **Credit Units: 02**

**Course Objective:**
The term environment is used to describe, in the aggregate, all the external forces, influences and conditions, which affect the life, nature, behaviour and the growth, development and maturity of living organisms. At present a great number of environment issues, have grown in size and complexity day by day, threatening the survival of mankind on earth. A study of environmental studies is quite essential in all types of environmental sciences, environmental engineering and industrial management. The objective of environmental studies is to enlighten the masses about the importance of the protection and conservation of our environment and control of human activities which has an adverse effect on the environment.

**Course Contents:**

**Module I: The multidisciplinary nature of environmental studies**
Definition, scope and importance
Need for public awareness

**Module II: Natural Resources**
**Renewable and non-renewable resources**
Natural resources and associated problems
Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies.
Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

**Module III: Ecosystems**
Concept of an ecosystem
Structure and function of an ecosystem
Producers, consumers and decomposers
Energy flow in the ecosystem
Ecological succession
Food chains, food webs and ecological pyramids
Introduction, types, characteristic features, structure and function of the following ecosystem:

a. Forest ecosystem
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, ocean estuaries)

**Module IV: Biodiversity and its conservation**
Introduction – Definition: genetic, species and ecosystem diversity

Biogeographical classification of India
Value of biodiversity: consumptive use, productive use, social, ethical aesthetic and option values
Biodiversity at global, national and local levels
India as a mega-diversity nation
Hot-spots of biodiversity
Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts
Endangered and endemic species of India
Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity

**Examination Scheme:**

| Components | CT | HA | S/V/Q | A | EE |
|---|---|---|---|---|---|
| Weightage (%) | 15 | 5 | 5 | 5 | 70 |

**Text & References:**


- Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
- Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad 380 013, India, Email:mapin@icenet.net (R)
- Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
- Clark R.S., Marine Pollution, Clanderson Press Oxford (TB)
- Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p
- De A.K., Environmental Chemistry, Wiley Eastern Ltd.
- Down to Earth, Centre for Science and Environment (R)
- Gleick, H.P. 1993. Water in Crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford Univ. Press. 473p
- Hawkins R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R)
- Heywood, V.H & Waston, R.T. 1995. Global Biodiversity Assessment. Cambridge Univ. Press 1140p.
- Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284 p.
- Mckinney, M.L. & School, R.M. 1996. Environmental Science Systems & Solutions, Web enhanced edition. 639p.
- Mhaskar A.K., Matter Hazardous, Techno-Science Publication (TB)
- Miller T.G. Jr. Environmental Science, Wadsworth Publishing Co. (TB)
- Odum, E.P. 1971. Fundamentals of Ecology. W.B. Saunders Co. USA, 574p
- Rao M N. & Datta, A.K. 1987. Waste Water treatment. Oxford & IBH Publ. Co. Pvt. Ltd. 345p.
- Sharma B.K., 2001. Environmental Chemistry. Geol Publ. House, Meerut
- Survey of the Environment, The Hindu (M)
- Townsend C., Harper J, and Michael Begon, Essentials of Ecology, Blackwell Science
- Trivedi R.K., Handbook of Environmental Laws, Rules Guidelines, Compliances and Standards, Vol I and II, Enviro Media (R)
- Trivedi R. K. and P.K. Goel, Introduction to air pollution, Techno-Science Publication (TB)
- Wanger K.D., 1998 Environnemental Management. W.B. Saunders Co. Philadelphia, USA 499p

# APPLIED PHYSICS LAB - I

**Course Code:** **BTI 120** **Credit Units: 01**

## List of Experiments:

1. To determine the wavelength of sodium light by Newton's rings method.
2. To determine the dispersive power of the material of prism with the help of a spectrometer.
3. To determine the specific rotation of sugar by Bi-quartz or Laurent half shade polarimeter.
4. To determine the speed of ultrasonic waves in liquid by diffraction method.
5. To determine the width of a narrow slit using diffraction phenomena.
6. To determine the temperature coefficient of platinum wire, using a platinum resistance thermometer and a Callender & Griffth's bridge.
7. To determine the value of specific charge (ratio of e/m) of an electron by Thomson method.
8. To determine the internal resistance of Leclanche cell with the help of Potentiometer.
9. To determine the resistance per unit length of a Carey Foster's bridge wire and also to find out the specific resistance of a given wire.
10. To plot graph showing the variation of magnetic field with distance along the aixs of a circular coil carrying current, and hence estimate the radius of the coil.
11. To determine the value of acceleration due to gravity ('g') in the laboratory using bar pendulum.
12. To determine the moment of inertia of a flywheel about its own axis of rotation.
13. To determine the density of material of the given wire with the help of sonometer.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# ELEMENTS OF MECHANICAL ENGINEERING - LAB (EEM)

**Course Code:** **BTI 121** **Credit Units: 01**

**Course Contents:**

1. Welding

   (a) Arc Welding - Butt Joint
   - Lap Joint
   - T Joint

   (b) Gas Welding - Butt Joint
   - Lap Joint
   - Brazing of Broken pieces

2. Foundry - Sand mould casting by single piece pattern& Split pattern bracket with cores

3. Sheet Metal - Dust Bin
   - Mug
   - Funnel
   - Cylindrical Mug with handle-Rectangular

4. Fitting Shop - Male – Female Joint
   - Rectangular piece
   Filing the job

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# PROGRAMMING IN C LAB

**Course Code:** **BTI 122** **Credit Units: 01**

**Software Required:** Turbo C

**Course Contents:**

- C program involving problems like finding the nth value of cosine series , Fibonacci series. Etc.
- C programs including user defined function calls
- C programs involving pointers, and solving various problems with the help of those.
- File handling

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# APPLIED CHEMISTRY LAB

**Course Code:** **BTI 123** **Credit Units: 01**

## Course Contents:

## List of Experiments:

(Any 10 Experiments)

1. To determine the ion exchange capacity of a given cation exchanger.
2. To determine the temporary, permanent and total hardness of a sample of water by complexometric titration method.
3. To determine the type and extent of alkalinity of given water sample.
4. To determine the number of water molecules of crystallization in Mohr's salt (ferrous ammonium sulphate) provided standard potassium dichromate solution (0.1N) using diphenylamine as internal indicator.
5. To determine the ferrous content in the supplied sample of iron ore by titrimetric analysis against standard $K_2Cr_2O_7$ solution using potassium ferricyanide $[K_3Fe(CN)_6]$ as external indicator.
6. (a) To determine the surface tension of a given liquid by drop number method.
   (b) To determine the composition of a liquid mixture A and B (acetic acid and water) by surface tension method.
7. To prepare and describe a titration curve for phosphoric acid – sodium hydroxide titration using pH-meter.
8. (a) To find the cell constant of conductivity cell.
   (b) Determine the strength of hydrochloric acid solution by titrating it against standard sodium hydroxide solution conductometrically
9. Determination of Dissolved oxygen in the given water sample.
10. To determine the total residual chlorine in water.
11. Determination of amount of oxalic acid and $H_2SO_4$ in 1 L of solution using N/10 NaOH and N/10 $KMnO_4$ solution.
12. Determination of viscosity of given oil by means of Redwood viscometer I.
13. To determine flash point and fire point of an oil by Pensky Martin's Apparatus
14. To determine the Iodine value of the oil.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| A | PR | LR | V | PR | V |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# ENGINEERING GRAPHICS LAB

**Course Code:** **BTI 124** **Credit Units: 01**

## Course Objective:

This course will provide students concepts on the drawings of different curves like straight line, parabola, ellipse etc. After completion of this course, students will be able to draw different figures manually and will be capable of using various instruments involved in drawings.

## Course Contents:

**Module I: General**
Importance, Significance and scope of engineering drawing, Lettering, Dimensioning, Scales, Sense of proportioning, Different types of projections, Orthographic Projection, B.I.S. Specifications.

**Module II: Projections of Point and Lines**
Introduction of planes of projection, Reference and auxiliary planes, projections of points and Lines in different quadrants, traces, inclinations, and true lengths of the lines, projections on Auxiliary planes, shortest distance, intersecting and non-intersecting lines.

**Module III: Planes other than the Reference Planes**
Introduction of other planes (perpendicular and oblique), their traces, inclinations etc., Projections of points and lines lying in the planes, conversion of oblique plane into auxiliary Plane and solution of related problems.

**Module IV: Projections of Plane Figures**
Different cases of plane figures (of different shapes) making different angles with one or both reference planes and lines lying in the plane figures making different given angles (with one of both reference planes). Obtaining true shape of the plane figure by projection.

**Module V: Projection of Solids**
Simple cases when solid is placed in different positions, Axis faces and lines lying in the faces of the solid making given angles.

**Module VI: Development of Surface**
Development of simple objects with and without sectioning. Isometric Projection

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

## Text & References:


- M.B. Shah & B.C. Rana, Engineering Drawing, Pearson Education, 2007
- PS Gill, Engineering Drawing, Kataria Publication
- ND Bhatt, Engineering Drawing, Charotar publications
- N Sidheshwar, Engineering Drawing, Tata McGraw Hill
- CL Tanta, Mechanical Drawing, “Dhanpat Rai”

# ENGLISH

## Course Objective:
The course is intended to give a foundation of English Language. The literary texts are indented to help students to inculcate creative & aesthetic sensitivity and critical faculty through comprehension, appreciation and analysis of the prescribed literary texts. It will also help them to respond form different perspectives.

## Course Contents:

**Module I: Vocabulary**
Use of Dictionary
Use of Words: Diminutives, Homonyms & Homophones

**Module II: Essentials of Grammar - I**
Articles
Parts of Speech
Tenses

**Module III: Essentials of Grammar - II**
Sentence Structure
Subject -Verb agreement
Punctuation

**Module IV: Communication**
The process and importance
Principles & benefits of Effective Communication

**Module V: Spoken English Communication**
Speech Drills
Pronunciation and accent
Stress and Intonation

**Module VI: Communication Skills - I**
Developing listening skills
Developing speaking skills

**Module VII: Communication Skills - II**
Developing Reading Skills
Developing writing Skills

**Module VIII: Written English communication**
Progression of Thought/ideas
Structure of Paragraph
Structure of Essays

**Module IX: Short Stories**
Of Studies, by Francis Bacon
Dream Children, by Charles Lamb
The Necklace, by Guy de Maupassant
A Shadow, by R.K. Narayan
Glory at Twilight, Bhabani Bhattacharya

**Module X: Poems**

| | |
|---|---|
| All the Worlds a Stage | Shakespeare |
| To Autumn | Keats |
| O! Captain, My Captain. | Walt Whitman |
| Where the Mind is Without Fear | Rabindranath Tagore |
| Psalm of Life | H.W. Longfellow |

## Examination Scheme:

| Components | A | CT | HA | EE |
|---|---|---|---|---|
| Weightage (%) | 05 | 15 | 10 | 70 |

**Text & References:**

- Madhulika Jha, Echoes, Orient Long Man
- Ramon & Prakash, Business Communication, Oxford.
- Sydney Greenbaum Oxford English Grammar, Oxford.
- Successful Communications, Malra Treece (Allyn and Bacon)
- Effective Technical Communication, M. Ashraf Rizvi.

*** 30 hrs Programme to be continued for Full year**

# BEHAVIOURAL SCIENCE - I
# (UNDERSTANDING SELF FOR EFFECTIVENESS)

**Course Code: BTI 143 Credit Units: 01**

## Course Objective:

This course aims at imparting**:**

- Understanding self & process of self exploration
- Learning strategies for development of a healthy self esteem
- Importance of attitudes and its effective on personality
- Building Emotional Competence

## Course Contents:

**Module I: Self: Core Competency**
Understanding of Self
Components of Self – Self identity
Self concept
Self confidence
Self image

**Module II: Techniques of Self Awareness**
Exploration through Johari Window
Mapping the key characteristics of self
Framing a charter for self
Stages – self awareness, self acceptance and self realization

**Module III: Self Esteem & Effectiveness**
Meaning and Importance
Components of self esteem
High and low self esteem
Measuring your self esteem

**Module IV: Building Positive Attitude**
Meaning and nature of attitude
Components and Types of attitude
Importance and relevance of attitude

**Module V: Building Emotional Competence**
Emotional Intelligence – Meaning, components, Importance and Relevance
Positive and Negative emotions
Healthy and Unhealthy expression of emotions

**Module VI: End-of-Semester Appraisal**
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

## Examination Scheme:

| Components | SAP | A | Mid Term Test (CT) | VIVA | Journal for Success (JOS) |
|---|---|---|---|---|---|
| Weightage (%) | 20 | 05 | 20 | 30 | 25 |

## Text & References:


- Organizational Behaviour, Davis, K.
- Hoover, Judhith D. Effective Small Group and Team Communication, 2002, Harcourt College Publishers
- Dick, Mc Cann & Margerison, Charles: Team Management, 1992 Edition, viva books
- Bates, A. P. and Julian, J.: Sociology - Understanding Social Behaviour
- Dressler, David and Cans, Donald: The Study of Human Interaction
- Lapiere, Richard. T – Social Change
- Lindzey, G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology, Addison – Welsley, US.

- Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.
- LaFasto and Larson: When Teams Work Best, 2001, Response Books (Sage), New Delhi
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 2, Group (1996); Pfeiffer & Company
- Smither Robert D.; The Psychology of Work and Human Performance, 1994, Harper Collins College Publishers

# FRENCH - I

**Course Code:** **BTI 144** **Credit Units: 02**

## Course Objective:

To familiarize the students with the French language

- with the phonetic system
- with the syntax
- with the manners
- with the cultural aspects

## Course Contents:

**Module A: pp. 01 to 37: Unités 1, 2, Unité 3 Object if 1, 2**
Only grammar of Unité 3: objectif 3, 4 and 5

**Contenu lexical: Unité 1: Découvrir la langue française: (oral et écrit)**

1. se présenter, présenter quelqu'un, faire la connaissance desautres, formules de politesse, rencontres
2. dire/interroger si on comprend
3. Nommer les choses

**Unité 2: Faire connaissance**

1. donner/demander des informations sur une personne, premiers contacts, exprimer ses goûts et ses préférences
2. Parler de soi: parler du travail, de ses activités, de son pays, de sa ville.

**Unité 3: Organiser son temps**

1. dire la date et l'heure

**Contenu grammatical:**

1. organisation générale de la grammaire
2. article indéfini, défini, contracté
3. nom, adjectif, masculin, féminin, singulier et pluriel
4. négation avec « de », "moi aussi", "moi non plus"
5. interrogation: Inversion, est-ce que, qui, que, quoi, qu'est-ce que, où, quand, comment, quel(s), quelle(s)
   Interro-négatif: réponses: oui, si, non
6. pronom tonique/disjoint- pour insister après une préposition
7. futur proche

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- le livre à suivre: Campus: Tome 1

# GERMAN - I

**Course Code: BTI 145 Credit Units: 02**

## Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany

## Course Contents:

**Module I: Introduction**
Self introduction: heissen, kommen, wohnwn, lernen, arbeiten, trinken, etc.
All personal pronouns in relation to the verbs taught so far.
Greetings: Guten Morgen!, Guten Tag!, Guten Abend!, Gute Nacht!, Danke sehr!, Danke!, Vielen Dank!, (es tut mir Leid!),
Hallo, wie geht's?: Danke gut!, sehr gut!, prima!, ausgezeichnet!,
Es geht!, nicht so gut!, so la la!, miserabel!

**Module II: Interviewspiel**
To assimilate the vocabulary learnt so far and to apply the words and phrases in short dialogues in an interview – game for self introduction.

**Module III: Phonetics**
Sound system of the language with special stress on Dipthongs

**Module IV: Countries, nationalities and their languages**
To make the students acquainted with the most widely used country names, their nationalitie and the language spoken in that country.

**Module V: Articles**
The definite and indefinite articles in masculine, feminine and neuter gender. All Vegetables, Fruits, Animals, Furniture, Eatables, modes of Transport

**Module VI: Professions**
To acquaint the students with professions in both the genders with the help of the verb "sein".

**Module VII: Pronouns**
Simple possessive pronouns, the use of my, your, etc.
The family members, family Tree with the help of the verb "to have"

**Module VIII: Colours**
All the color and color related vocabulary – colored, colorful, colorless, pale, light, dark, etc.

**Module IX: Numbers and calculations – verb "kosten"**
The counting, plural structures and simple calculation like addition, subtraction, multiplication and division to test the knowledge of numbers.
"Wie viel kostet das?"

**Module X: Revision list of Question pronouns**
W – Questions like who, what, where, when, which, how, how many, how much, etc.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation, I – Interaction/Conversation Practice

## Text & References:


- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

# SPANISH – I

**Course Code:** **BTI 146** **Credit Units: 02**

## Course Objective:
To enable students acquire the relevance of the Spanish language in today's global context, how to greet each other. How to present / introduce each other using basic verbs and vocabulary

## Course Contents:

**Module I**
A brief history of Spain, Latin America, the language, the culture…and the relevance of Spanish language in today's global context.
Introduction to alphabets

**Module II**
Introduction to '*Saludos*' (How to greet each other. How to present / introduce each other).
Goodbyes (despedidas)
The verb *llamarse* and practice of it.

**Module III**
Concept of Gender and Number
Months of the years, days of the week, seasons. Introduction to numbers 1-100, Colors, Revision of numbers and introduction to ordinal numbers.

**Module IV**
Introduction to *SER* and *ESTAR* (both of which mean To Be).Revision of '*Saludos*' and '*Llamarse*'. Some adjectives, nationalities, professions, physical/geographical location, the fact that spanish adjectives have to agree with gender and number of their nouns. Exercises highlighting usage of *Ser* and *Estar.*

**Module V**
Time, demonstrative pronoun (Este/esta, Aquel/aquella etc)

**Module VI**
Introduction to some key AR /ER/IR ending regular verbs.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- Español, En Directo I A
- Español Sin Fronteras

# JAPANESE - I

**Course Code:** **BTI 147** **Credit Units: 02**

## Course Objective:
To enable the students to learn the basic rules of grammar and Japanese language to be used in daily life that will later help them to strengthen their language.

## Course Contents:

**Module I: Salutations**
Self introduction, Asking and answering to small general questions

**Module II: Cardinal Numbers**
Numerals, Expression of time and period, Days, months

**Module III: Tenses**
Present Tense, Future tense

**Module IV: Prepositions**
Particles, possession, Forming questions

**Module V: Demonstratives**
Interrogatives, pronoun and adjectives

**Module VI: Description**
Common phrases, Adjectives to describe a person

**Module VII: Schedule**
Time Table, everyday routine etc.

**Module VIII: Outings**
Going to see a movie, party, friend's house etc.

## Learning Outcome
- Students can speak the basic language describing above mentioned topics

## Methods of Private study /Self help
- Handouts, audio-aids, and self-do assignments and role-plays will support classroom teaching

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

***Text:***
- Teach yourself Japanese

***References:***
- Shin Nihongo no kiso 1

# CHINESE – I

**Course Code:** **BTI 148** **Credit Units: 02**

## Course Objective:

There are many dialects spoken in China, but the language which will help you through wherever you go is Mandarin, or Putonghua, as it is called in Chinese. The most widely spoken forms of Chinese are Mandarin, Cantonese, Gan, Hakka, Min, Wu and Xiang. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

## Course Contents:

**Module I**
Show pictures, dialogue and retell.
Getting to know each other.
Practicing chart with Initials and Finals. (CHART – The Chinese Phonetic Alphabet Called "Hanyu Pinyin" in Mandarin Chinese.)
Practicing of Tones as it is a tonal language.
Changes in 3$^{rd}$ tone and Neutral Tone.

**Module II**
Greetings
Let me Introduce
The modal particle "ne".
Use of Please 'qing" – sit, have tea ………….. etc.
A brief self introduction – Ni hao ma? Zaijian!
Use of "bu" negative.

**Module III**
Attributives showing possession
How is your Health? Thank you
Where are you from?
A few Professions like – Engineer, Businessman, Doctor, Teacher, Worker.
Are you busy with your work?
May I know your name?

**Module IV**
Use of "How many" – People in your family?
Use of "zhe" and "na".
Use of interrogative particle "shenme", "shui", "ma" and "nar".
How to make interrogative sentences ending with "ma".
Structural particle "de".
Use of "Nin" when and where to use and with whom. Use of guixing.
Use of verb "zuo" and how to make sentences with it.

**Module V**
Family structure and Relations.
Use of "you" – "mei you".
Measure words
Days and Weekdays.
Numbers.
Maps, different languages and Countries.

## Examination Scheme:

| **Components** | **CT1** | **CT2** | **C** | **I** | **V** | **A** |
|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:


- "Elementary Chinese Reader Part I" Lesson 1-10

# APPLIED MATHEMATICS - II

**Course Code: BTI 201** **Credit Units: 04**

## Course Objective:

The knowledge of Mathematics is necessary for a better understanding of almost all the Engineering and Science subjects. Here our intention is to make the students acquainted with the concept of basic topics from Mathematics, which they need to pursue their Engineering degree in different disciplines.

## Course Contents:

**Module I: Linear Algebra**
Hermitian and Skew Hermitian Matrix, Unitary Matrix, Orthogonal Matrix, Elementary Row Transformation, Reduction of a Matrix to Row Echelon Form, Rank of a Matrix, Consistency of Linear Simultaneous Equations, Gauss Elimination Method, Gauss-Jordan Method, Eigen Values and Eigen Vectors of a Matrix, Caley-Hamilton Theorem, Diagonalization of a Matrix, Vector Space, Linear Independence and Dependence of Vectors, Linear Transformations.

**Module II: Infinite Series**
Definition of Sequence, Bounded Sequence, Limit of a Sequence, Series, Finite and Infinite Series, Convergence and Divergence of Infinite series, Cauchy's Principle of Convergence, Positive Term Infinite Series, Comparison test, D'Alembert's Ratio test. Raabe's Test, Cauchy's nth root Test. Logarithmic Test, Alternating Series, Leibnitz's Test, Absolute and conditioinal convergence, Uniform Convergence, Power Series and its Interval of Convergence.

**Module III: Complex Analysis**
De Moivre's Theorem and Roots of Complex Numbers, Logarithmic Functions, Circular, Hyperbolic Functions and their Inverses.
Functions of a Complex Variables, Limits, Continuity and Derivatives, Analytic Function, Cauchy-Riemann Equations (without proof), Harmonic Function, Harmonic Conjugates, Conformal Mapping, Bilinear Transformations, Complex Line Integral, Cauchy Integral Theorem, Cauchy Integral Formula, Derivative of Analytic Function, Power Series, Taylor Series, Laurent Series, Zeroes and Singularities, Residues, Residue Theorem, Evaluation of Real Integrals of the Form and $\int_{-\infty}^{\infty} \frac{f(x)}{F(x)} dx$ .

**Module IV: Statistics and Probability**
Moments, Skewness, Kurtosis, Random Variables and Probability Distribution, Mean and Variance of a Probability Distribution, Binomial Distribution, Poisson Distribution and Normal Distribution.

## Examination Scheme:

| **Components** | **CT1** | **CT2** | **C** | **I** | **V** | **A** |
|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 15 | 20 | 20 | 20 | 5 |

C – Project +Presentation
I – Interaction/Conversation Practice

## Text & References:

- Engineering Mathematics by Erwin Kreyszig.
- Engineering Mathematics by R.K. Jain and S.R.K. Iyengar.
- Higher Engineering Mathematics by H.K. Dass.
- Engineering Mathematics by B.S. Grewal.
- Differential Calculus by Shanti Narain.
- Integral Calculus by Shanti Narain.
- Linear Algebra- Schaum Outline Series.

# APPLIED PHYSICS - II - MODERN PHYSICS

**Course Code:** **BTI 202** **Credit Units: 03**

## Course Objective:

Aim of this course is to introduce the students to fundamentals of graduate level physics which form the basis of all applied science and engineering

## Course Contents:

**Module I: Special Theory of Relativity**

Michelson-Morley experiment, Importance of negative result, Inertial & non-inertial frames of reference, Einstein's postulates of Special theory of Relativity, Space-time coordinate system, Relativistic Space Time transformation (Lorentz transformation equation), Transformation of velocity, Addition of velocities, Length contraction and Time dilation, Mass-energy equivalence (Einstein's energy mass relation) & Derivation of Variation of mass with velocity,

**Module II: Wave Mechanics**

Wave particle duality, De-Broglie matter waves, phase and group velocity, Heisenberg uncertainty principle, wave function and its physical interpretation, Operators, expectation values. Time dependent & time independent Schrödinger wave equation for free & bound states, square well potential (rigid wall), Step potential.

**Module III: Atomic Physics**

Vector atom model, LS and j-j coupling, Zeceman effect (normal & anomalous), Paschen-Bach effect, X-ray spectra and energy level diagram, Moseleys Law, Lasers – Einstein coefficients, conditions for light amplification, population inversion, optical pumping, three level and four level lasers, He-Ne and Ruby laser, Properties and applications of lasers.

**Module IV: Solid State Physics**

Sommerfield's free electron theory of metals, Fermi energy, Introduction to periodic potential & Kronig-Penny model (Qualitative) Band Theory of Solids, Semi-conductors: Intrinsics and Extrinsic Semiconductors, photoconductivity and photovotaics, Basic aspects of Superconductivity, Meissner effect.

## Examination Scheme:

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

- Concept of Modern Physics, A. Beiser
- Applied Physics II, Agarawal & Goel
- Solid State Physics, S. O. Pallai
- Physics of Atom, Wehr & Richards

# ELECTRICAL SCIENCE

Course Code: BTI 203 Credit Units: 03

Course Objective:
The objective of the course is to provide a brief knowledge of Electrical Engineering to students of all disciplines. This Course includes some theorems related to electrical, some law's related to flow of current, voltages, basic knowledge of Transformer, basic knowledge of electromagnetism, basic knowledge of electrical network.

Course Contents:

Module I: Basic Electrical Quantities
Basic Electrical definitions-Energy, Power, Charge, Current, Voltage, Electric Field Strength, Magnetic Flux Density, etc., Resistance, Inductance and Capacitance. Ideal Source, Independent Source and Controlled Source

Module II: Network Analysis Techniques & Theorems
Circuit Principles: Ohm's Law, Kirchoff's Current Law, Kirchoff's Voltage Law Network Reduction: Star–Delta Transformation, Source Transformation, Nodal Analysis, Loop analysis. Superposition theorem, Thevenin's Theorem, Norton's theorem and Reciprocity theorem.

Module III: Alternating Current Circuits
Peak, Average and RMS values for alternating currents, Power calculation:
reactive power, active power, Complex power, power factor, impedance, reactance, conductance, susceptance Resonance: series Resonance, parallel resonance, basic definition of Q factor & Band-width.

Module IV: Transformers
Basic Transformer Operation principle, Construction, Voltage relations, current relations, Linear circuit models, open circuit test, short circuit test, Transformer Efficiency.

Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:


- R.J. Smith, R.C. Dorf: Circuits, devices and Systems
- B.L. Thareja: Electrical Technology: Part -1 & 2
- V. Deltoro: Electrical Engineering fundamentals
- Schaum's Series: Electrical Circuits

# OBJECT ORIENTED PROGRAMMING USING C++

**Course Code:** **BTI 204** **Credit Units: 03**

## Course Objective:

The objective of this module is to introduce object oriented programming. To explore and implement the various features of OOP such as inheritance, polymorphism, Exceptional handling using programming language C++. After completing this course student can easily identify the basic difference between the programming approaches like procedural and object oriented.

## Course Contents:

**Module I: Introduction**
Review of C, Difference between C and C++, Procedure Oriented and Object Oriented Approach. Basic Concepts: Objects, classes, Principals like Abstraction, Encapsulation, Inheritance and Polymorphism. Dynamic Binding, Message Passing. Characteristics of Object-Oriented Languages. Introduction to Object-Oriented Modeling techniques (Object, Functional and Dynamic Modeling).

**Module II: Classes and Objects**
Abstract data types, Object & classes, attributes, methods, C++ class declaration, Local Class and Global Class, State identity and behaviour of an object, Local Object and Global Object, Scope resolution operator, Friend Functions, Inline functions, Constructors and destructors, instantiation of objects, Types of Constructors, Static Class Data, Array of Objects, Constant member functions and Objects, Memory management Operators.

**Module III: Inheritance**
Inheritance, Types of Inheritance, access modes – public, private & protected, Abstract Classes, Ambiguity resolution using scope resolution operator and Virtual base class, Aggregation, composition vs classification hiérarchies, Overriding inheritance methods, Constructors in derived classes, Nesting of Classes.

**Module IV: Polymorphism**
Polymorphism, Type of Polymorphism – Compile time and runtime, Function Overloading, Operator Overloading (Unary and Binary) Polymorphism by parameter, Pointer to objects, this pointer, Virtual Functions, pure virtual functions.

**Module V: Strings, Files and Exception Handling**
Manipulating strings, Streams and files handling, formatted and Unformatted Input output. Exception handling, Generic Programming – function template, class Template Standard Template Library: Standard Template Library, Overview of Standard Template Library, Containers, Algorithms, Iterators, Other STL Elements, The Container Classes, General Theory of Operation, Vectors.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

## Text & References:

*Text:*
- A.R. Venugopal, Rajkumar, T. Ravishanker "Mastering C++", TMH, 1997
- R. Lafore, "Object Oriented Programming using C++", BPB Publications, 2004.
- "Object Oriented Programming with C++" By E. Balagurusamy.
- Schildt Herbert, "C++: The Complete Reference", Wiley DreamTech, 2005.

*References:*
- Parasons, "Object Oriented Programming with C++", BPB Publication, 1999.
- Steven C. Lawlor, "The Art of Programming Computer Science with C++", Vikas Publication, 2002.
Yashwant Kanethkar, "Object Oriented Programming using C++", BPB, 2004

# ENGINEERING MECHANICS

**Course Code: BTI 205 Credit Units: 03**

## Course Objective:

Objective of this course is to provide fundamental knowledge of force system and its effect on the behaviour of the bodies that may be in dynamic or in static state. It includes the equilibrium of different structures like beams, frames, truss etc and the force transfer mechanism in the different components of a body under given loading condition.

## Course Contents:

**Module I: Force system & Structure**
Free body diagram, Equilibrium equations and applications. Plane truss, perfect and imperfect truss, assumption in the truss analysis, analysis of perfect plane trusses by the method of joints, method of section.

**Module II: Friction**
Static and Kinetic friction, laws of dry friction, co-efficient of friction, angle of friction, angle of repose, cone of friction, friction lock, efficiency of screw jack, transmission of power through belt

**Module III: Distributed Force**
Determination of center of gravity, center of mass and centroid by direct integration and by the method of composite bodies, mass moment of inertia and area moment of inertia by direct integration and composite bodies method, radius of gyration, parallel axis theorem, Pappus theorems and its application, polar moment of inertia.

**Module IV: Work -Energy**
Work energy equation, conservation of energy, Virtual work, impulse, momentum conservation, impact of bodies, co-efficient of restitution, loss of energy during impact, D’alembert principle

## Examination Scheme:

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- S.S. Bhavikatti, Engineering Mechanics, New Age International Ltd
- Timoshenko, Engineering Mechanics, McGraw Hill
- R. S. Khurmi, Engineering Mechanics, S. Chand Publication
- H. Shames & G. K. M. Rao, Engineering Mechanics, Pearson Education, 2006

# ENVIRONMENTAL STUDIES

**Course Code:** **BTI 206** **Credit Units: 02**

**Course Objective:**

The term environment is used to describe, in the aggregate, all the external forces, influences and conditions, which affect the life, nature, behaviour and the growth, development and maturity of living organisms. At present a great number of environment issues, have grown in size and complexity day by day, threatening the survival of mankind on earth. A study of environmental studies is quite essential in all types of environmental sciences, environmental engineering and industrial management. The objective of environmental studies is to enlighten the masses about the importance of the protection and conservation of our environment and control of human activities which has an adverse effect on the environment.

**Course Contents:**

**Module I: Environmental Pollution**

Definition

Causes, effects and control measures of:

a. Air pollution
b. Water pollution
c. Soil pollution
d. Marine pollution
e. Noise pollution
f. Thermal pollution
g. Nuclear pollution

Solid waste management: Causes, effects and control measures of urban and industrial wastes.

Role of an individual in prevention of pollution.

Pollution case studies.

Disaster management: floods, earthquake, cyclone and landslides.

**Module II: Social Issues and the Environment**

From unsustainable to sustainable development

Urban problems and related to energy

Water conservation, rain water harvesting, watershed management

Resettlement and rehabilitation of people; its problems and concerns. Case studies.

Environmental ethics: Issues and possible solutions

Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.

Wasteland reclamation

Consumerism and waste products

Environmental Protection Act

Air (Prevention and Control of Pollution) Act

Water (Prevention and control of Pollution) Act

Wildlife Protection Act

Forest Conservation Act

Issues involved in enforcement of environmental legislation

Public awareness

**Module III: Human Population and the Environment**

Population growth, variation among nations

Population explosion – Family Welfare Programmes

Environment and human health
Human Rights
Value Education
HIV / AIDS
Women and Child Welfare
Role of Information Technology in Environment and Human Health
Case Studies

**Module IV: Field Work**
Visit to a local area to document environmental assets-river / forest/ grassland/ hill/ mountain.
Visit to a local polluted site – Urban / Rural / Industrial / Agricultural
Study of common plants, insects, birds
Study of simple ecosystems-pond, river, hill slopes, etc (Field work equal to 5 lecture hours)
**Examination Scheme:**

| Components | CT | HA | S/V/Q | A | EE |
|---|---|---|---|---|---|
| Weightage (%) | 15 | 5 | 5 | 5 | 70 |

**Text & References:**


- Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
- Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad 380 013, India, Email:mapin@icenet.net (R)
- Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
- Clark R.S., Marine Pollution, Clanderson Press Oxford (TB)
- Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p
- De A.K., Environmental Chemistry, Wiley Eastern Ltd.
- Down to Earth, Centre for Science and Environment (R)
- Gleick, H.P. 1993. Water in Crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford Univ. Press. 473p
- Hawkins R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R)
- Heywood, V.H & Waston, R.T. 1995. Global Biodiversity Assessment. Cambridge Univ. Press 1140p.
- Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284 p.
- Mckinney, M.L. & School, R.M. 1996. Environmental Science Systems & Solutions, Web enhanced edition. 639p.
- Mhaskar A.K., Matter Hazardous, Techno-Science Publication (TB)
- Miller T.G. Jr. Environmental Science, Wadsworth Publishing Co. (TB)
- Odum, E.P. 1971. Fundamentals of Ecology. W.B. Saunders Co. USA, 574p
- Rao M N. & Datta, A.K. 1987. Waste Water treatment. Oxford & IBH Publ. Co. Pvt. Ltd. 345p.
- Sharma B.K., 2001. Environmental Chemistry. Geol Publ. House, Meerut
- Survey of the Environment, The Hindu (M)
- Townsend C., Harper J, and Michael Begon, Essentials of Ecology, Blackwell Science
- Trivedi R.K., Handbook of Environmental Laws, Rules Guidelines, Compliances and Standards, Vol I and II, Enviro Media (R)
- Trivedi R. K. and P.K. Goel, Introduction to air pollution, Techno-Science Publication (TB)
- Wanger K.D., 1998 Environnemental Management. W.B. Saunders Co. Philadelphia, USA 499p

# APPLIED PHYSICS LAB - II

**Course Code:** **BTI 220** **Credit Units: 01**

## List of Experiments:

1. To determine the wavelength of sodium light by Newton's rings method.
2. To determine the dispersive power of the material of prism with the help of a spectrometer.
3. To determine the specific rotation of sugar by Bi-quartz or Laurent half shade polarimeter.
4. To determine the speed of ultrasonic waves in liquid by diffraction method.
5. To determine the width of a narrow slit using diffraction phenomena.
6. To determine the temperature coefficient of platinum wire, using a platinum resistance thermometer and a Callender & Griffth's bridge.
7. To determine the value of specific charge (ratio of e/m) of an electron by Thomson method.
8. To determine the internal resistance of Leclanche cell with the help of Potentiometer.
9. To determine the resistance per unit length of a Carey Foster's bridge wire and also to find out the specific resistance of a given wire.
10. To plot graph showing the variation of magnetic field with distance along the aixs of a circular coil carrying current, and hence estimate the radius of the coil.
11. To determine the value of acceleration due to gravity ('g') in the laboratory using bar pendulum.
12. To determine the moment of inertia of a flywheel about its own axis of rotation.
13. To determine the density of material of the given wire with the help of sonometer.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# ELECTRICAL SCIENCE LAB

**Course Code: BTI 221 Credit Units: 01**

## List of Experiments:

1. To verify KVL & KCL in the given network.
2. To verify Superposition Theorem.
3. To verify Maximum Power Transfer Theorem.
4. To verify Reciprocity Theorem.
5. To determine and verify RTh, VTh, RN, IN in a given network.
6. To perform open circuit & short circuit test on a single-phase transformer.
7. To study transient response of a given RLC Circuit.
8. To perform regulation, ratio & polarity test on a single-phase transformer.
9. To measure power & power factor in a three phase circuit by two wattmeter method.
10. To measure power & power factor in a three phase load using three ammeter & three voltmeter method.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# OBJECT ORIENTED PROGRAMMING USING C++ LAB

**Course Code:** **BTI 222** **Credit Units: 01**

**Software Required:** Turbo C++

**Course Contents:**

- Creation of objects in programs and solving problems through them.
- Different use of private, public member variables and functions and friend functions.
- Use of constructors and destructors.
- Operator overloading
- Use of inheritance in and accessing objects of different derived classes.
- Polymorphism and virtual functions (using pointers).
- File handling.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# ENGINEERING MECHANICS LAB

**Course Code:** **BTI 223** **Credit Units: 01**

## Engineering Mechanics:

1. To verify the law of Force Polygon
2. To verify the law of Moments using Parallel Force apparatus. (Simply supported type)
3. To determine the co-efficient of friction between wood and various surface (like
4. Leather, Wood, Aluminum) on an inclined plane.
5. To find the forces in the members of Jib Crane.
6. To determine the mechanical advantage, Velocity ratio and efficiency of a screw jack.
7. To determine the mechanical advantage, Velocity ratio and Mechanical efficiency of the
8. Wheel and Axle
9. To determine the MA, VR, $\eta$ of Worm Wheel (2-start)
10. Verification of force transmitted by members of given truss.
11. To verify the law of moments using Bell crank lever
12. To find CG and moment of Inertia of an irregular body using Computation method

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# ENGLISH

**Course Code:** **BTI 240** **Credit Units: 03**

## Course Objective:

The course is intended to give a foundation of English Language. The literary texts are indented to help students to inculcate creative & aesthetic sensitivity and critical faculty through comprehension, appreciation and analysis of the prescribed literary texts. It will also help them to respond form different perspectives.

## Course Contents:

**Module I: Vocabulary**
Use of Dictionary
Use of Words: Diminutives, Homonyms & Homophones

**Module II: Essentials of Grammar - I**
Articles
Parts of Speech
Tenses

**Module III: Essentials of Grammar - II**
Sentence Structure
Subject -Verb agreement
Punctuation

**Module IV: Communication**
The process and importance
Principles & benefits of Effective Communication

**Module V: Spoken English Communication**
Speech Drills
Pronunciation and accent
Stress and Intonation

**Module VI: Communication Skills - I**
Developing listening skills
Developing speaking skills

**Module VII: Communication Skills - II**
Developing Reading Skills
Developing writing Skills

**Module VIII: Written English communication**
Progression of Thought/ideas
Structure of Paragraph
Structure of Essays

**Module IX: Short Stories**
Of Studies, by Francis Bacon
Dream Children, by Charles Lamb
The Necklace, by Guy de Maupassant
A Shadow, by R.K.Narayan
Glory at Twilight, Bhabani Bhattacharya

**Module X: Poems**

| | |
|---|---|
| All the Worlds a Stage | Shakespeare |
| To Autumn | Keats |
| O! Captain, My Captain. | Walt Whitman |
| Where the Mind is Without Fear | Rabindranath Tagore |
| Psalm of Life | H.W. Longfellow |

## Examination Scheme:

| Components | A | CT | HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 05 | 15 | 10 | 70 |

## Text & References:


- Madhulika Jha, Echoes, Orient Long Man.
- Ramon & Prakash, Business Communication, Oxford.
- Sydney Greenbaum Oxford English Grammar, Oxford.
- Successful Communications, Malra Treece (Allyn and Bacon).
- Effective Technical Communication, M. Ashraf Rizvi.

# BEHAVIOURAL SCIENCE - II
# (PROBLEM SOLVING AND CREATIVE THINKING)

**Course Code:** **BTI 243** **Credit Units: 01**

## Course Objective:

To enable the students:

- Understand the process of problem solving and creative thinking.
- Facilitation and enhancement of skills required for decision-making.

## Course Contents:

**Module I: Thinking as a tool for Problem Solving**
What is thinking: The Mind/Brain/Behaviour
Critical Thinking and Learning:
- Making Predictions and Reasoning
- Memory and Critical Thinking
- Emotions and Critical Thinking

Thinking skills

**Module II: Hindrances to Problem Solving Process**
Perception
Expression
Emotion
Intellect
Work environment

**Module III: Problem Solving**
Recognizing and Defining a problem
Analyzing the problem (potential causes)
Developing possible alternatives
Evaluating Solutions
Resolution of problem
Implementation
Barriers to problem solving:
- Perception
- Expression
- Emotion
- Intellect
- Work environment

**Module IV: Plan of Action**
Construction of POA
Monitoring
Reviewing and analyzing the outcome

**Module V: Creative Thinking**
Definition and meaning of creativity
The nature of creative thinking
- Convergent and Divergent thinking
- Idea generation and evaluation (Brain Storming)
- Image generation and evaluation
- Debating

The six-phase model of Creative Thinking: ICEDIP model

**Module VI: End-of-Semester Appraisal**
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

## Examination Scheme:

| Components | SAP | A | Mid Term Test (CT) | VIVA | Journal for Success (JOS) |
|---|---|---|---|---|---|
| Weightage (%) | 20 | 05 | 20 | 30 | 25 |

## Text & References:


- Michael Steven: How to be a better problem solver, Kogan Page, New Delhi, 1999
- Geoff Petty: How to be better at creativity; Kogan Page, New Delhi, 1999
- Richard Y. Chang and P. Keith, Kelly: Wheeler Publishing, New Delhi, 1998.
- Phil Lowe Koge Page: Creativity and Problem Solving, New Delhi, 1996
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 3, Management (1996); Pfeiffer & Company
- Bensley, Alan D.: Critical Thinking in Psychology – A Unified Skills Approach, (1998), Brooks/Cole Publishing Company.

# FRENCH - II

**Course Code:** **BTI 244** **Credit Units: 02**

## Course Objective:

To enable the students to overcome the fear of speaking a foreign language and take position as a foreigner speaking French.

To make them learn the basic rules of French Grammar.

## Course Contents:

**Module A: pp.38 – 47: Unité 3: Object if 3, 4, 5. 6**

**Module B: pp. 47 to 75 Unité 4, 5**

**Contenu lexical:** **Unité 3: Organiser son temps**

1. donner/demander des informations sur un emploi du temps, un horaire SNCF – Imaginer un dialogue
2. rédiger un message/ une lettre pour …
   i) prendre un rendez-vous/ accepter et confirmer/ annuler
   ii) inviter/accepter/refuser
3. Faire un programme d'activités
   imaginer une conversation téléphonique/un dialogue
   Propositions- interroger, répondre

**Unité 4: Découvrir son environnement**

1. situer un lieu
2. s'orienter, s'informer sur un itinéraire.
3. Chercher, décrire un logement
4. connaître les rythmes de la vie

**Unité 5: s'informer**

1. demander/donner des informations sur un emploi du temps passé.
2. donner une explication, exprimer le doute ou la certitude.
3. découvrir les relations entre les mots
4. savoir s'informer

**Contenu grammatical:**

1. Adjectifs démonstratifs
2. Adjectifs possessifs/exprimer la possession à l'aide de:
   i. « de » ii. A+nom/pronom disjoint
3. Conjugaison pronominale – négative, interrogative - construction à l'infinitif
4. Impératif/exprimer l'obligation/l'interdiction à l'aide de « il faut…. »/ «il ne faut pas… »
5. passé composé
6. Questions directes/indirectes

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- le livre à suivre: Campus: Tome 1

# GERMAN – II

**Course Code:** **BTI 245** **Credit Units: 02**

## Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany.
Introduction to Grammar to consolidate the language base learnt in Semester I

## Course Contents:

**Module I: Everything about Time and Time periods**
Time and times of the day.
Weekdays, months, seasons.
Adverbs of time and time related prepositions

**Module II: Irregular verbs**
Introduction to irregular verbs like to be, and others, to learn the conjugations of the same, (fahren, essen, lessen, schlafen, sprechen und ähnliche).

**Module III: Separable verbs**
To comprehend the change in meaning that the verbs undergo when used as such
Treatment of such verbs with separable prefixes

**Module IV: Reading and comprehension**
Reading and deciphering railway schedules/school time table
Usage of separable verbs in the above context

**Module V: Accusative case**
Accusative case with the relevant articles
Introduction to 2 different kinds of sentences – Nominative and Accusative

**Module VI: Accusative personal pronouns**
Nominative and accusative in comparison
Emphasizing on the universal applicability of the pronouns to both persons and objects

**Module VII: Accusative prepositions**
Accusative propositions with their use
Both theoretical and figurative use

**Module VIII: Dialogues**
Dialogue reading: 'In the market place'
'At the Hotel'

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:


- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

# SPANISH – II

**Course Code: BTI 246 Credit Units: 02**

## Course Objective:

To enable students acquire more vocabulary, grammar, Verbal Phrases to understand simple texts and start describing any person or object in Simple Present Tense.

## Course Contents:

**Module I**
Revision of earlier modules.

**Module II**
Some more AR/ER/IR verbs. Introduction to root changing and irregular AR/ER/IR ending verbs

**Module III**
More verbal phrases (eg, Dios Mio, Que lastima etc), adverbs (bueno/malo, muy, mucho, bastante, poco).
Simple texts based on grammar and vocabulary done in earlier modules.

**Module IV**
Posessive pronouns

**Module V**
Writing/speaking essays like my friend, my house, my school/institution, myself….descriptions of people, objects etc, computer/internet related vocabulary

## Examination Scheme:

| **Components** | **CT1** | **CT2** | **C** | **I** | **V** | **A** |
|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- Español, En Directo I A
- Español Sin Fronteras

# JAPANESE - II

**Course Code:** **BTI 247** **Credit Units: 02**

## Course Objective:
To enable the students to converse in the language with the help of basic particles and be able to define the situations and people using different adjectives.

## Course Contents:

**Module I: Verbs**
Transitive verbs, intransitive verbs

**Module II: More prepositions**
More particles, articles and likes and dislikes.

**Module III: Terms used for instructions**
No parking, no smoking etc.

**Module IV: Adverbs**
Different adverbial expression.

**Module V: Invitations and celebrations**
Giving and receiving presents,
Inviting somebody for lunch, dinner, movie and how to accept and refuse in different ways

**Module VI: Comprehension's**
Short essay on Family, Friend etc.

**Module VII: Conversations**
Situational conversations like asking the way, At a post office, family

**Module VIII: Illness**
Going to the doctor, hospital etc.

## Learning Outcome
- Students can speak the language describing above-mentioned topics.

## Methods of Private study /Self help
- Handouts, audio-aids, and self-do assignments.
- Use of library, visiting and watching movies in Japan and culture center every Friday at 6pm.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

***Text:***
- Teach yourself Japanese

***References:***
- Shin Nihongo no kiso 1

# CHINESE – II

**Course Code:** **BTI 248** **Credit Units: 02**

## Course Objective:

Chinese is a tonal language where each syllable in isolation has its definite tone (flat, falling, rising and rising/falling), and same syllables with different tones mean different things. When you say, “ma” with a third tone, it mean horse and “ma” with the first tone is Mother. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

## Course Contents:

**Module I**
Drills
Practice reading aloud
Observe Picture and answer the question.
Tone practice.
Practice using the language both by speaking and by taking notes.
Introduction of basic sentence patterns.
Measure words.
Glad to meet you.

**Module II**
Where do you live?
Learning different colors.
Tones of “bu”
Buying things and how muchit costs?
Dialogue on change of Money.
More sentence patterns on Days and Weekdays.
How to tell time. Saying the units of time in Chinese. Learning to say useful phrases like – 8:00, 11:25, 10:30 P.M. everyday, afternoon, evening, night, morning 3:58, one hour, to begin, to end ….. etc.
Morning, Afternoon, Evening, Night.

**Module III**
Use of words of location like-li, wais hang, xia
Furniture – table, chair, bed, bookshelf,.. etc.
Description of room, house or hostel room.. eg what is placed where and how many things are there in it?
Review Lessons – Preview Lessons.
Expression ‘yao”, “xiang” and “yaoshi” (if).
Days of week, months in a year etc.
I am learning Chinese. Is Chinese difficult?

**Module IV**
Counting from 1-1000
Use of “chang-chang”.
Making an Inquiry – What time is it now? Where is the Post Office?
Days of the week. Months in a year.
Use of Preposition – “zai”, “gen”.
Use of interrogative pronoun – “duoshao” and “ji”.
“Whose”??? Sweater etc is it?
Different Games and going out for exercise in the morning.

**Module V**
The verb “qu”

- Going to the library issuing a book from the library
- Going to the cinema hall, buying tickets
- Going to the post office, buying stamps
- Going to the market to buy things.. etc
- Going to the buy clothes …. Etc.

Hobby. I also like swimming.
Comprehension and answer questions based on it.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- "Elementary Chinese Reader Part I" Lesson 11-20

# APPLIED MATHEMATICS-III

**Course Code:** **BTI 301** **Credit Units: 04**

## Course Objective:

The knowledge of Mathematics is necessary for a better understanding of almost all the Engineering and Science subjects. Here our intention is to make the students acquainted with the concept of basic topics from Mathematics, which they need to pursue their Engineering degree in different disciplines.

## Course Contents:

**Module I: Partial Differential Equations**
Formation of PDE, Equations solvable by direct integration, Linear equations of the first order, Non-linear equations of the first order, Charpit's method, Homogeneous linear equations with constant coefficients, Non homogeneous linear equations.

**Module II: Fourier Series**
Periodic Functions, Fourier Series, Functions having points of discontinuity, Even or Odd Functions, Change of Interval, Half-range series, , Parseval's Formula, Complex form of Fourier series, Practical Harmonic Analysis, Fourier Transforms, Sine and Cosine Transforms.

**Module III: Laplace Transformation**
Definition, Transforms of elementary functions, Properties of Laplace transforms, Existence conditions, Transforms of derivatives, Transforms of integrals, Evaluation of integrals by Laplace transform, Inverse transforms, Other methods of finding inverse transforms, Convolution theorem, Application to differential equations, Simultaneous linear equations with constant coefficients, Unit step functions, Periodic functions.

**Module IV: Linear Programming**
Formulation of the problem, Graphical method, Canonical and Standard forms of L.P.P. Simplex Method, Artificial variable Techniques-M-method, Two phase method, Degeneracy, Dual simplex method.

## Examination Scheme:

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***

- Differential Calculus by Shanti Narain
- Integral Calculus by Shanti Narain
- Higher Engineering Mathematics by B.S. Grewal

***References:***

- Differential Equations by A.R. Forsyth
- Higher Engineering Mathematics by H.K. Dass
- Partial Differential Equations by I.N. Snedon

# ANALOG ELECTRONICS

**Course Code: BTI 302 Credit Units: 04**

## Course Objective:

This course builds from basic knowledge of Semiconductor Physics to an understanding of basic devices and their models. This course builds a foundation for courses on VLSI design and analog CMOS IC Design.

## Course Contents:

**Module I: Semiconductor Diode and Diode Circuits**

Different types of diodes: Zener, Schottky, LED. Zener as voltage regulator, Diffusion capacitance, Drift capacitance, the load line concept, half wave, full wave rectifiers, clipping and clamping circuits.

**Module II: Bipolar Junction Transistor**

Bipolar junction transistor: Introduction, Transistor, construction, transistor operations, BJT characteristics, load line, operating point, leakage currents, saturation and cut off mode of operations. Bias stabilization: Need for stabilization, fixed Bias, emitter bias, self bias, bias stability with respect to variations in $I_{co,}$ $V_{BE}$ & $\beta$, Stabilization factors, thermal stability.

**Module III: Small signal Analysis of transistor and Multistage Amplifier**

Hybrid model for transistors at low frequencies, Analysis of transistor amplifier using h parameters, emitter follower, Miller's theorem, THE CE amplifier with an emitter resistance, Hybrid $\pi$ model, Hybrid $\pi$ Conducatnces and Capacitances, CE short circuit current gain, CE short circuit current gain with $R_L$ Multistage amplifier: Cascading of Amplifiers, Coupling schemes(RC coupling and Transformer coupling)

**Module IV: Field Effect Transistors**

Field effect transistor (JFET, MOSFET): volt-ampere characteristics, small signal model –common drain, common source, common gate, operating point, MOSFET, enhancement and -depletion mode, Common source amplifier, Source follower

**Module V: Feedback Amplifiers**

Feedback concept, Classification of Feedback amplifiers, Properties of negative Feedback amplifiers, Impedance considerations in different Configurations, Examples of analysis of feedback Amplifiers.

**Module VI: Power amplifiers**

Power dissipation in transistors, difference with voltage amplifiers, Amplifier classification (Class A, Class B, Class C, Class AB) class AB push pull amplifier, collector efficiency of each, cross over distortion.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Robert F. Pierret: Semiconductor Device Fundamentals, Pearson Education.
- Millman and Halkias: Electronic Devices and circuits, Tata McGraw.
- Boylestad: Electronic Devices and Circuits, Pearson Education.

# OPERATING SYSTEMS

**Course Code: BTI 303 Credit Units: 03**

## Course Objective:

Operating Systems serve as one of the most important courses for undergraduate students, since it provides the students with a new sight to envision every computerized systems especially general purpose computers. Therefore, the students are supposed to study, practice and discuss on the major fields discussed in the course to ensure the success of the education process. The outcome of this course implicitly and explicitly affects the abilities the students to understand, analyze and overcome the challenges they face with in the other courses and the real world.

## Course Contents:

**Module I: Introduction to operating system**

Operating system and function, Evolution of operating system, Batch, Interactive, multiprogramming, Time Sharing and Real Time System, multiprocessor system, Distributed system, System protection. Operating System structure, Operating System Services, System Program and calls.

**Module II: Process Management**

Process concept, State model, process scheduling, job and process synchronization, structure of process management, Threads

Interprocess Communication and Synchronization:

Principle of Concurrency, Producer Consumer Problem, Critical Section problem, Semaphores, Hardware Synchronization, Critical Regions, Conditional critical region, Monitor, Inter Process Communication.

CPU Scheduling:

Job scheduling functions, Process scheduling, Scheduling Algorithms, Non Preemptive and preemptive Strategies, Algorithm Evaluation, Multiprocessor Scheduling.

Deadlock:

System Deadlock Model, Deadlock Characterization, Methods for handling deadlock, Prevention strategies, Avoidance and Detection, Recovery from deadlock combined approach.

**Module III: Memory Management**

Single Contiguous Allocation: H/W support, S/W support, Advantages and disadvantages, Fragmentation, Paging, Segmentation, Virtual memory concept, Demand paging, Performance, Paged replaced algorithm, Allocation of frames, Thrashing, Cache memory, Swapping, Overlays

**Module IV: Device management**

Principles of I/O hardware, Device controller, Device Drivers, Memory mapped I/O, Direct Access Memory, Interrupts, Interrupt Handlers, Application I/O interface, I/O Scheduling, Buffering, Caching, Spooling,
Disk organization, Disk space management, Disk allocation Method, Disk Scheduling, Disk storage.

**Module V: File System and Protection and security**

File Concept, File Organization and Access Mechanism, File Directories, Basic file system, File Sharing, Allocation method, Free space management.

Policy Mechanism, Authentication, Internal excess Authorization.

## Examination Scheme:

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***

- Milenekovic, "Operating System Concepts", McGraw Hill
- A. Silberschatz, P.B. Galvin "Operating System Concepts", John Willey & son

***References:***


- Dietel, "An introduction to operating system", Addision Wesley
- Tannenbaum, "Operating system design and implementation", PHI
- Operating System, A Modern Perspection, Gary Nutt, Pearson Edu. 2000
- A. S Tanenbaum, Modern Operating System, 2nd Edition, PHI.
- Willam Stalling " Operating system" Pearson Education
- B. W. Kernighan & R. Pike, "The UNIX Programming Environment" Prentice Hall of India, 2000
- Sumitabha Das " Your UNIX The ultimate guide" Tata Mcgraw Hill
- "Design of UNIX Operating System " The Bach Prentice – Hall of India

# DATA STRUCTURES USING C

**Course Code:** **BTI 304** **Credit Units: 03**

## Course Objective:

Data structure deals with organizing large amount of data in order to reduce space complexity and time requirement. This course gives knowledge of algorithms, different types of data structures and the estimation space and time complexity.

## Course Contents:

**Module I: Introduction to Data structures**

**Data structures:** Definition, Types. Algorithm design, Complexity, Time-Space Trade offs. Use of pointers in data structures.

Array Definition and Analysis, Representation of Linear Arrays in Memory, Traversing of Linear Arrays, Insertion And Deletion, Single Dimensional Arrays, Two Dimensional Arrays, Multidimensional Arrays, Function Associated with Arrays, Character String in C, Character String Operations, Arrays as parameters, Implementing One Dimensional Array, Sparse matrix.

**Module II: Introduction to Stacks and queue**

**Stack:** Definition, Array representation of stacks, Operations Associated with Stacks- Push & Pop, Polish expressions, Conversion of infix to postfix, infix to prefix (and vice versa),Application of stacks recursion, polish expression and their compilation, conversion of infix expression to prefix and postfix expression, Tower of Hanoi problem.

**Queue:** Definition, Representation of Queues, Operations of queues- QInsert, QDelete, Priority Queues, Circular Queue, Deque.

**Module III: Dynamic Data Structure**

**Linked list:** Introduction to Singly linked lists: Representation of linked lists in memory, Traversing, Searching, Insertion into, Deletion from linked list, doubly linked list, circular linked list, generalized list. Applications of Linked List-Polynomial representation using linked list and basic operation. Stack and queue implementation using linked list.

**Module IV: Trees and Graphs**

**Trees:** Basic Terminology, Binary Trees and their representation, expression evaluation, Complete Binary trees, extended binary trees, Traversing binary trees, Searching, Insertion and Deletion in binary search trees, General trees, AVL trees, Threaded trees, B trees.

**Graphs:** Terminology and Representations, Graphs & Multigraphs, Directed Graphs, Sequential representation of graphs, Adjacency matrices, Transversal Connected Component and Spanning trees.

**Module V: Sorting and Searching and file structures**

**Sorting:** Insertion Sort, Bubble sort, Selection sort, Quick sort, two-way Merge sort, Heap sort, Partition exchange sort, Shell sort, Sorting on different keys, External sorting.

**Searching:** Linear search, Binary search

**File structures:** Physical storage media, File Organization, Linked organization of file, Inverted file, Organization records into blocks, Sequential blocks, Hash function, Indexing & Hashing, Multilevel indexing, Tree Index, Random file, Primary Indices, Secondary Indices, B tree index files.

## Examination Scheme:

| **Components** | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***


- Horowitz and Sahani, “Fundamentals of Data structures”, Galgotia publications
- Tannenbaum, “Data Structures”, PHI
- R.L. Kruse, B.P. Leary, C.L. Tondo, “Data structure and program design in C” PHI
- “Data structures and algorithms” – Schaum Series.
- File Structures An object-Oriented Approach with C++ by Michael J. Folk, Bill Zoellick, Breg Riccardi, Published by Addison Wesley (1st ISE Reprint,1999).

***References:***


- J. P. Tremblay and P. G. Sorenson, Introduction to Data Structures with Applications, McGraw – Hill Computer Science Series, Mc-Graw – Hill New York, 1984
- Algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Published by Prentice-Hall India (1999).
- Data Structures Using C and C++ second edition by Yeddidyah Langsam, Moshe J.Augenstein, Aaron M. Tenen Baum, Published by Prentice-Hall India
- Data Structures and Algorithm analysis in C++ by Mark Allen Weiss, Published by Addison Wesley (3rd Indian Reprint 2000).
- "Data Structures" – R. S. Salaria

# DATA BASE MANAGEMENT SYSTEMS

**Course Code: BTI 305 Credit Units: 03**

## Course Objective:

The objective of this course is to get students familiar with Databases and their use. They can identify different types of available database model, concurrency techniques and new applications of the DBMS.

## Course Contents:

**Module I: Introduction**
Concept and goals of DBMS, Database Languages, Database Users, Database Abstraction.
Basic Concepts of ER Model, Relationship sets, Keys, Mapping, Design of ER Model

**Module II: Hierarchical model & Network Model**
Concepts, Data definition, Data manipulation and implementation.
Network Data Model, DBTG Set Constructs, and Implementation

**Module III: Relational Model**
Relational database, Relational Algebra, Relational & Tuple Calculus.

**Module IV: Relational Database Design and Query Language**
SQL, QUEL, QBE, Normalization using Functional Dependency, Multivalued dependency and Join dependency.

**Module V: Concurrency Control and New Applications**
Lock Based Protocols, Time Stamped Based Protocols, Deadlock Handling, Crash Recovery. Distributed Database, Objective Oriented Database, Multimedia Database, Data Mining, Digital Libraries.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

*Text:*

- Korth, Silberschatz, “Database System Concepts”, 4th Ed., TMH, 2000.
- Steve Bobrowski, “Oracle & Architecture”, TMH, 2000

*References:*

- Date C. J., “An Introduction to Database Systems”, 7th Ed., Narosa Publishing, 2004
- Elmsari and Navathe, “Fundamentals of Database Systems”, 4th Ed., A. Wesley, 2004
- Ullman J. D., “Principles of Database Systems”, 2nd Ed., Galgotia Publications, 1999.

# ANALOG ELECTRONICS LAB

**Course Code:** **BTI 320** **Credit Units: 01**

## Course Contents:

1. To study and plot the characteristics of a junction diode.
2. To study Zener diode as a voltage regulator.
3. To study diode based clipping and clamping circuits.
4. To study half wave, full wave and bridge rectifier with filters.
5. To study the input and output characteristics of a transistor in its various configurations.
6. To study and plot the characteristics of a JFET in its various configurations.
7. To study and plot the characteristics of a MOSFET in its various configurations.
8. To study various types of Bias Stabilization for a transistor.
9. To study the gain and plot the frequency response of a single stage transistor amplifier.
10. To measure gain and plot the frequency response of double stage RC coupled amplifier.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# DATA BASE MANAGEMENT SYSTEMS LAB

**Course Code:** **BTI 321** **Credit Units: 01**

**Software Required:** Oracle 9i

**Topics covered in lab will include:**

- Database Design
- Data Definition (SQL)
- Data Retrieval (SQL)
- Data Modification (SQL)
- Views
- Triggers and Procedures
- PL\SQL

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# UNIX PROGRAMMING LAB – I

**Course Code:** **BTI 322** **Credit Units: 01**

**Software Required:** UNIX SCO

**Assignments will be provided for the following**

- Introduction to UNIX Commands
- Introduction to vi editor
- Programming in shell script
- Introduction to programming in C Shell

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

**Text & References:**


- "Unix Programming Environment" The Kernighan and Pike Prentice – Hall of India
- "Unix –Shell Programming" Kochar
- " Unix Concepts and application" Das Sumitabha Tata Mcgraw Hill

# DATA STRUCTURES USING C LAB

**Course Code:** **BTI 323** **Credit Units: 01**

**Software Required:** Turbo C++

## Assignment will be provided for following:

- Practical application of sorting and searching algorithm.
- Practical application of various data structure like linked list, queue, stack, tree

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# COMMUNICATION SKILLS - I

**Course Code:** **BTI 341** **Credit Units: 01**

## Course Objective:
To form written communication strategies necessary in the workplace

## Course Contents:

**Module I: Introduction to Writing Skills**
Effective Writing Skills
Avoiding Common Errors
Paragraph Writing
Note Taking
Writing Assignments

**Module II: Letter Writing**
Types
Formats

**Module III**
Memo
Agenda and Minutes
Notice and Circulars

**Module IV: Report Writing**
Purpose and Scope of a Report
Fundamental Principles of Report Writing
Project Report Writing
Summer Internship Reports

## Examination Scheme:

| Components | CT1 | CT2 | CAF | V | GD | GP | A |
|---|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 25 | 10 | 10 | 10 | 5 |

CAF – Communication Assessment File
GD – Group Discussion
GP – Group Presentation

## Text & References:


- Business Communication, Raman – Prakash, Oxford
- Creative English for Communication, Krishnaswamy N, Macmillan
- Textbook of Business Communication, Ramaswami S, Macmillan
- Working in English, Jones, Cambridge
- A Writer's Workbook Fourth edition, Smoke, Cambridge
- Effective Writing, Withrow, Cambridge
- Writing Skills, Coe/Rycroft/Ernest, Cambridge
- Welcome!, Jones, Cambridge

# BEHAVIOURAL SCIENCE - III
# (INTERPERSONAL COMMUNICATION)

**Course Code:** **BTI 343** **Credit Units: 01**

## Course Objective:
This course provides practical guidance on
- Enhancing personal effectiveness and performance through effective interpersonal communication
- Enhancing their conflict management and negotiation skills

## Course Contents:

**Module I: Interpersonal Communication: An Introduction**
Importance of Interpersonal Communication
Types – Self and Other Oriented
Rapport Building – NLP, Communication Mode
Steps to improve Interpersonal Communication

**Module II: Behavioural Communication**
Meaning and Nature of behavioural communication
Persuasion, Influence, Listening and Questioning
Guidelines for developing Human Communication skills
Relevance of Behavioural Communication for personal and professional development

**Module III: Interpersonal Styles**
Transactional Analysis
Life Position/Script Analysis
Games Analysis
Interactional and Transactional Styles

**Module IV: Conflict Management**
Meaning and nature of conflicts
Styles and techniques of conflict management
Conflict management and interpersonal communication

**Module V: Negotiation Skills**
Meaning and Negotiation approaches (Traditional and Contemporary)
Process and strategies of negotiations
Negotiation and interpersonal communication

**Module VI: End-of-Semester Appraisal**
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

## Examination Scheme:

| Components | SAP | A | Mid Term Test (CT) | VIVA | Journal for Success (JOS) |
|---|---|---|---|---|---|
| Weightage (%) | 20 | 05 | 20 | 30 | 25 |

## Text & References:


- Vangelist L. Anita, Mark N. Knapp, Inter Personal Communication and Human Relationships: Third Edition, Allyn and Bacon
- Julia T. Wood. Interpersonal Communication everyday encounter
- Simons, Christine, Naylor, Belinda: Effective Communication for Managers, 1997 1st Edition Cassel
- Goddard, Ken: Informative Writing, 1995 1st Edition, Cassell
- Harvard Business School, Effective Communication: United States of America
- Foster John, Effective Writing Skills: Volume-7, First Edition 2000, Institute of Public Relations (IPR)
- Beebe, Beebe and Redmond; Interpersonal Communication, 1996; Allyn and Bacon Publishers.

# FRENCH - III

**Course Code:** **BTI 344** **Credit Units: 02**

## Course Objective:
To provide the students with the know-how

- To master the current social communication skills in oral and in written.
- To enrich the formulations, the linguistic tools and vary the sentence construction without repetition.

## Course Contents:

**Module B: pp. 76 – 88 Unité 6**

**Module C: pp. 89 to103 Unité 7**

**Contenu lexical:** **Unité 6: se faire plaisir**

1. acheter: exprimer ses choix, décrire un objet (forme, dimension, poids et matières) payer
2. parler de la nourriture, deux façons d'exprimer la quantité, commander un repas au restaurant
3. parler des différentes occasions de faire la fête

**Unité 7: Cultiver ses relations**

1. maîtriser les actes de la communication sociale courante (Salutations, présentations, invitations, remerciements)
2. annoncer un événement, exprimer un souhait, remercier, s'excuser par écrit.
3. caractériser une personne (aspect physique et caractère)

**Contenu grammatical:**

1. accord des adjectifs qualificatifs
2. articles partitifs
3. Négations avec de, ne…rien/personne/plus
4. Questions avec combien, quel…
5. expressions de la quantité
6. ne…plus/toujours - encore
7. pronoms compléments directs et indirects
8. accord du participe passé (auxiliaire « avoir ») avec l'objet direct
9. Impératif avec un pronom complément direct ou indirect
10. construction avec « que » - Je crois que/ Je pense que/ Je sais que

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- le livre à suivre: Campus: Tome 1

# GERMAN - III

**Course Code:** **BTI 345** **Credit Units: 02**

## Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany

## Course Contents:

**Module I: Modal verbs**
Modal verbs with conjugations and usage
Imparting the finer nuances of the language

**Module II: Information about Germany (ongoing)**
Information about Germany in the form of presentations or "Referat"– neighbors, states and capitals, important cities and towns and characteristic features of the same, and also a few other topics related to Germany.

**Module III: Dative case**
Dative case, comparison with accusative case
Dative case with the relevant articles
Introduction to 3 different kinds of sentences – nominative, accusative and dative

**Module IV: Dative personal pronouns**
Nominative, accusative and dative pronouns in comparison

**Module V: Dative prepositions**
Dative preposition with their usage both theoretical and figurative use

**Module VI: Dialogues**
In the Restaurant,
At the Tourist Information Office,
A telephone conversation

**Module VII: Directions**
Names of the directions
Asking and telling the directions with the help of a roadmap

**Module VIII: Conjunctions**
To assimilate the knowledge of the conjunctions learnt indirectly so far

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:


- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

# SPANISH – III

**Course Code:** **BTI 346** **Credit Units: 02**

## Course Objective:

To enable students acquire knowledge of the Set/definite expressions (idiomatic expressions) in Spanish language and to handle some Spanish situations with ease.

## Course Contents:

**Module I**
Revision of earlier semester modules
Set expressions (idiomatic expressions) with the verb *Tener*, *Poner, Ir*….
Weather

**Module II**
Introduction to *Gustar*…and all its forms. Revision of *Gustar* and usage of it

**Module III**
Translation of Spanish-English; English-Spanish. Practice sentences.
How to ask for directions (using estar)
Introduction to IR + A + INFINITIVE FORM OF A VERB

**Module IV**
Simple conversation with help of texts and vocabulary
En el restaurante
En el instituto
En el aeropuerto

**Module V**
Reflexives

## Examination Scheme:

| **Components** | **CT1** | **CT2** | **C** | **I** | **V** | **A** |
|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- Español, En Directo I A
- Español Sin Fronteras -Nivel Elemental

# JAPANESE - III

**Course Code: BTI 347 Credit Units: 02**

## Course Objective:
To enable the students to converse in the language with the help of basic verbs and to express themselves effectively and narrate their everyday short encounters. Students are also given projects on Japan and Japanese culture to widen their horizon further.
**Note:** The Japanese script is introduced in this semester.

## Course Contents:

**Module I: Verbs**
Different forms of verbs: present continuos verbs etc

**Module II**
More Adverbs and adverbial expressions

**Module III: Counters**
Learning to count different shaped objects,

**Module IV: Tenses**
Past tense, Past continuous tense.

**Module V: Comparison**
Comparative and Superlative degree

**Module VI: Wishes and desires**
Expressing desire to buy, hold, possess. Usage in negative sentences as well.
Comparative degree, Superlative degree.

**Module VII: Appointment**
Over phone, formal and informal etc.

## Learning Outcome
- Students can speak the language and can describe themselves and situations effectively
- They also gain great knowledge in terms of Japanese lifestyle and culture, which help them at the time of placements.

## Methods of Private study /Self help
- Handouts, audio-aids, and self-do assignments.
- Use of library, visiting and watching movies in Japan and culture center every Friday at 6pm.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

***Text:***
- Teach yourself Japanese

***References:***
- Shin Nihongo no kiso 1

# CHINESE – III

**Course Code:** **BTI 348** **Credit Units: 02**

## Course Objective:

Foreign words are usually imported by translating the concept into Chinese, the emphasis is on the meaning rather than the sound. But the system runs into a problem because the underlying name of personal name is often obscure so they are almost always transcribed according to their pronciation alone. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

## Course Contents:

**Module I**

Drills
Dialogue practice
Observe picture and answer the question.
Introduction of written characters.
Practice reading aloud
Practice using the language both by speaking and by taking notes.
Character writing and stroke order

**Module II**

Measure words
Position words e.g. inside, outside, middle, in front, behind, top, bottom, side, left, right, straight.
Directional words – beibian, xibian, nanbian, dongbian, zhongjian.
Our school and its different building locations.
What game do you like?
Difference between "hii" and "neng", "keyi".

**Module III**

Changing affirmative sentences to negative ones and vice versa
Human body parts.
Not feeling well words e.g.; fever, cold, stomach ache, head ache.
Use of the modal particle "le"
Making a telephone call
Use of "jiu" and "cal" (Grammar portion)
Automobiles e.g. Bus, train, boat, car, bike etc.
Traveling, by train, by airplane, by bus, on the bike, by boat.. etc.

**Module IV**

The ordinal number "di"
"Mei" the demonstrative pronoun e.g. mei tian, mei nian etc.
use of to enter to exit
Structural particle "de" (Compliment of degree).
Going to the Park.
Description about class schedule during a week in school.
Grammar use of "li" and "cong".
Comprehension reading followed by questions.

**Module V**

Persuasion-Please don't smoke.
Please speak slowly
Praise – This pictorial is very beautiful
Opposites e.g. Clean-Dirty, Little-More, Old-New, Young-Old, Easy-Difficult, Boy-Girl, Black-White, Big-Small, Slow-Fast … etc.
Talking about studies and classmates
Use of "it doesn't matter"
Enquiring about a student, description about study method.
Grammar: Negation of a sentence with a verbal predicate.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation, I – Interaction/Conversation Practice

## Text & References:

- "Elementary Chinese Reader Part I, Part-2" Lesson 21-30

# TERM PAPER

**Course Code: BTI 330 Credit Units: 02**

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

**GUIDELINES FOR TERM PAPER**

The procedure for writing a term paper may consist of the following steps:

1. Choosing a subject
2. Finding sources of materials
3. Collecting the notes
4. Outlining the paper
5. Writing the first draft
6. Editing & preparing the final paper

1. **Choosing a Subject**

The subject chosen should not be too general.

2. **Finding Sources of materials**
   a) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
   b) Begin by making a list of subject-headings under which you might expect the subject to be listed.
   c) The sources could be books and magazine articles, news stories, periodicals, scientific journals etc.

3. **Collecting the notes**

Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.
   a) Get facts, not just opinions. Compare the facts with author's conclusion.
   b) In research studies, notice the methods and procedures, results & conclusions.
   c) Check cross references.

4. **Outlining the paper**
   a) Review notes to find main sub-divisions of the subject.
   b) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. **Writing the first draft**

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:
   a) statement of purpose
   b) main body of the paper
   c) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main idea.

6. **Editing & Preparing the final Paper**
   a) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.
   b) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
   c) Check for proper spelling, phrasing and sentence construction.
   d) Check for proper form on footnotes, quotes, and punctuation.
   e) Check to see that quotations serve one of the following purposes:
      (i) Show evidence of what an author has said.
      (ii) Avoid misrepresentation through restatement.
      (iii) Save unnecessary writing when ideas have been well expressed by the original author.
   f) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:
   1) Title page

2) Table of contents
3) Introduction
4) Review
5) Discussion & Conclusion
6) References
7) Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

**Discussion**
The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

**Conclusion**
The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

a) summary of question posed
b) summary of findings
c) summary of main limitations of the study at hand
d) details of possibilities for related future research

**Reference**
From the very beginning of a research project, you should be careful to note all details of articles gathered. The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.
The key to a good bibliography is consistency. Choose a particular convention and stick to this.

**Conventions**
Monographs
Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

**Edited volumes**
Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.
[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

**Edited articles**
Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

**Journal articles**
McQuarrie, E.F./Mick, D.G. (1992), on resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

**Electronic book**
Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] from the World Wide Web, http://www.aber.ac.uk/media/Documents/S4B/.

**Electronic journal articles**
Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document]. German as a Foreign Language Journal [online] 1. Retrieved [12.09.'00] from the World Wide Web, http://www.gfl-journal.com/.

**Other websites**
Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document]. Retrieved [13.10.'01] from the World Wide Web, http://olaf.hiof.no/~sverrev/eng.html.

**Unpublished papers**
Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

**Unpublished theses/ dissertations**

Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg.

Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

**Appendix**

The appendix should be used for data collected (e.g. questionnaires, transcripts, ...) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

## Assessment Scheme:

| | |
|---|---|
| **Continuous Evaluation:**<br>(Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.) | 40% |
| **Final Evaluation:**<br>(Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/ presented, outcomes vs. objectives, presentation/ viva etc.) | 60% |

# THEORY OF AUTOMATA AND COMPUTATION

**Course Code:** **BTI 401** **Credit Units: 04**

## Course Objective:

The course begins with the basic mathematical preliminaries and goes on to discuss the general theory of automata, properties of regular sets and regular expressions, and the basics of formal languages. Besides, sufficient attention is devoted to such topics as pushdown automata and it's relation with context free languages, Turing machines and linear bounded automata, the basic concepts of computability such as primitive recursive functions and partial recursive functions.

## Course Contents:

**Module I: Introduction to Languages and Automata**
Formal Grammars and Chomsky Hierarchy, Regular Expression Deterministic and Nondeterministic Finite Automata, Regular Expression, Two way Finite Automata, Finite Automata with output, Properties of regular sets, pumping lemma for regular sets, My-Hill-Nerode Theorem.

**Module II: Context Free Grammars and Pushdown Automata**
CFG: Formal Definition, Derivation and Syntax trees, Simplification Forms, Ambiguous Grammar, Properties of CFL, Normal Forms (CNF and GNF)
Pushdown Automata: Definitions, Relationship between PDA and context free language, Decision Algorithms

**Module III: Turing Machine**
The Turing Machine Model, Language acceptability of Turing Machine ,Design of TM, Variation of TM, Universal TM, Church's Machine.
Recursive and recursively enumerable language, unrestricted grammars, Context Sensitive Language, Linear Bounded Automata (LBA).

**Module IV: Undecidability**
Turing machine halting Problem, undecidable problems for recursive enumerable language, Post correspondence problems (PCP) and Modified Post correspondence problems, Undecidable problems for CFL.

**Module V: Computability**
Partial and Total Functions, Primitive Recursive functions, Recursive functions.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***

- Hopcroft and Ullman, "Introduction to Automata Theory, languages and computation", Addision Wesley.
- "An introduction to formal languages and Automata (2nd ed)" by Peter Linz, D. C. Health and Company.

***References:***

- "Introduction to theory of computation (2nd Ed)" by Michael sipser.
- Mishra & Chandrashekharan, "Theory of Computer Sciences", PHI.
- Zavi Kohavi, "Switching and finite Automata Theory "
- Kohan, "Theory of Computer Sciences".
- Korral, "Theory of Computer Sciences".

# DIGITAL ELECTRONICS

**Course Code:** **BTI 402** **Credit Units: 03**

## Course Objective:

This course is an introduction to the basic principles of digital electronics. At the conclusion of this course, the student will be able to quantitatively identify the fundamentals of computers, including number systems, logic gates, logic and arithmetic subsystems, and integrated circuits. They will gain the practical skills necessary to work with digital circuits through problem solving and hands on laboratory experience with logic gates, encoders, flip-flops, counters, shift registers, adders, etc. The student will be able to analyze and design simple logic circuits using tools such as Boolean Algebra and Karnaugh Mapping, and will be able to draw logic diagrams.

## Course Contents:

**Module I: Boolean Functions**
Analog & digital signals, AND, OR, NOT, NAND, NOR & XOR gates, Boolean algebra, Standard representation of logical functions, K-map representation and simplification of logical function, don't care conditions, XOR & XNOR simplifications of K-maps, Tabulation method.

**Module II: Combinational Circuits**
Adders, Subtractors, Multiplexer, de-multiplexer, decoder & encoder, code converters, Comparators, decoder / driver for display devices, Implementation of logic functions using multiplexer / de-multiplexer,.

**Module III: Sequential Circuits**
Flip-flops: SR, JK, D & T flip flops – Truth table, Excitation table, Conversion of flip-flops, race around condition, Master Slave flip flop, Shift registers: SIPO, PISO, PIPO, SIPO, Bi-directional; Counters: ripple & synchronous counters – up / down; Synchronous Sequential circuit: design procedure.

**Module IV: Logic families**
Logic families: RTL, DTL, TTL, ECL

**Module V: Data Converters**
Data converters: ADC – successive approximation, linear ramp, dual slope; DAC – Binary Weighted, R-2R ladder type

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Moris Mano: Digital Circuits Systems
- R. P. Jain: Digital Logic & Circuits
- Thomas L. Floyd: Digital Fundamentals
- Malvino and Leech: Digital Principles & Applications

# DISCRETE MATHEMATICS

**Course Code: BTI 403 Credit Units: 04**

## Course Objective:

This subject provides students with an in-depth education in the conceptual foundations of computer science and in engineering complex software and hardware systems. It allows them to explore the connections between computer science and a variety of other disciplines in engineering and outside. Combined with a strong education in mathematics, sciences, and the liberal arts it prepares students to be leaders in computer science practice, applications to other disciplines, and research.

## Course Contents:

**Module I: Formal Logic**

Statement, Symbolic Representation and Tautologies, Quantifiers, Predicator and validity, Normal form. Propositional Logic, Predicate Logic, First Order Logic.

**Module II: Proof & Relation**

Techniques for theorem proving: Direct Proof, Proof by Contra position, Proof by exhausting cares and proof by contradiction, principle of mathematical induction, principle of complete induction. Recursive definitions, solution methods for linear, first-order recurrence relations with constant coefficients.

**Module III: Sets and Combinations**

Sets, Subtracts, power sets, binary and unary operations on a set, set operations/set identities, fundamental country principles, principle of inclusion, exclusion and pigeonhole principle, permutation and combination, Pascal's triangles, Comparing rates of growth: big theta, little oh, big oh and big omega.

**Module IV: Relation/function and matrices**

Relation/function and matrices: Relation, properties of binary relation, operation on binary relation, closures, partial ordering, equivalence relation, Function, properties of function, composition of function, inverse, binary and n-ary operations,

characteristic function, Permutation function, composition of cycles, Boolean matrices, Boolean matrices multiplication.

**Module V: Lattices & Boolean Algebra**

Lattices: definition, sub lattices, direct product, homomorphism Boolean algebra: definition, properties, isomorphic structures (in particulars, structures with binary operations) sub algebra, direct product and homo-morphism, Boolean function, Boolean expression, representation & minimization of Boolean function.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

*Text:*

- J.P. Tremblay & R. Mamohan, "Discrete Mathematical Structure with Application to Computer Science," TMH, New Delhi (2000).
- Kolman, Busby & Ross "Discrete Mathematical Structures", PHI.
- Iyengar, Chandrasekaran and Venkatesh, "Discrete Mathematics", Vikas Publication.
- Peter Linz, "An Introduction to Formal Languages and Automata", Narosa Publishing House.

*References:*

- J. Truss, "Discrete Mathematics", Addison Wesley.
- C.L. Liu, "Elements of Discrete Mathematics", McGraw Hill Book Company.
- M. Lipson & Lipshutz, "Discrete Mathematics", Schaum's Outline series.
- J. E. Hopcroft & J. D. Ullman, "Introduction to Automata Theory, Languages and Computation", Addison Weliy.

# COMMUNICATION SYSTEMS

**Course Code:** **BTI 404** **Credit Units: 04**

## Course Objective:

The purpose of this course is to provide a thorough introduction to analog and digital communications with an in depth study of various modulation techniques, Random processes are discussed, and information theory is introduced.

## Course Contents:

**Module I: Introduction**

Communication Process, Source of Information, Communication channels, base-band and pass-band signals, Review of Fourier transforms, Random variables, different types of PDF, need of modulation process, primary communication resources, analog versus digital communications

**Module II: Amplitude modulation**

Amplitude modulation with full carrier, suppressed carrier systems, single side band transmission, switching modulators, synchronous detection, envelope detection, effect of frequency and phase errors in synchronous detection, comparison of various AM systems, vestigial side band transmission.

**Module III: Angle Modulation**

Narrow and wide band FM, BW calculations using Carlson rule, Direct & Indirect FM generations, phase modulation, Demodulation of FM signals, noise reduction using pre & de-emphasis.

**Module IV: Pulse Modulation**

Pulse amplitude, width & position modulation, generation & detection of PAM, PWM & PPM, Comparison of frequency division and time division multiplexed systems,

Basics of digital communications: ASK, PSK, FSK, QPSK basics & wavform with brief mathematical introduction

**Module V: Noise**

Different types of noise, noise calculations, equivalent noise band width, noise figures, effective noise temperature, noise figure.

**Module VI: Introduction to Information Theory**

Measurement of Information, mutual, Shannon's theorem, Source coding, channel coding and channel capacity theorem, Huffman code

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***

- B. P. Lathi: "Modern analog & digital communication", OXFORD Publications
- Wayne Tomasi: "Electronic Communication systems", Pearson Education, $5^{th}$ edition

***References:***


- Simon Haykin, "Communication Systems", John Wiley & Sons, 1999, Third Edition.
- Taub and schilling, "Principles of Communication Systems" TMH

# COMPUTER GRAPHICS

**Course Code:** **BTI 405** **Credit Units: 04**

## Course Objective:

The objective of the course is to provide the understanding of the fundamental graphical operations and the implementation on computer, the mathematics behind computer graphics, including the use of spline curves and surfaces. It gives the glimpse of recent advances in computer graphics, user interface issues that make the computer easy, for the novice to use.

## Course Contents:

**Module I: Introduction to Graphics and Graphics Hardware System**

Video display devices, CRT, LCD Display devices Raster scan displays, Random scan displays, Raster scan systems, Random scan Systems.
Input devices, keyboard, mouse, Trackball and spaceball, Joystick, Data glove, Digitizers, Image scanners, Touch panels, Light pens, Voice systems.
Hardcopy devices, Printers, Plotters.

**Module II: Output Primitives and Clipping operations**

Algorithms for drawing 2D Primitives lines (DDA and Bresenham's line algorithm), circles (Bresenham's and midpoint circle algorithm), ellipses (midpoint ellipse algorithm), other curves(conic sections, polynomials and spline curves).
Antialiasing and filtering techniques
Line clipping (cohen-sutherland algorithm), clip windows, circles, ellipses, polygon, clipping with Sutherland Hodgeman algorithm.

**Module III: Geometric transformation**

2D Transformation: Basic transformation, Translation, Rotation, scaling, Matrix Representations and Homogeneous coordinates, window to viewport transformation.
3D Concepts: Parallel projection and Perspective projection, 3 D Transformation.

**Module IV: 3 D Object Representation, Colour models and rendering**

Polygon meshes in 3 D, Spheres, Ellipsoid, Bezier curves and Bezier surfaces, Bspline curves and surfaces, solid modeling, sweep representation, constructive solid geometry methods. Achromatic and color models.
Shading, rendering techniques and visible surface detection method: Basic illumination, diffuse reflection, specular reflection, transparency, shadows. Polygon rendering method, Gouraud & Phong shading, Ray tracing method, recursive ray tracing, radio-sity method. Depth-buffer method,A-buffer method, Depth-sorting method(painter's algorithm), Oct-tres method.

**Module V: Introduction to multimedia**

File formats for BMP, GIF, TIFF, IPEG, MPEG-II, Animation techniques and languages. Design of animation sequences, Computer Animation languages, Elementary filtering techniques and elementary Image Processing techniques

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References*:*

***Text:***


- Foley et. al., "Computer Graphics Principles & practice", 2nd ed. AWL, 2000.
- D. Hearn and P. Baker, "Computer Graphics", Prentice Hall, 1986.
- R. Plastock and G. Kalley, "Theory and Problems of Computer Graphics", Schaum's Series, McGraw Hill, 1986


***References:***


- R.H. Bartels, J.C. Beatty and B.A. Barsky, "An Introduction to Splines for use in Computer Graphics and Geometric Modeling", Morgan Kaufmann Publishers Inc., 1987.

- C.E. Leiserson, T.H. Cormen and R.L. Rivest, “Introduction to Algorithms”, McGraw-Hill Book Company, 1990.
- W. Newman and R. Sproul, “Principles of Interactive Computer Graphics, McGraw-Hill, 1973.
- F.P. Preparata and M.I. Shamos, “Computational Geometry: An Introduction”, Springer-Verlag New York Inc., 1985.
- D. Rogers and J. Adams, “Mathematical Elements for Computer Graphics”, MacGraw-Hill International Edition, 1989
- David F. Rogers, “Procedural Elements for Computer Graphics”, McGraw Hill Book Company, 1985.
- Alan Watt and Mark Watt, “Advanced Animation and Rendering Techniques”, Addison-Wesley, 1992

# DIGITAL ELECTRONICS LAB

**Course Code: BTI 420 Credit Units: 01**

## List of Experiments:

1. To verify the truth tables of OR, AND, NOR, NAND, EX-OR, EX-NOR gates.
2. To obtain half adder, full adder and subtractor using gates and verify their truth tables.
3. To verify the truth tables of RS, JK and D flip- flops.
4. To design and study a binary counter.
5. To design and study synchronous counter.
6. To design and study ripple counter.
7. To convert BCD number into excess 3 form
8. To design and study a decade counter.
9. To design and study a sequence detector.
10. To implement control circuit using multiplexer.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# COMMUNICATION SYSTEMS LAB

**Course Code:** **BTI 421** **Credit Units: 01**

## List of Experiments:

1. To study the sampling and reconstruction of a given signal.
2. To study amplitude modulation and demodulation.
3. To study frequency modulation and demodulation.
4. To study time division multiplexing.
5. To study pulse amplitude modulation.
6. To study delta and adaptive delta modulation and demodulation.
7. To study carrier modulation techniques using amplitude shift keying and Frequency shift keying.
8. To study carrier modulation techniques using binary phase shift keying and differential shift keying.
9. To study pulse code modulation & differential pulse code modulation as well as relevant demodulations.
10. To study quadrature phase shift keying & quadrature amplitude modulation.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# COMPUTER GRAPHICS LAB

**Course Code: BTI 422 Credit Units: 01**

**Software Required:** Turbo C++

## Course Contents:

**Assignments will be provided for the following:**

- Geometrical shapes based on graphics algorithms
- 2D Geometric transformation translation, rotation, scaling, reflection.
- Clipping
- Animation

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# COMMUNICATION SKILLS - II

**Course Code: BTI 441 Credit Units: 01**

## Course Objective:
To teach the participants strategies for improving academic reading and writing.
Emphasis is placed on increasing fluency, deepening vocabulary, and refining academic language proficiency.

## Course Contents:

**Module I: Social Communication Skills**
Small Talk
Conversational English
Appropriateness
Building rapport

**Module II: Context Based Speaking**
In general situations
In specific professional situations
Discussion and associated vocabulary
Simulations/Role Play

**Module III: Professional Skills**
Presentations
Negotiations
Meetings
Telephony Skills

## Examination Scheme:

| Components | CT1 | CT2 | CAF | V | GD | GP | A |
|---|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 25 | 10 | 10 | 10 | 5 |

CAF – Communication Assessment File
GD – Group Discussion
GP – Group Presentation

## Text & References:


- Essential Telephoning in English, Garside/Garside, Cambridge
- Working in English, Jones, Cambridge
- Business Communication, Raman – Prakash, Oxford
- Speaking Personally, Porter-Ladousse, Cambridge
- Speaking Effectively, Jermy Comfort, et.al, Cambridge
- Business Communication, Raman – Prakash, Oxford

# BEHAVIOURAL SCIENCE – IV
# (RELATIONSHIP MANAGEMENT)

**Course Code:** **BTI 443** **Credit Units: 01**

## Course Objective:
To understand the basis of interpersonal relationship
To understand various communication style
To learn the strategies for effective interpersonal relationship

## Course Contents:

**Module I: Understanding Relationships**
Importance of relationships
Role and relationships
Maintaining healthy relationships

**Module II: Bridging Individual Differences**
Understanding individual differences
Bridging differences in Interpersonal Relationship – TA
Communication Styles

**Module III: Interpersonal Relationship Development**
Importance of Interpersonal Relationships
Interpersonal Relationships Skills
Types of Interpersonal Relationships

**Module IV: Theories of Interpersonal Relationships**
Theories: Social Exchange, Uncertainty Reduction Theory
Factors Affecting Interpersonal Relationships
Improving Interpersonal Relationships

**Module V: Impression Management**
Meaning & Components of Impression Management
Impression Management Techniques (Influencing Skills)
Impression Management Training-Self help and Formal approaches

**Module VI: End-of-Semester Appraisal**
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

## Text & References:


- Vangelist L. Anita, Mark N. Knapp, Inter Personal Communication and Human Relationships: Third Edition, Allyn and Bacon
- Julia T. Wood. Interpersonal Communication everyday encounter
- Simons, Christine, Naylor, Belinda: Effective Communication for Managers, 1997 1st Edition Cassell
- Goddard, Ken: Informative Writing, 1995 1st Edition, Cassell
- Harvard Business School, Effective Communication: United States of America
- Foster John, Effective Writing Skills: Volume-7, First Edition 2000, Institute of Public Relations (IPR)
- Beebe, Beebe and Redmond; Interpersonal Communication, 1996; Allyn and Bacon Publishers.

# FRENCH - IV

**Course Code:** **BTI 444** **Credit Units: 02**

## Course Objective:
To enable students:
- To develop strategies of comprehension of texts of different origin
- To present facts, projects, plans with precision

## Course Contents:

**Module C: pp. 104 – 139 : Unités 8,9**

**Contenu lexical :** **Unité 8: Découvrir le passé**
1. parler du passé, des habitudes et des changements.
2. parler de la famille, raconter une suite d'événements/préciser leur date et leur durée.
3. connaître quelques moments de l'histoire

**Unité 9: Entreprendre**
1. faire un projet de la réalisation: (exprimer un besoin, préciser les étapes d'une réalisation)
2. parler d'une entreprise
3. parler du futur

**Contenu grammatical:**
1. Imparfait
2. Pronom « en »
3. Futur
4. Discours rapporté au présent
5. Passé récent
6. Présent progressif

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- le livre à suivre : Campus: Tome 1

# GERMAN - IV

**Course Code: BTI 445 Credit Units: 02**

## Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany.
Introduction to Advanced Grammar Language and Professional Jargon

## Course Contents:

**Module I: Present perfect tense**
Present perfect tense, usage and applicability
Usage of this tense to indicate near past
Universal applicability of this tense in German

**Module II: Letter writing**
To acquaint the students with the form of writing informal letters.

**Module III: Interchanging prepositions**
Usage of prepositions with both accusative and dative cases
Usage of verbs fixed with prepositions
Emphasizing on the action and position factor

**Module IV: Past tense**
Introduction to simple past tense
Learning the verb forms in past tense
Making a list of all verbs in the past tense and the participle forms

**Module V: Reading a Fairy Tale**
Comprehension and narration

- Rotkäppchen
- Froschprinzessin
- Die Fremdsprache

**Module VI: Genitive case**
Genitive case – Explain the concept of possession in genitive
Mentioning the structure of weak nouns

**Module VII: Genitive prepositions**
Discuss the genitive propositions and their usage: (während, wegen, statt, trotz)

**Module VIII: Picture Description**
Firstly recognize the persons or things in the picture and identify the situation depicted in the picture;
Secondly answer questions of general meaning in context to the picture and also talk about the personal experiences which come to your mind upon seeing the picture.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:


- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

# SPANISH - IV

**Course Code:** **BTI 446** **Credit Units: 02**

## Course Objective:
To enable students acquire working knowledge of the language; to give them vocabulary, grammar, voice modulations/intonations to handle everyday Spanish situations with ease.

## Course Contents:

**Module I**
Revision of earlier semester modules
Introduction to Present Continuous Tense (Gerunds)

**Module II**
Translation with Present Continuous Tense
Introduction to Gustar, Parecer, Apetecer, doler

**Module III**
Imperatives (positive and negative commands of regular verbs)

**Module IV**
Commercial/business vocabulary

**Module V**
Simple conversation with help of texts and vocabulary
En la recepcion del hotel
En el restaurante
En la agencia de viajes
En la tienda/supermercado

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- Español Sin Fronteras (Nivel – Elemental)

# JAPANESE - IV

**Course Code:** **BTI 447** **Credit Units: 02**

## Course Objective:
To enable the students to comfortably interact using basic Japanese.
**Note:** Teaching is done in roman as well as Japanese script, students will be taught katankana (another form of script) in this semester i.e. to be able to write all the foreign words in Japanese.

## Course Contents:

**Module I**
Comparison using adjectives, making requests

**Module II**
Seeking permission

**Module III**
Practice of conversations on:
Visiting people, Party, Meetings, after work, at a ticket vending machine etc

**Module IV**
Essays, writing formal letters

## Learning Outcome
- Students can speak the language describing above-mentioned topics

## Methods of Private study /Self help
- Handouts, audio-aids, and self-do assignments, role-plays
- Students are also encouraged to attend Japanese film festival and other such fairs and workshops organized in the capital from time to time

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

***Text:***
- Teach yourself Japanese

***References:***
- Shin Nihongo no kiso 1

# CHINESE – IV

**Course Code:** **BTI 448** **Credit Units: 02**

## Course Objective:

How many characters are there? The early Qing dynasty dictionary included nearly 50,000 characters the vast majority of which were rare accumulated characters over the centuries. An educate person in China can probably recognize around 6000 characters. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

## Course Contents:

**Module I**
Dialogue Practice
Observe picture and answer the question
Pronunciation and intonation
Character writing and stroke order.
Electronic items

**Module II**
Traveling – The Scenery is very beautiful
Weather and climate
Grammar question with – "bu shi …. Ma?"
The construction "yao … le" (Used to indicate that an action is going to take place)
Time words "yiqian", "yiwai" (Before and after).
The adverb "geng".

**Module III**
Going to a friend house for a visit meeting his family and talking about their customs.
Fallen sick and going to the Doctor, the doctor examines, takes temperature and writes prescription.
Aspect particle "guo" shows that an action has happened some time in the past.
Progressive aspect of an actin "zhengzai" Also the use if "zhe" with it.
To welcome someone and to see off someone …. I cant go the airport to see you off… etc.

**Module IV**
Shipment. Is this the place to checking luggage?
Basic dialogue on – Where do u work?
Basic dialogue on – This is my address
Basic dialogue on – I understand Chinese
Basic dialogue on – What job do u do?
Basic dialogue on – What time is it now?

**Module V**
Basic dialogue on – What day (date) is it today?
Basic dialogue on – What is the weather like here.
Basic dialogue on – Do u like Chinese food?
Basic dialogue on – I am planning to go to China.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

"Elementary Chinese Reader, Part-2" Lesson 31-38

# OPEN SOURCE TECHNOLOGIES
# (PHP, MySQL)

**Course Code: BTI 501 Credit Units: 03**

## Course Objective:
This course is aimed to provide a fundamental understanding of web site creation. HTML, PHP is the language used for development of most common web sites. Syllabus includes HTML, CSS, basic and advanced features of PHP which includes detailed introduction of PHP and MYSQL, Arrays, Loops and variables etc.
Course Contents:

Module I: HTML
History of HTML, Structure of HTML, Adding Comments, Formatting Text, Creating List, Creating Definition List, Creating Hyper Text Links, Creating Link Lists, Inserting Inline Images, Creating Image Links, Horizontal Rules, Address Tag, Working with Text, Changing font Sizes and Colors, Using Background Image, Marquee Tag.

Module II: Advanced HTML
Creating Tables, Table Element, Adding Border, Adding Column Headings, Adding Spacing and Padding, Adding a Caption, Setting the table Width and Height, Add Row Headings, Aligning Cell contents, Setting Column Width, Centering a Table, Inserting and Image, Spanning Columns, Spanning Rows Assigning Background Colors, Frame Elements, Creation of Frame Based Pages, No frames Element

Module III: Cascading style sheets
Overview of style sheets, Different ways to use style sheets, Selectors DIV and SPAN Elements, Adding style to a Document, Use id Classes and Ids, Style Sheet Properties.

Module IV: Introduction of PHP
Introduction to PHP, installation and configuration, Variables, String functions, Numeric functions, Operators, Conditions, Loops, Array, Multidimensional Array, Associative array, Classes, Regular Expr, Working with Date time, code re-use, require (), include (), and the include-path; file system functions, and file input and output; file uploads; error handling and logging; sending mail.

Module V: Working with data base
MYSQL, Introducing MySQL; database design concepts; the Structured Query, Language (SQL); communicating with a MySQL backend via the PHP, MySQL API Building Database Applications,

**Examination Scheme:**

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

Text & References:

**Text:**
- Dive Into HTML5 by Mark Pilgrim
- Beginning PHP, Apache, MySQL Web Development
- Michael K. Glass, Yann Le Scouarnec, Elizabeth Naramore, Gary Mailer, Jeremy Stolz, Jason Gerner

**References:**
- PHP Manual.

# SOFTWARE ENGINEERING

**Course Code: BTI 502 Credit Units: 03**

## Course Objective:

The basic objective of Software Engineering is to develop methods and procedures for software development that can scale up for large systems and that can be used to consistently produce high-quality software at low cost and with a small cycle time. Software Engineering is the systematic approach to the development, operation, maintenance, and retirement of software.
The course provides a thorough introduction to the fundamentals principles of software engineering. The organization broadly be based on the classical analysis-design-implementation framework.

## Course Contents:

**Module I: Introduction**
Software life cycle models: Waterfall, Prototype, Evolutionary and Spiral models, Overview of Quality Standards like ISO 9001, SEI-CMM

**Module II: Software Metrics and Project Planning**
Size Metrics like LOC, Token Count, Function Count, Design Metrics, Data Structure Metrics, Information Flow Metrics. Cost estimation, static, Single and multivariate models, COCOMO model, Putnam Resource Allocation Model, Risk management.

**Module III: Software Requirement Analysis, design and coding**
Problem Analysis, Software Requirement and Specifications, Behavioural and non-behavioural requirements, Software Prototyping Cohesion & Coupling, Classification of Cohesiveness & Coupling, Function Oriented Design, Object Oriented Design, User Interface Design Top-down and bottom-up Structured programming, Information hiding,

**Module IV: Software Reliability, Testing and Maintenance**
Failure and Faults, Reliability Models: Basic Model, Logarithmic Poisson Model, Software process, Functional testing: Boundary value analysis, Equivalence class testing, Decision table testing, Cause effect graphing, Structural testing: path testing, Data flow and mutation testing, unit testing, integration and system testing, Debugging, Testing Tools, & Standards. Management of maintenance, Maintenance Process, Maintenance Models, Reverse Engineering, Software RE-engineering

**Module V: UML**
Introduction to UML, Use Case Diagrams, Class Diagram: State Diagram in UML Activity Diagram in UML Sequence Diagram in UML Collaboration Diagram in UML

## Examination Scheme:

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***

- K. K. Aggarwal & Yogesh Singh, “Software Engineering”, 2nd Ed, New Age International, 2005.
- R. S. Pressman, “Software Engineering – A practitioner’s approach”, 5th Ed., McGraw Hill Int. Ed., 2001.

***References:***

- R. Fairley, “Software Engineering Concepts”, Tata McGraw Hill, 1997.
- P. Jalote, “An Integrated approach to Software Engineering”, Narosa, 1991.
- Stephen R. Schach, “Classical & Object Oriented Software Engineering”, IRWIN, 1996.
- James Peter, W. Pedrycz, “Software Engineering”, John Wiley & Sons.
- Sommerville, “Software Engineering”, Addison Wesley, 1999.

# ADVANCE COMPUTER ARCHITECTURE

**Course Code:** **BTC 503** **Credit Units: 03**

## Course Objective:

This course deals with computer architecture as well as computer organization and design. Computer architecture is concerned with the structure and behaviour of the various functional modules of the computer and how they interact to provide the processing needs of the user. Computer organization is concerned with the way the hardware components are connected together to form a computer system. Computer design is concerned with the development of the hardware for the computer taking into consideration a given set of specifications. This course also provides a comprehensive study of scalable and parallel computer architectures for achieving a proportional increase in performance with increasing system resources.

**Module I : Basic Computer Organizations and Design**
Instruction Codes, Computer Registers, Computer Instructions, Register Transfer Language, Timing and Control, Instruction Cycle, Memory-Reference Instructions, Input-Output and Interrupt, Design of Accumulator Logic. Hardwired and Microprogrammed control: Control Memory, Address Sequencing, Design of Control Unit.
**Module II: Central Processing Unit**
Introduction, General Register Organization, Stack Organization, Instruction representation, Instruction Formats, Instruction type, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer RISC and CISC
Computer Arithmetic: Introduction, Multiplication Algorithms, Division Algorithms, Floating-Point Arithmetic Operations

**Module III: Memory and Intrasystem Communication and Input output organization**
**Memory:** Memory types and organization Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory, Memory Management Hardware
**Intrasystem communication and I/O :** Peripheral Devices, Input-Output
Controller and I/O driver, IDE for hard disk, I/O port and Bus concept, Bus cycle, Synchronous and asynchronous transfer, Interrupt handling in PC, Parallel Port, RS – 232 interface, Serial port in PC, Serial I/O interface, Universal serial bus IEEE 1394, Bus Arbitration Techniques, Uni-bus and multi-bus architectures EISA Bus, VESA Bus.

**Module IV: Parallel Computing**

The state of computing, Multiprocessors and multicomputers, Multivector and SIMD computers, Architectural development tracks, Parallel Processing, Conditions of parallelism, Data and resource dependences, Hardware and software parallelism, Program partitioning and scheduling, Grain size and latency, Program flow mechanisms, Control flow versus data flow, Data flow architecture, Demand driven mechanisms, Comparisons of flow mechanisms. Network properties and routing, Static interconnection networks, Dynamic interconnection Networks, Multiprocessor system interconnects, Hierarchical bus systems, Crossbar switch and multiport memory, Multistage and combining network.

**Module V: Pipelining and Vector Processing principles**

Pipelining: Linear pipeline processor, Nonlinear pipeline processor, Instruction pipeline design, Mechanisms for instruction pipelining, Dynamic instruction scheduling, Branch handling techniques, Arithmetic Pipeline Design, Computer arithmetic principles, Static arithmetic pipeline, Multifunctional arithmetic pipelines, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Vector Processing, Vector instruction types, Vector-access memory schemes,

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

***Text:***
- Morris Mano, Computer System Architecture, 3rd Edition – 1999, Prentice-Hall of India Private Limited.
- Kai Hwang, "Advanced computer architecture"; TMH, 2000

***References:***

- WIliam Stallings, Computer Organization and Architecture, 4th Edition-2000, Prentice-Hall of India Private Limited.
- M.J Flynn, "Computer Architecture, Pipelined and Parallel Processor Design", Narosa Publishing, 1998.
- Hwang and Briggs, "Computer Architecture and Parallel Processing"; MGH, 2000.
- Kai Hwang & Faye a Briggs, McGrew Hill, inc., Computer Architecture & Parallel Processing.
- John D. Carpinelli, Computer system Organization & Architecture, Edition 2001, Addison Wesley, Delhi
- John P Hayes, McGraw-Hill Inc, Computer Architecture and Organization.
- M. Morris Mano and Charles, Logic and Computer Design Fundamentals, 2nd Edition Updated, Pearson Education, ASIA.
- Hamacher, "Computer Organization," McGraw hill.
- Tennenbaum," Structured Computer Organization," PHI
- B. Ram, "Computer Fundamentals architecture and organization," New age international Gear C. w., "Computer Organization and Programming, McGraw hill

# DATA COMMUNICATION AND COMPUTER NETWORKS

**Course Code:** **BTI 504** **Credit Units: 03**

## Course Objective:

The objective is to acquaint the students with the basics of data communication and networking. A structured approach to explain how networks work from the inside out is being covered. The physical layer of networking, computer hardware and transmission systems have been explained. In-depth application coverage includes email, the domain name system; the World Wide Web (both client- and server-side); and multimedia (including voice over IP.

## Course Contents:

**Module I: Introduction**

Introduction to computer networks, evolution of computer networks and its uses, reference models, example networks

The physical layer: Theoretical basis for data communication, transmission media, wireless transmission, telecom infrastructure, PSTN, communication satellites, mobile telephone system

**Module II: The data link layer**

Data link layer design issues, error detection and correction, data link protocols, sliding window protocols, example of data link protocols- HDLC, PPP Access

**Module III: Medium access layer**

Channel allocation problem, multiple access protocols, ALOHA, CSMA/CD, IEEE Standard 802 for LAN and MAN, Bridges

**Module IV: The network layer**

Network layer concepts, design issues, static and dynamic routing algorithms, shortest path routing, flooding, distance vector routing, link state routing, distance vector routing, multicast routing, congestion control algorithm, internetworking, Ipv4

**Module V: The transport layer**

The transport services, elements of transport protocols, TCP and UDP

The application layer: Brief introduction to presentation and session layer, DNS, E-mail, WWW

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

*Text:*

- Computer networks: Tanenbaum, Andrew S, Prentice Hall
- Data communication & neworking: Forouzan, B. A.

*References:*

- Computer network protocol standard and interface: Uyless, Black
- Data and Computer Communications, Seventh Edition (7th.) William Stallings
- Publisher: Prentice Hall
- Computer Networking: A Top-Down Approach Featuring the Internet (3rd Edition) by James F. Kurose
-

# JAVA PROGRAMMING

**Course Code:** **BTI 505** **Credit Units: 04**

## Course Objective:
The objective is to impart programming skills used in this object oriented language java.
The course explores all the basic concepts of core java programming. The students are expected to learn it enough so that they can develop the web solutions like creating applets etc.

## Course Contents:

**Module I**
Concepts of OOP, Features of Java, How Java is different from C++, Data types, Control Statements, identifiers, arrays, operators. Inheritance: Multilevel hierarchy, method overriding, Abstract classes, Final classes, String Class.

**Module II**
Defining, Implementing, Applying Packages and Interfaces, Importing Packages. Fundamentals, Types, Uncaught Exceptions, Multiple catch Clauses, Java's Built-in Exception.

**Module III**
Creating, Implementing and Extending thread, thread priorities, synchronization suspending, resuming and stopping Threads, Constructors, Various Types of String Operations. Exploring Various Basic Packages of Java: Java. lang, Java. util, Java.i.o

**Module IV**
Event handling Mechanism, Event Model, Event Classes, Sources of Events, Event Listener Interfaces
AWT: Working with Windows, AWT Controls, Layout Managers

**Module V**
Applet Class, Architecture, Skeleton, Display Methods.
Swings: Japplet, Icons, labels, Text Fields, Buttons, Combo Boxes.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***
- JAVA The Complete Reference by PATRICK NAUGHTON & HERBERT SCHILD, TMH
- Introduction to JAVA Programming a primar, Balaguruswamy.

***References:***
- "Introduction to JAVA Programming" Daniel/Young PHI
- Jeff Frentzen and Sobotka, "Java Script", Tata McGraw Hill,1999

## OPEN SOURCE TECHNOLOGIES LAB
## (PHP, MySql)

**Course Code:** **BTI 520** **Credit Units: 01**

**Course Contents:**

1. WAP to develop a student Registration Form using HTML.
2. WAP to show the scrolling text using Marquee Element using HTML.
3. WAP to draw a table with three rows and three columns.
4. WAP to show Image Mapping.
5. Write the process of installation of web server.
6. Write programs to print all details of your php sever. Use phpinfo().
7. Write a program to give demo of ECHO and PRINT command.
8. Write a program sort ten number by using array.
9. Create a database in MySql and connect that database from PHP.
10. Write a program to Update, insert and delete the values of table in Question No – 9 database.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

## SOFTWARE ENGINEERING LAB

**Course Code:** **BTI 521** **Credit Units: 01**

**Software Required:** Rational Rose

### Assignments will be provided for the following:

- Use of Rational Rose for visual modeling.
- Creating various UML diagrams such as use case, sequence, collaboration, activity, state diagram, and class diagrams.

### Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# ADVANCE COMPUTER ARCHITECTURE LAB

**Course Code: BTI 522** **Credit Units: 01**

## Course Contents:

| S. NO. | NAME OF EXPERIMENTS | EQUIPMENT REQUIRED |
|---|---|---|
| | **Part – A** | Digital trainer kit with P/S<br>IC Name<br>4 bit binary adder – 7483<br>Decoder (2 x 4) - 74139<br>MUX (2 x 1) Quad – 74157<br>MUX (4 x 1) Dual – 74153<br>Register ( 4 bit) – 74195<br>Bidirectional – 74194<br>RAM – 7489<br><br>AND, OR, NOT, XOR, GATE<br>AND – 7408<br>OR – 7432<br>NOT – 7404<br>XOR – 7486<br>NAND – 7400<br><br>WIRE (SINGLE CORE THICK)<br><br>LED'S (RED, GREEN, YELLOW)<br><br>WIRE CUTTER<br><br>PC TRAINER<br><br>48 channel logic state analyzer |
| 1) | Design 4 bit combinational circuit shifter for left right and circular shift (using MUX). | |
| 2) | To design a BCD adder ( 4 bit) | |
| 3) | To design combinational circuit that performs following logic operations.<br>AND, OR, XOR, NOT using MUX. | |
| 4) | Design a 4 bit combinational circuit decrementer using 4 full adder circuit. | |
| 5) | Transfer of Data from different registers to a common by using MUX. | |
| 6) | Transfer of data from different registers to a common bus by using decoders and tristate buffers. | |
| 7) | Verify arithmetic operations by using MUX and full adders | |
| 8) | Transfer of data from one register to another register by using bus. | |
| | **Part – B**<br>**(Experiments based on PC trainer kit )** | |
| 9) | Write a program to initialise CRT controlled and displays a pass message on screen. | |
| 10) | Write a program to transmit a character and display it on a video monitor. | |
| 11) | Write a program to initialise key board and display a scan code of the key pressed in seven segment display. | |
| 12) | Write a program to generate beeps of different frequencies as generated at the time of reset. | |
| 13) | Write a program to initialise printer on a dual display cared at address O36C and print data from a specified address. | |
| 14) | Write a program to refresh dynamic memory of the PC and read back from the same memory. | |

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# DATA COMMUNICATION AND COMPUTER NETWORKS LAB

**Course Code:** **BTI 523** **Credit Units: 01**

## Equipments Required:
Switch Network Cables, Patch Chord- Fiber optical and twisted pair cable, LAN cards, RJ-45 connectors etc.
Platforms required: Linux Server

## Course Contents:

- Introduction and Installation of Linux
- Administrating Linux
- Setting up a Local Area Network
- Connecting to the Internet
- Setting up Print Server
- Setting up File Server
- Setting up Mail Server
- Setting up FTP Server
- Setting up Web Server
- Setting up MySQL Database Server

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# JAVA PROGRAMMING LAB

**Course Code:** **BTI 524** **Credit Units: 01**

**Software Required:** JDK1.3

## Assignments will be provided for the following:

- Java programs using classes & objects and various control constructs such as loops etc, and data structures such as arrays, structures and functions
- Java programs for creating Applets for display of images and texts.
- Programs related to Interfaces & Packages.
- Input/Output and random files programs in Java.
- Java programs using Event driven concept.
- Programs related to network programming.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# COMMUNICATION SKILLS - III

**Course Code:** **BTI 541** **Credit Units: 01**

## Course Objective:
To equip the participant with linguistic skills required in the field of science and technology while guiding them to excel in their academic field.

## Course Contents:

**Module I**
Reading Comprehension
Summarising

Paraphrasing

**Module II**
Essay Writing
Dialogue Report

**Module III**
Writing Emails
Brochure
Leaflets

**Module IV: Introduction to Phonetics**
Vowels
Consonants
Accent and Rhythm
Accent Neutralization
Spoken English and Listening Practice

## Examination Scheme:

| Components | CT1 | CT2 | CAF | V | GD | GP | A |
|---|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 25 | 10 | 10 | 10 | 5 |

CAF – Communication Assessment File
GD – Group Discussion
GP – Group Presentation

## Text & References:


- Effective English for Engineering Students, B Cauveri, Macmillan India
- Creative English for Communication, Krishnaswamy N, Macmillan
- A Textbook of English Phonetics, Balasubramanian T, Macmillan

# BEHAVIOURAL SCIENCE - V
# (GROUP DYNAMICS AND TEAM BUILDING)

**Course Code:** **BTI 543** **Credit Units: 01**

## Course Objective:
To inculcate in the students an elementary level of understanding of group/team functions
To develop team spirit and to know the importance of working in teams

## Course Contents:
**Module I: Group formation**
Definition and Characteristics
Importance of groups
Classification of groups
Stages of group formation
Benefits of group formation

**Module II: Group Functions**
External Conditions affecting group functioning: Authority, Structure, Org. Resources, Organizational policies etc.
Internal conditions affecting group functioning: Roles, Norms, Conformity, Status, Cohesiveness, Size, Inter group conflict.
Group Cohesiveness and Group Conflict
Adjustment in Groups

**Module III: Teams**
Meaning and nature of teams
External and internal factors effecting team
Building Effective Teams
Consensus Building
Collaboration

**Module IV: Leadership**
Meaning, Nature and Functions
Self leadership
Leadership styles in organization
Leadership in Teams

**Module V: Power to empower: Individual and Teams**
Meaning and Nature
Types of power
Relevance in organization and Society

**Module VI: End-of-Semester Appraisal**
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

## Examination Scheme:

| Components | SAP | A | Mid Term Test (CT) | VIVA | Journal for Success (JOS) |
|---|---|---|---|---|---|
| Weightage (%) | 20 | 05 | 20 | 30 | 25 |

## Text & References:

- Organizational Behaviour, Davis, K.
- Hoover, Judhith D. Effective Small Group and Team Communication, 2002,Harcourt College Publishers
- Dick, Mc Cann & Margerison, Charles: Team Management, 1992 Edition, viva books
- Bates, A. P. and Julian, J.: Sociology - Understanding Social Behaviour
- Dressers, David and Cans, Donald: The Study of Human Interaction
- Lapiere, Richard. T – Social Change
- Lindzey, G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology, Addison – Welsley, US.
- Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.
- LaFasto and Larson: When Teams Work Best, 2001, Response Books (Sage), New Delhi
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 2, Group (1996); Pfeiffer & Company
- Smither Robert D.; The Psychology of Work and Human Performance, 1994, Harper Collins College Publishers

# FRENCH - V

**Course Code:** **BTI 544** **Credit Units: 02**

## Course Objective:

To furnish some basic knowledge of French culture and civilization for understanding an authentic document and information relating to political and administrative life

## Course Contents:

**Module D: pp. 131 – 156 Unités 10, 11**

**Contenu lexical:**

**Unité 10:** Prendre des décisions

1. Faire des comparaisons
2. décrire un lieu, le temps, les gens, l'ambiance
3. rédiger une carte postale

**Unité 11: faire face aux problèmes**

1. Exposer un problème.
2. parler de la santé, de la maladie
3. interdire/demander/donner une autorisation
4. connaître la vie politique française

**Contenu grammatical:**

1. comparatif - comparer des qualités/ quantités/actions
2. supposition: Si + présent, futur
3. adverbe - caractériser une action
4. pronom "Y"

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- le livre à suivre: Campus: Tome 1

# GERMAN - V

**Course Code:** **BTI 545** **Credit Units: 02**

## Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany
Introduction to Advanced Grammar and Business Language and Professional Jargon

## Course Contents:

**Module I: Genitive case**
Genitive case – Explain the concept of possession in genitive
Mentioning the structure of weak nouns

**Module II: Genitive prepositions**
Discuss the genitive propositions and their usage: (während, wegen, statt, trotz)

**Module III: Reflexive verbs**
Verbs with accusative case
Verbs with dative case
Difference in usage in the two cases

**Module IV: Verbs with fixed prepositions**
Verbs with accusative case
Verbs with dative case
Difference in the usage of the two cases

**Module V: Texts**
A poem ‘Maxi’
A text Rocko

**Module VI: Picture Description**
Firstly recognize the persons or things in the picture and identify the situation depicted in the picture;
Secondly answer questions of general meaning in context to the picture and also talk about the personal experiences which come to your mind upon seeing the picture.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:


- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

# SPANISH - V

**Course Code:** **BTI 546** **Credit Units: 02**

## Course Objective:

To enable students acquire working knowledge of the language; to give them vocabulary, grammar, voice modulations/intonations to handle everyday Spanish situations with ease.

## Course Contents:

**Module I**
Revision of earlier semester modules

**Module II**
Future Tense

**Module III**
Presentations in English on
Spanish speaking countries'
Culture
Sports
Food
People
Politics
Society
Geography

**Module IV**
Situations:
En el hospital
En la comisaria
En la estacion de autobus/tren
En el banco/cambio

**Module V**
General revision of Spanish language learnt so far.

## Examination Scheme:

| **Components** | **CT1** | **CT2** | **C** | **I** | **V** | **A** |
|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- Español Sin Fronteras, Greenfield

# JAPANESE - V

**Course Code:** **BTI 547** **Credit Units: 02**

## Course Objective:

To enable the students to converse, read and write language comfortably and be able to converse using different patterns and forms taught through out. Students are taught and trained enough to get placed themselves in Japanese companies.
**Note:** Teaching is done in roman as well as Japanese script.

## Course Contents:

**Module I**
Dictionary form of the verbs, Joining of verbs
Negative form of verbs
Potential form

**Module II**
Joining of many actions together
Usage of dictionary form of the verbs in sentences
Introducing colloquial language.

**Module III**
Direct form of the speech, quotations,
Expressing thoughts
Actions and reasoning

**Module IV**
Conclusion
Receiving and giving things, favour etc.
Different forms like 'tara' form.

**Module V**
Revision of the whole syllabus

## Learning Outcome

- Students can speak and use different patterns, ways to describe a particular situation and can converse comfortably in mentioned situations through out.
- Students can appear in the interviews for placements in Japanese companies.

## Methods of Private study /Self help

- Teaching will be supported by handouts, audio-aids, and self-do assignments and role plays.
- Use of library, visiting and watching movies in Japan and culture center every Friday at 6pm.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

***Text:***
- Teach yourself Japanese

***References:***
- Shin Nihongo no kiso 1

# CHINESE – V

**Course Code:** **BTI 548** **Credit Units: 02**

## Course Objective:

What English words come from Chinese? Some of the more common English words with Chinese roots areginseng, silk, dim sum, fengshui, typhoon, yin and yang, T'al chi, kung-fu. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

## Course Contents:

**Module I**
Drills
Dialogue practice
Observe picture and answer the question.
Pronunciation and intonation.
Character writing and stroke order

**Module II**
Intonation
Chinese foods and tastes – tofu, chowmian, noodle, Beijing duck, rice, sweet, sour….etc. Learning to say phrases like – Chinese food, Western food, delicious, hot and spicy, sour, salty, tasteless, tender, nutritious, god for health, fish, shrimps, vegetables, cholesterol is not high, pizza, milk, vitamins, to be able to cook, to be used to, cook well, once a week, once a month, once a year, twice a week……
Repetition of the grammar and verbs taught in the previous module and making dialogues usingit.
Compliment of degree "de".

**Module III**
Grammar the complex sentence "suiran … danshi…."
Comparison – It is colder today than it was yesterday…..etc.
The Expression "chule….yiwai". (Besides)
Names of different animals.
Talking about Great Wall of China
Short stories

**Module IV**
Use of "huozhe" and "haishi"
Is he/she married?
Going for a film with a friend.
Having a meal at the restaurant and ordering a meal.

**Module V**
Shopping – Talking abut a thing you have bought, how much money you spent on it? How many kinds were there? What did you think of others?
Talking about a day in your life using compliment of degree "de". When you get up? When do you go for class? Do you sleep early or late? How is Chinese? Do you enjoy your life in the hostel?
Making up a dialogue by asking question on the year, month, day and the days of the week and answer them.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- "Elementary Chinese Reader " Part-II Lesson 39-46

# PRACTICAL TRAINING - I

**Course Code:** **BTI 550** **Credit Units: 03**

## Course Objective:

The objective of this course is to provide practical training on some live projects that will increase capability to work on actual problem in industry. This training may undergo in an industrial environment or may be an in house training on some latest software which is in high demand in market. This training will be designed such that it will useful for their future employment in industry.

## Examination Scheme:

| | |
|---|---|
| Feedback from industry/work place | 20 |
| Training Report | 40 |
| Viva | 15 |
| Presentation | 25 |
| **Total** | **100** |

# ADVANCED MICROPROCESSORS

**Course Code: BTI 601 Credit Units: 03**

## Course Objective:
This course deals with the systematic study of the Architecture and programming issues of 8085-microprocessor family. The aim of this course is to give the students basic knowledge of the above microprocessor needed to develop the systems using it.

## Course Contents:

**Module I: Computer Number Systems, Codes, and Digital Devices**
Computer Number Systems and Codes, Introduction to 8085 microprocessor, internal architecture, addressing modes and instruction set, Microprocessor Evolution and Types, the 8086 microprocessor family-overview, 8086 internal architecture, introduction to programming the 8086, addressing modes of 8086.
8086 Family Assembly Language Programming: Program Development Steps, Constructing the machine codes for 8086 instructions, writing programs for use with an assembler, assembly language program development tools

**Module II: Implementing Standard Program Structures in 8086 Assembly Language**
Simple Sequence Programs, Jumps, Flags, and Conditional Jumps, If-Then, if-then-else, and multiple if-then-else programs, while-do programs, while-do programs, repeat-until programs, instruction timing and delay loops Strings, Procedures, and macros: the 8086 string instructions, writing and using procedures, writing and using assembler macros
8086 Instruction Descriptions and Assembler Directives

**Module III: 8086 System Connections, Timing and Troubleshooting**
A basic 8086 microcomputer System, An example Minimum-mode System, the SDK-86, Troubleshooting a simple 8086-based microcomputer, Timing Diagrams
8086 Interrupts and Interrupt Applications: 8086 interrupts and Interrupt Responses, Hardware Interrupt Applications

**Module IV**
Interfacing 8086 with 8255, 8254, 8259, 8253, 8251, 8259, 8279.
Brief Introduction to Architecture of 80186, 80286, 80386, 80486, 8087 and Pentium architecture.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


*Text:*
- D. V. Hall, "Microprocessors and Interfacing", TMH, 2nd Edition, 1999

*References:*
- Peter Able, "IBM PC Assembly language programming", PHI, 1994.
- James. L. Antonaks, "An Introduction to the Intel Family of Microprocessors", Addison Wesley, 1999.
- Liu Gibson, "Microprocessor Systems: The 8086/8088 family Architecture, Programming & Design", PHI, 1999

# SYSTEM PROGRAMMING

**Course Code:** **BTI 602** **Credit Units: 03**

## Course Objective:
This course provides knowledge to design various system programs.

## Course Contents:

**Module I: Introduction**
Definition, Evolution, Components**,** Editors: Introduction to system Programming Line editor, Full screen editor and multi window editor. Case study MS-Word, DOS Editor and vi editor.

**Module II: Assemblers**
First pass and second pass of assembler and their algorithms. Assemblers for CISC Machines: case study x85 & x86 machines.

**Module III: Compilers**
Introduction to various translators. Various phases of compiler. Introduction to Grammars and finite automata. Bootstrapping for compilers. Lexical Analysis, syntax analysis, Intermediate Code Generation,
Code optimization techniques, Code generation. Case study: LEXX and YACC. Design of a compiler in C++ as Prototype.

**Module IV: Debuggers, Loaders and Linkers**
Introduction to various debugging techniques. Case study:- Debugging in Turbo C++ IDE. Linkers and Loaders Concept of linking. Case study of Linker in x86 machines. Loading of various loading schemes.

**Module V: Operating System**
Booting techniques and sub-routines. Design of kernel and various management for OS. Design of Shell and other utilities,(**Overview of Unix OS,Difference Between Unix and Linux,Commands in Unix.)-changes made**

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***
- Donovan J.J., Systems Programming, New York, Mc-Graw Hill, 1972.
- Dhamdhere, D.M., Introduction to Systems Software, Tata Mc-Graw Hill 1996.

***References:***
- Aho A.V. and J.D. Ullman Principles of compiler Design Addison Wesley/ Narosa 1985.

# Introduction to Android Application Development

**Course Code:** **BTI 603** **Credit Units: 03**

## Course Objective:

This course provides students with the knowledge of fundamentals of Android application; Android Application Development is a hands-on course which is designed for providing essential skills and experiences to the students in developing applications on mobile platform. The hands-on training is effective for beginners and experienced developers for practical Android Code Application.

## Course Contents:

**Module I**
Introduction to Android -Overview of Android, What does Android run On – Android Internals, Android for mobile apps development, Environment setup for Android apps Development, Framework - Android- SDK, Eclipse, Emulators – What is an Emulator / Android AVD?

**Module II**
Android activities and GUI design concepts- Design criteria for Android Application: Hardware Design Consideration, Design Demands for Android application, Intent, Activity, Activity Lifecycle and Manifest, Creating Application and new Activities, Simple UI -Layouts and Layout, Properties: Introduction to android UI design, Introducing Layouts, GUI objects, Layout design concepts.

**Module III**
Advanced UI Programming: Event driven Programming in Android(Text Edit, Button clicked etc.) Activity Lifecycle of Android, Exception handling

**Module IV**

Menu:Basics, Custom v/s System Menus, Create and Use Handset menu Button (Hardware) Dialog : Creating and Altering Dialogs Toast : List & Adapters Demo Application Development and Launching Basic operation of SQLite Database Android Application Priorities

## Examination Scheme:

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

## Text & References:


- Professional Android Application Development, Reto Meier
- Beginning Android, Mark L Murphy
- Pro Android, S.Y Hashimi & Satya Komatineni
- Android Studio Development Essentials, Neil Smyth
- The Definitive Guide to SQL Lite, Michael Owens
- Building Android Apps, IN EASY STEPS

# ADVANCE NETWORKING

**Course Code:** **BTI 604** **Credit Units: 03**

## Course Objective:

The objective here is to acquaint the students with the application of networking. Detail description of the various TCP/IP protocols and the working of ATM and its performance, Network security and authentication, and various algorithms related to it has been dealt, to get a practical approach.

## Course Contents:

**Module I: TCP/IP Protocol**
Layered protocols, internet Addressing, mapping internet address to physical address, internet protocol, OSPF, RIP, RARP, BOOTP, DHCP, BGP, ARP, IP, Ipv6, ICMP
Transport protocols: UDP, TCP, SNMP

**Module II: Connection oriented networks**
Frame relay, B-ISDN, ATM protocol stack, ATM switching, internetworking with ATM Networks, traffic management in ATM.

**Module III: High Speed LAN**
LAN Ethernet, fast Ethernet, gigabit Ethernet, FDDI, DSL, ADSL

**Module IV: Wireless communication**
Wireless networks, wireless channels, channel access, network architecture, IEEE 802.11, bluetooth

**Module V: Network Analysis and Modeling**
Queuing theory, modeling network as a graph, network management system and standard

## Examination Scheme:

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***


- High performance communication networks by: J. Walrand & Pravin Varaiya, Morgan Kaufman, 1999.
- Internetworking with TCP/IP Vol.1: Principles, Protocols, and Architecture (4th Edition) by Douglas E. Comer
- ATM networks: Concepts, Protocols, Applications by: Handel, Addision Wesseley.
- Cryptography & Networks Security Stallings, William 3rd edition


***References:***


- Computer networks: Tanenbaum, Andrew S, Prentice Hall
- Data communication & neworking: Forouzan, B. A.
- Computer network protocol standard and interface Uyless, Black

# ADVANCE JAVA PROGRAMMING

**Course Code:** **BTI 605** **Credit Units: 03**

## Course Objective:

The objective is to equip the students with the advanced feature of contemporary java which would enable them to handle complex programs relating to managing data and processes over the network. The major objective of this course is to provide a sound foundation to the students on the concepts, precepts and practices, in a field that is of immense concern to the industry and business.

## Course Contents:

**Module I**
Introduction to Java RMI, RMI services, RMI client, Running client and server, Introduction of Swing, Swing Components, Look and Feel for Swing Components, Introduction to Multimedia Programming.

**Module II**
ODBC and JDBC Drivers, Connecting to Database with the java.sql Package, Using JDBC Terminology; Evolving Nature of Area

**Module III**
Introduction to Servlets, Servlet Life Cycle, Servlet based Applications, Servlet and HTML. JSP: Introduction to JSP, JSP implicit objects, JSP based Applications

**Module IV**
Enterprise Java Beans:-EJB roles—EJB Client-Object -container-Transaction Management—implementing a Basic EJB Object-Implementing session Beans-Implementing Entity Beans-Deploying an enterprise Java Beans Object-Changes in EJB1.1 specification.

**Module V**
The Model-View-Controller Architecture What is Struts, Struts Tags, Creating Beans, Other Bean Tags, Bean Output, Creating HTML Forms, The ActionForm class The Action class, SimpleStruts: a simple Struts application

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***
- Java 2 Unleashed (Techmedia – SAMS) By Jamie Jaworski
- Professional Java Server Programming ( a Press ) By Allamaraju
- Developing Java Servlets (Techmedia – SAMS) By James Goodwill
- Using Java 1.2 Special Edition ( PHI ) By Webber

***References:***

- David Flanagan,Jim Parley, William Crawford & Kris Magnusson, Java Enterprise in a nutshell- A desktop Quick reference -O'REILLY, 2003
- Stephen Ausbury and Scott R. Weiner, Developing Java Enterprise Applications, Wiley-2001
- Jaison Hunder & William Crawford, Java Servlet Programming, O'REILLY, 2002
- Dietal and Deital, “JAVA 2” PEARSON publication

# Problem Solving and Placement Practices

**Course Code: BTI 606** **Credit Units: 04**

## Course Objective:
Aim of this course is to introduce the students to progrming paradigm and placement prac tices, which form the basis of all placement practices.

## Course Contents:
## Module I– Programming in C –I
Absolute basics , variable ,Data types ,arithmetic operators,priority and binding ,post- and pre -incrementation and -decrementation ,operators of type op= , char type and ASCII code, char literals ,equivalence of int and char data ,comparison operators ,conditional execution and if keyword ,printf() and scanf() functions: absolute basics ,Flow control ,conditional execution continued: the "else" branch ,more integer and float types conversions – why?

typecast and its operators ,loops – while, do and for ,controlling the loop execution – break and continue ,logical and bitwise operators ,Arrays ,switch: different faces of 'if' ,arrays (vectors) ,sorting , pointers, sizeof operator ,pointers arithmetic ,pointers vs. arrays: using strings: basics ,basic functions dedicated to string manipulation.

## Module II- Programming in C – II
Memory management and structures ,void type ,arrays of arrays and multidimensional arrays memory allocation and deallocation: malloc() and free() functions arrays of pointers vs. multidimensional arrays

structures ,declaring, using and initializing structures pointers to structures and arrays of structures basics of recursive data collections ,Functions ,functions how to declare, define and invoke a function ,variables' scope, local variables and function parameters ,pointers, arrays and structures as function parameters ,function result and return statement ,void as a parameter, pointer and result ,parameterizing the main function ,external function and the extern declarator

header files and their role ,Files and streams ,files vs. streams: where does the difference lie? header files needed for stream operations ,FILE structure ,opening and closing a stream, open modes, errno variable ,reading and writing to/from a stream ,predefined streams: stdin, stdout and stderr ,stream manipulation: fgetc(), fputc(), fgets() and fputs() functions ,raw input/output: fread() and fwrite() functions ,Preprocessor and complex declarations,pre-processor, scopes of declarations, storage classes ,user -defined types, pointers to functions

## Modue III – Data Structure
Algorithm, Analysis, Array , Lists, Stacks and queues, Priority queues-Binary Heap-Application,Heaps–hashing-hash tables without linked lists,Trees-Binary trees, search tree ADT, AVL trees, Graph Algorithms-Topological sort,shortest path algorithm network flow problems-minimum spanning tree - Introduction to NP – completeness, Sorting – Insertion sort, Shell sort, Heap sort, Merge sort, Quick sort, Indirect sorting, Bucket sort, Introduction to Algorithm Design Techniques –Greedy algorithm (Minimum Spanning Tree), Divide and Conquer (Merge Sort), Dynamic Programming (All pairs Shortest Path Problem).

## Module IV: Object Oriented Programming in C++
Introduction to C++ ,Basic concept of oops-Objects, Classes, Encapsulation, Data Abstraction, Inheritance, Polymorphism, Dynamic Binding, Message Passing etc. , Tokens-Expressions-contour Structures Function overloading, Static Class Members, Static Member Functions, Friend Functions, constructors and destructors ,operators overloading and type conversions ,Inheritance, Extending classes, Pointers, Virtual functions and polymorphism, File Handling Templates ,Exception handling, Manipulating strings.

## Module V: Operating System Concepts

Processes, Threads, Inter-process communication, Concurrency, Synchronization, Deadlock, CPU scheduling, Memory management and virtual memory, File systems, I/O systems, Protection and security. Unix command.

## Module VI: Computer Network

Computer networks and its uses , reference models, basis for data communication, transmission media, error detection and correction, data link protocols, sliding window protocols, PPP Access, ISO/OSI stack, LAN technologies (Ethernet, Token ring), Flow and error control techniques, Routing algorithms, Congestion control, TCP/UDP and sockets, IP(v4), Application layer protocols (icmp, dns, smtp, pop, ftp, http); Basic concepts of hubs, switches, gateways, and routers.

## Module VII: Database Management System

Definition of DBMS, Data Independence, DBMS Architecture, Levels, File System Approach Vs DBMS Approach, Advantages, Data Models, Schemas, and Instances. Relational Model, Tables and Views, Entity and Types Entity – Relationship Diagrams. Domains and Relations, Relations and predicates, Relational Data Integrity; Key and their rules; Relational Algebra, Relational Calculus, SQL Language, Data definition, Functional Dependencies, Normalization , Recovery- Transaction concurrency Control Techniques, Locking, Dead Lock.

## Examination Scheme:

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***

1. A.R. Venugopal, Rajkumar, T. Ravishanker “Mastering C++”, TMH, 1997
2. R. Lafore, “Object Oriented Programming using C++”, BPB Publications, 2004.
3. A. Silberschatz, P.B. Galvin “Operating System Concepts”, John Willey & son
4. Korth, Silberschatz, “Database System Concepts”, 4th Ed., TMH, 2000.
5. Data communication & networking: Forouzan, B. A.

***Refrence:***

1. “Object Oriented Programming with C++” By E. Balagurusamy.
2. Milenekovic, “Operating System Concepts”, McGraw Hill
3. Steve Bobrowski, “Oracle & Architecture”, TMH, 2000
4. Date C. J., “An Introduction to Database Systems”, 7th Ed., Narosa Publishing.

# MICROPROCESSOR LAB

**Course Code:** **BTI 620** **Credit Units: 01**

## Course Contents:

1. To load the numbers 49H and 53H in the memory location 9510 and 9511respectively and add the contents of memory location 9601
2. To write assembly language programming for 8 bit addition with and without carry.
3. To write assembly language programming for 8 bit subtraction with and without borrow.
4. To write assembly language programming for 8 bit multiplication and division.
5. To write assembly language programming for sorting an array of numbers in ascending and descending order.
6. To write assembly language programming with additional instructions.
7. To write and execute a program using stacks.
8. To study and program the programmable peripheral interface (8255) board.
9. To study and program the programmable interval timer (8253) board.
10. To study and program the programmable DMA controller (8257) board.
11. To study and program the programmable interrupt controller (8259) board.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

# Introduction to Android Application Development Lab

**Course Code: BTI 621 Credit Units: 01**

**Objective:** The practical/exercises should be properly designed and implemented with an attempt to develop different types of skills **(outcomes in psychomotor and affective domain)** so that students are able to acquire the competencies/programme outcomes. Following is the list of practical exercises for guidance.

**Course Contents:**

| S.No | Practical Exercises |
|---|---|
| 1 | Installation and setup of java development kit(JDK),setup android SDK,setup eclipse IDE,setup android development tools (ADT) plugins, create android virtual device |
| 2 | Create “Hello World” application. That will display “Hello World” in the middle of the screen using TextView Widget in the red color |
| 3 | Create application for demonstration of android activity life cycle |
| 4 | Create Registration page to demonstration of Basic widgets available in android. |
| 5 | Create sample application with login module.(Check username and password) On successful login, Change TextView “Login Sucessful”. And on failing login, alert user using Toast “Login fail” |
| 6 | Create login application where you will have to validate usename and passwords Till the username and password is not validated , login button should remain disabled. |
| 7 | Create and Login application as above. Validate login data and display Error to user using setError() method. |
| 8 | Create an application for demonstration of Relative and Table Layout in android. |
| 9 | Create an application for demonstration of Scroll view in android |
| 10 | Create an application for demonstration of Explicitly Starting New Activity using Intent. |
| 11 | Create an application that will pass two number using TextView to the next screen , and on the next screen display sum of that number. |
| 12 | Create spinner with strings taken from resource folder(res >> value folder).<br>On changing spinner value, change background of screen |

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

# ADVANCE NETWORKING LAB

**Course Code:** **BTI 622** **Credit Units: 01**

## Equipments Required:

Switch, Network Cables, Patch Chord- Fiber optical and twisted pair cable, LAN cards, RJ-45 connectors Routers, Modem, etc.
Software required: C/C++
Operating System: Linux/Windows Server

## Course Contents:

- Configuring Routers
- Introduction to Socket programming
- Implementation of Socket Programming
- Troubleshoot common network failures
- Gaining Access to the Routers and Switches

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| A | PR | LR | V | PR | V |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

# ADVANCE JAVA PROGRAMMING LAB

**Course Code:** **BTI 623** **Credit Units: 01**

**Course Contents:**

**Programming Language:** Java

1. WAP to display label on a frame with the help of JFrame
2. WAP to display six buttons on a panel using JFrame.
3. WAP. To display an image and a string in a label on the JFrame.
4. WAP that implement a JApplet that display a simple label
5. WAP that implement a JApplet and display the following frame
   a. Customer name
   b. Customer number
   c. Age
   d. Address
6. WAP to access a table Product Master from MS-Access using Java code.
7. WAP that implement a simple servlet program.
8. WAP for authentication, which validate the login-id and password by the servlet code.
9. WAP to connecting a database using user-id and password.
10. WAP to insert data into the database using the prepared statement.
11. WAP to read data from the database using the Resulset.
12. WAP to read data send by the client (HTML page) using servlet.
13. WAP to include a HTML page into a JSP page.
14. WAP to handle the JSPException.
15. WAP to read data send by a client (HTML page) using JSP.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

# COMMUNICATION SKILLS - IV

**Course Code:** **BTI 641** **Credit Units: 01**

## Course Objective:

To enhance the skills needed to work in an English-speaking global business environment.

## Course Contents:

**Module I: Business/Technical Language Development**
Advanced Grammar: Syntax, Tenses, Voices
Advanced Vocabulary skills: Jargons, Terminology, Colloquialism
Individualised pronunciation practice

**Module II: Social Communication**
Building relationships through Communication
Communication, Culture and Context
Entertainment and Communication
Informal business/ Technical Communication

**Module III: Business Communication**
Reading Business/ Technical press
Listening to Business/ Technical reports (TV, radio)
Researching for Business /Technology

**Module IV: Presentations**
Planning and getting started
Design and layout of presentation
Information Packaging
Making the Presentation

## Examination Scheme:

| **Components** | **CT1** | **CT2** | **CAF** | **V** | **GD** | **GP** | **A** |
|---|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 25 | 10 | 10 | 10 | 5 |

CAF – Communication Assessment File
GD – Group Discussion
GP – Group Presentation

## Text & References:


- Business Vocabulary in Use: Advanced Mascull, Cambridge
- Business Communication, Raman – Prakash, Oxford
- Business Communications, Rodgers, Cambridge
- Working in English, Jones, Cambridge
- New International Business English, Jones/Alexander, Cambridge

# BEHAVIOURAL SCIENCE - VI
# (STRESS AND COPING STRATEGIES)

**Course Code: BTI 643 Credit Units: 01**

## Course Objective:

To develop an understanding the concept of stress its causes, symptoms and consequences.
To develop an understanding the consequences of the stress on one's wellness, health, and work performance.

## Course Contents:

**Module I: Stress**
Meaning & Nature
Characteristics
Types of stress

**Module II: Stages and Models of Stress**
Stages of stress
The physiology of stress
Stimulus-oriented approach.
Response-oriented approach.
The transactional and interact ional model.
Pressure – environment fit model of stress.

**Module III: Causes and symptoms of stress**
Personal
Organizational
Environmental

**Module IV: Consequences of stress**
Effect on behaviour and personality
Effect of stress on performance
Individual and Organizational consequences with special focus on health

**Module V: Strategies for stress management**
Importance of stress management
Healthy and Unhealthy strategies
Peer group and social support
Happiness and well-being

**Module VI: End-of-Semester Appraisal**
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

## Examination Scheme:

| Components | SAP | A | Mid Term Test (CT) | VIVA | Journal for Success (JOS) |
|---|---|---|---|---|---|
| Weightage (%) | 20 | 05 | 20 | 30 | 25 |

## Text & References:


- Blonna, Richard; Coping with Stress in a Changing World: Second edition
- Pestonjee, D.M, Pareek, Udai, Agarwal Rita; Studies in Stress And its Management
- Pestonjee, D.M.; Stress and Coping: The Indian Experience
- Clegg, Brian; Instant Stress Management – Bring calm to your life now

# FRENCH - VI

**Course Code:** **BTI 644** **Credit Units: 02**

## Course Objective:

To strengthen the language of the students both in oral and written so that they can:
i) express their sentiments, emotions and opinions, reacting to information, situations;
ii) narrate incidents, events;
iii) perform certain simple communicative tasks.

## Course Contents:

**Module D: pp. 157 – 168 – Unité 12**

**Unité 12: s'évader**

1. présenter, caractériser, définir
2. parler de livres, de lectures
3. préparer et organiser un voyage
4. exprimer des sentiments et des opinions
5. téléphoner
6. faire une réservation

**Contenu grammatical:**

1. proposition relative avec pronom relatif "qui", "que", "où" - pour caractériser
2. faire + verbe

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- le livre à suivre: Campus: Tome 1

# GERMAN - VI

**Course Code:** **BTI 645** **Credit Units: 02**

## Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany
Introduction to Advanced Grammar and Business Language and Professional Jargon

## Course Contents:

**Module I: Adjective endings**
Adjective endings in all the four cases discussed so far
Definite and indefinite articles
Cases without article

**Module II: Comparative adverbs**
Comparative adverbs as and like

**Module III: Compound words**
To learn the structure of compound words and the correct article which they take
Exploring the possibility of compound words in German

**Module IV: Infinitive sentence**
Special usage of 'to' sentences called zu+ infinitive sentences

**Module V: Texts**
A Dialogue: 'Ein schwieriger Gast'
A text: 'Abgeschlossene Vergangenheit'

**Module VI: Comprehension texts**
Reading and comprehending various texts to consolidate the usage of the constructions learnt so far in this semester.

**Module VII: Picture Description**
Firstly recognize the persons or things in the picture and identify the situation depicted in the picture;
Secondly answer questions of general meaning in context to the picture and also talk about the personal experiences which come to your mind upon seeing the picture.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:


- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

# SPANISH – VI

**Course Code:** **BTI 646** **Credit Units: 02**

## Course Objective:
To enable students acquire working knowledge of the language; to give them vocabulary, grammar, voice modulations/intonations to handle everyday Spanish situations in Present as well as in Present Perfect Tense with ease.

## Course Contents:

**Module I**
Revision of the earlier modules

**Module II**
Present Perfect Tense

**Module III**
Commands of irregular verbs

**Module IV**
Expressions with Tener que and Hay que

**Module V**
En la embajada
Emergency situations like fire, illness, accident, theft

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- Español, En Directo I A
- Español Sin Fronteras

# JAPANESE - VI

**Course Code:** **BTI 647** **Credit Units: 02**

## Course Objective:

To enable the students to converse in the language with the help of verbs and the usage of different sentence patterns, which help them to strengthen the language.
Students are taught and trained enough to get placed in Japanese companies.
**Note:** The teaching is done in roman as well as Japanese script. 10 more kanjis are introduced in this semester.

## Course Contents:

**Module I: Polite form of verbs**
Expressing feelings with the polite forms of verb.

**Module II: Potential form**
Ability of doing or not doing something

**Module III: Conjunctions**
Joining two sentences with the help of *shi* and *mo*

**Module IV: Intransitive Verbs**
Sentence patterns of indirect speech

**Module V: Feelings and expressions**
Regret, existence etc.

## Learning Outcome

- Students can speak the language with the use of different forms of verb.

## Methods of Private study/ Self help

- Hand-outs, audio -aids, assignments and role-plays will support classroom teaching.
- Students are encouraged to watch Japanese movies at Japan Cultural and information center.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- Shin Nihon-go no Kiso Lesson No. 26 to 30.
- All vocabulary and topics taught are from the above-mentioned book.

# CHINESE – VI

**Course Code:** **BTI 648** **Credit Units: 02**

## Course Objective:

Chinese emperor Qin Shi Huang – Ti who built the great wall of China also built a network of 270 palaces, linked by tunnels, and was so afraid of assassination that he slept in a different palace each night. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

## Course Contents:

**Module I**
Drills
Dialogue practice
Observe picture and answer the question.
Pronunciation and intonation.
Character writing and stroke order.

**Module II**
Going out to see a science exhibition
Going to the theatre.
Train or Plane is behind schedule.
Indian Economy-Chinese Economy
Talking about different Seasons of the Year and Weather conditions. Learning to say phrases like-spring, summer, fall, winter, fairly hot, very cold, very humid, very stuffy, neither hot nor cold, most comfortable, pleasant …. etc.

**Module III**
Temperature – how to say – What is the temperature in May here?

- How is the weather in summer in your area?
- Around 30 degrees
- Heating, air-conditioning
- Is winter is Shanghai very cold?

Talking about birthdays and where you were born?
The verb "shuo" (speak) saying useful phrases like speak very well, do not speak very well, if speak slowly then understand if speak fast then don't understand, difficult to speak, difficult to write, speak too fast, speak too slow, listen and can understand, listen and cannot understand … etc.
Tell the following in Chinese – My name is …. I was born in … (year). My birthday is ……… Today is … (date and day of the week). I go to work (school) everyday. I usually leave home at . (O'clock). In the evening, I usually ………. (do what)? At week end, I ……… On Sundays I usually …………… It is today….. It will soon be my younger sisters birthday. She was born in ….. (year). She lives in ………. (where). She is working (or studying)…… where… She lives in …….. (where.)

## Examination Scheme:

| **Components** | **CT1** | **CT2** | **C** | **I** | **V** | **A** |
|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- Elementary Chinese Reader Part-2, 3; Lesson 47-54

# ARTIFICIAL INTELLIGENCE

**Course Code:** **BTI 701** **Credit Units: 03**

## Course Objective:

To develop semantic-based and context-aware systems to acquire, organize process, share and use the knowledge embedded in multimedia content. Research will aim to maximize automation of the complete knowledge lifecycle and achieve semantic interoperability between Web resources and services. The field of Robotics is a multi disciplinary as robots are amazingly complex system comprising mechanical, electrical, electronic H/W and S/W and issues germane to all these.

## Course Contents:

**Module I: Problem solving and Scope of AI**

Introduction to Artificial Intelligence. Applications- Games, theorem proving, natural language processing, vision and speech processing, robotics, expert systems. AI techniques- search knowledge, abstraction.

**Problem Solving**

State space search; Production systems, search space control: depth-first, breadth-first search. Heuristic search - Hill climbing, best-first search, branch and bound. Problem Reduction, Constraint Satisfaction End, Means-End Analysis.

**Module II: Knowledge Representation**

Knowledge Representation issues, first order predicate calculus, Horn Clauses, Resolution, Semantic Nets, Frames, Partitioned Nets, Procedural Vs Declarative knowledge, Forward Vs Backward Reasoning.

**Module III: Understanding Natural Languages**

Introduction to NLP, Basics of Syntactic Processing, Basics of Semantic Analysis, Basics of Parsing techniques, context free and transformational grammars, transition nets, augmented transition nets, Shanks Conceptual Dependency, Scripts, Basics of grammar free analyzers, Basics of sentence generation, and Basics of translation.

**Module IV**

**Expert System:** Need and justification for expert systems, knowledge acquisition, Case studies: MYCIN, RI.
**Learning:** Concept of learning, learning automation, genetic algorithm, learning by inductions, neural nets.
**Programming Language:** Introduction to programming Language, LISP and PROLOG.
**Handling Uncertainties:** Non-monotonic reasoning, Probabilistic reasoning, use of certainty factors, Fuzzy logic.

**Module V: Introduction to Robotics**

Fundamentals of Robotics, Robot Kinematics: Position Analysis, Dynamic Analysis and Forces, Trajectory Planning, Sensors and vision system.
Robot Programming languages & systems: Introduction, the three levels of robot programming, requirements of a robot programming language, problems peculiar to robot programming languages.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

*Text:*

- E. Rich and K. Knight, "Artificial intelligence", TMH, 2nd ed., 1992.
- N.J. Nilsson, "Principles of AI", Narosa Publ. House, 1990.
- John J. Craig, "Introduction to Robotics", Addison Wesley publication
- Richard D. Klafter, Thomas A. Chmielewski, Michael Negin, "Robotic Engineering – An integrated approach", PHI Publication
- Tsuneo Yoshikawa, "Foundations of Robotics", PHI Publication

*References:*

- D.W. Patterson, "Introduction to AI and Expert Systems", PHI, 1992.
- Peter Jackson, "Introduction to Expert Systems", AWP, M.A., 1992.
- R.J. Schalkoff, "Artificial Intelligence - an Engineering Approach", McGraw Hill Int. Ed., Singapore, 1992.
- M. Sasikumar, S. Ramani, "Rule Based Expert Systems", Narosa Publishing House, 1994.

# PROGRAMMING WITH ASP .NET

**Course Code: BTI 702 Credit Units: 04**

## Course Objective:

To create web based applications using ASP.NET.

## Course Contents:

**Module I: Introduction to .NET technologies**
Features of .NET, .NET Framework, CLR, MSIL, .NET class library, .NET Languages, CTS, assemblies, manifest, and metadata, What is ASP.NET?, Difference between ASP and ASP.NET.

**Module II: Controls in ASP.NET**
Overview of Dynamic Web page, Understanding ASP.NET Controls, Applications, Web servers, Installation of IIS. Web forms, web form controls -server controls, client controls. Adding controls to a web form, Buttons, Text Box, Labels, Checkbox, Radio Buttons, List Box. Adding controls at runtime. Running a web Application, creating a multiform web project. Form Validation: Client side validation, server Side validation, validation Controls: Required Field Comparison Range. Calendarcontrol, Ad rotator Control, Internet Explorer Control.

**Module III: Overview of ADO.NET and XML**
What is ADO.NET, from ADO to ADO .NET. ADO.NET architecture, Accessing Data using Data Adapters and Datasets, using Command & Data Reader, binding data to data bind Controls, displaying data in data grid, XML basics, attributes, fundamental XML classes: Document, text writer, text reader. XML validations, XML in ADO.NET, The XML Data Document.

**Module IV: ASP.NET Applications**
Creating, tracking, caching, error handling, Securing ASP.NET applications- form based applications, window based application.

**Module V: Web services**
Introduction, State management - View state, Session state, Application state, Building ASP.NET web services, working with ASP.NET applications, creating custom controls.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***

- ASP.NET Unleashed by Stephen Walther, SAMS publications

***References:***

- ASP.NET by Wrox Publications
- ASP.NET and VB.NET by Wrox Publication
- ASP.NET and C#.NET by Wrox publication.

# ARTIFICIAL INTELLIGENCE LAB

**Course Code:** **BTI 720** **Credit Units: 01**

## Course Contents:

Assignments will be provided for the following:

- Programming in LISP
- Programming in Prolog
- Programming for Robotics

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# PROGRAMMING WITH ASP .NET LAB

**Course Code:** **BTI 721** **Credit Units: 01**

## Course Contents:

- Use of Controls in creating web pages
- Creating sessions
- Creating Custom controls
- Implementing security

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# COMMUNICATION SKILLS - V

**Course Code:** **BTI 741** **Credit Units: 01**

## Course Objective:
To facilitate the learner with Academic Language Proficiency and make them effective users of functional language to excel in their profession.

## Course Contents:

**Module I**
Introduction to Public Speaking
Business Conversation
Effective Public Speaking
Art of Persuasion

**Module II: Speaking for Employment**
Types of Interview
Styles of Interview
Facing Interviews-Fundamentals and Practice Session
Conducting Interviews- Fundamentals and Practice Session
Question Answer on Various Dimensions

**Module III**
Resume Writing
Covering Letters
Interview Follow Up Letters

**Module IV: Basic Telephony Skills**
Guidelines for Making a Call
Guidelines for Answering a Call

**Module V: Work Place Speaking**
Negotiations
Participation in Meetings
Keynote Speeches

## Examination Scheme:

| Components | CT1 | CT2 | CAF | V | GD | GP | A |
|---|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 25 | 10 | 10 | 10 | 5 |

CAF – Communication Assessment File
GD – Group Discussion
GP – Group Presentation

## Text & References:


- Jermy Comfort, Speaking Effectively, et.al, Cambridge
- Krishnaswamy, N, Creative English for Communication, Macmillan
- Raman Prakash, Business Communication, Oxford.
- Taylor, Conversation in Practice,

# BEHAVIOURAL SCIENCE - VII
# (INDIVIDUAL, SOCIETY AND NATION)

**Course Code:** **BTI 743** **Credit Units: 01**

## Course Objective:
This course aims at enabling students towards:
Understand the importance of individual differences
Better understanding of self in relation to society and nation
Facilitation for a meaningful existence and adjustment in society
Inculcating patriotism and national pride

## Course Contents:

**Module I: Individual differences & Personality**
Personality: Definition& Relevance
Importance of nature & nurture in Personality Development
Importance and Recognition of Individual differences in Personality
Accepting and Managing Individual differences (adjustment mechanisms)
Intuition, Judgment, Perception & Sensation (MBTI)
BIG5 Factors

**Module II: Managing Diversity**
Defining Diversity
Affirmation Action and Managing Diversity
Increasing Diversity in Work Force
Barriers and Challenges in Managing Diversity

**Module III: Socialization**
Nature of Socialization
Social Interaction
Interaction of Socialization Process
Contributions to Society and Nation

**Module IV: Patriotism and National Pride**
Sense of pride and patriotism
Importance of discipline and hard work
Integrity and accountability

**Module V: Human Rights, Values and Ethics**
Meaning and Importance of human rights
Human rights awareness
Values and Ethics- Learning based on project work on Scriptures like- Ramayana, Mahabharata, Gita etc.

**Module VI: End-of-Semester Appraisal**
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

## Examination Scheme:

| Components | SAP | A | Mid Term Test (CT) | VIVA | Journal for Success (JOS) |
|---|---|---|---|---|---|
| Weightage (%) | 20 | 05 | 20 | 30 | 25 |

## Text & References:

- Davis, K. Organizational Behaviour,
- Bates, A. P. and Julian, J.: Sociology - Understanding Social Behaviour
- Dressler, David and Cans, Donald: The Study of Human Interaction
- Lapiere, Richard. T – Social Change
- Lindzey, G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology, Addison – Welsley, US.
- Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.
- Robbins O.B. Stephen; Organizational Behaviour

# FRENCH - VII

**Course Code:** **BTI 744** **Credit Units: 02**

## Course Objective:

Revise the portion covered in the first volume, give proper orientation in communication and culture.

## Course Contents:

**Module A: Unités 1 – 3: pp. 06 - 46**

**Contenu lexical:**

**Unité 1:** Rédiger et présenter son curriculum vitae
Exprimer une opinion
Caractériser, mettre en valeur
Parler des rencontres, des lieux, des gens

**Unité 2:** Imaginer **-** Faire des projets
Proposer - conseiller
Parler des qualités et des défauts
Faire une demande écrite
Raconter une anecdote
Améliorer son image

**Unité 3:** Exprimer la volonté et l'obligation
Formuler des souhaits
Exprimer un manque/un besoin
Parler de l'environnement, des animaux, des catastrophes naturelles

**Contenu grammatical:**

1. Le passé: passé composé/imparfait
2. Pronoms compléments directs/indirects, y/en (idées/choses)
3. Propositons relatives introduites par qui, que, où
4. Comparatif et superlatif
5. Le conditionnel présent
6. Situer dans le temps
7. Féminin des adjectifs
8. La prise de paroles: expressions
9. Le subjonctif: volonté, obligation

## Examination Scheme:

| **Components** | **CT1** | **CT2** | **C** | **I** | **V** | **A** |
|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- le livre à suivre: Campus: Tome 2

# GERMAN - VII

**Course Code:** **BTI 745** **Credit Units: 02**

## Course Objective:
To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany
Introduction to Advanced Grammar and Business Language and Professional Jargon

## Course Contents:

**Module I: Dass- Sätze**
Explain the use of the conjunction "-that", where verb comes at the end of the sentence

**Module II: Indirekte Fragesätze**
To explain the usage of the "Question Pronoun" as the Relative Pronoun in a Relative Sentence, where again the verb falls in the last place in that sentence.

**Module III: Wenn- Sätze**
Equivalent to the conditional "If-" sentence in English. Explain that the verb comes at the end of the sentence.

**Module IV: Weil- Sätze**
Explain the use of the conjunction "because-" and also tell that the verb falls in the last place in the sentence.

**Module V: Comprehension texts**
Reading and comprehending various texts to consolidate the usage of the constructions learnt so far in this semester.

**Module VI: Picture Description**
Firstly recognize the persons or things in the picture and identify the situation depicted in the picture;
Secondly answer questions of general meaning in context to the picture and also talk about the personal experiences which come to your mind upon seeing the picture.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:


- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

# SPANISH - VII

**Course Code:** **BTI 746** **Credit Units: 02**

## Course Objective:
To enable students acquire working knowledge of the language; to give them vocabulary, grammar, expressions used on telephonic conversation and other situations to handle everyday Spanish situations with ease.

## Course Contents:

**Module I**
Revision of earlier semester modules

**Module II**
Zodiac signs. More adjectives…to describe situations, state of minds, surroundings, people and places.

**Module III**
Various expressions used on telephonic conversation (formal and informal)

**Module IV**
Being able to read newspaper headlines and extracts (Material to be provided by teacher)

**Module V**
Negative commands (AR ending verbs)

**Module VI**
Revision of earlier sessions and introduction to negative ER ending commands, introduction to negative IR ending verbs

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- Español En Directo I A, 1B
- Español Sin Fronteras
- Material provided by the teacher from various sources

# JAPANESE - VII

**Course Code:** **BTI 747** **Credit Units: 02**

## Course Objective:
To enable the students to converse in the language with the help of different speech, possibilities, probabilities etc.

**Note:** The teaching is done in roman as well as Japanese script. 10 more kanjis (Japanese characters) are taught in this semester.

## Course Contents:

**Module I: Thought**
Expressing one's thought and intentions on different situations.

**Module II: Advice**
Giving advice, probability, possibility and suggestions.

**Module III: Informal Speech**
Addressing friends and close people using informal ways.

**Module IV: Simultaneous Verbs**
Describing two situations simultaneously.

**Module V: Possibility**
Explaining the probability and possibility of any situation.

## Learning Outcome
- Students can interact in a formal as well as informal way on above-mentioned topics.

## Methods of Private study/ Self help
- Hand-outs, audio-aids, assignments and role-plays will support classroom teaching.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- Shin Nihon-go no Kiso Lesson No.-31 to 35
- All vocabulary and topics taught to the students are from the above mentioned book

# CHINESE – VII

**Course Code:** **BTI 748** **Credit Units: 02**

## Course Objective:

The story of Cinderella first appears in a Chinese book written between 850 and 860 A.D. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

## Course Contents:

**Module I**
Drills
Dialogue practice
Observe picture and answer the question.
About china part – I Lesson 1, 2.

**Module II**
Pronunciation and intonation
Character Writing and stroke order.

**Module III**
Ask someone what he/she usually does on weekends?
Visiting people, Party, Meeting, After work….etc.

**Module IV**
Conversation practice
Translation from English to Chinese and vise-versa.
Short fables.

**Module V**
A brief summary of grammar.
The optative verb “yuanyi”.
The pronoun “ziji”.

## Examination Scheme:

| **Components** | **CT1** | **CT2** | **C** | **I** | **V** | **A** |
|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:


- “Kan tu shuo hua” Part-I Lesson 1-7

# PRACTICAL TRAINING - II

**Course Code:** **BTI 750** **Credit Units: 06**

## Course Objective:

The objective of this course is to provide practical training on some live projects that will increase capability to work on actual problem in industry. This training may undergo in an industrial environment or may be an in house training on some latest software which is in high demand in market. This training will be designed such that it will useful for their future employment in industry.

## Examination Scheme:

| | |
|---|---|
| Feedback from industry/work place | 20 |
| Training Report | 40 |
| Viva | 15 |
| Presentation | 25 |
| **Total** | **100** |

# SOFTWARE PROJECT MANAGEMENT

**Course Code:** **BTI 703** **Credit Units: 04**

## Course Objective:

To make the student aware of the importance of Management in software projects.

## Course Contents:

**Module I: Introduction to Software Project Management**
The nature of software production; Key objectives of effective management: quality, productivity, risk reduction; role of the software project manager.

**Module II: Planning the Project**
Business Planning: determining objectives, forecasting demand for product, proposal writing, requirement analysis, legal issues (patent, copyright, liability, warranty);

**Module III: Technical planning**
Life cycle models, types of plans, plan documentation methods: PERT and CPM, Gantt charts, work breakdown structures, standards,

**Module IV: Planning for risk management and control**
Entry and exit criteria, intermediate checkpoints, performance prediction and analysis people, prototyping and modeling, inspections and reviews, process and process assessment, development methods, metrics, configuration management, testing and quality assurance, capacity planning, estimating - what it takes to do the job: cost (direct and indirect), resources, time, size and complexity of product risk determination, role of requirements and design in estimating, financial planning-budgeting, resource allocation, organizational considerations (teams, hierarchies, etc), technology, human factors and usability, tools and environments, transition of product to the user.

**Module V: Managing and Evaluating the Project**
Managing the task: project control, managing the plan, reviews, feedback and reporting mechanisms, configuration management, quality control and quality assurance, managing change, readjusting goals and milestones, risk management, testing phases, formalized support activities; Managing the team: Team organizations, recruiting and staffing-picking the right people, technical leadership, avoiding obsolescence-training etc.; Managing the context: Communication skill, decision theory, business management, assessing the organization?s ability to perform the process, probability and statistics; Managing product support and maintenance, Evaluation of the project.

## Examination Scheme:

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


***Text:***

- Tom Demarco, Controlling Software Project Management, Measurement, Prentice Hall, New Jersey.

***References:***

- Tom Glib, Finzi Susannah, Principles of Software Engineering Management, Addison Wesley, England.
- Bob Hughes and Mike Cotterell; Software Project Management, third edition, Tata McGraw Hill Publishing Company Ltd., New Delhi.
- Pankaj Jalote; Software Project Management in Practice, Pearson Education Asia.
- Watts S. Humphrey; Winning with Software? An Executive Strategy, Pearson Education Asia.
- Philip Metzger, Managing a Programming Project, Prentice Hall, New Jersey.

# ADVANCE DBMS

**Course Code:** **BTI 704** **Credit Units: 04**

## Course Objective:

The objective of this course is designed to cover and impart knowledge of various aspects of a Data Base Management systems like, databases, different database models, how transaction is managed, query is processed and different types databases.

## Course Contents:

**Module I: Object based databases**
Introduction, OODM, OODB, OODBMS, ODMG, ORDBMS, ORDBMS design

**Module II: Parallel and distributed databases**
Parallel databases: Introduction, advantages and disadvantages, architecture, Parallel data processing and query parallelism.
Distributed databases: Introduction, Properties, types, advantages, disadvantages, architecture, design, query processing, concurrency control, recovery control

**Module III: Data warehousing and data mining**
Introduction, evolution of datawarehouse concept, components, characteristics, benefits, limitations, dataware house architecture, datamarts, OLAP, data mining process, data mining knowledge discovery, goals of data mining, data mining tools and applications

**Module IV: Advanced Normalization**
Normal forms-INF, 2NF, 3NF, BCNF, 4NF, 5NF, join dependencies.

**Module V: Emerging Database Technologies**
Internet databases, digital libraries, multimedia databases, mobile databases, spatial databases and clustering based disaster proof databases.

## Examination Scheme:

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***
- "Database Systems Concepts, Design and Applications", 1st Ed., Pearson Ed.

***References:***

- Date C. J., "An Introduction to Database Systems", 7th Ed., Narosa Publishing, 2004
- Elmsari and Navathe, "Fundamentals of Database Systmes", 4th Ed., A. Wesley, 2004
- Ullman J. D., "Principles of Database Systems", 2nd Ed., Galgotia Publications, 1999.

# OPERATIONAL RESEARCH

**Course Code:** **BTI 705** **Credit Units: 04**

## Course Objective:

In a rapidly changing environment an understanding is sought which will facilitate the choice and the implementation of more effective solutions, which, typically, may involve complex interactions among people, materials and money. Organizations may seek a very wide range of operational improvements - for example, greater efficiency, better customer service, higher quality or lower cost. Whatever the business, engineering aim, Operation Research can offer the flexibility and adaptability to provide objective help. This course introduces students to the principles of operational research.

## Course Contents:

**Module I: Linear Programming**
Formulation of problem. Graphical and simplex method for maximization and minimization. Duality theory and sensitivity analysis

**Module II: Transportation Models**
Stepping stone algorithm, MODI method and Vogel's Approximation Method (VAM) for selfing balanced, unbalanced transportation problems and problems of degeneracy and maximization.

**Module III: Assignment Models**
Assignment model for maximization and traveling salesman problems, Industrial Problems

**Module IV: Queuing Theory**
Basic structured, Terminology, classification. Birth and death process. Sequencing: Processing in jobs through machines with the same processing order. Processing of 2 jobs through machines with each having different processing order.

**Module V: Network Models**
Introduction to PERT and CPM. Fundamental concept of Network models and construction of network diagrams. PERT activity, time estimate. Critical path and project time duration. Probability of completing the project on or before specified time. Float of a activity.

**Module VI: Games Theory**
Zero Sum two person competitive games, Minimax and maximini principle Arithmetic, algebraic, matrix algebra method,. Solution by dominance, sub game, Graphical and linear programming method.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- HM Wagner, Principles of Operations Research, Prentice Hall
- Heizer, J. & Render B., Operations Management, Pearson Education (8/e), 2006
- PK Gupta and DS Hira, Operations Research, S. Chand & Co.
- Taha, Introduction to Operation Research
- F.S. Hiller and G.I. Libermann, Introduction to Operation Research, Holden Ray.

# NUMERICAL METHODS AND STATISTICAL TECHNIQUES

**Course Code:** **BTI 706** **Credit Units: 04**

## Course Objective:

The knowledge of mathematics is necessary for better understanding of almost all the Engineering and Science subjects. Here our intention is to make the students acquainted with the concept of basic topics from Mathematics, which they need to pursue their Engineering degree.

## Course Contents:

**Module I: Solution of Algebraic and Transcendental Equation**
Error, types of errors, errors in a series approximation, Bisection Method, Iteration method, Method of false position, Newton-Raphson method
**Solutions of Simultaneous equation**
Gauss elimination method, Jacobi iteration method, Gauss Seidal method

**Module II: Interpolation**
Finite Differences, Difference tables
Polynomial Interpolation: Newton's forward and backward formula
Central Difference Formulae: Gauss forward and backward formula.
Interpolation with unequal intervals: Lagrange's Interpolation, Newton Divided difference formula

**Module III: Numerical Integration and Differentiation**
Introduction, Numerical differentiation Numerical Integration: Trapezoidal rule, Simpson's 1/3 and 3/8 rules.

**Module IV: Solution of differential Equations**
Euler's Method, Modified Euler's Method, Taylor series Method, Runga-Kutta Methods.

**Module V: Statistical Computation**
Curve fitting by method of least squares, fitting of straight lines, polynomials, exponential curves etc, Data fitting with Cubic splines.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


*Text:*

- Rajaraman V, "Computer Oriented Numerical Methods", Pearson Education
- Gerald & Whealey, "Applied Numerical Analyses", AW
- Jain, Iyengar and Jain, "Numerical Methods for Scientific and Engineering Computations", New Age Int.
- Grewal B S, "Numerical methods in Engineering and Science", Khanna Publishers, Delhi

*References:*

- T Veerarajan, T Ramachandran, "Theory and Problems in Numerical Methods, TMH
- Pradip Niyogi, "Numerical Analysis and Algorithms", TMH
- Francis Scheld, " Numerical Analysis", TMH
- Sastry S. S, "Introductory Methods of Numerical Analysis", Pearson Education.
- Gupta C.B., Vijay Gupta, "Introduction to Statistical Methods", Vikas Publishing.
- Goyal, M, "Computer Based Numerical and Statistical Techniques", Firewall Media, New Delhi.

# COMPILER CONSTRUCTION

**Course Code:** **BTI 707** **Credit Units: 04**

## Course Objective:

The objective is to make aware students the concepts of compiler designing. It is expected students have should knowledge on automata theory. This course includes various Lexical Analysis, parsing techniques and syntax directed translation.

## Course Contents:

**Module I: Introduction**
Definition, functions of Compiler in Linux / Unix / TC etc environments, other associated terms e.g. Text formatter, Text Editors, Phases and Passes, FSM & RE's and their application to Lexical Analysis, Implementation of Lexical Analyzers, Lexical- Analyzer Generator, Lex – Compiler, Formal Grammar and their application to Syntax Analysis, BNF Notation, YACC. The Syntactic specification of Languages: CFG, Derivation and Parse Trees, Capabilities of CFG.

**Module II: Basic Parsing Techniques**
Parsers, Shift Reduce Parsing, Operator precedence parsing, topdown Parsing, Predictive Parsers.

**Module III: Automatic Construction of efficient Parsers**
LR Parsers, the canonical collection of LR(0) items, constructing SLR Parsing Tables, Constructing canonical LR Parsing tables and LALR parsing tables, An Automatic Parser Generator, Implementation of LR parsing
Tables, Constructing LALR sets of items.

**Module IV: Syntax Directed Translation**
Syntax directed Translation Schemes, Implementation of Syntax directed translators, Intermediate Code, Postfix notation, Parse Trees and Syntax Trees, Three address Code, Quadruple & Triples, Translation of Assignment Statements, Boolean expressions, Control Statements, Postfix Translation, Translation with a Top Down Parser, Array references in Arithmetic expressions, Procedure Calls, Declarations and Case statements Translations.
**Symbol Tables**
Data Structure for Symbol Tables, representing scope information. Run Time Administration: Implementation of simple Stack allocation scheme, storage allocation in block structured language.

**Module V: Error detection and Recovery**
Lexical phase errors, syntax phase errors, semantic errors Code Optimization: Loop optimization, the DAG representation of basic blocks, value numbers and Algebraic Laws, Global Data – Flow Analysis.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

*Text:*


- Alfread V. Aho, Ravi Sethi & J.D. Ullman, "Compiler Design", Addison Wesley
- Ullman, Principles of Compiler Design, Narosa publications.

*References:*

- D.M. Dhamdhere, "Compiler Construction – Principles & Practice", Macmillan India Ltd.
- Holub, "Compiler Design in C", PHI.
- Tremblay K.P & Sorenson P.G., "The Theory and practice of Compiler writing" McGraw Hill
- Waite W.N. and Goos G., "Compiler Construction" Springer Verlag.

# SOFTWARE PROJECT MANAGEMENT LAB

**Course Code: BTI 722** **Credit Units: 01**

## Course Contents:
Implementation of software project management concepts using tools like MS Project, Rational Requisite Pro, Purify, etc., selected case studies.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# ADVANCE DBMS LAB

**Course Code:** **BTI 723** **Credit Units: 01**

**Software Required:** Oracle 9i

## Course Contents:

**Topics covered in lab will include:**

- Database Design
- Data Definition (SQL)
- Data Retrieval (SQL)
- Data Modification (SQL)
- Views
- Triggers and Procedures
- PL\SQL
- Queries Using Object Oriented Approach.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# OPERATIONS RESEARCH (PROGRAMMING) LAB

**Course Code:** **BTI 724** **Credit Units: 01**

## Course Contents:

1. Program on C or C++ for Linear Programming.
2. Program on C or C++ for Simplex Problem.
3. Program on C or C++ for Assignment Problem.
4. Program on C or C++ for Transportation Problem.
5. Program on C or C++ for PART, CPM Problem.
6. Program on C or C++ for Sequencing Problem.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# NUMERICAL METHODS AND STATISTICAL TECHNIQUES LAB

**Course Code:** **BTI 725** **Credit Units: 01**

**Course Contents:**

**Software Required:** Turbo C/C++

**Assignments will be provided for the following:**

- Analysis of various numerical and statistical techniques

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# COMPILER CONSTRUCTION LAB

**Course Code: BTC 726** **Credit Units: 01**

**Programming Language:** Unix/C/C++

**List of Programs:**

1. Write a Program to create, read, and write into a file having record of students.
2. a) Write a program to generate Machine Op-Code Table , Symbol Table and Pseudo Op- Code table during First Pass Assembler.
   b) Write a program to generate Machine Op- code table using two pass Assembler.
3. a) Write a program to Generate Macro Name Table , Macro definition Table and Argument List Array during Pass One of Two Pass Macro.
   b) Write a program to generate Expanded Source in Pass Two of Two Pass Macro.
4. Study of Lexical Analyzer.
5. Study of Device Drivers.
6. Study and implement general purpose commands in UNIX. (Date, Who, Who am I, Cal, Echo, Clear, Mesg, Mail, and Login Command)
7. To Study and implement all the directory oriented Commands of UNIX (Cd, MKdir, rmdir, And Pwd Command)
8. To Study and implement all the File oriented Commands of UNIX ( ls list files, Cat, cp, rm commands)
9. To study implement HEAD, TAIL, CUT and PASTE commands.
10. To Study Common Object File Format (COFF)
11. WAP to check whether string is accepted or not for entered grammar.
12. WAP to convert Infix to Postfix notation.
13. WAP to convert Infix to Prefix notation.
14. WAP to find no of Tokens in an expression.
15. WAP to convert Regular Expression to NFA.
16. WAP to convert NFA to DFA.
17. WAP to calculate LEADING and TRAILING of a grammar.
18. WAP calculate FIRST and FOLLOW of a grammar.
19. WAP to implement shift reduce parser.
20. WAP to implement top down parser.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

# GRID COMPUTING

**Course Code:** **BTI 708** **Credit Units: 03**

## Course Objective:

Grid computing (or the use of a *computational grid*) is applying the resources of many computers in a network to a single problem at the same time - usually to a scientific or technical problem that requires a great number of computer processing cycles or access to large amounts of data. The major objective of this course is to provide a sound foundation to the students on the concepts, percepts and practices in a field that is of immense concern to the industry and business.

## Course Contents:

**Module I: Introduction: Cluster to grid computing**
Cluster computing models, Grid models, Mobile grid models, Applications.
**Parset: System independent parallel programming on distributed systems:** Motivation and introduction, Semantics of the parset construct, Expressing parallelism through parsets, implementing parsets on a loosely coupled distributed system.
**Anonymous remote computing model:** Introduction, Issues in parallel computing on interconnected workstations, Existing distributed programming approaches, The arc model of computation, The two tired arc language constructs, Implementation

**Module II: Integrating task parallelism with data parallelism**
Introduction and motivation, A model for integrating task parallelism into data parallel programming platforms, Integration of the model into ARC, Design and implementation applications, performance analysis, guidelines for composing user programs, related work
**Anonymous remote computing and communication model:** Introduction, Location in dependent inter task communication with DP, DP model of iterative grid computations, Design and implementation of distributed pipes, Case study, and Performance analysis.

**Module III: rallel programming model on CORBA**
Introduction, Existing works, notion of concurrency, system support implementation performance, sitability of CORBA: introspection.
**Grid computing model:** Introduction, a parallel computing model over grids, Design and implementation of the model, Performance studies, Related work.

**Module IV: Introducing mobility into anonymous remote computing and communication model**
Introduction, issues in mobile clusters and parallel computing on mobile clusters, moset overview, moset computation model, implementation, performance.
**Distributed simulating annealing algorithms for job shop scheduling:** Introduction, overview, distributed algorithms for job shop scheduling, implementation, results and observation.

**Module V: Parallel Simulated Annealing Algorithms**
Introduction, Simulated annealing (SA) Technique, Clustering algorithm for simulated annealing (SA), Combination of genetic algorithm and simulated annealing (SA) algorithm

## Examination Scheme:

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***

- "GRID COMPUTING A Research Monograph" by D. Janakiram, Tata McGraw hill publications, 2005

***References:***


- "Grid Computing: A Practical Guide to technology and Applications" by Ahmar Abbas, Charles River media – 2003.
- "Grid Computing" Joshy Joseph & Craig Fellenstein, Pearson Education

# MOBILE COMPUTING

**Course Code: BTI 709 Credit Units: 03**

## Course Objective:

The objective of this consortium is to shape and expand a full-scale and sound mobile computing system market. To achieve this, cooperation is required of interests related to communication (network), computer hardware/software, system integrators (including service providers),and the media.

## Course Contents:

**Module I: Introduction to Personal Communications Services (PCS)**
PCS Architecture, Mobility management, Networks signaling.
Global System for Mobile Communication (GSM) system overview: GSM Architecture, Mobility management, Network signaling.

**Module II: General Packet Radio Services (GPRS) & Wireless Application Protocol (WAP)**
GPRS Architecture, GPRS Network Nodes.
Mobile Data Communication: WLANs (Wireless LANs) IEEE 802.11 standard, Mobile IP.
Wireless Application Protocol (WAP): The Mobile Internet standard, WAP Gateway and Protocols, wireless mark up Languages (WML).

**Module III: Third Generation (3G) Mobile Services**
Introduction to International Mobile Telecommunications 2000 (IMT 2000) vision, Wideband Code Division Multiple Access (W-CDMA), and CDMA 2000, Quality of services in 3G.
Wireless Local Loop(WLL): Introduction to WLL Architecture, wireless Local Loop Technologies.

**Module IV: Global Mobile Satellite Systems**
Global Mobile Satellite Systems; case studies of the IRIDIUM and GLOBALSTAR systems.
Wireless

**Module V: Enterprise Networks**
Introduction to Virtual Networks, Blue tooth technology, Blue tooth Protocols. Advanced techniques in mobile computing.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


*Text:*

- “Wireless and Mobile Networks Architectures”, by Yi-Bing Lin & Imrich Chlamtac, John Wiley & Sons, 2001.
- “Mobile and Personal Communication systems and services”, by Raj Pandya, Prentice Hall of India, 2001.

*References:*

- “Guide to Designing and Implementing wireless LANs”, by Mark Ciampa, Thomson learning, Vikas Publishing House, 2001.
- “Wireless Web Development”, Ray Rischpater, Springer Publishing, 2000.
- “The Wireless Application Protocol”, by Sandeep Singhal, Pearson Education Asia, 2000.
- “Third Generation Mobile Telecommunication systems”, by P.Stavronlakis, Springer Publishers, 2001.

# INFORMATION SECURITY

**Course Code: BTI 710 Credit Units: 03**

## Course Objective:
The importance of security and how to implement it in information systems.

## Course Contents:

**Module I**
Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs, Buffer overflow & format string vulnerabilities, TCP session hijacking, ARP attacks, route table modification, UDP hijacking, and man-in-the-middle attacks.

**Module II**
Conventional Encryption Principles, Conventional encryption algorithms, cipher block modes of operation, location of encryption devices, key distribution Approaches of Message Authentication, Secure Hash Functions and HMAC,

**Module III**
Public key cryptography principles, public key cryptography algorithms, digital signatures, digital Certificates, Certificate Authority and key management Kerberos, X.509 Directory Authentication Service

**Module IV**
Email privacy: Pretty Good Privacy (PGP) and S/MIME.

**Module V**
IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management

**Module VI**
Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET)

**Module VII**
Basic concepts of SNMP, SNMPv1 Community facility and SNMPv3, Intruders, Viruses and related threats

**Module VIII**
Firewall Design principles, Trusted Systems, Intrusion Detection Systems

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

*Text:*
- Network Security Essentials (Applications and Standards) by William Stallings Pearson Education.
- Hack Proofing your network by Ryan Russell, Dan Kaminsky, Rain Forest Puppy, Joe Grand, David Ahmad, Hal Flynn Ido Dubrawsky, Steve W.Manzuik and Ryan Permeh, wiley Dreamtech,

*References:*
- Fundamentals of Network Security by Eric Maiwald (Dreamtech press)
- Network Security - Private Communication in a Public World by Charlie Kaufman, Radia Perlman and Mike Speciner, Pearson/PHI.
- Principles of Information Security, Whitman, Thomson.
- Cryptography and network Security, Third edition, Stallings, PHI/Pearson
- Network Security: The complete reference, Robert Bragg, Mark Rhodes, TMH
- Introduction to Cryptography, Buchmann, Springer.

# MARKETING MANAGEMENT

**Course Code:** **BTI 711** **Credit Units: 03**

## Course Objective:

The objective of this course is to introduce the basic concepts of marketing business environment, consumers and markets and to develop a feel of the marketplace.

## Course Contents:

**Module I: Understanding Marketing Management**

The production concepts, product concept, selling concept, the marketing concept, comparison of various concepts, Relationship marketing, Social marketing, Customer needs, Customer value and satisfaction. CRM, Value chain analysis, Value delivery network, Strategic Planning, Introduction to strategic planning with marketing perspective, Designing business portfolio, Marketing plan, Marketing process, Marketing service.

**Module II: Market research business environment and Understanding Consumer Behaviour**

Market research, Objectives, Primary and Secondary Research, Gathering and Analyzing Data The factors influencing consumer behaviour. The stages buying process, the buying decision making process, factors effecting the buying decision, problem recognition, information search, Examination of alternatives, purchased decision, post purchase behaviour, The industrial buying process

**Module III: Segmentation, Managing Competition**

Competition, identifying competition, strategies of competition, strengths and weaknesses of competitors, reaction patterns of various market players, customer value analysis. Strategies adopted by market leaders, market followers and market challengers. Market segmentation, Lifestyle Marketing, Generation X Consumers and differentiating your offering, targeting, Positioning, Product life cycles, stages in lifecycle and factors effecting each stage, Managing product life cycles.

**Module IV: Product Management**

Classification of products, New Product development, stages of product development, kinds of consumers depending on stage of adoption. Adoption process, Product mix decisions and line management, Length, width and depth of a line, line analysis, and brand management. Marketing of services

**Module V: Pricing Strategies**

Production to the various objectives of pricing, steps adopted in selecting the right price. Various pricing strategies, Adapting prices according market requirements, responding to various market price changes. Initiating a price change and handling impacts of price changes.

**Module VI: Managing Channels**

Channel functions, channel flows, establishing channel objectives, identifying channel alternatives, evaluating alternatives, selecting channel partners, training and motivating channel members, Channel dynamics, conflict and cooperation in channel members, Market logistics, Sales force management.

**Module VII: Managing the Integrated Communication**

What is communication? Setting of communication objectives, identifying target audience, modes of communication, designing message, choosing tool for communication, Media decisions, evaluating various media, Advertising management, Advertisement management, Managing sales promotions, evaluating results, integrating the entire communication, role of public relations and publicity, significance and managing communication through direct marketing and personnel selling, role of internet marketing, emerging communication trends.

## Examination Scheme:

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***

- Principles of Marketing by Philip Kotler 11th Ed, PHI publications

***References:***

- Marketing Management by Rajan Saxena, 3rd Ed, Tata McGrow Hill
- Marketing Management by Ramaswamy, 3rd Ed, Namakumari

# E-COMMERCE AND ERP

**Course Code: BTI 712 Credit Units: 03**

## Course Objective:

This course examines the evolution of enterprise resource planning (ERP) systems - from internally focused client/server systems to externally focused e-business. This class studies the types of issues that managers will need to consider in implementing cross-functional integrated ERP systems. The objective of this course is to make students aware of the potential and limitations of ERP systems. This objective will be reached through hands-on experience, case studies, lectures, guest speakers and a group project. The course would equip students with the basics of E-Commerce, technologies involved with it and various issues associated with.

## Course Contents:

**Module 1: Introduction and Concepts**

**Networks and commercial transactions -** Internet and other novelties; Networks and electronic transactions today, Model for commercial transactions; Internet environment - internet advantage, world wide web and other internet sales venues; Online commerce solutions.

**Security Technologies:** Why is internet insecure? A brief introduction to Cryptography; Public key solution. Digital payment systems; First virtual internet payment system; cyber cash model Operational process of Digicash, Ecash Trail; Using Ecash; Smart cards; Electronic Data Interchange: Its basics; EDI versus Internet and EDI over Internet.

**Module II: Introduction ERP**

An Overview, Enterprise-An Overview, Benefits of ERP, ERP and Related Technologies, Business Process Reengineering (BPR), Data Warehousing, Data Mining, On-line Analytical Processing (OLAP), Supply Chain Management

**Module III: ERP Implementation**

To be or not to be, ERP Implementation Lifecycle, Implementation Methodology, Not all Packages are Created Equal!, ERP Implementation-The Hidden Costs, Organizing the Implementation, Vendors, Consultants and Users, Contracts with Vendors, Consultants and Employees, Project Management and Monitoring, After ERP Implementation.

**Module IV: The Business Modules**

Business Modules in an ERP Package, Finance, Manufacturing (Production), Human Resources, Plant Maintenance, Materials Management, Quality Management, Sales and Distribution

**Module V: The ERP Market**

ERP Market Place, SAP AG, PeopleSoft, Baan Company, JD Edwards World Solutions Company, Oracle Corporation, QAD, System Software Associates, Inc. (SSA)

**ERP-Present and Future**

Turbo Charge the ERP System, Enterprise Integration Applications (EIA), ERP and E-Commerce, ERP and Internet, Future Directions in ERP, Appendices"

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

*Text:*


- S. Sadagopan, “Enterprise Resource Planning”, Tata McGraw Hill 2000
- Bajaj, Kamlesh K. and Nag, Debjani, E-Commerce: The Cutting Edge of Business, Tata McGraw-Hill Publishing Company


*References:*


- Alexis Leon, “Enterprise Resource Planning”, Tata McGraw Hill 2001
- Loshin, Pete and Murphy, Paul, *Electronic Commerce*, Second edition, 1990, Jaico Publishing House, Mumbai.

# DIGITAL IMAGE PROCESSING

**Course Code: BTI 801 Credit Units: 03**

## Course Objective:

Processing color and grayscale images or other two-dimensional signals has become an important tool for research and investigation in many areas of science and engineering. *Digital Image Processing* is designed to give professionals and students a powerful collection of fundamental and advanced image processing tools on the desktop. Digital Image Processing takes full advantage of the computational technology of Mathematica.

## Course Contents:

**Module I: Introduction and Digital Image Fundamentals**
The origins of Digital Image Processing, Examples of Fields that Use Digital Image Processing, Fundamentals Steps in Image Processing, Elements of Digital Image Processing Systems, Image Sampling and Quantization, Some basic relationships like Neighbours, Connectivity, Distance Measures between pixels, Linear and Non Linear Operations.

**Module II: Image Enhancement in the Spatial Domain**
Some basic Gray Level Transformations, Histogram Processing, Enhancement Using Arithmetic and Logic operations, Basics of Spatial Filters, Smoothening and Sharpening Spatial Filters, Combining Spatial Enhancement Methods.

**Module III: Image Enhancement in the Frequency Domain**
Introduction to Fourier Transform and the frequency Domain, Smoothing and Sharpening Frequency Domain Filters, Homomorphic Filtering.
**Image Restoration**
A model of The Image Degradation / Restoration Process, Noise Models, Restoration in the presence of Noise Only Spatial Filtering, Pereodic Noise Reduction by Frequency Domain Filtering, Linear Position-Invarient Dedradations, Estimation of Degradation Function, Inverse filtering, Wiener filtering, Constrained Least Square Filtering, Geometric Mean Filter, Geometric Transformations.

**Module IV: Image Compression**
Coding, Interpixel and Psychovisual Redundancy, Image Compression models, Elements of Information Theory, Error free comparison, Lossy compression, Image compression standards.
**Image Segmentation**
Detection of Discontinuities, Edge linking and boundary detection, Threshold, Region Oriented Segmentation, Motion based segmentation.

**Module V: Representation and Description**
Representation, Boundary Descriptors, Regional Descriptors, Use of Principal Components for Description, Introduction to Morphology, Some basic Morphological Algorithms.
**Object Recognition:**
Patterns and Pattern Classes, Decision-Theoretic Methods, Structural Methods.

## Examination Scheme:

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***
- Rafael C. Conzalez & Richard E. Woods, “Digital Image Processing”, 2nd edition, Pearson Education.
- A.K. Jain, “Fundamental of Digital Image Processing”, PHI.

***References:***
- Rosefield Kak, “Digital Picture Processing”,
- W.K. Pratt, “Digital Image Processing”,

# REAL TIME SYSTEMS

**Course Code: BTI 802 Credit Units: 02**

## Course Objective:

Real-time systems involves the study of computer software and hardware systems which are subject to a real-time constraint. The aim is to make the students aware of various aspects of real time systems

## Course Contents:

**Module I: Typical Real Time systems**

Digital control, High Level controls, Signal Processing, Other real time applications .,Hard versus soft Real Time systems**:** Jobs and processors, Hard Real Time systems, Soft Real Time systems. A reference model of Real Time Systems: Processors and Resources, Temporal parameters of real time workload, Periodic task model, Functional parameters, Scheduling Hierarchy.

**Module II: Commonly used approaches to Real Time scheduling**

Clock Driven approach, Weighted Round robin approach, Priority Driven approach, Dynamic vs. Static systems, Offline vs. Online scheduling. Clock Driven scheduling: General structure of cyclic schedules, Scheduling sporadic jobs, Algorithm for constructing static schedules**,** Pros and Cons of Clock driven scheduling.

**Module III: Priority driven scheduling of Periodic tasks**

Static Assumption, Fixed Priority Versus Dynamic Priority algorithms, Optimality of the RM and DM algorithms, A schedulability test for Fixed Priority tasks with short response times and arbitrary response times, sufficient schedulability conditions for the RM and DM algorithms .Scheduling Periodic and sporadic jobs in Priority Driven systems: Deferrable Servers, Sporadic Servers, Constant Utilization, Total Bandwidth and weighted Fair Queuing Servers, Scheduling of sporadic Jobs.

**Module IV: Resources and Resources Access Control**

Assumptions on Resources and their usage, Non preemptive critical sections, Basic priority-Inheritance protocol, Basic Priority-Ceiling Protocol, Preemption-Ceiling Protocol.

**Module V: Scheduling Flexible computations and tasks with temporal distance Constraints**

Flexible Applications, Tasks with Temporal Distance Constraints

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & references:

***Text:***

- Real Time Systems by Jane W.S. Liu, 3rd Edition, Pearson Education.

***References:***

- Real Time Systems by C.M. Krishna and G. Shin, Tata Mc Graw Hill

# MANAGEMENT INFORAMTION SYSTEM

**Course Code:** **BTI 803** **Credit Units: 04**

## Course Objective:

This course provides students with the knowledge of fundamentals of Information Systems, problem solving in business with the help of MIS and the concept of a balanced approach. This module also deals with Case Tools, Information Analysis, system development and Information System for Managerial Decision Support. The advance concepts in MIS module highlight enterprise resource planning, supply chain management, CRM and procurement management.

## Course Contents:

**Module I**

Foundation of Information Systems: Introduction to information system in business, fundamentals of information systems, solving business problems with information system, concept of balanced MIS, effectiveness & efficiency criteria.

**Module II**

System Analysis Design function, CASE Tools, Project Feasibility, Information Requirement & Decision Analysis, Preparing System Proposal, Input / Output design, Procedures & control design, System development, Testing & Quality assurance.

**Module III**

Implementation, Operation, Evaluation and Maintenance, Structured System Methodologies, Automated systems development, Hardware / Software selection, Systems function management. Business application of Information Technology: Internet & Electronic commerce, internet, extranet & enterprise solutions, information system for business operations, information system for managerial decision support, information system for strategic advantage.

**Module IV**

Managing Information Technology: Enterprise and global management, security & ethical challenges planning & implementing changes.

**Module V**

Advanced Concepts In Information Systems: Enterprise resource planning, Supply Chain Management, C.R.M., Procurement Management.

## Examination Scheme:

| **Components** | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Brian, "Introduction to Information System", McGraw Hill
- Brain, "Management Information System", TMH
- Ashok Kumar Sharma, "Analysis Design & Implementation of Information Systems: A Transition to Objects"
- Vikas, Alter, "Information System: A management perspectives Addison Wesley
- Arore & Bhatia, "Information System for Managers", Excel Bansal. "Information
- System Analysis and Design", New Age Murdick, "Information System for Modem Management", PHI.

# DIGITAL IMAGE PROCESSING LAB

**Course Code:** **BTI 820** **Credit Units: 01**

**Course Contents:**

**Software Required:** Java

**List of Assignements:**

Experiments will be based on Image Representation,Image transformation,Image Enhancements, Edge Detection, Morphological Image processing and Segmentation.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| A | PR | LR | V | PR | V |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# COMMUNICATION SKILLS - VI

**Course Code:** **BTI 841** **Credit Units: 01**

## Course Objective:

The modules are designed to enhance the communicative competence of the learners to equip them with efficient interpersonal communication.

## Course Contents:

**Module I: Dynamics of Group Discussion**
Introduction,
Methodology
Role Functions
Mannerism
Guidelines

**Module II: Communication through Electronic Channels**
Introduction
Technology based Communication Tools
Video Conferencing
Web Conferencing
Selection of the Effective Tool
E-mails, Fax etc.

**Module III: Effective Public Speaking**
Types
Essentials
Success in Public Speaking
Dos and Don'ts

## Examination Scheme:

| **Components** | **CT1** | **CT2** | **CAF** | **V** | **GD** | **GP** | **A** |
|---|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 25 | 10 | 10 | 10 | 5 |

CAF – Communication Assessment File
GD – Group Discussion
GP – Group Presentation

## Text & References:


- Jermy Comfort, Speaking Effectively, et.al, Cambridge
- Krishnaswamy, N, Creative English for Communication, Macmillan
- Raman Prakash, Business Communication, Oxford.
- Taylor, Conversation in Practice,

# BEHAVIOURAL SCIENCE - VIII
# (PERSONAL AND PROFESSIONAL EXCELLENCE)

**Course Code: BTI 843 Credit Units: 01**

## Course Objective:
Importance of Personal and Professional excellence
Inculcating the components of excellence

## Course Contents:

**Module I: Components of Excellence**
Personal Excellence:
Identifying long-term choices and goals
Uncovering the talent, strength & style
Analyzing choke points in your personal processes by analysis in area of placements, events, seminars, conference, extracurricular activities, projects etc.

**Module II: Managing Personal Effectiveness**
Setting goals to maintain focus
Dimensions of personal effectiveness (self disclosure, openness to feedback and perceptiveness)
Integration of personal and organizational vision for effectiveness
A healthy balance of work and play
Managing Stress creatively and productively

**Module III: Personal Success Strategy**
Time management
Handling criticism and interruptions
Dealing with difficult people
Mapping and evaluating the situations
Identifying long-term goals

**Module IV: Positive Personal Growth**
Understanding & Developing positive emotions
Positive approach towards future
Resilience during loss and challenge

**Module V: Professional Success**
Building independence & interdependence
Reducing resistance to change
Continued reflection (Placements, events, seminars, conferences, projects extracurricular Activities etc.)

**Module VI: End-of-Semester Appraisal**
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

## Examination Scheme:

| Components | SAP | A | Mid Term Test (CT) | VIVA | Journal for Success (JOS) |
|---|---|---|---|---|---|
| Weightage (%) | 20 | 05 | 20 | 30 | 25 |

# FRENCH - VIII

**Course Code:** **BTI 844** **Credit Units: 02**

## Course Objective:

Provide students with the necessary linguistic tools

- to face up to different situations of communication
- to enhance their capacity in oral/written comprehension/expression

## Course Contents:

**Module B: Unités 4, 5, 6: PP. 48 - 86**

**Contenu lexical:**

**Unité 4:**
1. Présenter une information/les circonstances d'un événement
2. Exprimer la possibilité/la probabilité
3. Exprimer une quantité indéfinie
4. Comprendre et raconter un fait div

**Unité 5:**
1. Parler d'une passion, d'une aventure
2. Choisir/créer
3. Exprimer la surpirse/des sentiments

**Unité 6:**
1. Exprimer la cause et la conséquence
2. Exprimer la crainte et rassurer
3. Faire une démonstration

**Contenu grammatical:**

1. la construction passive
2. la forme impersonnelle
3. l'interrogation
4. les adjectifs et les pronoms indéfinis
5. les pronoms interrogatifs et démonstratifs
6. la construction avec deux pronoms
7. le subjonctif dans l'expression des sentiments, de la crainte, du but
8. constructions permettant l'expression de la cause et de la conséquence
9. l'enchaînement des idées: succession et opposition

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 15 | 20 | 20 | 20 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- le livre à suivre: Campus: Tome 2

# GERMAN - VIII

**Course Code:** **BTI 845** **Credit Units: 02**

## Course Objective:
To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany
Introduction to Advanced Grammar and Business Language and Professional Jargon

## Course Contents:

**Module I: Reading and comprehension**
Reading texts and comprehending them

**Module II: Information about German History**
Acquiring information about German History through appropriate texts and stories

**Module III: Bio data/Curriculam vitae**
Writing a bio-data in the proper format with all essential components

**Module IV: Informal letters**
Reading and writing informal letters

**Module V: Business etiquette**
Business etiquette in Germany and types of companies

**Module VI: Interview skills**
To learn to face interviews
Read a text 'Interviewspiel'

**Module VII: Picture Description**
Firstly recognize the persons or things in the picture and identify the situation depicted in the picture;
Secondly answer questions of general meaning in context to the picture and also talk about the personal experiences which come to your mind upon seeing the picture.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 15 | 20 | 20 | 20 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:


- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

# SPANISH – VIII

**Course Code:** **BTI 846** **Credit Units: 02**

## Course Objective:
To enable students to deal with Spanish situations putting things in perspective, using Past Tense. Enabling them to comprehend and form slightly complex sentences. Give students vocabulary of various situations.

## Course Contents:

**Module I**
Situational exercises/Picture Description:
At the cine
At the Chemist's/Hospital

**Module II**
At a corporate client's informal/formal meeting/gathering
Looking for accommodation

**Module III**
Past Tense (Indefinido) of regular verbs
Past Tense (Indefinido) of irregular verbs
Exercises related to the above

**Module IV**
Past Tense (Imperfecto)

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 15 | 20 | 20 | 20 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- Español En Directo I A, 1B
- Español Sin Fronteras
- Material provided by the teacher from various sources

# JAPANESE - VIII

**Course Code:** **BTI 847** **Credit Units: 02**

## Course Objective:

To enable the students to converse in the language with the help of different forms as volitional forms, active and passive voice and decision making etc.

**Note:** The course and teaching in Roman as well as Japanese script. Also introducing next 10 to 20 kanjis.

## Course Contents:

**Module I: Volitional forms**
Explaining the situation when one is thinking of doing something.

**Module II: Active and Passive voice**
Direct and indirect ways of speech.

**Module III: Plain Forms**
Sentence patterns using plain forms of verb.

**Module IV: Causes and effects**
Explaining causes and effects with different forms of verb.

**Module V: Decision making**
Expressing different occupations and how to make decision.

## Learning Outcome

- Students can speak the language and will be able to express their views and opinions comfortably.

## Methods of Private study/ Self help

- Hand-outs, audio-aids, assignments and role-plays will support classroom teaching.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 15 | 20 | 20 | 20 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- Shin Nihon-go no Kiso Lesson No.-36 to 40.
- All vocabulary and topics taught to the students are from the above mentioned book.

# CHINESE – VIII

**Course Code:** **BTI 848** **Credit Units: 02**

## Course Objective:
Paper was first invented n China in 105 AD. It was a closely guarded secret and didn't reach Europe until the 8th Century. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

## Course Contents:

**Module I**
Drills
Dialogue practice
Observe picture and answer the question.
The aspect particle "le" and the modal particle "le".

**Module II**
Optative verbs
Texts based on different topics
Enriching vocabulary by dealing with various daily scenarios and situations.

**Module III**
Sentences with subject predicate construction as its predicate
Pronunciation and intonation
Character writing and stroke order

**Module IV**
About china Part I Lesson 2,3
Chinese to English and English to Chinese translations from the news paper.

**Module V**
Questions with an interrogative pronoun
Essays, writing formal letters.
Conversation practice.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 15 | 20 | 20 | 20 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- "Kan tu shuo hua" Part-I Lesson 8-13

# PROJECT

**Course Code:** **BTI 860** **Credit Units: 08**

**GUIDELINES FOR PROJECT FILE**

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation. Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.

The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

**In general, the File should be comprehensive and include**

A short account of the activities that were undertaken as part of the project;

A statement about the extent to which the project has achieved its stated goals.

A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;

Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project.

Any problems that have arisen that may be useful to document for future reference.

➢ **Report Layout**

The report should contain the following components:

➢ **Title or Cover Page**

The title page should contain the following information: Project Title; Student's Name; Course; Year; Supervisor's Name.

➢ **Acknowledgements** (optional)

Acknowledgment to any advisory or financial assistance received in the course of work may be given.

➢ **Abstract**

A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project

➢ **Table of Contents**

Titles and subtitles are to correspond exactly with those in the text.

➢ **Introduction**

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

➢ **Materials and Methods**

This section should aim at experimental designs, materials used. Methodology should be mentioned in details including modifications if any.

➢ **Results and Discussion**

Present results, discuss and compare these with those from other workers, etc. In writing these section, emphasis should be given on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various secions, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary never write in "point" form.

➢ **Conclusion**

A conclusion should be the final section in which the outcome of the work is mentioned briefly.

- **Future prospects**

- **Appendices**

The Appendix contains material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

- **References / Bibliography**

This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

**Examples**

For research article:
Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichia coli* O157: H7. *Clin Microbiol Infect*, 8 (suppl 1): 116–117.

For book:
Kowalski,M.(1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), **7**: 63-67

**ASSESSMENT OF THE PROJECT FILE**

Essentially, marking will be based on the following criteria: the quality of the report, the technical merit of the project and the project execution.
Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project.
Project execution is concerned with assessing how much work has been put in.
The File should fulfill the following ***assessment objectives:***

**Range of Research Methods used to obtain information**

**Execution of Research**

**Data Analysis**
Analysis Quantitative/ Qualitative information
Control Quality

**Draw Conclusions**

## Examination Scheme:

| | |
|---|---|
| Dissertation: | 50 |
| Viva Voce: | 50 |
| **Total:** | **100** |

# WINDOWS PROGRAMMING IN VC++

**Course Code:** **BTI 804** **Credit Units: 03**

## Course Objective:

To make the students to understand the windows programming concepts including Microsoft Foundation Classes.

- To introduce the concepts of windows programming
- To introduce GUI programming using Microsoft Foundation Classes
- To enable the students to develop programs and simple applications using Visual C++

## Course Contents:

**Module I: Windows Programming**
Windows environment – a simple windows program – windows and messages – creating the window – displaying the window – message loop – the window procedure – message processing – text output – painting and repainting – introduction to GDI – device context – basic drawing – child window controls

**Module II: Visual C++ Programming – Introduction**
Application Framework – MFC library – Visual C++ Components – Event Handling – Mapping modes – colors – fonts – modal and modeless dialog – windows common controls – bitmaps

**Module III: The Document and View Architecture**
Menus – Keyboard accelerators – rich edit control – toolbars – status bars – reusable frame window base class – separating document from its view – reading and writing SDI and MDI documents – splitter window and multiple views – creating DLLs – dialog based applications

**Module IV: Activex and Object Linking and Embedding (OLE)**
ActiveX controls Vs. Ordinary Windows Controls – Installing ActiveX controls – Calendar Control – ActiveX control container programming – create ActiveX control at runtime – Component Object Model (COM) – containment and aggregation Vs. inheritance – OLE drag and drop – OLE embedded component and containers – sample applications

**Module V: Advanced Concepts**
Database Management with Microsoft ODBC – Structured Query Language – MFC ODBC classes – sample database applications – filter and sort strings – DAO concepts – displaying database records in scrolling view – Threading – VC++ Networking issues – Winsock – WinInet – building a web client – Internet Information Server – ISAPI server extension – chat application – playing and multimedia (sound and video) files.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

*Text:*

- Charles Petzold, “Windows Programming”, Microsoft press, 1996 (Module I – Chapter 1-9)
- David J. Kruglinski, George Shepherd and Scot Wingo, “Programming Visual C++”, Microsoft press, 1999 (Module II – V)

*References:*

- Steve Holtzner, “Visual C++ 6 Programming”, Wiley Dreamtech India Pvt. Ltd., 2003

# NETWORK OPERATING SYSTEM

**Course Code:** **BTI 805** **Credit Units: 03**

## Course Objective:

The course provides the sufficient knowledge about the theoretical and practical aspects of Networks and their applications.

## Course Contents:

**Module I**
Introduction to window NT server, window NT features, hardware requirements, Planning the network, Window NT network security model, Special purpose server, Licensing.

**Module II**
Planning storage strategies, Working with disk administrator and backup, Networking and networking protocol, Configuration of window NT.

**Module III**
Window NT services architecture and security architecture, Planning and managing groups and users accounts file services. Distributed file system.

**Module IV**
Remote administration. Remote access services, Internet and Intranet Printing and supporting networking clients,
Performance tuning.

**Module V**
ATM Technologies, Comparative study of Ethernet, FDDI and ATM technologies

## Examination Scheme:

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- MCSE NT Server 4 Study Guide by Mathew Strebe, Charles Perkin and James Chellis
- Perkin and James Chellis Nt Server 4.0 Exam Cram Dream Tech Publisher 38

# SOFTWARE TESTING AND QUALITY ASSURANCE

**Course Code: BTI 806 Credit Units: 03**

## Course Objective:

The goal of the coding or programming phase is to translate the design of the system produced during the design phase into code in a given programming language, which can be executed by a computer and that performs the computation specified by the design. Verification of the output of the coding phase is primarily indended for detecting errors introduced during this phase. That is, the goal of verification of the code produced is to show that the code is consistent with the design it is supposed to implement. Validation is the process of evaluating software at the end of the software development to ensure compliance with the software requirements. The aim of the course is to provide clear understanding of verification, validation and testing techniques.

## Course Contents:

**Module I: Introduction**
Terminology; Evolving Nature of Area

**Module II: V & V Limitations**
Theoretical Foundations; Impracticality of Testing All data; Impracticality of Testing All Paths; No Absolute Proof of Correctness

**Module III: The Role of V & V in Software Evolution**
Types of Products, Requirements; Specifications, Designs, Implementations, Changes, V & V Objectives, Correctness, Consistency, Necessity, Sufficiency, Performance.

**Module IV: Software V & V Approaches and their Applicability**
Software Technical Reviews, Software Testing: Levels of Testing, Module, Integration, System, Regression, Testing Techniques and their Applicability, Functional Testing and Analysis, Structural Testing and Analysis, Error-Oriented Testing and Analysis, Hybrid Approaches, Integration Strategies, Transaction Flow Analysis, Stress Analysis, Failure Analysis, Concurrency Analysis, Performance Analysis, Proof of Correctness, Simulation and Prototyping, Requirements Tracing.

**Module V: Software V & V Planning**
Identification of V & V Goals, Selection of V & V Techniques: Requirements, Specifications, Designs, Implementations, Changes, Organizational Responsibilities, Development Organization, Independent Test Organization, Software Quality Assurance, Independent V & V Contractor, V & V Standards, Integrating V & V Approaches, Problem Tracking, Tracking Test Activities, Assessment.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

*Text:*

- William Perry, "Effective Methods for Software Testing", John Wiley & Sons, New York, 1995.
- Louise Tamres, "Software Testing", Pearson Education Asia, 2002
- Robert V. Binder, "Testing Object-Oriented Systems-Models, Patterns and Tools", Addison Wesley, 1999.

*References:*

- Cem Kaner, Jack Falk, Nguyen Quoc, "Testing Computer Software", Second Edition, Van Nostrand Reinhold, New York, 1993.
- K.K. Aggarwal & Yogesh Singh, "Software Engineering", 2nd Ed., New Age International Publishers, New Delhi, 2005
- Boris Beizer, "Software Testing Techniques", Second Edition, Wiley-Dreamtech India, New Delhi, 2003
- Boris Beizer, "Black-Box Testing – Techniques for Functional Testing of Software and Systems", John Wiley & Sons Inc., New York, 1995.

# LINUX ADMINSTRATION

**Course Code:** **BTI 807** **Credit Units: 03**

## Course Objective:

The course will teach the students to manage network clients, to apply security to network users and resources, manage and compile Linux kernel, implement FTP server, manage and configure web server, manage mail and messaging services and troubleshooting network resources.

## Course Contents:

**Module I: Installing Linux as a Server**

Linux and Linux Distributions; Major differences between Windows 2000 and Linux; Single Users Vs Multiusers Vs Network Users; Separation of the GUI and the Kernel; Domains; Active Directory INSTALLING LINUX IN A SERVER CONFIGUARTION: Before Installation; Hardware; Server Design; Dual-Booting Issues; Methods of Installation; Installing Red Hat Linux; Creating a Boot Disk; Starting the Installation; Welcome of Red Hat Linux. INSTALLING SOFTWARE: The Red Hat Package Manager; Installing a New Package; Querying a Package; Uninstalling a Package; gnorpm; Compiling Software; Getting and Unpacking the Package; Looking for Documentation; Configuring the Package; Compiling Your Package; Installing the Package

**Module II: GNOME AND KDE**

The History of X Windows; The Downside; Enter KDE and GNOME; About KDE; Licensing issues; Starting X Windows and KDE; KDE Basics; The KDE Control Center; About GNOME; Starting X Windows and GNOME; GNOME Basics; The GNOME Configuration Tool.

**Module III: Managing Users**

Home Directories; Passwords; Shells; Stratup Scripts; Mail; User Databases; The / etc /password File; The / etc / shadow File; The / etc /group File; User Management Tools; Command-Line User Management; User LinuxConf to Manipulate Users and Groups; SetUID and SetGID Programs THE COMMAND LINE: An Introduction to BASH; Job Control; Environment Variables; Pipes; Redirection; Command-Line Shortcuts; Documentation Tools; The man Command; the text info System; File Listings; Owner ships and permissions; Listing Files; File and Directory Types; Change Ownership; Change Group; Change Mode; File Management and Manipulstion; Process Manipulation; Miscellaneous Tools; BOOTING AND SHUTTING DOWN: LILO; Configuring LILO; Additional LILO options; Adding a New Kernel to Boot; Running LILO; The Steps of Booting; Enabling and disabling Services.

**Module IV: File Systems**

The Make up File Systems; Managing File Systems; Adding and Partitioning a Disk; Network File Systems; Quota Management;

**Module V: Core System Services**

The init Service; The inetd and xinetd Processsess;The syslogd Daemon;The cron Program PRINTING: The Basic of lpd; Installing LPRng; Configuring /etc/printcap; The /ETC/lpd.perms File; Clients of lpd

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

- Linux Administration Complete Reference Tata Mc graw Hill publication

# VLSI DESIGN

**Course Code:** **BTI 808** **Credit Units: 03**

## Course Objective:

In the recent years, IC manufacturing technology has gone through dramatic evolution and changes, continuously scaling to ever smatter dimensions. This scaling has a double impact on the design of ICs. First, the complexity of the designs that can be put on a single die has increased dramatically which led to new design methodologies. At the same time, this plunge into deep submicron space causes devices to behave differently and brings challenging issues to forefront. This course along with the course of Digital Circuits and Systems II and Analog CMOS IC design will give you many of the basic essentials to work in the area of Circuit Design. Since this course takes the latest trends in the industry into account, you will find yourself at a definite edge.

## Course Contents:

**Module I: Devices and the wire**

Diode, dynamic and transient behaviour-diffusion capacitance, SPICE diode model.
MOSFET STATIC BEHAVIOUR: Threshold voltage and its dependence on $V_{SB}$ MOSFET Operation in resistive and saturation region, channel length modulation, Velocity saturation and its impact on sub micron devices, sub threshold conduction, Model for manual analysis, Equivalent resistance for MOSFET in (velocity) saturated region, comparison of equations for PMOS and NMOS, depletion and enhancement device
DYNAMIC BEHAVIOUR: Channel capacitance in different regions of operation, junction capacitance, Level 1 SPICE MODELS for MOS transistors
The Wire: Interconnect parameters: resistance, capacitance and Inductance, Lumped RC model, Elmore Delay

**Module II: CMOS Inverter**

VTC of an ideal inverter, Switching Model of the CMOS inverter: nMOS /pMOS discharge and charge, VTC of CMOS inverter: PMOS AND NMOS operation in various regions including velocity saturation, Switching threshold, (W/L)p/(W/L)n ratio for setting desired $V_M$ with and without velocity saturation, Noise Margins, buffer
Ratioed logic: Pseudo NMOS inverter and PMOS to NMOS ratio for performance, tristate inverter, Resistive load inverter.
Load Capacitance calculations: fan out capacitance, self capacitance calculations: Miller effect, wire capacitance; Improving delay calculation with input slope, Propagation delay: first order analysis, analysis from a design perspective, sizing a chain of inverters for minimum delay, choosing optimum number of stages
Power, Energy and Energy Delay: Dynamic power consumption, Static power, Glitches and power dissipation due to direct path currents, power and delay trade off, Transistor sizing for energy minimization

**Module III: Combinational circuits**

CMOS LOGIC: Good 0 and poor 0, Goo1 and poor 1, series and parallel N and P switches, 2 and Higher input NAND and NOR gates, Functions of the type (AB+C(D+E)) and their complements, XOR and XNOR gates, 2 input Multiplexer, Full Adder; Transistor sizing in CMOS logic for optimal delay,
Pseudo NMOS NAND NOR and other gates and the transistor sizing, Introduction to DSVCL logic, CPL AND/NAND, OR/NOR, XOR/XNOR gates
Logical effort, Electrical Effort, Branching effort, Examples of sizing Combinational logic chains for minimum delay. Pass-transistor logic, pass gate configurations for nmos and pmos, 2 input and 4 input MUX, XOR, XNOR and implementation of general functions like AB+AB*C+A*C*, Robust and Efficient PTL Design, Delay of Transmission Gate chain
Dynamic CMOS design: Precharge and Evaluation, charge leakage, bootstrapping, charge sharing, Cascading Dynamic Gates, DOMINO Logic, Optimization of Domino Logic Gates, simple example circuit implementations of DOMINO logic

**Module IV: Sequential Logic circuits**

Principle of Bistability, NAND and NOR based SR latch, and clocked SR Latch, JK latch, example of master slave flip flop, CMOS D latch, MUX based Latches, master slave edge triggered register, non ideal clocks, clock overlap, C2MOS register, TSPCR Register, Schmitt Trigger, Pipelining and NORA CMOS

**Module V: Layout Design Rules**

Introduction to CMOS Process technology, Layout of CMOS inverter, CMOS NAND and NOR gates, Concept of Euler path, and stick diagrams for functions like (AB+E+CD)*

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Jan M Rabaey: Digital Integrated Circuits
- David Hodges et al: Analysis and Design of Digital ICs
- Kang: CMOS Digital ICs
- Weste and Harris: CMOS VLSI design
- Weste and Eshragian: Principles of CMOS VLSI Design

# SIMULATION AND MODELING

**Course Code:** **BTI 809** **Credit Units: 03**

## Course Objective:

The objectives are to familiarize the student with a variety of modeling and simulation techniques. Teach the student which techniques are applicable under what circumstances, stress the advantages and disadvantages of the various approaches that are commonly used, give the student practical experience in composing models and running simulations under a variety of circumstances and, discuss the presentation of results from modeling and simulation.

## Course Contents:

**Module I**

System definition and components, stochastic activities, continuous and discrete Systems, System modeling, types of models, static and dynamic physical models, Static and dynamic mathematical models, Full corporate model, types of system study.

**Module II**

System simulation, Why to simulate and when to simulate, Basic nature of simulation, technique of simulation, comparison of simulation and analytical methods, types of system simulation, real time simulation, hybrid simulation, simulation of pure-pursuit problem single-server queuing system and an inventory problem, Monte Carlo simulation, Distributed Lag models, Cobweb model. Applications and benefits of Simulation and modeling.

**Module III**

Simulation of continuous systems, analog vs. digital simulation, simulation of water reservoir system, simulation of a servo system, simulation of an autopilot. Discrete system Simulation, Fixed time-step vs. event-to-event model, generation of random numbers, Test for randomness, Generalization of non-uniformly distributed random numbers, Monte-Carlo computation vs. stochastic simulation.

**Module IV**

System dynamics, exponential growth models, exponential decay models, modified exponential growth models, logistic curves, generalization of growth models, System Dynamics diagrams, Feedback in Socio-Economic systems, world model. Simulation of PERT networks, Critical path computation, uncertaintities in Activity duration, Resource allocation and consideration

**Module V**

Simulation software, Simulation languages, continuous and discrete simulation languages, Expression based languages, object-oriented simulation, general-purpose vs. application-oriented simulation packages, CSMP-III, MODSIM-III.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Discrete Event System Simulation , J. Banks , J.S. Carson , B.L. Nelson
- Modelling and Computer Simulation N.A. Kheir, Marcle Dekker
- System Simulation, Gordan, Geoffrey

# SOFT COMPUTING

**Course Code:** **BTI 810** **Credit Units: 03**

## Course Objective:

Fuzzy sets and fuzzy logic find many applications in the area of stability theory, pattern recognition, controls etc. Neural networks offer fundamentally alternative approaches to procedural programming .These systems proved their applicability to the problems where there are missing data or information or the problems which could not be defined in an algorithm. The integration of fuzzy systems and neural networks gives a tremendous potential which can be applied to many complicated problems of artificial intelligence and other applications in real world computing. This course provides a comprehensive treatment of Neural network architectures ,Fuzzy Logic and learning algorithms .

## Course Contents:

**Module I: Neural Networks**
History, overview of biological Neuro-system, Mathematical Models of Neurons, ANN architecture, Learning rules, Learning Paradigms-Supervised, Unsupervised and reinforcement Learning, ANN training Algorithms-perceptions, Training rules, Delta, Back Propagation Algorithm, Multilayer Perceptron Model, Hopfield Networks, Associative Memories, Applications of Artificial Neural Networks.

**Module II: Fuzzy Logic**
Introduction to Fuzzy Logic, Classical and Fuzzy Sets: Overview of Classical Sets, Membership Function, Fuzzy rule generation.
Operations on Fuzzy Sets: Compliment, Intersections, Unions, and Combinations of Operations, Aggregation Operations.

**Module III: Fuzzy Arithmetic**
Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals & Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations.
Fuzzy Logic: Classical Logic, Multivalued Logics, Fuzzy Propositions, Fuzzy Qualifiers, Linguistic Hedges.

**Module IV: Uncertainty based Information**
Information & Uncertainty, Nonspecificity of Fuzzy & Crisp Sets, Fuzziness of Fuzzy Sets.

**Module V**
Introduction of Neuro-Fuzzy Systems, Architecture of Neuro Fuzzy Networks.
Application of Fuzzy Logic: Medicine, Economics etc.
Genetic Algorithm: An Overview, GA in problem solving, Implementation of GA

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


***Text:***

- "An Introduction to Neural Networks", Anderson J.A., PHI, 1999.
- "Introduction to the Theory of Neural Computation", Hertz J. Krogh, R.G. Palmer, Addison- Wesley, California, 1991.
- "Fuzzy Sets & Fuzzy Logic", G.J. Klir & B. Yuan, PHI, 1995.
- "An Introduction to Genetic Algorithm", Melanie Mitchell, PHI, 1998.

***References:***

- "Neural Networks-A Comprehensive Foundations", Prentice-Hall International, New Jersey, 1999.
- "Neural Networks: Algorithms, Applications and Programming Techniques", Freeman J.A & D.M. Skapura, Addison Wesley, Reading, Mass, (1992).

# DATA WAREHOUSING AND DATA MINING

**Course Code:** **BTI 811** **Credit Units: 03**

## Course Objective:

The saying goes there is water & water no drop to drink, similarly there could be endless heaps of data but no information. To get out of this dilemma the new concepts of organizing data ware house & data mining technique to drive the useful information out of the piles of data. This course will expose students to these recent concepts which could enable him to search a needle from the stoke of hag.

## Course Contents:

**Module I: Data Warehousing**
Introduction to Data Warehousing: Evolution of Data Warehousing, Data Warehousing concepts, Benefits of Data Warehousing, Comparison of OLTP and Data Warehousing, Problems of Data Warehousing.

**Module II: Data Warehousing Architecture**
Architecture: Operational Data and Data store, Load Manager, Warehouse Manager, Query Manager, Detailed Data, Lightly and Highly summarized Data, Archive/Backup Data, Meta-Data, architecture model, 2-tier, 3-tier and 4-tier data warehouse, end user Access tools.

**Module III: Data Warehousing Tools and Technology**
Tools and Technologies: Extraction, cleaning and Transformation tools, Data Warehouse DBMS, Data Warehouse Meta-Data, Administration and management tolls, operational vs. information systems. OLAP & DSS support in data warehouse.

**Module IV: Distributed Data Warehouse**
Types of Distributed Data Warehouses, Nature of development Efforts, Distributed Data Warehouse Development, Building the Warehouse on multiple levels.

**Module V: Types of Data Warehouses & Data Warehouse Design**
Host based, single stage, LAN based, Multistage, stationary distributed & virtual data-warehouses. Data warehousing Design: Designing Data warehouse Database, Database Design Methodology for Data Warehouses, Data Warehousing design Using Oracle, OLAP and data mining: Online Analytical processing, Data mining.
**Knowledge discovery**
Knowledge discovery through statistical techniques, Knowledge discovery through neural networks, Fuzzy technology & genetic algorithms.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

*Text:*
- “Building the Data Warehouse”, W.H. Inmon, 3rd Edition, John Wiley & Sons.
- “Developing the Data Warehouse”, W.H. Inmon, C. Kelly, John Wiley & Sons.
- Thomas Connoly, Carolyn Begg-“Database Systems-A practical approach to Design,
- Implementation and management” 3rd Edition Pearson Education

*References:*
- W.H. Inmon, C.L. Gassey, “Managing the Data Warehouse”, John Wiley & Sons.
- Fayyad, Usama M. et. al., “Advances in knowledge discovery & Data Mining”, MIT Press.

# PERSONNEL MANAGEMENT

**Course Code:** **BTI 812** **Credit Units: 03**

## Course Objective:

Personal management is traditional, routine, maintenance-oriented administrative function. Personal management is an independent function with independent sub-functions, it is reactive, responding to demands as and when they arise. Course is designed with aim that students will get skill sets needed for personal management.

## Course Contents:

**Module I: Personnel Programme**

Nature, Scope, Objective and Growth of Personnel Programmes,personnel Department and Its Functions; Profile of a good Personnel Manager; Formulation of Personnel Policy,Manpower Planning, Recruitment and Selection-Traditional and Scientific Approach.

**Module II: Training and Development**

Job Change–Promotion, Transfer and Separation; Training and Development-Counseling and succession planning: performance appraisals and Merit Rating.

**Module III: Motivation**

Wage and Salary Administration-equitable wage structure; Wage disparities and different job examination; Motivation in actual practices. Motivation research; Communication Channel; Media and Forms of communication; Barrier.

**Module IV: Industrial Relations**

How to issue Instruction; Industrial Relation-Meaning and cope Role of Employers, Machinery, Welfare Activities, Employee Benefits and Service statutory and non statutory.

**Module V: Manpower Data Bank**

Concepts, Objectives, Manpower Data Bank, Supply forecast, reconciling demand and Supply, budgeting and control, audit and improvement ,acquition and redeployment ,reporting, performance evaluation and appraisal,trining,compensation,counseling policies, Safety and Health, Carrier development ,Test and Interviews

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


***Text:***

- Morappa and Saiya Ram," Personnel Management:, TMH, 1998
- T.N. Chhabra," Human Resource Management" Dhanpat Rai and Sons

***References:***

- S.P. Robbins," Human Resource Management: PHI.
- C.B. Memoria," Personnel Management: Himalaya publishing House.

# FINANCIAL MANAGEMENT

**Course Code:** **BTI 813** **Credit Units: 03**

## Course Objective:

The objective of this course is to develop an understanding of short-term and long-term financial decisions of a firm and various financial tools used in taking these decisions. It is also aimed to develop the understanding of the financial environment in which a company operates and how it copes with it.

## Course Contents:

**Module I: Introduction**
A Framework for Financial Decision-Making- Financial Environment, Changing Role of Finance Managers, Objectives of the firm

**Module II: Valuation Concepts**
Time Value of Money, Risk and Return, Financial and Operating Leverage

**Module III: Financing Decisions**
Capital Structure and Cost of Capital**,** Marginal Cost of Capital

**Module IV: Capital Budgeting**
Estimation of Cash Flows, Criteria for Capital Budgeting Decisions, Issues Involved in Capital Budgeting, Risk analysis in Capital Budgeting – An Introduction

**Module V: Working Capital Management**
Factors Influencing Working Capital Policy, Operating Cycle Analysis, Management of Inventory, Management of Receivables, Management of Cash and Marketable Securities, Financing of Working Capital.

**Module VI: Dividend Policy Decisions**
An introduction**:** Different Schools of Thought on Dividend Policy

## Examination Scheme:

| **Components** | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***


- Chandra, P. 2006, Financial Management: Theory and Practice, 6th Ed., Tata McGraw Hill.


***References:***


- Damodaran, A. 2004, Corporate Finance: Theory and Practice, 2nd Ed., Wiley & Sons.
- Van Horne, J.C. 2006, Financial Management and Policy, 12th Ed., Prentice Hall of India.
- Brearly, R. A. and Myers, S. C. 2006, Principles of Corporate Finance, 8th Ed., Tata McGraw Hill
- Pike, R and Neale, B. 1998, Corporate Finance and Investment: Decisions and Strategies, Prentice Hall of India
- Rustagi, R.P. 1999, Financial Management: Theory, Concepts and Problems, Galgotia Publishing Company.
- Pandey, I.M. 1999, Financial Management, 9th Ed., Vikas Publishing House

# WINDOWS PROGRAMMING IN VC++ LAB

**Course Code:** **BTI 821** **Credit Units: 01**

**Programming Language:** VC++

**Course Contents:**

**List of Experiments:**

1. Creation of a window of size 100*200 with title "Hello world".
2. Adding text and graphics to the window.
3. Handling Input.
4. Attaching menus
5. Attaching controls to the windows
   (i) Push buttons
   (ii) Tool bars
   (iii) Status bars
6. Handelling Dialog boxes.
7. Handelling Common Controls.
8. File Handelling.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# NETWORK OPERATING SYSTEM LAB

**Course Code:** **BTI 822** **Credit Units: 01**

## Course Contents:

1. Installation of windows NT 4.0 with different options
2. Unattended installation of windows NT 4.0 with different options
3. Create user accounts and to apply different account policies
4. Using disk administrator to create partitions, volumes and strip sets etc.
5. Formatting the partition with NTFS file system or to convert the file system from fat to NTFS
6. Assigning different rights to user and determining the effective rights of user in different situations
7. Creating and managing shares
8. Exploring various options in windows NT backup
9. Configuring and maintaining the printing in windows NT network
10. Configuring windows NT server 4.0
11. Connecting windows NT clients
12. Study of windows NT 4.0 RAS service

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# SOFTWARE TESTING AND QUALITY ASSURANCE LAB

**Course Code:** **BTI 823** **Credit Units: 01**

## Course Contents:

Practical list for software testing and quality assurance:

1. Write a test case to test login window using manual testing
2. Write a test case to test triangle using manual testing
3. Write a test case to test valid mobile no using manual testing
4. Write a test case to test ATM machine no using manual testing
5. Write the script to test the “save” functionality of notepad using rational robot
6. Write the script to test “find” functionality of notepad using rational robot
7. Write the script to test “replace” functionality of notepad using rational robot
8. Write the script to test “+” functionality of window calculator using rational robot
9. Write the script to test “*” functionality of window calculator using rational robot
10. Write the script to test “%” functionality of window calculator using rational robot
11. Write the script to test “/” functionality of window calculator using rational robot
12. Write the script to test login page of window using rational robot
13. Write the script to test Date field of window using rational robot
14. Write the script to test drop drown field of window using rational robot
15. Write the script to test hyperlink of web site using rational robot

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# LINUX ADMINISTRATION LAB

**Course Code:** **BTI 824** **Credit Units: 01**

## Course Contents:

- Installation of Linux
- Linux administration techniques

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.
Viva

# VLSI DESIGN LAB

**Course Code:** **BTI 825** **Credit Units: 01**

## Course Contents:

1. Using Design architect and simulate V vs time for CMOS inverter using same W/L ratio for PMOS and NMOS.
2. Design and simulate again by Sizing PMOS to NMOS appropriately and repeat experiment 1
3. Design and simulate V vs t for 2 input NAND and Nor gates.
4. Design and Simulation for general CMOS functions
5. One bit full adder simulation
6. 2:1 MUX using pass transistor logic
7. Other functions using pass transistor logic
8. Layout of CMOS inverter
9. Layout of NAND and NOR gates
10. Design and Simulation SR latch using NAND and NOR representations
11. Design and simulate D flip flop

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# COMPILER CONSTRUCTION LAB

**Course Code: BTC 726** **Credit Units: 01**

**Programming Language:** Unix/C/C++

**List of Programs:**

1. Write a Program to create, read, and write into a file having record of students.
2. a) Write a program to generate Machine Op-Code Table , Symbol Table and Pseudo Op- Code table during First Pass Assembler.
   b) Write a program to generate Machine Op- code table using two pass Assembler.
3. a) Write a program to Generate Macro Name Table , Macro definition Table and Argument List Array during Pass One of Two Pass Macro.
   b) Write a program to generate Expanded Source in Pass Two of Two Pass Macro.
4. Study of Lexical Analyzer.
5. Study of Device Drivers.
6. Study and implement general purpose commands in UNIX. (Date, Who, Who am I, Cal, Echo, Clear, Mesg, Mail, and Login Command)
7. To Study and implement all the directory oriented Commands of UNIX (Cd, MKdir, rmdir, And Pwd Command)
8. To Study and implement all the File oriented Commands of UNIX ( ls list files, Cat, cp, rm commands)
9. To study implement HEAD, TAIL, CUT and PASTE commands.
10. To Study Common Object File Format (COFF)
11. WAP to check whether string is accepted or not for entered grammar.
12. WAP to convert Infix to Postfix notation.
13. WAP to convert Infix to Prefix notation.
14. WAP to find no of Tokens in an expression.
15. WAP to convert Regular Expression to NFA.
16. WAP to convert NFA to DFA.
17. WAP to calculate LEADING and TRAILING of a grammar.
18. WAP calculate FIRST and FOLLOW of a grammar.
19. WAP to implement shift reduce parser.
20. WAP to implement top down parser.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

# Internet of Things

**Course Code:** **BTC 602** **Credit Units: 03**

**Course Objectives:**

The objective of the course is to:Vision and Introduction to IOT, Understand IOT Market perspective, Data and Knowledge Management and use of Devices in IOT Technology, Understand State of the Art – IOT Architecture, Real World IOT Design Constraints, Industrial Automation and Commercial Building Automation in IOT.

Module 1: **Introduction to the Internet of Things**-Key Features, advantages, disadvantages, Wearable electronics, The Basics of Sensors & Actuators, Introduction to Cloud Computing, IOT Software.

Module 2: **IoT-An Architectural Overview**– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations.IoT Technology Fundamentals- Devices and gateways, Local and wide area networking, Data management, Business processes in IoT, Everything as a Service(XaaS), M2M and IoT Analytics, Knowledge Management.

Module 3: **The Arduino Platform** – What is Arduino, Why Arduino, Driver installation, programming & Burning ,Coding in wiring language , Compiling in Arduino, The Arduino Open-Microcontroller Platform, Arduino Basics, Arduino Board Layout & ArchitectureReading from Sensors

Module 4: **Arduino Programming & Interface of Sensors–** LED display, PUSH button to array of LED, Communicating to and from computer, GSM, GPS and Zigbee interfacing, Interface sensor with arduino, Programming arduino, Reading from sensor, Connecting Arduino with Mobile Device. The Android Mobile OS, Using the Bluetooth Module.

Module 5: **Projects:**1. Creating own Android App using MIT App Inventor & controlling Arduino connected devices. 2. Use Arduino to Upload free data from Environmental Sensors to Cloud Server. 3. Receive Automatic Call Notification on Mobile Phone for Burglar Alarm using IoT Platform4.Control Electronic Devices from anywhere across the world using Internet & Mobile App.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

**Textbook:**


- Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, David Boyle, **"From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence",** 1st Edition, Academic Press, 2014.


**Reference Books:**


- Vijay Madisetti and ArshdeepBahga, **"Internet of Things (A Hands-on-Approach)",** 1stEdition, VPT, 2014.
- Francis daCosta, **"Rethinking the Internet of Things: A Scalable Approach to Connecting Everything",** 1st Edition, Apress Publications, 2013


# Internet of Things

**Course Code:** **BTI 602** **Credit Units: 03**

**Course Objectives:**

The objective of the course is to:Vision and Introduction to IOT, Understand IOT Market perspective, Data and Knowledge Management and use of Devices in IOT Technology, Understand State of the Art – IOT Architecture, Real World IOT Design Constraints, Industrial Automation and Commercial Building Automation in IOT.

Module 1: **Introduction to the Internet of Things**-Key Features, advantages, disadvantages, Wearable electronics, The Basics of Sensors & Actuators, Introduction to Cloud Computing, IOT Software.

Module 2: **IoT-An Architectural Overview**– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations.IoT Technology Fundamentals- Devices and gateways, Local and wide area networking, Data management, Business processes in IoT, Everything as a Service(XaaS), M2M and IoT Analytics, Knowledge Management.

Module 3: **The Arduino Platform** – What is Arduino, Why Arduino, Driver installation, programming & Burning ,Coding in wiring language , Compiling in Arduino, The Arduino Open-Microcontroller Platform, Arduino Basics, Arduino Board Layout & ArchitectureReading from Sensors

Module 4: **Arduino Programming & Interface of Sensors–** LED display, PUSH button to array of LED, Communicating to and from computer, GSM, GPS and Zigbee interfacing ,Interface sensor with arduino, Programming arduino, Reading from sensor, Connecting Arduino with Mobile Device. The Android Mobile OS, Using the Bluetooth Module.

Module 5: **Projects:**1. Creating own Android App using MIT App Inventor & controlling Arduino connected devices. 2. Use Arduino to Upload free data from Environmental Sensors to Cloud Server. 3. Receive Automatic Call Notification on Mobile Phone for Burglar Alarm using IoT Platform4.Control Electronic Devices from anywhere across the world using Internet & Mobile App.

## Examination Scheme:

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

**Textbook:**

- Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, David Boyle, **"From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence",** 1st Edition, Academic Press, 2014.

**Reference Books:**

- Vijay Madisetti and ArshdeepBahga, **"Internet of Things (A Hands-on-Approach)",** 1stEdition, VPT, 2014.
- Francis daCosta, **"Rethinking the Internet of Things: A Scalable Approach to Connecting Everything",** 1st Edition, Apress Publications, 2013.

## PROJECT (CLOUD COMPUTING)

**Course Code : CBA 602** **Credit Units : 01**

### GUIDELINES FOR PROJECT FILE

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.

The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

**In general, the File should be comprehensive and include**

A short account of the activities that were undertaken as part of the project;

A statement about the extent to which the project has achieved its stated goals.

A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;

Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;

Any problems that have arisen that may be useful to document for future reference.

- **Report Layout**

The report should contain the following components:

- **Title or Cover Page**

The title page should contain the following information: Project Title; Student's Name; Course; Year; Supervisor's Name.

- **Acknowledgements** (optional)

Acknowledgment to any advisory or financial assistance received in the course of work may be given.

- **Abstract**

A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project

- **Table of Contents**

Titles and subtitles are to correspond exactly with those in the text.

- **Introduction**

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

- **Materials and Methods**

This section should aim at experimental designs, materials used. Methodology should be mentioned in details including modifications if any.

- **Results and Discussion**

Present results, discuss and compare these with those from other workers, etc. In writing these section, emphasis should be given on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow. Note that in writing the various secions, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary never write in "point" form.

- **Conclusion**

A conclusion should be the final section in which the outcome of the work is mentioned briefly.

- **Future prospects**
- **Appendices**

The Appendix contains material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

- **References / Bibliography**

This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

**Examples**

For research article:

Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichia coli* O157: H7. *Clin Microbiol Infect*, 8(suppl 1): 116–117.

For book:

Kowalski,M.(1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), **7**: 63-67

**ASSESSMENT OF THE PROJECT FILE**

Essentially, marking will be based on the following criteria: the quality of the report, the technical merit of the project and the project execution.

Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project.

Project execution is concerned with assessing how much work has been put in.

The File should fulfill the following ***assessment objectives:***

**Range of Research Methods used to obtain information**

**Execution of Research**

**Data Analysis**

Analysis Quantitative/ Qualitative information

Control Quality

**Draw Conclusions**

Examination Scheme: Dissertation: 50

Viva Voce: 50

Total: 100

## FUNDAMENTALS OF COMPUTERS

**Course Code : CBD 102** **Credit Units : 03**

**Course Objective:**

The objective of this course module is to acquaint the students with the basics of computers system, its components, data representation inside computer, various storage devices and software's. Student would be able to understand the need of security in computers.

**Module 1 Introduction to Computer**

History of development of Computers , Computer system concepts , Characteristics , Capabilities and limitations, Generations of computers., Basic components of a computer system – Control Unit, ALU.

**Module 2 Storage Devices**

Storage fundamentals – Primary Vs Secondary, Data Storage and Retrieval methods – Sequential, Direct and Index Sequential, I/ O Devices, memory – RAM, ROM, EPROM, PROM, Flash Memory and other types of memory, Various Storage Devices – Magnetic Tape, Magnetic Disks, Cartridge Tape, Data Drives, Hard Disk Drives.

**Module 3 Computer Software**

Types of Software – System software, Application software, Utility Software, Demoware, Shareware, Freeware, Firmware, Free Software, Operating Systems – Functions, Types – Batch Processing, Single User, Multi User, Multiprogramming, Multi-Tasking, Programming languages – Machine, Assembly, High Level, 4 GL. MS Office

**Module 4 Number systems of Computers**

Data representation in computers, Number System of computers – Binary, Octal, Hexa Decimal – Representation & their conversion, Coding System – ASCII, BCD, and EBCDIC etc.

**Module 5 Computer Security**

Need of security in computers, Virus, types of viruses, Trojans, firewall, masquerades, hackers, Internet, Intranet and Extranet, Security issues in Internet.

**Examination Scheme:**

| **Components** | **CT1** | **A/C/Q** | **Attd** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 10 | 15 | 5 | 70 |

**Text & References:**

Text:

- Fundamental of Computers – By V. Rajaraman B.P.B. Publications
- MS- Office 2000(For Windows) – By Steve Sagman

References:

- Fundamental of Computers – By P. K. Sinha
- Computer Today- By Suresh Basandra 4. Unix Concepts and Application – By Sumitabha Das
- Computer Networks – By Tennenbum Tata MacGrow Hill Publication

## OPERATING SYSTEM AND APPLICATION PROGRAM

**Course Code : CBD 202** **Credit Units : 03**

**Course Objective:**
The objective of this course module is to acquaint the students with the understandings of operating systems like WINDOWS, DOS, LINUX and to get them familiar with various important features and concepts of MS word and MS EXCEL.

**Module 1**
**Windows**
Introduction, History & Versions of DOS DOS basics,.Windows concepts, features, windows structure, desktop, taskbar, start menu, my computer, Recycle Bin, Windows Accessories – Calculator, Notepad, Paint, WordPad, Character map, Windows Explorer – Creating folders and other Explorer facilities, Entertainment – CD Player, DVD Player, Media Player, Sound Recorder, Volume Control.

**Module 2 Linux**
Linux, Introduction, History & Versions of Linux, Linux Basics- Physical structure of disk, drive name, FAT, file & directory structure and naming rules, booting process, Linux system files. Basic Linux Commands- Internal – LS, Make Directory, CD, CP,MB, DEL, REN, DATE, TIME, CLEAR, etc. , Executable V/s Non executable files in Linux.

**Module 3 MS Word**
Introduction to Word Processing, Introduction to MS Word: features, Creating, Saving and Opening documents in Word, Interface, Toolbars, Ruler, Menus, Keyboard Shortcut, Editing a Document – Moving, Scrolling in a document, Opening Multi document windows, Editing Text – Selecting, Inserting, deleting, moving text, Previewing documents, Printing documents – Print a document from the standard toolbar, Print a document from the menu, shrinking a document to fit a page, Reduce the number of pages by one, Formatting Documents: Paragraph formats, Aligning Text and Paragraph, Borders and Shading, Headers and Footers, Multiple Columns.

**Module 4 Worksheet: MS Excel**
Worksheet basics, Creating worksheet, entering data into worksheet, heading information, data, text, dates, Cell formatting values, saving & protecting worksheet, Opening and moving around in an existing worksheet, Toolbars and Menus, keyboard shortcuts, Working with single and multiple workbook – coping, renaming, moving, adding and deleting, coping entries and moving between workbooks, Working with formulas & cell referencing, Autosum, Coping formulas, Absolute & Relative addressing, Working with ranges, creating, editing and selecting ranges, sorting, Formatting of worksheet, Auto format, changing, alignment, character styles, column width, date format, borders &colours, currency signs, Previewing & Printing worksheet – Page setting, Print titles, Adjusting margins, Page break, headers and footers, Graphs and charts – using wizards, various charts type, formatting grid lines & legends, previewing & printing charts.

**Module 5: Presentation Graphics**
Features and various versions, Creating presentation using Slide master and template in various colour scheme, Working with different views and menus of power point , Working with slides – Make new slide, move, copy, delete, duplicate, lay outing of slide, zoom in or out

of a slide. Editing and formatting text: Alignment, editing, inserting, deleting, selecting, formatting of text, find and replace text. Bullets, footer, paragraph formatting, spell checking. Printing presentation – Print slides, notes, handouts and outlines, Inserting Objects – Drawing and inserting objects using Clip Art's pictures and charts, Custom Animation – slide transition effects and other animation effects, Presenting the show – making stand alone presentation.

**Examination Scheme:**

| **Components** | **CT1** | **A/C/Q** | **Attd** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 10 | 15 | 5 | 70 |

**Text & References:**

- Fundamental of Computers – By V. Rajaraman B.P.B. Publications
- MS- Office 2000(For Windows) – By Steve Sagman
- Step by Step Microsoft Office Professional 2010-By joyce Cox, Joan Lambert and Curtis Frye

References:

- Fundamental of Computers – By P. K. Sinha
- Computer Today- By Suresh Basandra 4. Unix Concepts and Application – By Sumitabha Das
- Computer Networks – By Tennenbum Tata MacGrow Hill Publication
- Norton, Peter (2000.). Peter Norton Complete Guide to Linux. New Delhi : Techmedia Publications .

# WEB TECHNOLOGIES

**Course Code : CBD 302** **Credit Units : 03**

**Course Objective:**
This course is aimed to provide a fundamental understanding of web site creation. HTML is the language used for designing most basic web pages. Syllabus include basic and advanced features of HTML which includes images, links, tables, frames and forms etc. It also gives an overview of XML.

**Course Contents:**
**Module I: Introduction to html programming**
History of HTML, Structure of HTML, Adding Comments, Formatting Text, Creating List, Creating Definition List, Creating Hyper Text Links, Creating Link Lists, Inserting Inline Images, Creating Image Links, Horizontal Rules, Address Tag, Working with Text, Changing font Sizes and Colors, Using Background Image, Marquee Tag.

**Module II: Tables and frames**
Creating Tables, Table Element, Adding Border, Adding Column Headings, Adding Spacing and Padding, Adding a Caption, Setting the table Width and Height, Add Row Headings, Aligning Cell contents, Setting Column Width, Centering a Table, Inserting and Image, Spanning Columns, Spanning Rows Assigning Background Colors,

**Module III: Frame**
Frame Elements, Creation of Frame Based Pages, No frames Element.

**Module IV: Forms**
Introduction to Forms, Form Elements

**Module V: Cascading style sheets**
Overview of style sheets, Different ways to use style sheets, Selectors DIV and SPAN Elements, Adding style to a Document, Use id Classes and Ids, Style Sheet Properties.

**Examination Scheme:**

| **Components** | **CT1** | **A/C/Q** | **Attd** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 10 | 15 | 5 | 70 |

**Text & References:**

Text:
- HTML, DHTML, JavaScript, Perl, CGI, Ivan Bayross, BPB Publication.

References:
- HTML Complete Reference, BPB Publication.
- Internet for everyone, Alexis Leon and Mathew Leon, Leon Tech world.

## INTRODUCTION OF CLIENT-SIDE PROGRAMMING USING JAVA SCRIPT

**Course Code : CBD 402** **Credit Units : 04**

**Course Objective:**
This course is aimed to provide a fundamental understanding of dynamic web site creation the course introduces JavaScript, the language of the browser that enables dynamic web sites and rich UI.

**Course Contents:**
**Module I: Introduction to JavaScript**
**Basic Syntax,** Character set, Variables Identifiers, Data type, Arithmetic operation, Constant, operators, Expression, Assignments, basic input/output statements

**Module II: Control Structures**
Decision making in program, Relational Logical operators, if statements, if -else, nested if-else statements, Switch, case loop, Do-While, While, for loop and nesting of loop.

**Module III: Writing Functions**
Problems solving Top down Approach, Modular Programming and functions, Passing Arguments, call by value and call by references, Recursive function, .Recursion,

**Module IV: Working with Arrays.**
One Dimensional Arrays, Arrays Manipulation, Sorting, Searching

**Module V: The Document Object Model and event handling**
Working with objects in Java Script, Events, Type of Events, Use of Events

**Examination Scheme:**

| **Components** | **CT1** | **A/C/Q** | **Attd** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 10 | 15 | 5 | 70 |

**Text & References:**
Text:

- HTML, DHTML, JavaScript, Perl, CGI, Ivan Bayross, BPB Publication.

References:

- HTML Complete Reference, BPB Publication.
- Internet for everyone, Alexis Leon and Mathew Leon, Leon Tech world.

## INTRODUCTION TO OPEN SOURCE TECHNOLOGIES (PHP)

**Course Code : CBD 502** **Credit Units : 04**

**Course Objective:**
This course is aimed to provide a fundamental understanding of dynamic web site creation. PHP is the language used for development of most common web sites. Syllabus includes basic and advanced features of PHP which includes detailed introduction of PHP and MYSQL, Arrays, Loops and variables etc. It also gives an overview open source framework like JOOMLA, ZEND etc...

**Course Contents:**
**Module I: Introduction to PHP programming**
Introduction to PHP, installation and configuration, Variables, String functions, Numeric functions

**Module II: Operator, Loops and Array**
Operators, Conditions, Loops, Array, Multidimensional Array, Associative array

**Module III: Classes**
Classes, Regular Expr, Working with Datetime, code re-use, require(), include(), and the include-path;

**Module IV Functions**
Files system functions, and file input and output; file uploads; error handling and logging; sending mail,

**Module V**
Application based on PHP

**Examination Scheme:**

| **Components** | **CT1** | **PR** | **Attd** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 10 | 15 | 5 | 70 |

**Text & References:**

Text:
- Beginning PHP, Apache, MySQL Web Development
- Michael K. Glass, Yann Le Scouarnec, Elizabeth Naramore, Gary Mailer, Jeremy Stolz, Jason Gerner

References:
- PHP Manual.

## PROJECT (WEB TECHNOLOGY)

**Course Code : CBD 602** **Credit Units : 01**

**GUIDELINES FOR PROJECT FILE**

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.

The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

In general, the File should be comprehensive and include

A short account of the activities that were undertaken as part of the project;

A statement about the extent to which the project has achieved its stated goals.

A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;

Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project.

Any problems that have arisen that may be useful to document for future reference.

- **Report Layout**

The report should contain the following components:

- **Title or Cover Page**

The title page should contain the following information: Project Title; Student's Name; Course; Year; Supervisor's Name.

- **Acknowledgements** (optional)

Acknowledgment to any advisory or financial assistance received in the course of work may be given.

- **Abstract**

A good "Abstract" should be straight to the point; not too descriptive but fully informative. Firstparagraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope andresults of the project

- Table of Contents

Titles and subtitles are to correspond exactly with those in the text.

- **Introduction**

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

- **Materials and Methods**

This section should aim at experimental designs, materials used. Methodology should be mentioned in details including modifications if any.

- **Results and Discussion**

Present results, discuss and compare these with those from other workers, etc. In writing these section, emphasis should be given on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various secions, all figures and tables should as far as possible be nextto the associated text, in the same orientation as the main text, numbered, and given appropriatetitles or captions. All major equations should also be numbered and unless it is really necessarynever write in "point" form.

- **Conclusion**

A conclusion should be the final section in which the outcome of the work is mentioned briefly.

- **Future prospects**
- **Appendices**

The Appendix contains material which is of interest to the reader but not an integral part of thethesis and any problem that have arisen that may be useful to document for future reference.

- References / Bibliography

This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not beabbreviated; if they are, abbreviations must comply with an internationally recognised system.

**Examples**

For research article:

Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichiacoli* O157: H7. *Clin Microbiol Infect*, 8(suppl 1): 116–117.

For book:

Kowalski,M.(1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), **7**: 63-67

ASSESSMENT OF THE PROJECT FILE

Essentially, marking will be based on the following criteria: the quality of the report, thetechnical merit of the project and the project execution.

Technical merit attempts to assess the quality and depth of the intellectual efforts put into theproject.

Project execution is concerned with assessing how much work has been put in. The File should fulfill the following ***assessment objectives:***

Range of Research Methods used to obtain informationExecution of Research

**Data Analysis**

Analysis Quantitative/ Qualitative information

Control Quality

**Draw Conclusions**

Examination Scheme:

| | |
|---|---|
| Dissertation | 50 |
| Viva Voce: | 50 |
| Total: | 100 |

# PROGRAMMING FOR PROBLEM SOLVING

**Course Code: CSE 104** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The objective of this course module is to acquaint the students with the basics of computers system, its components, data representation inside computer and to get them familiar with various important features of procedure oriented programming language i.e. C.

**Course Contents:**

**Module I: Introduction to Programming: (03 Hours)**
Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.) Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/ Pseudocode with examples. From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code.

**Module II: Programming Essential: (08 Hours)**
Arithmetic expressions and precedence, Conditional Branching and Loop, Writing and evaluation of conditionals and consequent branching , Iteration and loops.

**Module III: Arrays: (04 Hours)**
Arrays (1-D, 2-D), Character arrays and Strings.

**Module IV: Basic Algorithms: (3 Hours)**
Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required)

**Module V: Function: (03 Hours)**
Functions (including using built in libraries), Parameter passing in functions, call by value, Passing arrays to functions: idea of call by reference

**Module VI: Recursion: (03 Hours)**
Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort.

**Module VII: Structure: (02 Hours)**
Structures, Defining structures and Array of Structures.

**Module VIII: Pointers: (02 Hours)**
Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation)

**Module IX: File handling: (02 Hours)**
Basics of file Handling.

# DATA STRUCTURES THROUGH C++

**Course Code: CSE 202** **Credit Units: 03**
**Total Hours : 30**

**Course Objective:**
To understand the basic concepts such as Abstract Data Types, Linear and Non Linear Data structures. To understand the notations used to analyze the Performance of algorithms. To understand the behavior of data structures such as stacks, queues, trees, hash tables, search trees, Graphs and their representations. To choose an appropriate data structure for a specified application. To understand and analyze various searching and sorting algorithms. To learn to implement ADTs such as lists, stacks, queues, trees, graphs, search trees in C++ to solve problems.

**Course Contents:**

**Module I: Introduction to C++: (07 Hours)**
C++ Programming Concepts: Review of C, input and output in C++, functions in C++- value parameters, reference parameters, Parameter passing, function overloading, function templates, Exceptions-throwing an exception and handling an exception, arrays, pointers, new and delete operators, class and object, access specifiers , friend functions, constructors and destructor, Operator overloading, class templates, Inheritance and Polymorphism.
Basic Concepts - Data objects and Structures, Algorithm Specification-Introduction, Recursive algorithms, Data Abstraction, Performance analysis- time complexity and space complexity, Asymptotic Notation-Big O, Omega and Theta notations, Complexity Analysis Examples, Introduction to Linear and Non Linear data structures.

**Module II: Introduction to DS: (06 Hours)**
Representation of single, two dimensional arrays, sparse matrices-array and linked representations.
Linear list ADT-array representation and linked representation, Singly Linked Lists- Operations-Insertion, Deletion, Circularly linked lists-Operations for Circularly linked lists, Doubly Linked Lists- Operations-Insertion, Deletion.
Stack ADT, definition, array and linked implementations, applications-infix to postfix conversion, Postfix expression evaluation, recursion implementation, Queue ADT, definition, array and linked Implementations, Circular queues-Insertion and deletion operations.

**Module III: TREES: (06 Hours)**
Trees – definition, terminology, Binary trees-definition, Properties of Binary Trees, Binary Tree ADT, representation of Binary Trees-array and linked representations, Binary Tree traversals, Threaded binary trees, Priority Queues –Definition and applications, Max Priority Queue ADT-implementation-Max Heap-Definition, Insertion into a Max Heap, Deletion from a Max Heap.
Minimum Spanning Tree: Prim's and Kruskal's Algorithm, Shortest Path Algorithms.

**Module IV: SEARCHING & SORTING: (5 Hours)**
Searching - Linear Search, Binary Search, Hashing-Introduction, hash tables, hash functions, Overflow Handling, Comparison of Searching methods.
Sorting-Insertion Sort, Selection Sort, Radix Sort, Quick sort, Heap Sort, Merge sort, Comparison of Sorting methods.

**Module V: GRAPHS: (06 Hours)**
Graphs–Definitions, Terminology, Applications and more definitions, Properties, Graph ADT, Graph Representations- Adjacency matrix, Adjacency lists, Graph Search methods - DFS and BFS, Complexity analysis,
Search Trees-Binary Search Tree ADT, Definition, Operations- Searching, Insertion and Deletion, Balanced search trees-AVL Trees-Definition and Examples only, B-Trees- Definition and Examples only, Red-Black Trees-Definitions and Examples only, Comparison of Search Trees.

# PYTHON PROGRAMMING

**Course Code: CSE 302** **CreditUnits: 03**
**Total Hours: 30**

**Course Objective:**
To understand the basic concepts such as lists, tuples and dictionary Data structures. To understand concepts like networking and website development using frameworks of python. To understand working third party libraries in python. To understand Scientific programming paradigm.

**Course Contents:**

**Module I: Introduction of Python: (08 Hours)**
History of Python, Features of Python Programming, Applications of Python, Use of python, install and Run Python in Windows/Linux, Keyword and Identifier, Statements and Comments, Python Variables, Python Data types, Python Type Conversion,Python I/O and Import, Python Operators, Python Namespace.
Python If-else statements, Python for Loop, while loop, break and continue, String manipulation, List Tuple, dictionaries, pass statement, looping technique, functions, function arguments, recursion,anonymous function, python global, local and Nonlocal.

**Module II: Object and Class: (05 Hours)**
Python modules, python package, File operation, Python directory, Python exception, Exception Handling, User-Define Exception, Python OOP, class, inheritance, multiple inheritance, operator overloading.

**Module III: Regular Expression, CGI and Database: (08 Hours)**
Match function, Search function, matching vs. searching, modifier, pattern, Introduction of CGI,CGI Architecture, CGI environment Variable, GET/POST Method, Cookies,File upload, Introduction of Database, connections, Executing queries, transactions, handling errors.

**Module IV: GUI Programming: (09 Hours)**
Tkinter Programming, Tkinter widgets, Standard Attributes, CGI Programming, Introduction to Web Framework: - Django, Application Lifecycle, creating a Django Project, Creating Admin Interface, Creating Views, URL Mapping, Template System, Creating Database Models, Interfacing database: - PostgreSQL with the Django Project, Page Redirection, Form Processing.

**Module V: Industrial Visit**
At least one day visit to local industry in the field of Computer Science & Engineering.

## Course Outcomes:
- Ability to create client-server application for real world problems.
- Ability to apply Regular Expression, CGI and Database.
- Ability to apply GUI Programming in real world problems.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | ESE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

A: Attendance, CT: Class Test,:, S/V/Q/HA: Seminar/Viva/Quiz/ Home Assignment, ESE: End Semester Examination;

## *Text & References:*
**Text:**
- Core Python Programming , Wesley J. Chun, Publisher: Prentice Hall PTR, First Edition.
- Django Unleashed, Andrew Pinkham, SAMS, second edition
- OpenCV 4, Roy Shilkrot, Packt Pub, third edition
- Elegant Scipy, Juan Nunez, O'Reilly, third edition.

**Reference:**
- Learning Python, Mark Lutz, O'Reilly. Ltd., Second Edition.
- Python CookBook, Alex Martelli, O'Reilly. Ltd., Third Edition.

# DESIGN AND ANALYSIS OF ALGORITHMS

**Course Code: CSE 303** **Credit Units: 04**
**Total Hours: 40**

**Course Objective:**
The designing of algorithm isan important component of computer science. The objective of this course is to make students aware of various techniques used to evaluate the efficiency of a particular algorithm. Students eventually should learn to design efficient algorithm for a particular program

**Course Contents:**

**Module I: Introduction: (08 Hours)**
Algorithm Design paradigms - Motivation, Concept of algorithmic efficiency, Run Time Analysis of algorithms, Asymptotic Notations.
Recurrences- Substitution Method, Recursion Tree Method, Masters Method.

**Module II: Divide and conquer: (08 Hours)**
Structure of divide-and-conquer algorithms: examples; Binary search, quick sort, Merge sort**,** Strassen Multiplication; Analysis of divide and conquer run time recurrence relations.

**Greedy Method**
Overview of the greedy paradigm examples of exact optimization solution (minimum cost spanning tree), Approximate solution (Knapsack problem), Single source shortest paths, traveling salesman

**Module III: Dynamic programming: (08 Hours)**
Overview, difference between dynamic programming and divide and conquer, Applications: Shortest path in graph, chain Matrix multiplication, Traveling salesman Problem, longest Common sequence, knapsack problem

**Module IV: Graph searching and Traversal: (08 Hours)**
Overview, Representation of graphs, strongly connected components, Traversal methods (depth first and breadth first search)

**Back tracking**
Overview, 8-queen problem, and Knapsack problem

**Brach and bound**
LC searching Bounding, FIFO branch and bound, LC branch and bound application: 0/1 Knapsack problem, Traveling Salesman Problem

**Module V: Computational Complexity: (08 Hours)**
Complexity measures, Polynomial Vs non-polynomial time complexity; NP-hard and NP-complete classes, examples.

## Course Outcomes:

- Analyze the asymptotic performance of algorithms.
- Write rigorous correctness proofs for algorithms.
- Demonstrate a familiarity with major algorithms and data structures.
- Apply important algorithmic design paradigms and methods of analysis.
- Synthesize efficient algorithms in common engineering design situations.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **ESE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

A: Attendance, CT: Class Test,:, S/V/Q/HA: Seminar/Viva/Quiz/ Home Assignment, ESE: End Semester Examination;

## *Text & References:*

***Text:***


- E. Horowitz, S. Sahni, and S. Rajsekaran, "Funadmentals of Computer Algorithms", Galgotia Publication.
- T. H. Cormen, Leiserson , Rivest and Stein, "Introduction of Computer algorithm", PHI.

***References:***

- Sara Basse, A. V. Gelder, " Computer Algorithms", Addison-Wesley.
- J.E Hopcroft, J.D Ullman, " Design and analysis of algorithms", Addison-Wesley.
- D. E. Knuth , " The art of Computer Program", Addison-Wesley.

# COMPUTER ORGANIZATION & ARCHITECTURE

**Course Code: CSE 402** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
To conceptualize the basics of organizational and architectural issues of a digital computer. To analyse performance issues in processor and memory design of a digital computer. To understand various data transfer techniques in digital computer. To analyse processor performance improvement using instruction level parallelism.

**Course Contents:**

**Module I: Overview of Computer Architecture & Organization: (06 Hours)**
Introduction of Computer Organization and Architecture. Basic organization of computer and block level description of the functional units. Performance measure of Computer Architecture. Introduction to buses and connecting I/O devices to CPU and Memory, bus structure.

**Module II: CPU andRegister Transfer Operations: (06 Hours)**
Instruction Codes, Computer Registers, Computer Instructions, Register Transfer Language, Timing and Control, Instruction Cycle, Memory, Input-Output and Interrupt Reference Instructions, Signed multiplication, Booth's algorithm. Division of integers: Restoring and non-restoring division Floating point arithmetic: Addition, subtraction.

**Module III: Processor Organization and Architecture: (08 Hours)**
Introduction to CPU Architecture, General Register Organization, Stack Organization, Instruction representation, Instruction Formats, Instruction type, Control Unit: Soft wired (Micro-programmed) and hardwired control unit design methods. Microinstruction sequencing and execution. Micro operations. Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer RISC and CISC. Design of Accumulator Logic. Hardwired and Microprogrammed control: Control Memory, Address Sequencing, Design of Control Unit.

**Module IV: Memory Organization: (05 Hours)**
Memory hierarchy and characteristics. Cache memory: Concept, architecture (L1, L2, L3), mapping techniques. Cache Coherency, Interleaved and Associative Memory. Virtual Memory, Concept, Segmentation and Paging, Page replacement policies.

**Module V: I/O Organization and Peripherals: (05 Hours)**
Input/output systems, I/O modules and IO processor. Pipeline processing, Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline Types of data transfer techniques: Programmed I/O, Interrupt driven I/O and DMA. Introduction to parallel processing systems.

## Course Outcomes:

- Ability to understand basic structure of computer.
- Ability to perform computer arithmetic operations.
- Ability to understand control unit operations.
- Ability to design memory organization that uses banks for different word size operations.
- Ability to understand the concept of cache mapping techniques.
- Ability to understand the concept of I/O organization.
- Ability to conceptualize instruction level parallelism

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | ESE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

A: Attendance, CT: Class Test,:, S/V/Q/HA: Seminar/Viva/Quiz/ Home Assignment, ESE: End Semester Examination;

# JAVA PROGRAMMING

**Course Code: CSE 403** | **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The objective is to impart programming skills used in this object oriented language java. The course explores all the basic concepts of core java programming. The students are expected to learn it enough so that they can develop the web solutions like creating applets etc.

**Course Contents:**

**Module I : (07 Hours)**
Object Oriented Programming: Concept and features of object-oriented programming, create classes and objects and add methods to a class, Real World Comparison. Evolution of JAVA: History of Java, Requirements and Environment (JDK), Comparison with other languages, Basic Features & Java Architecture-Java Virtual Machine (JVM), Installing Java Development Kit, Program Structure- Data types, Variables and Operators. Arrays

**Module II : (07 Hours)**
Classes and Objects in Java: Understanding Constructors, Dealing with Garbage Collection. Working with Inheritance in Java: Understanding Abstract Classes and Interfaces. Packages: Introduction to packages, How to implement a package, CLASSPATH Setting for Packages, Types and understanding packages.

**Module III : (06 Hours)**
Multithreaded Programming: Basic concepts and needs of multi-threading, Life Cycle of a Thread, How to create a thread, Handling Thread Priorities, Enforcing Thread Synchronization, Maintaining Inter-thread Communication. Exception Handling: The Idea behind Exception, Exceptions & Errors, Types of Exception, Control Flow in Exceptions, Use of try, catch, finally, throw, throws in Exception Handling.

**Module IV : (07 Hours)**
GUI Programming -Introduction to AWT, Window Fundamentals, Working with Graphics, Using AWT Controls and Menus, Understanding Layout Managers. JFC and Swing - A Higher Level of User Interaction, Features of the Java Foundation Classes, Overview of Swing, Components and Containers, Swing Packages, Exploring Swing components ,Generating Swing Application

**Module V : (03 Hours)**
Event Handling -The Delegation Event Model, Event Classes, Event Listener Interfaces Handling Various Events.

## Course Outcomes:
The student will learn:

- Students can perform object oriented programming solution and develop solutions to problems demonstrating usage of control structure, modularity, classes, I/O and the scope of the class members
- Students can demonstrate adeptness of object oriented programming in developing solution to problems demonstrating usage of data abstraction, encapsulation and inheritance
- Students can demonstrate ability to implement one or more patterns involving dynamic binding and utilization of polymorphism in the solution of problems
- Students can demonstrate ability to implement multithreading in the programming.
- To learn syntax and features of exception handling
- Students can demonstrate the ability to implement solution to various I/O manipulation operations and the ability to create two-dimensional graphic components using Swings.
- To demonstrate the ability to handle Events in the Programming

**Examination Scheme:**

| Components | A | CT | S/V/Q | HA | ESE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:
***Text:***

- JAVA The Complete Reference by Patrick Naughton & Herbert Schild, TMH
- Introduction to JAVA Programming a primar, Balaguruswamy.

***References:***

- "Introduction to JAVA Programming" Daniel/Young PHI
- Jeff Frentzen and Sobotka, "Java Script" , Tata McGraw Hill,1999

# INTRODUCTION TO ANDROID APPLICATION DEVELOPMENT

**Course Code: CSE 503** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
This course provides students with the knowledge of fundamentals of Android application; Android Application Development is a hands-on course which is designed for providing essential skills and experiences to the students in developing applications on mobile platform. The hands-on training is effective for beginners and experienced developers for practical Android Code Application.

**Course Contents:**

**Module I: (07 Hours)**
Introduction to Android -Overview of Android, What does Android run On – Android Internals, Android for mobile apps development, Environment setup for Android apps Development, Framework - Android- SDK, Eclipse, Emulators – What is an Emulator / Android AVD?

**Module II: (09 Hours)**
Android activities and GUI design concepts- Design criteria for Android Application: Hardware Design Consideration, Design Demands for Android application, Intent**,** Activity, Activity Lifecycle and Manifest, Creating Application and new Activities, Simple UI -Layouts and Layout, Properties: Introduction to android UI design, Introducing Layouts, GUI objects, Layout design concepts.

**Module III: (07 Hours)**
Advanced UI Programming: Event driven Programming in Android(Text Edit, Button clicked etc.) Activity Lifecycle of Android, Exception handling

**Module IV: (07 Hours)**
Menu:Basics, Custom v/s System Menus, Create and Use Handset menu Button (Hardware) Dialog : Creating and Altering Dialogs Toast : List & Adapters Demo Application Development and Launching Basic operation of SQLite Database Android Application Priorities.

## Course Outcome:
At the end of the course the participant will. Create a Web Application with server controls.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:

**Text:**

- Professional Android
- Application Development, Reto Meier
- Beginning Android, Mark L Murphy
- Pro Android, S.Y Hashimi & Satya Komatineni

**References:**

- Android Studio Development Essentials, Neil Smyth
- The Definitive Guide to SQL Lite, Michael Owens
- Building Android Apps, IN EASY STEPS

# INTRODUCTION TO WEB TECHNOLOGIES

**Course Code: CSE 505** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**

To impart the design, development and implementation of Dynamic Web Pages and develop programs for Web using Scripting Languages and give an introduction to Data Interchange formats in Web.

**Module I: Introduction to HTML/XHTML: (06 Hours)**
Origins and Evolution of HTML and XHTML, Basic Syntax of HTML, Standard HTML Document Structure, Basic Text Markup, Images, Hypertext Links, Lists, Tables, Forms, HTML5, Syntactic Differences between HTML and XHTML.

**Module II: Introduction to Styles sheets and Frameworks Cascading Style Sheets: (5 Hours)**
Levels of Style Sheets - Style Specification Formats, Selector Forms, Property-Value Forms, Font Properties, List Properties, Alignment of Text, Color, The Box Model, Background Images, The span and div Tags. Frameworks: Overview and Basics of Responsive CSS Frameworks - Bootstrap.

**Module III: Introduction to JavaScript and jQuery: (09 Hours)**
Overview of JavaScript, Object Orientation and JavaScript, General Syntactic Characteristics Primitives, Operations, and Expressions, Screen Output and Keyboard Input, Control Statements, Object Creation and Modification, Arrays, Functions. Callback Functions, Java Script HTML DOM. Introduction to jQuery: Overview and Basics

**Module IV: Introduction to PHP: (10 Hours)**
Origins and Uses of PHP, Overview of PHP - General Syntactic Characteristics - Primitives, Operations, and Expressions - Control Statements, Arrays, Functions, Pattern Matching, Form Handling, Cookies, Session Tracking.

**Module V: Industrial Visit**
At least one visit up to Two days to industry in the field of Computer Science & Engineering.

## Course Outcomes:

The student will be able to

- Understand different components in web technology and to know about CGI and CMS.
- Develop interactive Web pages using HTML/XHTML.
- Present a professional document using Cascaded Style Sheets.
- Construct websites for user interactions using JavaScript and JQuery.
- Develop Web applications using PHP.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References


- P. J. Deitel, H.M. Deitel, Internet &World Wide Web How To Program, 4/e, Pearson International Edition 2010.
- Robert W Sebesta, Programming the World Wide Web, 7/e, Pearson Education Inc., 2014.
- 3.Bear Bibeault and Yehuda Katz, jQuery in Action, Second Edition, Manning Publications. [Chapter 1] Black Book, Kogent Learning Solutions Inc. 2009.
- Bob Boiko, Content Management Bible, 2nd Edition, Wiley Publishers. [Chapter 1, 2]
- Chris Bates, Web Programming Building Internet Applications, 3/e, Wiley India Edition 2009.
- Dream Tech, Web Technologies: HTML, JS, PHP, Java, JSP, ASP.NET, XML, AJAX,
- Jeffrey C Jackson, Web Technologies A Computer Science Perspective, Pearson Education Inc. 2009.
- Lindsay Bassett, Introduction to JavaScript Object Notation: A To-the-Point Guide to JSON 1st Edition, O'Reilly. [Chapter 1,2,3,4] 7.
- Matthew MacDonald, WordPress: The Missing Manual, 2nd Edition, O'Reilly Media.

# DATA COMMUNICATION AND COMPUTER NETWORKS

**Course Code : CSE 601** **Credit Units: 03**
**Total Hours: 30**

**Course Objectives:**

- The objective of the course is to provide knowledge of various multiplexing techniques and communication medias for transmission of data.
- Learn how computer network hardware and software operate.
- Investigate the fundamental issues driving network design Learn about dominant network technologies ,routing techniques ,error detection and correction techniques, various protocols and their working.

**Course Contents:**

**Module I: Introduction: (04 Hours)**
Introduction to Data Communication, Networks-protocols, advantages, disadvantages & applications, Line Configuration, topology, Transmission mode, Classification of networks. . OSI & TCP/IP reference models, with functionality and design issues of all layers presented in the models ,LAN,MAN,WAN.
Parallel & Serial Transmissions, Analog & Digital Signals, Periodic & Aperiodic Signals, Modulation-Amplitude Modulation, Frequency Modulation, Phase Modulation, Pulse Amplitude Modulation, Pulse Code Modulation.

**Module II: Physical Layer: (04 Hours)**
TDM, FDM, WDM; Circuit switching time division & space division switch. Transmission Media-Twisted Pair Cable, Coaxial Cable, Fiber-Optics Cable, Radio frequency Allocation, Terrestrial Microwave, Infrared rays, Satellite Communication, Cellular Telephony.

**Module III: Data Link Layer: (06 Hours)**
Framing, Line Discipline, Types of Errors, Error Detection & Correction (VRC, LRC, CRC, Checksum, Hamming Code), Flow Control, Error Control, CSMA/CD, Project 802, IEEE Standards-802.3, Token Bus (802.4), Token Ring (802.5).

**Module IV: Network Layer: (06 Hours)**
Internetworking & devices: Repeaters, Hubs, Bridges, Switches, Router, Gateway; Internet address, classful address, subnetting; Static vs. dynamic routing , Routing algorithms: shortest path algorithm, flooding, distance vector routing, link state routing; Protocols: ARP,RARP, IP, ICMP and IPV6

**Module V: Transport Layer: (04 Hours)**
Process to process delivery; UDP; TCP; Congestion control algorithm: Leaky bucket algorithm, Token bucket algorithm, choke packets; Quality of service: techniques to improve Qos.

**Module VI: Application Layer: (06 Hours)**
DNS; SMTP, SNMP, FTP, HTTP & WWW; Security: Cryptography, user authentication, security protocols in internet, Firewalls.

**Advanced topics**
ISDN services &ATM ; DSL technology, Wireless LAN: IEEE 802.11; Bluetooth, VLAN's, Cellular telephony & Satellite network.

## Course Outcomes:

- Show clear understanding of the basic concepts of data communications including the key aspects of networking and their interrelationship, packet switching, circuit switching and cell switching as internal and external operations, physical structures, types, models, and internetworking.
- Demonstrate the ability to unambiguously explain networking as it relates to the connection of computers, media, and devices (routing).
- Able to intelligently compare and contrast local area networks and wide area networks in terms of characteristics and functionalities. Able to identify limitations of typical communication systems.
- Able to differentiate among and discuss the four levels of addresses (physical, logical, port, and specific used by the Internet TCP/IP protocols.
- Understand the concept of reliable and unreliable transfer protocol of data and how TCP and UDP implement these concepts
- Developing the understanding of various advanced techniques like ISDN,ATM and wifi.

# INTERNET OF THINGS (IOT)

**Course Code: CSE 603** **Credit Units: 02**
**Total Hours: 20**

**Course Objective:**
The objective of the course is to:Vision and Introduction to IOT, Understand IOT Market perspective, Data and Knowledge Management and use of Devices in IOT Technology, Understand State of the Art – IOT Architecture, Real World IOT Design Constraints, Industrial Automation and Commercial Building Automation in IOT.

**Course Contents:**

**Module I: Introduction to the Internet of Things: (07 Hours)**
Key Features, advantages, disadvantages, Wearable electronics, The Basics of Sensors & Actuators, Introduction to Cloud Computing, IOT Software.

**Module II: IoT-An Architectural Overview: (06 Hours)**
Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations. IoT Technology Fundamentals- Devices and gateways, Local and wide area networking, Data management, Business processes in IoT, Everything as a Service(XaaS), M2M and IoT Analytics, Knowledge Management.

**Module III: The Arduino Platform: (06 Hours)**
What is Arduino, Why Arduino, Driver installation, programming &Burning ,Coding in wiring language, Compiling in Arduino, The Arduino Open-Microcontroller Platform, Arduino Basics, Arduino Board Layout & Architecture Reading from Sensors.

**Module IV: Arduino Programming & Interface of Sensors: (05 Hours)**
LED display, PUSH button to array of LED, Communicating to and from computer, GSM, GPS and Zigbee interfacing ,Interface sensor with arduino, Programming arduino, Reading from sensor, Connecting Arduino with Mobile Device. The Android Mobile OS, Using the Bluetooth Module.

**Module V: Projects: (06 Hours)**
1. Creating own Android App using MIT App Inventor & controlling Arduino connected devices. 2. Use Arduino to Upload free data from Environmental Sensors to Cloud Server. 3. Receive Automatic Call Notification on Mobile Phone for Burglar Alarm using IoT Platform4.Control Electronic Devices from anywhere across the world using Internet & Mobile App.

## Course Outcome:
Ability to develop IOT application.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | ESE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

A: Attendance, CT: Class Test,:, S/V/Q/HA: Seminar/Viva/Quiz/ Home Assignment, ESE: End Semester Examination;

## *Text & References:*
**Text:**


- Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, David Boyle, **"From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence",** 1st Edition, Academic Press, 2014.


**Reference Books:**


- Vijay Madisetti and ArshdeepBahga, **"Internet of Things (A Hands-on-Approach)",** 1stEdition, VPT, 2014.
- Francis daCosta, **"Rethinking the Internet of Things: A Scalable Approach to Connecting Everything",** 1st Edition, Apress Publications, 2013

# ARTIFICIAL INTELLIGENCE

**Course Code: CSE 702** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
To develop semantic-based and context-aware systems to acquire, organize process, share and use the knowledge embedded in multimedia content. Research will aim to maximize automation of the complete knowledge lifecycle and achieve semantic interoperability between Web resources and services. The field of Robotics is a multi disciplinary as robots are amazingly complex system comprising mechanical, electrical, electronic H/W and S/W and issues germane to all these.

**Course Contents:**

**Module I: Problem solving and Scope of AI: (7 Hours)**
Introduction to Artificial Intelligence. Applications- Games, theorem proving, natural language processing, vision and speech processing, robotics, expert systems. AI techniques- search knowledge, abstraction.
**Problem Solving**
State space search; Production systems, search space control: depth-first, breadth-first search. Heuristic search - Hill climbing, best-first search, branch and bound. Problem Reduction, Constraint Satisfaction End, Means-End Analysis.

**Module II: Knowledge Representation: (6 Hours)**
Knowledge Representation issues, first order predicate calculus, Horn Clauses, Resolution, Semantic Nets, Frames, Partitioned Nets, Procedural Vs Declarative knowledge, Forward Vs Backward Reasoning.

**Module III: Understanding Natural Languages: (6 Hours)**
Introduction to NLP, Basics of Syntactic Processing, Basics of Semantic Analysis, Basics of Parsing techniques, context free and transformational grammars, transition nets, augmented transition nets,Scripts, Basics of grammar free analyzers, Basics of sentence generation, and Basics of translation.

**Module IV: (5 Hours)**
**Expert System:** Need and justification for expert systems, knowledge acquisition, Case studies: MYCIN, RI.
**Learning:** Concept of learning, learning automation, genetic algorithm, learning by inductions, neural nets.
**Programming Language:** Introduction to programming Language, LISP and PROLOG.

**Module V: Introduction to Robotics: (6 Hours)**
Fundamentals of Robotics, Robot Kinematics: Position Analysis, Dynamic Analysis and Forces, Trajectory Planning, Sensors and vision system.
Robot Programming languages & systems: Introduction, the three levels of robot programming, requirements of a robot programming language, problems peculiar to robot programming languages.

**Module VI: Industrial Visit**
At least one visit up to Three days to industry in the field of Computer Science & Engineering.

## Course Outcomes:
Upon successful completion of this course student will:
- be able to design a knowledge based system,
- be familiar with terminology used in this topical area,
- have read and analyzed important historical and current trends addressing artificial intelligence.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | ESE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

A: Attendance, CT: Class Test,:, S/V/Q/HA: Seminar/Viva/Quiz/ Home Assignment, ESE: End Semester Examination;

# DATA ANALYTICS

**Course Code: CSE 704** **Credit Units: 03**
**Total Hours: 30**

**Course objectives:**

- To know the fundamental concepts of big data and analytics.
- To explore tools and practices for working with big data
- To learn about stream computing.
- To know about the research that requires the integration of large amounts of data.

**Course Contents:**

**Module I: Introduction to Big Data: (08 Hours)**
Evolution of Big data – Best Practices for Big data Analytics – Big data characteristics – Validating – The Promotion of the Value of Big Data – Big Data Use Cases- Characteristics of Big Data Applications – Perception and Quantification of Value -Understanding Big Data Storage – A General Overview of High-Performance Architecture – HDFS – MapReduce and YARN – Map Reduce Programming Model

**Module II: Clustering and Classification: (06 Hours)**
Analytical Theory and Methods: Overview of Clustering – K-means – Use Cases – Overview of the Method – Determining the Number of Clusters – Diagnostics – Reasons to Choose and Cautions .- Classification: Decision Trees – Overview of a Decision Tree – The General Algorithm – Decision Tree Algorithms – Evaluating a Decision Tree

**Module III: Association and Recommendation System: (08 Hours)**
Analytical Theory and Methods: Association Rules – Overview – Apriori Algorithm – Evaluation of Candidate Rules – Applications of Association Rules – Finding Association& finding similarity Introduction to Streams Concepts – Stream Data Model and Architecture – Stream Computing, Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating moments ,Case Studies – Real Time Sentiment Analysis. Using Graph Analytics for Big Data: Graph Analytics

**Module IV: NoSQL Data Management for Big Data and Visualization: (08 Hours)**
NoSQL Databases: Schema-less Models‖: Increasing Flexibility for Data Manipulation-Key Value Stores-Document Stores – Tabular Stores – Object Data Stores – Graph Databases Hive – Sharding –- Hbase – Analyzing big data with twitter – Big data for E-Commerce Big data for blogs – Review of Basic Data Analytic Methods using R.

## Course Outcomes:

**Upon completion of the course, the students will be able to:**

- Work with big data tools and its analysis techniques
- Analyze data by utilizing clustering and classification algorithms
- Learn and apply different mining algorithms and recommendation systems for large volumes of data
- Perform analytics on data streams
- Learn NoSQL databases and management.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | ESE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

A: Attendance, CT: Class Test,:, S/V/Q/HA: Seminar/Viva/Quiz/ Home Assignment, ESE: End Semester Examination;

# DIGITAL IMAGE PROCESSING

**Course Code: CSE 801** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
Processing color and grayscale images or other two-dimensional signals has become an important tool for research and investigation in many areas of science and engineering. Digital Image Processing is designed to give professionals and students a powerful collection of fundamental and advanced image processing tools on the desktop. Digital Image Processing takes full advantage of the computational technology of Mathematics.

**Course Contents:**

**Module I: Introduction and Digital Image Fundamentals: (06 Hours)**
The origins of Digital Image Processing, Examples of Fields that Use Digital Image Processing, Fundamentals Steps in Image Processing, Elements of Digital Image Processing Systems, Image Sampling and Quantization, Some basic relationships like Neighbours, Connectivity, Distance Measures between pixels, Linear and Non Linear Operations.

**Module II: Image Enhancement in the Spatial Domain: (06 Hours)**
Some basic Gray Level Transformations, Histogram Processing, Enhancement Using Arithmetic and Logic operations, Basics of Spatial Filters, Smoothening and Sharpening Spatial Filters, Combining Spatial Enhancement Methods.

**Module III: Image Enhancement in the Frequency Domain: (07 Hours)**
Introduction to Fourier Transform and the frequency Domain, Smoothing and Sharpening Frequency Domain Filters, Homomorphic Filtering.
**Image Restoration**
A model of The Image Degradation / Restoration Process, Noise Models, Restoration in the presence of Noise Only Spatial Filtering, Pereodic Noise Reduction by Frequency Domain Filtering, Linear Position-Invarient Dedradations, Estimation of Degradation Function, Inverse filtering, Wiener filtering, Constrained Least Square Filtering, Geometric Mean Filter, Geometric Transformations.

**Module IV: Image Compression: (06 Hours)**
Coding, Interpixel and Psychovisual Redundancy, Image Compression models, Elements of Information Theory, Error free comparison, Lossy compression, Image compression standards.
**Image Segmentation**
Detection of Discontinuities, Edge linking and boundary detection, Threshold, Region Oriented Segmentation, Motion based segmentation.

**Module V: Representation and Description (05 Hours)**
Representation, Boundary Descriptors, Regional Descriptors, Use of Principal Components for Description, Introduction to Morphology, Some basic Morphological Algorithms.

**Object Recognition**
Patterns and Pattern Classes, Decision-Theoretic Methods, Structural Methods.

## Course Outcomes:
- Ability to examine various types of images, intensity transformations and spatial filtering.
- Ability to evaluate the methodologies for image segmentation, restoration etc.
- Ability to apply image processing algorithms in practical applications.
- Ability to develop Fourier transform for image processing in frequency domain.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | ESE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

A: Attendance, CT: Class Test,:, S/V/Q/HA: Seminar/Viva/Quiz/ Home Assignment, ESE: End Semester Examination;

## Text & References:
*Text:*
- Rafael C. Conzalez & Richard E. Woods, “Digital Image Processing”, 2nd edition, Pearson Education.
- A. K. Jain, “Fundamental of Digital Image Processing”, PHI.

*References:*
- Rosefield Kak, “Digital Picture Processing”,
- W.K. Pratt, “Digital Image Processing”,

# BIG DATA AND BUSINESS ANALYTICS

**Course code: CSE 805** | **Credit Units: 03**
**Total Hours: 30**

**Course objectives:**

- To optimize business decisions and create competitive advantage with Big Data analytics
- To explore the fundamental concepts of big data analytics.
- To learn to analyze the big data using intelligent techniques.
- To understand the various search methods and visualization techniques.
- To learn to use various techniques for mining data stream.
- To understand the applications using Map Reduce Concepts.
- To introduce programming tools PIG & HIVE in Hadoop echo system.

**Course Content:**

**Module I: Introduction to Big Data: (06 Hours)**
Introduction – distributed file system – Big Data and its importance, Four Vs, Drivers for Big data, Big data analytics, Big data applications. Algorithms using map reduce, Matrix-Vector Multiplication by Map Reduce.

**Module II: Introduction Hadoop and Its Architecture: (08 Hours)**
Big Data – Apache Hadoop & Hadoop EcoSystem – Moving Data in and out of Hadoop – Understanding inputs and outputs of MapReduce - Data Serialization. Hadoop Architecture, Hadoop Storage: HDFS, Common Hadoop Shell commands , Anatomy of File Write and Read., NameNode, Secondary NameNode, and DataNode, Hadoop MapReduce paradigm, Map and Reduce tasks, Job, Task trackers - Cluster Setup – SSH & Hadoop Configuration – HDFS Administering –Monitoring & Maintenance.

**Module III: Business Analysis Concepts: (08 Hours)**
Understanding the field of business intelligence in a global world - Understanding the BI process and choosing – Place and tasks of the study of private and public intelligence The practice of private and public intelligence: the choice of means -Strategies of information gathering, The distinction between intelligence, information and data, Information asymmetry and competitive advantage

**Module IV: Business Analytics: (08 Hours)**
Analytics concepts and use in Business Intelligence, Exploratory and statistical techniques:- Cluster analysis, Data visualization, Predictive analysis :- Regression, Time series, Data Mining :- Hierarchical clustering, Decision tree Text analytics :- Text mining, In-Memory Analytics and In-DB Analytics, Case study: Google Analytics

## Course Outcomes:

- After learning the course the students should be able to
- Design and implement OLTP, OLAP and Warehouse concepts
- Design and develop Data Warehouse using Various Schemas & Dimensional modelling
- Use the ETL concepts, tools and techniques to perform Extraction, Transformation, and Loading of data
- Report the usable data by using various reporting concepts, techniques/tools, and use charts, tables for reporting in BI
- Use Analytics concepts like data mining, Exploratory and statistical techniques for predictive analysis in Business Intelligence
- Demonstrate application of concepts in BI

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | ESE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

A: Attendance, CT: Class Test,:, S/V/Q/HA: Seminar/Viva/Quiz/ Home Assignment, ESE: End Semester Examination;

# JAVA PROGRAMMING

**Course Code: CSE 403** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The objective is to impart programming skills used in this object oriented language java. The course explores all the basic concepts of core java programming. The students are expected to learn it enough so that they can develop the web solutions like creating applets etc.

**Course Contents:**

**Module I : (7 Hours)**
Object Oriented Programming: Concept and features of object-oriented programming, create classes and objects and add methods to a class, Real World Comparison. Evolution of JAVA: History of Java, Requirements and Environment (JDK), Comparison with other languages, Basic Features & Java Architecture-Java Virtual Machine (JVM), Installing Java Development Kit, Program Structure- Data types, Variables and Operators. Arrays

**Module II : (7 Hours)**
Classes and Objects in Java: Understanding Constructors, Dealing with Garbage Collection. Working with Inheritance in Java: Understanding Abstract Classes and Interfaces. Packages: Introduction to packages, How to implement a package, CLASSPATH Setting for Packages, Types and understanding packages.

**Module III : (6 Hours)**
Multithreaded Programming: Basic concepts and needs of multi-threading, Life Cycle of a Thread, How to create a thread, Handling Thread Priorities, Enforcing Thread Synchronization, Maintaining Inter-thread Communication. Exception Handling: The Idea behind Exception, Exceptions & Errors, Types of Exception, Control Flow in Exceptions, Use of try, catch, finally, throw, throws in Exception Handling.

**Module IV : (7 Hours)**
GUI Programming -Introduction to AWT, Window Fundamentals, Working with Graphics, Using AWT Controls and Menus, Understanding Layout Managers. JFC and Swing - A Higher Level of User Interaction, Features of the Java Foundation Classes, Overview of Swing, Components and Containers, Swing Packages, Exploring Swing components ,Generating Swing Application

**Module V : (3 Hours)**
Event Handling -The Delegation Event Model, Event Classes, Event Listener Interfaces Handling Various Events.

## Course Outcomes:
The student will learn:

- Students can perform object oriented programming solution and develop solutions to problems demonstrating usage of control structure, modularity, classes, I/O and the scope of the class members
- Students can demonstrate adeptness of object oriented programming in developing solution to problems demonstrating usage of data abstraction, encapsulation and inheritance
- Students can demonstrate ability to implement one or more patterns involving dynamic binding and utilization of polymorphism in the solution of problems
- Students can demonstrate ability to implement multithreading in the programming.
- To learn syntax and features of exception handling
- Students can demonstrate the ability to implement solution to various I/O manipulation operations and the ability to create two-dimensional graphic components using Swings.
- To demonstrate the ability to handle Events in the Programming

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | ESE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

A: Attendance, CT: Class Test, S/V/Q/HA: Seminar/Viva/Quiz/ Home Assignment, ESE: End Semester Examination;

## Text & References:

***Text:***

- JAVA The Complete Reference by Patrick Naughton & Herbert Schild, TMH
- Introduction to JAVA Programming a primar, Balaguruswamy.

***References:***

- "Introduction to JAVA Programming" Daniel/Young PHI
- Jeff Frentzen and Sobotka, "Java Script" , Tata McGraw Hill,1999

# JAVA PROGRAMMING LAB

**Course Code: CSE 423** **Credit Units: 02**

**Total Hours: 40**

**Course Objective:**
programming in the Java programming language,knowledge of object-oriented paradigm in the Java programming language, the use of Java in a variety of technologies and on different platforms.

**Course Contents :**
Lab Experiments are based on the course Java Programming (CSE 403)

1. **Lab assignment will be based on the following:**
   1. Use Eclipse or NetBeans platform and acquaint with the various menus. Create a test project, add a test class and run it. See how you can use auto suggestions, auto fill. Try code formatter and code refactoring like renaming variables, methods and classes. Try debug step by step with a small program of about 10 to 15 lines which contains at least one if else condition and a for loop. :**(4 Hours)**
   2. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -, *, % operations. Add a text field to display the result. Handle any possible exceptions like divided by zero. :**(4 Hours)**
   3. Develop an applet in Java that displays a simple message.: **(02 Hour)**
   4. Develop an applet in Java that receives an integer in one text field, and computes its factorial Value and returns it in another text field, when the button named "Compute" is clicked. :**(02 Hour)**
   5. Write a Java program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 andNum2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a Number Format Exception. If Num2 were Zero, the program would throw an Arithmetic Exception. Display the exception in a message dialog box. :**(4 Hours)**
   6. Write a Java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number. :**(4 Hours)**
   7. Write a Java program that connects to a database using JDBC and does add, delete, modify and retrieve operations. :**(02 Hour)**
   8. Write a Java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green with radio buttons. On selecting a button, an appropriate message with "Stop" or "Ready" or "Go" should appear above the buttons in selected color. Initially there is no message shown. :**(02 Hour)**
   9. Write a Java program to create an abstract class named Shape that contains two integers and an empty method named printArea(). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method printArea() that prints the area of the given shape. : **(2 Hours)**
   10. Suppose that a table named Table.txt is stored in a text file. The first line in the file is the header, and the remaining lines correspond to rows in the table. The elements are separated by commas. Write a java program to display the table using Labels in Grid Layout. :**(4 Hours)**
   11. Write a Java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired (Use Adapter classes). :**(02 Hour)**
   12. Write a Java program that loads names and phone numbers from a text file where the data is organized as one line per record and each field in a record are separated by a tab. It takes a name or phone number as input and prints the corresponding other value from the hash table (hint: use hash tables). :**(02 Hour)**
   13. Implement the above program with database instead of a text file. :**(02 Hour)**
   14. Write a Java program that takes tab separated data (one record per line) from a text file and inserts them into a database. :**(02 Hour)**
   15. Write a java program that prints the meta-data of a given table. :**(02 Hour)**

## Course Outcomes:

- knowledge of the structure and model of the Java programming language, (knowledge)
- use the Java programming language for various programming technologies (understanding)
- develop software in the Java programming language, (application)
- evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements (analysis)
- propose the use of certain technologies by implementing them in the Java programming language to solve the given problem (synthesis)

**Examination Scheme:**

| IA | | | EE | | | |
|---|---|---|---|---|---|---|
| **A** | **PR** | **Practical Based Test** | **Major Experiment** | **Minor Experiment** | **LR** | **Viva** |
| 5 | 10 | 15 | 35 | 15 | 10 | 10 |

Note: IA – Internal Assessment, EE- External Exam, A- Attendance, PR- Performance, LR – Lab Record, V – Viva.

## Text & References:

***Text:***

- Java Fundamentals - A comprehensive Introduction, Herbet Schidt and Dale Srien, TMH.

***References:***

- Java for Programmers, P.J. Deitel and H.M. Deitel, Pearson education (OR) Java: How to Program P.J. Deitel and H.M. Deitel, PHI.
- Object Orientd Programming through Java, P. Radha Krishna, Universities Press.
- Thinking in Java, Bruce Eckel, Pearson Education
- Programming in Java, Bruce Eckel, Pearson Education
- Programming in Java, S. Malhotra and S. Choudhary, Oxford Univ. Press.

# ADVANCED PROGRAMMING THROUGH PYTHON

**Course Code: CSE 510** **Credit Units: 03**

**Total Hours: 30**

**Course Objective:**

To understand the basic concepts such as lists, tuples and dictionary Data structures. To understand concepts like networking and website development using frameworks of python. To understand working third party libraries in python. To understand Scientific programming paradigm.

**Course Contents:**

**Module I: Introduction of Python: (8 Hours)**

History of Python, Features of Python Programming, Applications of Python, Use of python, install and Run Python in Windows/Linux, Keyword and Identifier, Statements and Comments, Python Variables, Python Data types, Python Type Conversion,Python I/O and Import, Python Operators, Python Namespace.

Python If-else statements, Python for Loop, while loop, break and continue, String manipulation, List Tuple, dictionaries, pass statement, looping technique, functions, function arguments, recursion,anonymous function, python global, local and Nonlocal.

**Module II: Object and Class: (5 Hours)**

Python modules, python package, File operation, Python directory, Python exception, Exception Handling, User-Define Exception, Python OOP, class, inheritance, multiple inheritance, operator overloading.

**Module III: Regular Expression, CGI and Database: (8 Hours)**

Match function, Search function, matching vs. searching, modifier, pattern, Introduction of CGI,CGI Architecture, CGI environment Variable, GET/POST Method, Cookies,File upload, Introduction of Database, connections, Executing queries, transactions, handling errors.

**Module IV: GUI Programming: (9 Hours)**

Tkinter Programming, Tkinter widgets, Standard Attributes, CGI Programming, Introduction to Web Framework: - Django, Application Lifecycle, creating a Django Project, Creating Admin Interface, Creating Views, URL Mapping, Template System, Creating Database Models, Interfacing database: - PostgreSQL with the Django Project, Page Redirection, Form Processing.

## Course Outcomes:

- Ability to create client-server application for real world problems.
- Ability to apply Regular Expression, CGI and Database.
- Ability to apply GUI Programming in real world problems.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | ESE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

A: Attendance, CT: Class Test, S/V/Q/HA: Seminar/Viva/Quiz/ Home Assignment, ESE: End Semester Examination;

## *Text & References:*

**Text:**

- Core Python Programming , Wesley J. Chun, Publisher: Prentice Hall PTR, First Edition.
- Django Unleashed, Andrew Pinkham, SAMS, second edition
- OpenCV 4, Roy Shilkrot, Packt Pub, third edition
- Elegant Scipy, Juan Nunez, O'Reilly, third edition.

**Reference:**

- Learning Python, Mark Lutz, O'Reilly. Ltd., Second Edition.
- Python CookBook, Alex Martelli, O'Reilly. Ltd., Third Edition.

# ADVANCED PROGRAMMING THROUGH PYTHON LAB

**Course Code: CSE 530** **Credit nits: 01**

**Total Hours: 20**

**Course Objective:**
To write and execute programs in python to solve problems using data structures such as lists, tuples, dictionaries. To write and execute write programs in python to implement various networking, web applications

**SOFTWARE REQUIREMENTS:** Python 3.6

**Course Contents:**
Lab Experiments are based on the coursePython Programming (CSE 302)

**List of experiments/demonstrations:**
1. Write a python program to demonstrate working of lists.**: (2 Hours)**
2. Write a python program to demonstrate working of tuples.**: (2 Hours)**
3. Write a python program to demonstrate working of dictionaries and conditional statements**: (2 Hours)**
4. Write a python program to demonstrate working of Inheritance and other OOP concepts.**: (2 Hours)**
5. Write a python program to demonstrate regular expressions like match function, search function, pattern search function.**: (2 Hours)**
6. Write a python program for reading data from CSV file.**: (2 Hours)**
7. Write a python program for writing data in CSV file.**: (2 Hours)**
8. Write a python program for reading data from text file.**: (2 Hours)**
9. Write a python program for writing data from text file.**: (01 Hour)**
10. Write a python program for image analysis using openCV.**: (01 Hour)**
11. Write a program to demonstrate connection with postgresql**: (01 Hour)**
12. Develop a dynamic website using Django framework and postgresql as backend.**: (1 Hour)**

## Course Outcomes:
- Ability to create client-server application for real world problems.
- Ability to develop multithreaded application.
- Ability to create web application for real world problem.

**Examination Scheme:**

| IA | | | EE | | | |
|---|---|---|---|---|---|---|
| **A** | **PR** | **Practical Based Test** | **Major Experiment** | **Minor Experiment** | **LR** | **Viva** |
| 5 | 10 | 15 | 35 | 15 | 10 | 10 |

Note: IA –InternalAssessment, EE- External Exam, A- Attendance, PR- Performance, LR – Lab Record, V – Viva.

## Text & References:

- Core Python Programming, Wesley J. Chun, Publisher: Prentice Hall PTR, First Edition.
- Python: The Complete Reference, Martin C Brown, McGraw Hill Publications.
- Programming Python, Mark Lutz, O'Reilly. Ltd., Second Edition.

# RELATIONAL DATABASE MANAGEMENT SYSTEMS

**Course Code: CSE 710** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The objective of this course is to get students familiar with Databases and their use. They can identify different types of available database model, concurrency techniques and new applications of the DBMS.

**Course Contents:**

**Module I: Introduction: (6 Hours)**
Concept and goals of DBMS, Database Languages, Database Users, Database Abstraction.
Basic Concepts of ER Model, Relationship sets, Keys, Mapping, Design of ER Model ,Concept of Generalization, Aggregation and Specialization. transforming ER diagram into the tables. Various other data models object oriented data Model, Network data model, and Relational data model.

**Module II: Relational Data models: (6 Hours)**
Domains, Tuples, Attributes, Relations, Characteristics of relations, Keys, Key attributes of relation, Relational database, Schemas, Integrity constraints. Referential integrity, Intension and Extension, Relational Query languages: SQL-DDL, DML, integrity constraints, Complex queries, various joins, indexing, triggers ,Relational algebra and relational calculus, Relational algebra operations like select, Project, Join, Division, outer union. Tuple relational calculus.

**Module III: Data Base Design: (6 Hours)**
Data Base Design: Introduction to normalization, Normal forms, Functional dependency, Decomposition, Dependency preservation and lossless join, problems with null valued and dangling tuples, multivalued dependencies.

**Module IV: Transaction Processing Concepts: (6 Hours)**
Transaction System, Testing of Serilizability, Serializability of schedules, conflict & view serializable schedule, recoverability, Recovery from transaction failures. Log based recovery. Checkpoints deadlock handling. Concurrency Control Techniques: – Concurrency Control, locking Techniques for concurrency control, time stamping protocols for concurrency control, validation-based protocol, multiple granularity. Multi version schemes, Recovery with concurrent transaction.

**Module V: Relational Database Management Systems: (6 Hours)**
Study of Relational Database Management Systems through Oracle/Postgres SQL/MySQL: Architecture, physical files, memory structures, background process. Concept of table spaces, segments, extents and block. Dedicated server, multi-threaded server, distributed database. Introduction of ANSI SQL. Usage of like, any, all, exists, views and other commands, Special operators. Hierarchical queries, inline queries, flashback queries

## Course Outcomes:
The student will learn
- Describe DBMS architecture, physical and logical database designs, database modeling, relational, hierarchical and network models.
- Identify basic database storage structures and access techniques such as file organizations, indexing methods including B-tree, and hashing.
- Learn and apply Structured query language (SQL) for database definition and database manipulation.
- Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database.
- Understand various transaction processing, concurrency control mechanisms and database protection mechanisms.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | ESE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

A: Attendance, CT: Class Test,:, S/V/Q/HA: Seminar/Viva/Quiz/ Home Assignment, ESE: End Semester Examination;

## Text & References:

***Text:***

- Korth, Silberschatz, “Database System Concepts”, 4th Ed., TMH, 2000.
- Steve Bobrowski, “Oracle & Architecture”, TMH, 2000

***References:***

- Date C. J., “An Introduction to Database Systems”, 7th Ed., Narosa Publishing, 2004
- Elmsari and Navathe, “Fundamentals of Database Systems”, 4th Ed., A. Wesley, 2004
- Ullman J. D., “Principles of Database Systems”, 2nd Ed., Galgotia Publications, 1999.

# RELATIONAL DATABASE MANAGEMENT SYSTEMS LAB

**Course Code: CSE 730** **Credit Unit: 01**
**Total Hours: 20**

**Course Objective:**
To write and execute SQL statements, understand design of backend applications

**Software Required:** Oracle 9i

**Course Contents:**
Lab Experiments are based on the courseDatabase Management Systems (CSE 304)

**Topics covered in lab will include the following Programs: (2 Hours)**

1. Using create command design three specific table and the table structure is given below.

Table name- Book

| ISBN | TITLE | PUB_YEAR | UNIT_PRICE | AUTHOR_NAME | PUB_NAME |
|---|---|---|---|---|---|
| 1001 | Oracle | 2004 | 399 | Arora | phi |
| 1002 | Dbms | 2004 | 400 | Basu | technical |
| 2001 | Dos | 2003 | 250 | Sinha | nirali |
| 2002 | Adbms | 2004 | 450 | Basu | technical |
| 2003 | Unix | 2000 | 300 | Kapoor | scitech |

Table name- Author

| AUTHOR_NAME | COUNTRY |
|---|---|
| Arora | U.S.A. |
| Kapoor | Canada |
| Basu | India |
| Sinha | India |

Table name- Publisher

| PUB_NAME | PUB_ADD1 |
|---|---|
| Phi | Delhi |
| Technical | Pune mainmarket |
| Nirali | Mumbai |
| Scitech | Chennai |

2. Write the SQL query to find the name of all publisher from Book relation. **(2 Hours)**
3. Write the SQL query to display the name of all publisher using distinct clause.**(2 Hours)**
4. Write the SQL query to find the names of author from the author table where the first two characters of names are 'ba'.**(2 Hours)**
5. Write the SQL query to display title of books published in year 2004.**(2 Hours)**
6. Write the SQL query to display title of books having price between 300 to 400.**(1 Hour)**
7. Write the SQL query to display title of books having price between 300 to 400 using operators.**(1 Hour)**
8. Write the SQL query to display title of books with author_name and country published in year 2004.**(1 Hour)**
9. Write the SQL query to display all title and (unit_price*10) as an attribute from book table using arithmetic expression.**(01 Hour)**
10. Write the SQL query to add the new column in all three tables.**(1 Hour)**
11. Study the concept of Views and their utility in DBMS,write the SQL query to design a view.**(1 Hour)**
12. Write the SQL query to make the attribute ISBN as a primary key in Book relation.**(1 Hour)**

13. Write the SQL query to display the all the titles of Books with price and year in descending order.**(1 Hour)**
14. Write the SQL query to study the use of Delete and Drop command in DBMS. **(1 Hour)**

# OBJECT ORIENTED PROGRAMMING USING C++

**Course Code: CSE 204** **Credit Units: 03**

**Total Hours: 30**

**Course Objective:**

The objective of this module is to introduce object oriented programming. To explore and implement the various features of OOP such as inheritance, polymorphism, Exceptional handling using programming language C++. After completing this course student can easily identify the basic difference between the programming approaches like procedural and object oriented.

**Course Contents:**

**Module I: Introduction: (6 Hours)**

Review of C, Difference between C and C++, Procedure Oriented and Object Oriented Approach. Basic Concepts:Objects, classes, Principals like Abstraction, Encapsulation, Inheritance and Polymorphism. Dynamic Binding, Message Passing. Characteristics of Object-Oriented Languages. Introduction to Object-Oriented Modeling techniques (Object, Functional and Dynamic Modeling).

**Module II: Classes and Objects: (7 Hours)**

Abstract data types, Object & classes, attributes, methods, C++ class declaration, Local Class and Global Class, State identity and behaviour of an object, Local Object and Global Object, Scope resolution operator, Friend Functions, Inline functions, Constructors and destructors, instantiation of objects, Types of Constructors, Static Class Data, Array of Objects, Constant member functions and Objects, Memory management Operators.

**Module III: Inheritance: (6 Hours)**

Inheritance, Types of Inheritance, access modes – public, private & protected, Abstract Classes, Ambiguity resolution using scope resolution operator and Virtual base class, Aggregation, composition vs classification hierarchies, Overriding inheritance methods, Constructors in derived classes, Nesting of Classes.

**Module IV: Polymorphism: (6 Hours)**

Polymorphism, Type of Polymorphism – Compile time and runtime, Function Overloading, Operator Overloading (Unary and Binary) Polymorphism by parameter, Pointer to objects, this pointer, Virtual Functions, pure virtual functions.

**Module V: Strings, Files and Exception Handling: (5 Hours)**

Manipulating strings, Streams and files handling, formatted and Unformatted Input output. Exception handling, Generic Programming – function template, class Template Standard Template Library: Standard Template Library, Overview of Standard Template Library, Containers, Algorithms, Iterators.

## Course Outcomes:

At the end of this course, students will demonstrate ability to:

- To apply concepts of classes and objects in real world scenarios.
- Understand object-oriented programming features in C++,
- Apply these features to program design and implementation,
- Understand object-oriented concepts and how they are supported by C++,
- Gain some practical experience of C++.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:

**Text:**

- A.R.Venugopal, Rajkumar, T. Ravishanker "Mastering C++", TMH, 1997
- R. Lafore, "Object Oriented Programming using C++", BPB Publications, 2004.
- "Object Oriented Programming with C++" By E. Balagurusamy.
- Schildt Herbert, "C++: The Complete Reference", Wiley DreamTech, 2005.

**References:**

- Parasons, "Object Oriented Programming with C++", BPB Publication, 1999.
- Steven C. Lawlor, "The Art of Programming Computer Science with C++", Vikas Publication, 2002.
- Yashwant Kanethkar, "Object Oriented Programming using C++", BPB, 2004

# OBJECT ORIENTED PROGRAMMING USING C++ LAB

**Course Code: CSE 224** **Credit Units: 01**

**Total Hours: 20**

**Course Objective:**

To perform object oriented programming solution and develop solutions to problems demonstrating usage of control structure, modularity, classes, I/O and the scope of the class members.

SOFTWARE REQUIRED: TURBO C++

**Course Contents :**

Lab Experiments are based on the course Object Oriented Programming Using C++ (CSE 204)

**Lab assignment will be based on the following:**

1 [Classes and Objects] Write a program that uses a class where the member functions are defined inside a class. **(1 Hour)**
2 [Classes and Objects] Write a program that uses a class where the member functions are defined outside a class. **(1 Hour)**
3 [Classes and Objects] Write a Program to Demonstrate Inline functions. **(1 Hour)**
4 [Classes and Objects] Write a Program to Demonstrate Friend function, classes and this pointer. **(1 Hour)**
5 [Constructors and Destructors] Write a program to demonstrate the use of zero argument and parameterizedconstructors. **(2 Hours)**
6 [Operator Overloading] Write a program to demonstrate the overloading of increment and decrementoperators. **(2 Hours)**
7 [Inheritance] Write a program to demonstrate the single inheritance. **(1 Hour)**
8 [Inheritance] Write a program to demonstrate the multiple inheritance. **(1 Hour)**
9 [Inheritance] Write a Program to demonstrate use of protected members, public & private protected classes, multilevel inheritance etc. **(1 Hour)**
10 [Polymorphism] Write a program to demonstrate the runtime polymorphism. **(1 Hour)**
11 [Exception Handling] Write a program to demonstrate the exception handling. **(2 Hours)**
12 [Templates and Generic Programming] Write a program to demonstrate the use of function template. **(2 Hours)**
13 [Templates and Generic Programming] Write a program to demonstrate the use of class template. **(2 Hours)**
14 [File Handling] Write a Program to Show how file management is done in C++. **(2 Hours)**

## Course Outcomes:

At the end of this course, students will demonstrate ability to:

- knowledge of the structure and model of the C++ programming language, (knowledge)
- evaluate user requirements for software functionality required to decide whether the C++ programming language can meet user requirements (analysis)
- design the object-oriented programs for real world problems.

**Examination Scheme:**

| IA | | | EE | | | |
|---|---|---|---|---|---|---|
| **A** | **PR** | **Practical Based Test** | **Major Experiment** | **Minor Experiment** | **Practical Record** | **Viva** |
| 5 | 10 | 15 | 35 | 15 | 10 | 10 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

## Text & References:

**Text:**


- A.R.Venugopal, Rajkumar, T. Ravishanker “Mastering C++”, TMH, 1997
- R. Lafore, “Object Oriented Programming using C++”, BPB Publications, 2004.
- “Object Oriented Programming with C++” By E. Balagurusamy.
- Schildt Herbert, “C++: The Complete Reference”, Wiley DreamTech, 2005.


**References:**


- Parasons, “Object Oriented Programming with C++”, BPB Publication, 1999.
- Steven C. Lawlor, “The Art of Programming Computer Science with C++”, Vikas Publication, 2002.
- Yashwant Kanethkar, “Object Oriented Programming using C++”, BPB, 2004

15. Study the concept of Triggers, cursors and stored procedures in DBMS. **(1 Hour)**

## Course Outcomes:

- At the end of lab session students would be able to design the Database application for the real life projects.
- Students would be able to perform insertion, deletion and updation operation on Databases.

**Examination Scheme:**

| IA | | | EE | | | |
|---|---|---|---|---|---|---|
| **A** | **PR** | **Practical Based Test** | **Major Experiment** | **Minor Experiment** | **LR** | **Viva** |
| 5 | 10 | 15 | 35 | 15 | 10 | 10 |

Note: IA –InternalAssessment, EE- External Exam, A- Attendance, PR- Performance, LR – Lab Record, V – Viva.

# DATA STRUCTURES THROUGH C++

**Course Code: CSE 202** **Credit Units: 03**

**Total Hours : 30**

**Course Objective:**

To understand the basic concepts such as Abstract Data Types, Linear and Non Linear Data structures. To understand the notations used to analyze the Performance of algorithms. To understand the behavior of data structures such as stacks, queues, trees, hash tables, search trees, Graphs and their representations. To choose an appropriate data structure for a specified application. To understand and analyze various searching and sorting algorithms. To learn to implement ADTs such as lists, stacks, queues, trees, graphs, search trees in C++ to solve problems.

**Course Contents:**

**Module I: Introduction to C++: (7 Hours)**

C++ Programming Concepts: Review of C, input and output in C++, functions in C++- value parameters, reference parameters, Parameter passing, function overloading, function templates, Exceptions-throwing an exception and handling an exception, arrays, pointers, new and delete operators, class and object, access specifiers , friend functions, constructors and destructor, Operator overloading, class templates, Inheritance and Polymorphism.

Basic Concepts - Data objects and Structures, Algorithm Specification-Introduction, Recursive algorithms, Data Abstraction, Performance analysis- time complexity and space complexity, Asymptotic Notation-Big O, Omega and Theta notations, Complexity Analysis Examples, Introduction to Linear and Non Linear data structures.

**Module II: Introduction to DS: (6 Hours)**

Representation of single, two dimensional arrays, sparse matrices-array and linked representations.

Linear list ADT-array representation and linked representation, Singly Linked Lists- Operations-Insertion, Deletion, Circularly linked lists-Operations for Circularly linked lists, Doubly Linked Lists- Operations- Insertion, Deletion.

Stack ADT, definition, array and linked implementations, applications-infix to postfix conversion, Postfix expression evaluation, recursion implementation, Queue ADT, definition, array and linked Implementations, Circular queues-Insertion and deletion operations.

**Module III: TREES: (6 Hours)**

Trees – definition, terminology, Binary trees-definition, Properties of Binary Trees, Binary Tree ADT, representation of Binary Trees-array and linked representations, Binary Tree traversals, Threaded binary trees, Priority Queues –Definition and applications, Max Priority Queue ADT-implementation-Max Heap-Definition, Insertion into a Max Heap, Deletion from a Max Heap.

Minimum Spanning Tree: Prim's and Kruskal's Algorithm, Shortest Path Algorithms.

**Module IV: SEARCHING & SORTING: (5 Hours)**

Searching - Linear Search, Binary Search, Hashing-Introduction, hash tables, hash functions, Overflow Handling, Comparison of Searching methods.

Sorting-Insertion Sort, Selection Sort, Radix Sort, Quick sort, Heap Sort, Merge sort, Comparison of Sorting methods.

**Module V: GRAPHS: (6 Hours)**

Graphs–Definitions, Terminology, Applications and more definitions, Properties, Graph ADT, Graph Representations- Adjacency matrix, Adjacency lists, Graph Search methods - DFS and BFS, Complexity analysis, Search Trees-Binary Search Tree ADT, Definition, Operations- Searching, Insertion and Deletion, Balanced search trees-AVL Trees-Definition and Examples only, B-Trees- Definition and Examples only, Red-Black Trees-Definitions and Examples only, Comparison of Search Trees.

## Course Outcomes:

- Ability to choose appropriate data structures to represent data items in real world problems.
- Ability to analyze the time and space complexities of algorithms.
- Ability to design programs using a variety of data structures such as stacks, queues, hash tables, binary trees, search trees, heaps, graphs, and B-trees.
- Able to analyze and implement various kinds of searching and sorting techniques.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | ESE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

A: Attendance, CT: Class Test, S/V/Q/HA: Seminar/Viva/Quiz/ Home Assignment, ESE: End Semester Examination;

## *Text & References:*

**Text:**

- Data structures, Algorithms and Applications in C++, S.Sahni, University Press (India) Pvt.Ltd, 2nd edition, Universities Press, Pvt. Ltd.
- Data structures and Algorithm Analysis in C++, Mark Allen Weiss, Pearson Education. Ltd., Second Edition.
- Data structures and Algorithms in C++, Michael T.Goodrich, R.Tamassia and .Mount, Wiley student edition, John Wiley and Sons.

**Reference:**

- Data structures and algorithms in C++, 3rd Edition, Adam Drozdek, Thomson
- Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.
- Problem solving with C++, The OOP, Fourth edition, W.Savitch, Pearson education.

# DATA STRUCTURES THROUGH C++ LAB

**Course Code: CSE 222** **Credit Unit: 01**
**Total Hours: 20**

**Course Objective:**
To write and execute programs in C++ to solve problems using data structures such as arrays, linked lists, stacks, queues, trees, graphs, hash tables and search trees. To write and execute write programs in C++ to implement various sorting and searching methods.

**SOFTWARE REQUIREMENTS:** Turbo C++ compiler or GCC compilers

**Course Contents:**
Lab Experiments are based on the course Data Structures Through C++ (CSE 202)
**List of experiments/ demonstrations: (Each experiment is of 2 Hours duration)**

1 Write a C++ programs to implement recursive and non recursive i) Linear search ii) Binary search
2 Write a C++ programs to implement i) Bubble sort ii) Selection sort iii) quick sort iv) insertion sort
3 Write a C++ programs to implement the following using an array.
(a) Stack ADT b) Queue ADT
4 Write a C++ programs to implement list ADT to perform following operations
(a) Insert an element into a list.
(b) Delete an element from list
(c) Search for a key element in list
(d) count number of nodes in list
5 Write C++ programs to implement the following using a singly linked list. Stack ADT b) Queue ADT
6 Write C++ programs to implement the deque (double ended queue) ADT using a doubly linked list and an array.
7 Write a C++ program to perform the following operations:
(a) Insert an element into a binary search tree.
(b) Delete an element from a binary search tree.
(c) Search for a key element in a binary search tree.
8 Write C++ programs for implementing the following sorting methods:Merge sort b) Heap sort
9 Write C++ programs that use recursive functions to traverse the given binary tree in a) Preorder b) in order and c) post order
10 Write a C++ program to perform the following operations a) Insertion into a B-tree b) Deletion from a B-tree

## Course Outcomes:

- Ability to identify the appropriate data structure for given problem.
- Graduate able to design and analyze the time and space complexity of algorithm or program.
- Ability to effectively use compilers includes library functions, debuggers and trouble shooting.

**Examination Scheme:**

| IA | | | EE | | | |
|---|---|---|---|---|---|---|
| **A** | **PR** | **Practical Based Test** | **Major Experiment** | **Minor Experiment** | **LR** | **Viva** |
| 5 | 10 | 15 | 35 | 15 | 10 | 10 |

Note: IA –Internal Assessment, EE- External Exam, A- Attendance PR- Performance, LR – Lab Record, V – Viva.

## Text & References:


- Data structures, Algorithms and Applications in C++, S.Sahni, University Press (India) Pvt.Ltd, 2nd edition, Universities Press Orient Longman Pvt. Ltd.
- Data structures and Algorithms in C++, Michael T.Goodrich, R.Tamassia and .Mount, Wiley student edition, John Wiley and Sons.
- Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI

# PROBLEM SOLVING TECHNIQUES

**Course Code: CSE 604** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
To improve problem solving skills using the concept of C,C++ and data structures and develop knowledge of basic data structures for storage and retrieval of ordered or unordered data. Data structures include: arrays, linked lists, binary trees, heaps, and hash tables etc.

**Course Contents:**

**Module I: Programming in C –I: (4 Hours)**
**Introduction:** Basic structure of C program, Concept of variables, constants and data types in C, Operators and expressions: Introduction, arithmetic, relational, Logical, Assignment, Increment and decrement operator, Conditional, bitwise operators, Expressions, Operator precedence and associativity. Managing Input and output Operation, formatting I/O.

**Control Structures and Looping:** C Statements, conditional executing using if, else, nesting of if, switch and break Concepts of loops, example of loops in C using for, while and do-while, continue and break. Storage types (automatic, register etc.), predefined processor, Command Line Argument.

**Module II: Programming in C – II: (6 Hours)**
**Arrays and Functions:** One dimensional arrays and example of iterative programs using arrays, 2-D arrays Use in matrix computations. Concept of Sub-programming, functions Example of user defined functions. Function prototype, Return values and their types, calling function, function argument, function with variable number of argument, recursion.
**Pointers:** Pointers, relationship between arrays and pointers Argument passing using pointers, Array of pointers. Passing arrays as arguments.
**String:** Strings and C string library.
**Structure:** Structure and Union, Defining C structures, Giving values to members, Array of structure, Nested structure, passing strings as arguments.
**File Handling:** Basics of file Handling.

**Module III: Object Oriented Programming in C++: (5 Hours)**
Difference between C and C++, Procedure Oriented and Object Oriented Approach, Characteristics of Object-Oriented Languages

**Classes and Objects:** Abstract data types, Object & classes, attributes, methods, C++ class declaration, Local Class and Global Class, State identity and behaviour of an object, Local Object and Global Object, Scope resolution operator, Friend Functions, Inline functions, Constructors and destructors, instantiation of objects, Types of Constructors, Static Class Data, Array of Objects, Constant member functions and Objects, Memory management Operators.
**Inheritance:** Inheritance, Types of Inheritance, access modes – public, private & protected, Abstract Classes, Ambiguity resolution using scope resolution operator and Virtual base class, Aggregation, composition vs classification hiérarchies, Overriding inheritance methods, Constructors in derived classes, Nesting of Classes.
**Polymorphism:** Polymorphism, Type of Polymorphism – Compile time and runtime, Function Overloading, Operator Overloading (Unary and Binary) Polymorphism by parameter, Pointer to objects, this pointer, Virtual Functions, pure virtual functions.

**Module IV: Data Structure –I: (7 Hours)**
Classification of Data structures, Abstract Data Types, Implementation aspects: Memory representation. Data structures operations and its cost estimation.
**Linked List:** Representation of linked list in memory, different implementation of linked list. Circular linked list, doubly linked list, etc. Application of linked list: polynomial manipulation using linked list, etc.

**Stacks:** Stacks as ADT, Different implementation of stack, multiple stacks. Application of Stack: Conversion of infix to postfix notation using stack, evaluation of postfix expression, Recursion.
**Queues:** Queues as ADT, Different implementation of queue, Circular queue, Concept of Dqueue and Priority Queue, Application of queues.

**Module V: Data Structure-II: (8 Hours)**
**Tree:** Definitions - Height, depth, order, degree etc. Binary Search Tree - Operations, Traversal, Search. AVL Tree, Heap, Applications and comparison of various types of tree; Introduction to forest, multi-way Tree, B tree, B+ tree, B* tree and red-black tree.
**Graphs:** Introduction, Classification of graph: Directed and Undirected graphs, etc, Representation, Graph Traversal: Depth First Search (DFS), Breadth First Search (BFS), Graph algorithm: Minimum Spanning Tree (MST)- Kruskal, Prim's algorithms. Dijkstra's shortest path algorithm; Comparison between different graph algorithms. Application of graphs.
**Sorting:** Introduction, Sort methods like: Bubble Sort, Quick sort. Selection sort, Heap sort, Insertion sort, Shell sort, Merge sort and Radix sort; comparison of various sorting techniques. Basic Search Techniques: Sequential search, Binary search, Comparison of search methods, Hashing & Indexing.

## Course outcomes:

- Able to understand the concepts of data structure, data type and array data structure.
- Able to implement linked list data structure to solve various problems.
- Able to understand and apply various data structure such as stacks, queues, trees and graphs to solve various computing problems using C/C++ -programming language.
- To apply concepts and techniques for implementation.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **ESE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

A: Attendance, CT: Class Test,:, S/V/Q/HA: Seminar/Viva/Quiz/ Home Assignment, ESE: End Semester Examination;

## Text & References:

***Text:***


- Yashwant Kanetkar, "Let us C", BPB Publications, 2nd Edition, 2001.
- Herbert Schildt, "C: The complete reference", Osbourne Mcgraw Hill, 4th Edition, 2002.
- A.R. Venugopal, Rajkumar, T. Ravishanker "Mastering C++", TMH, 1997
- R. Lafore, "Object Oriented Programming using C++", BPB Publications, 2004.
- A. M. Tenenbaum, "Data Structures using C & C++", Prentice-Hall of India Pvt. Ltd., New Delhi.


***Reference:***


- Kernighan & Ritchie, "C Programming Language", The (Ansi C Version), PHI, 2nd Edition.
- "Object Oriented Programming with C++" By E. Balagurusamy.
- Bruno R Preiss, "Data Structures and Algorithms with Object Oriented Design Pattern in C++",
- Jhon Wiley & Sons, Inc.
- Gilberg Forozan, "Data Structure – A pseudo code approach with C++", Cengage Learning, New Delhi.

# PROBLEM SOLVING TECHNIQUES LAB

**Course Code: CSE 624** **Credit Units: 02**
**Total Hours: 40**

**Course Objective:**
To write the programs for solving problems using the concept of C,C++ and data structures and develop knowledge of basic data structures for storage and retrieval of ordered or unordered data.

**Software Requirements:** Turbo C++ compiler

**Course Contents :**
Lab Experiments are based on the courseProblem Solving Techniques (CSE 604)

**List of experiments/demonstrations:**
**(A) Programming in C : (10 Hours)**

1. Write a simple program based on operators (pre, post increment , bitwise and , or , etc.).
2. Write a simple program based on conversions (from int to float & float to int)
3. Write a program for find the max and min from the three numbers.
4. Write the program for the simple, compound interest.
5. Write program for students marks grading.
6. C program to check whether a given number is odd or even.
7. C program to Add digits of input number.
8. C program to Factorial of a given number.
9. C program to swap two numbers without using third variable.
10. C program to check whether a given year is leap year or not.
11. C program to check whether a given number Palindrome Number or not.
12. C programs to print different patterns.
13. Program for the following using switch statement:

**Menu:-**
   (a) Sum of two numbers
   (b) Negative or Positive Number
   (c) Simple Interest
   (d) Area of Circle
   (e) Exit

14. C program to check whether a given number Prime Number or not.
15. C program to check whether a given number Armstrong Number or not.
16. C program to print Fibonacci series up to given term.
17. C program to find out sum of 10 numbers by using array.
18. C program to reverses of one array elements into another.
19. C program to find out maximum and minimum number in an array.
20. Write a C program that uses functions to perform the following:
    (a) Addition of Two Matrices
    (b) Multiplication of Two Matrices
    (c) Transpose of a matrix
21. C program to Factorial of a given number by using user define function.
22. Write a program for display values reverse order from array using pointer.
23. Write a program through pointer variable to sum of n elements from array .
24. Write a C program which copies one file to another.

**(B) Object Oriented Programming in C++ : (10 Hours)**

1. Write a program that show the concept of class and object and having function for addition,subtraction,multiplication and division of two number.
2. Program that show the concept of inline function.
3. Program that show the concept of friend function.

4. Program that show the concept of all types of constructor and destructor.
5. Program that show the concept of local class and global class.
6. Program that show the concept of local object and global object.
7. Program that show the concept of static class data and static member function.
8. Program that show the concept of constant member data and function .
9. Program that show the concept of dynamic memory allocation.
10. Program that show the concept of multiple inheritance.
11. Program that show the concept of multilevel inheritance.
12. Program that show the concept of function overloading.
13. Program that show the concept of function overriding.
14. Program that illustrates the order of execution of constructors and destructors when new class is derived from more than one base class.
15. Program that show the concept of operator overloading(overload ++ operator) .
16. Program that overload +,- for addition and subtraction of two complex number.
17. Program that show the concept of this pointer.
18. Program that illustrates how run time polymorphism is achieved using virtual functions.
19. Program that illustrates the role of virtual base class in building class hierarchy.
20. Program that illustrates the role of abstract class in building class hierarchy.

**(C) Data Structure : (20 Hours)**

1. Write a C/C++ program that uses functions to perform the following: i) Create a singly linked list of integers. ii) Delete a given integer from the above linked list. iii) Display the contents of the above list after deletion.
2. Write a C/C++ program that uses functions to perform the following: i) Create a doubly linked list of integers. ii) Delete a given integer from the above doubly linked list. iii) Display the contents of the above list after deletion.
3. Write a C/C++ program that implement the concept of Stack using array/link list.
4. Write a C/C++ program that implement the concept of Queue using array/link list..
5. Write a C/C++ program that implement the concept of Circular Queue.
6. Write a C/C++ program that implement the solution of Tower of Hanoi problem.
7. Write a C/C++ program that uses stack operations to convert a given infix expression into its postfix Equivalent.
8. Write a C/C++ program that uses functions to perform the following: i) Create a binary search tree of characters. ii) Traverse the above Binary search tree recursively in postorder.
9. Write a C/C++ program that uses functions to perform the following: i) Create a binary search tree of integers. ii) Traverse the above Binary search tree non recursively in order.
10. Write C/C++ programs for implementing the following sorting methods to arrange a list of integers in ascending order: i) Insertion sort ii) Bubble Sort iii) Insertion Sort iv) Quick Sort v) Merge sort vi) Counting Sort etc.
11. Write C/C++ programs for implementing the following graph traversal algorithms:
(i)Depth first traversal (ii)Breadth first traversal

## Course outcomes:

Able to write the program using different data structures.

- Able to implement linked list data structure to solve various problems.
- Able to apply various data structure such as stacks, queues, trees and graphs to solve various computing problems using C/C++ -programming language.
- To apply concepts and techniques for implementation.

**Examination Scheme:**

| IA | | | EE | | | |
|---|---|---|---|---|---|---|
| **A** | **PR** | **Practical Based Test** | **Major Experiment** | **Minor Experiment** | **LR** | **Viva** |
| 5 | 10 | 15 | 35 | 15 | 10 | 10 |

Note: IA –Internal Assessment, EE- External Exam, A- Attendance PR- Performance, LR – Lab Record, V – Viva.

## Text & References:

***Text:***

- Yashwant Kanetkar, "Let us C", BPB Publications, 2nd Edition, 2001.
- Herbert Schildt, "C: The complete reference", Osbourne Mcgraw Hill, 4th Edition, 2002.
- A.R. Venugopal, Rajkumar, T. Ravishanker "Mastering C++", TMH, 1997
- R. Lafore, "Object Oriented Programming using C++", BPB Publications, 2004.
- A. M. Tenenbaum, "Data Structures using C & C++", Prentice-Hall of India Pvt. Ltd., New Delhi.

***Refrence:***

- Kernighan & Ritchie, "C Programming Language", The (Ansi C Version), PHI, 2nd Edition.
- "Object Oriented Programming with C++" By E. Balagurusamy.
- Bruno R Preiss, "Data Structures and Algorithms with Object Oriented Design Pattern in C++", Jhon Wiley & Sons, Inc.
- Gilberg Forozan , "Data Structure – A pseudo code approach with C++", Cengage Learning, New Delhi.

# FORMAL LANGUAGES AND AUTOMATA THEORY

**Course Code: IT 401** **Credit Units: 04**
**Total Hours: 40**

**Course Objective:**
Students will able to understand the formal mathematical models of computation along with their relationships with formal languages. In particular, they will learn regular languages and context free languages which are crucial to understand how compilers and programming languages are built. Also students will learn that not all problems are solvable by computers, and some problems do not admit efficient algorithms. Throughout this course, students will strengthen their rigorous mathematical reasoning skills.

**Course Contents:**

**Module I: Finite Automata and Regular Languages: (10 Hours)**
Introduction- Basic Mathematical Notation and techniques- Finite State systems – Basic Definitions – Finite Automaton – DFA & NDFA – Finite Automaton with €- moves – Regular Languages- Regular Expression – Equivalence of NFA and DFA – Equivalence of NDFA‟s with and without €-moves – Equivalence of finite Automaton and regular expressions –Minimization of DFA- – Pumping Lemma for Regular sets – Problems based on Pumping Lemma.

**Module II: Grammars: (10 Hours)**
Grammar Introduction– Types of Grammar – Context Free Grammars and Languages– Derivations and Languages – Ambiguity- Relationship between derivation and derivation trees – Simplification of CFG – Elimination of Useless symbols – Unit productions – Null productions – Greibach Normal form – Chomsky normal form – Problems related to CNF and GNF. Chomsky hierarchy of languages.

**Module III: Pushdown Automata (6 Hours)**
Pushdown Automata- Definitions – Moves – Instantaneous descriptions – Deterministic pushdown automata – Equivalence of Pushdown automata and CFL – pumping lemma for CFL – problems based on pumping Lemma. Linear Bounded Automata (LBA).

**Module IV: Turing Machines: (6 Hours)**
The Turing Machine Model, Language acceptability of Turing Machine, Design of TM, Variation of TM, Universal TM, Church’s Machine. Context sensitive language and linear bounded automata (LBA), Chomsky hierarchy, Decidability, Post's correspondence problem (PCP), undecidability of PCP

**Module V: Introduction to compiler (8 Hours)**
Compilers Analysis of source Program, The Phases of a compiler, The tasks of a compiler, Analysis of the Source Program, Phases and Passes in compilers, Cousins of the compiler, The Grouping of phases, Compiler - construction tools. Lexical Analysis - The role of Lexical Analyzer, Input Buffering, Specification of Tokens, Recognition of Tokens, A Language for Specifying Lexical Analyzer, Review of Regular Expressions, Finite State Machines, Finite Automata based, Pattern Matching. Specification and recognition of tokens, a language for specifying lexical analyser

## Course Outcomes:
At the end of this course, students will be able to do the following:
- Students will demonstrate knowledge of basic mathematical models of computation and describe how they relate to formal languages.
- Students will understand that there are limitations on what computers can do, and learn examples of unsolvable problems.
- Students will learn that certain problems do not admit efficient algorithms, and identify such problems.
- Students will learn basic concepts of compiler.

# INTRODUCTION TO BLOCKCHAIN TECHNOLOGY

**Course Code: IT 501** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
Students will able to understand the Blockchain and its main application cryptocurrency. Students will learn how this system works and how can they utilize and what application can be build.

**Course Contents:**

**Module I: Introduction(8 Hours)**
Distributed Database, Two General Problem, Byzantine General problem and Fault Tolerance, Hadoop Distributed File System, Distributed Hash Table, ASIC resistance, Turing Complete. Cryptography: Hash function, Digital Signature - ECDSA, Memory Hard Algorithm, Zero Knowledge Proof.

**Module II: Blockchain(8 Hours)**
Introduction, Advantage over conventional distributed database, Blockchain Network, Mining Mechanism, Distributed Consensus, Merkle Patricia Tree, Gas Limit, Transactions and Fee,Anonymity, Reward, Chain Policy, Life of Blockchain application, Soft & Hard Fork, Private and Public blockchain.

**Module III: Distributed Consensus(8 Hours)**
Nakamoto consensus, Proof of Work, Proof of Stake, Proof of Burn, Difficulty Level, Sybil Attack, Energy utilization and alternate.

**Module IV: Cryptocurrency and Regulation(8 Hours)**
History, Distributed Ledger, Bitcoin protocols - Mining strategy and rewards, Ethereum -Construction, DAO, Smart Contract, GHOST, Vulnerability, Attacks, Sidechain, Namecoin Stakeholders, Roots of Bit coin, Legal Aspects-Crypto currency Exchange, Black Market and Global Economy.Applications:

**Module V: Blockchain Applications(8 Hours)**
Internet of Things, Medical Record Management System, Domain Name Service and future of Blockchain.

## Course Outcomes:

At the end of this course, students will be able to do the following:

- Students will demonstrate knowledge of blockchain technology
- Students will understand the concepts of Cryptocurrency
- Students will learn applications of blockchain

# AMITY SCHOOL OF ENGINEERING & TECHNOLOGY

# (Computer Science & Engineering)

## Minor Track (CSE/IT Specialization)

### (Cyber Security)

| Semester | Course Name | Vacancies Available | Course Code | Subject | Credit |
|---|---|---|---|---|---|
| **I** | Cyber Security | | **CSC 101** | Introduction to cyber security | 3 |
| **II** | | | **CSC 201** | Cyber security essentials | 3 |
| **III** | | | **CSC 301** | Cyber security operations | 3 |
| | | | **CSC 321** | Cyber security operations lab | 1 |
| | | | | | |
| **IV** | | | **CSC 401** | Applied cryptography and network security | 3 |
| | | | **CSC 421** | Applied cryptography and network security lab | 1 |
| **V** | | | **CSC 501** | Cyber laws & cyber forensics | 3 |
| | | | **CSC 521** | Cyber forensics lab | 1 |
| **VI** | | | **CSC 601** | Web application security and penetration testing design | 3 |
| | | | **CSC 621** | Web application security and penetration testing design lab | 1 |

# INTRODUCTION TO CYBER SECURITY

**Course Code: CSC 101** **Credit Units: 03**
**Total Hours: 30**

**Course Objectives:**
To understand the basics of
- Cyber security perspective.
- Use of internet and internet security
- Understand the basics of security architecture
- Real World cyber issues

**Course Contents:**

**Module I: Introduction to Cyber Space: (6 Hours)**
History of Internet and Information Security, Computer Ethics and Security Policies, Choosing the Best Browser according to the requirement and email security, Guidelines to choose web browsers, Securing web browser, Antivirus, Email security.

**Module II: Introduction to Hardware, Software and Devices Security: (7 Hours)**
Guidelines for secure password and wi-fi security, Two-step authentication, Password Manager, Wi-Fi Security, Guidelines for social media and basic Windows security, Guidelines for social media security, Tips and best practices for safer Social Networking, Basic Security for Windows, User Account Password, Smartphone security guidelines, Introduction to mobile phones, Smartphone Security.

**Module III: Networking and Communication Protocols: (6 Hours)**
Basics of Networking, basics of networking devices, topologies and their types, comparisons of router, hub, switch, Communication Protocols: Types of IoT Network and topology, Communication protocols, comparative study of OSI, TCP/IP and IOT layered architecture, IPv4/IPv6, Introduction to cloud services and cyber security.

**Module IV: Security Issues in Application Layer: (7 Hours)**
Cyber Security Applications, Social Engineering, Types of Social Engineering, Cyber Security Threat Landscape and Techniques, IT Security Act, Hackers-Attacker-Countermeasures, Web Application Security, Digital Infrastructure Security, Defensive Programming.

**Module V: Cyber Security Initiatives: (7 Hours)**
Counter Cyber Security Initiatives and Cyber Security Exercises, Cyber Security Incident Handling, Cyber Security Assurance, Online Banking, Credit Card and UPI Security, Online Banking Security, Mobile Banking Security, UPI Security, e-wallet Security Guidelines, Understanding Cyberwarfare and resolution issues in Cyber Applications.

## Course Outcomes:
The student will learn
- Determine the levels of protection and response to security incidents
- Design a consistent, reasonable information security system, with appropriate intrusion detection and reporting features
- Identify the spectrum of security activities, methods, methodologies, and procedures
- Perform inspection and protection of information assets
- Detect and react to threats to information assets
- Examine pre- and post-incident procedures
- Provide technical and managerial responses
- Present an overview of information security planning and staffing functions

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

A: Attendance, CT: Class Test, S/V/Q/HA: Seminar/Viva/Quiz/ Home Assignment, EE: End Semester Examination.

## Text & References:
- Introduction to Computer Networks and Cybersecurity by J. David Irwin

- Fundamentals of Information Security by Sanil Nadkarni
- Introduction to Cyber Security by Anand Shinde

# CYBER SECURITY ESSENTIALS

**Course Code: CSC 201** **Credit Units: 03**
**Total Hours: 30**

## Course Objectives:

- Understand the field of digital security and concepts of access control mechanism.
- To introduce keywords and jargons involved in securing browser
- Understanding network basic and familiarize on security of network protocols
- Awareness and understanding on cyber-attacks and data privacy.

**Course Contents:**

**Module I: Digital Security Primitives: (8 hours)**
Basics of digital security, protecting personal computers and devices, protecting devices from Virus and Malware, Identity, Authentication and Authorization, need for strong credentials, keeping credentials secure, protecting servers using physical and logical security, World Wide Web (www), the Internet and the HTTP protocol, security of browser to web server interaction.

**Module II: Networking basics: (6 hours)**
Design of secured networks, security for SOHO, designing home networks and VPN, managing DMZ, home network and large-scale business networks, Networking protocols, Security of protocols, sample application hosted on-premises, Information Destroying and Recovery Tools, Recovering from Information Loss, Destroying Sensitive Information.

**Module III: Detection and Prevention of cyber-attacks: (8 hours)**
Introduction to cyber-attacks, application security (design, development and testing), operations security, monitoring, identifying threats and remediating them, Principles of data security - Confidentiality, Integrity and Availability, Data Privacy, Data breaches, preventing attacks and breaches with security controls, Compliance standards, Computer Ethics.

**Module IV: Architecture of Security System: (8 hours)**
Security Architecture - an overview, Fundamentals of Designing Secure Computer Systems, Security Architecture and Design, Purpose of Cybersecurity Architecture, scopes of security architecture and paradigm, basics of ethical hacking and penetration testing.

## Course Outcomes:

The student will learn

- Apply a solid foundation in digital security and measures taken to protect device from threats.
- Learning access control mechanism and understand how to protect servers
- Understand the importance of a network basics and brief introduction on security of network protocols
- To understand cyber-attacks and learn data privacy issues and preventive measures.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

A: Attendance, CT: Class Test, S/V/Q/HA: Seminar/Viva/Quiz/ Home Assignment, EE: End Semester Examination.

## Text & References:


- Sammons, John, and Michael Cross. The basics of cyber safety: computer and mobile device safety made easy. Elsevier, 2016.

- Charles P. Pfleeger, Shari Lawrence, Pfleeger Jonathan Margulies; Security in Computing, Pearson Education Inc . 5th Edition, 2015
- Brooks, Charles J., Christopher Grow, Philip Craig, and Donald Short.; Cybersecurity essentials. John Wiley & Sons, 2018

# CYBER SECURITY OPERATIONS

**Course Code: CSC 301** **Credit Units: 03**
**Total Hours: 30**

**Course Objectives:**
- Explain how a Security Operations Center (SOC) operates and describe the different types of services that are performed from a Tier 1 SOC analyst's perspective.
- Explain Network Security Monitoring (NSM) tools that are available to the network security analyst.
- Explain the data that is available to the network security analyst.

**Course Contents:**

**Module I: Basic concepts and uses of cryptography: (6 Hours)**

An Overview of Cryptography and identify resources for hunting cyber threats, security flaws in the TCP/IP protocol, Cryptography and its Types, algorithm used in cyber security, RSA, AES, MD5, Cryptography Concepts - Web Service Security, understanding the attack of networks and hosts, common endpoint security technologies.

**Module II: Communication Characteristics and Deployment Mechanisms: (6 Hours)**

Understand the kill chain and the diamond models for incident investigations, and the use of exploit kits by threat actors, need for event data normalization and event correlation, Identify the common attack vectors, Identify malicious activities and patterns of suspicious behaviors, security incident investigations, use of a typical playbook in the SOC, use of SOC metrics to measure the effectiveness of the SOC, use of a workflow management system and automation to improve the effectiveness of the SOC.

**Module III: Incident Reporting: (8 Hours)**

Typical incident response plan and the functions of a typical Computer Security Incident Response Team (CSIRT), use of Vocabulary for Event Recording and Incident Sharing (VERIS), security incident format, Defining the Security Operations Center, Understanding Network Infrastructure and Network Security Monitoring Tools, Understanding Common TCP/IP Attacks, Understanding Endpoint Security Technologies, Understanding Incident Analysis in a Threat-Centric SOC, Identifying Resources for Hunting Cyber Threats, Understanding Event Correlation and Normalization.

**Module IV: Cyber Security Issues: (5 Hours)**

Identifying Common Attack Vectors, Malicious Activity, Patterns of Suspicious Behavior, Conducting Security Incident Investigations, Using a Playbook Model to Organize Security Monitoring, Use NSM Tools to Analyze Data Categories, Explore Endpoint Security, Investigate Hacker Methodology, Hunt Malicious Traffic, Correlate Event Logs, Packet Captures (PCAPs), Understanding Security Onion includes Elasticsearch, Logstash, Kibana, Suricata, Zeek (formerly known as Bro), Wazuh, Stenographer, TheHive, Cortex, CyberChef, NetworkMiner, and many other security tools.

**Module V: Understanding Cyber Security operation center: (5 Hours)**

Understanding SOC Metrics, Understanding SOC Workflow and Automation, Describing Incident Response, Understanding the Use of VERIS, Alerts of an Attack, Investigate Browser-Based Attacks, Analyze Suspicious Domain Name System (DNS) Activity, Explore Security Data for Analysis, Investigate Suspicious Activity Using Security Onion, Investigate Advanced Persistent Threats.

## Course Outcomes:

The student will learn
- Understand key IoT concepts on sensor network.
- Understand routing in wireless sensor network.
- How IOT work on data link and network layer.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

A: Attendance, CT: Class Test, S/V/Q/HA: Seminar/Viva/Quiz/ Home Assignment, EE: End Semester Examination.

**Text & References:**

- Cybersecurity Operations Handbook by John Ritting, William M. Hancock.
- CCNA Cybersecurity Operations Companion Guide by Cisco Networking Academy
- Cyber Operations: Building, Defending, and Attacking Modern Computer Networks by Mike O'Leary
- Principles for Cyber Security Operations by Hinne Hettema

# CYBER SECURITY OPERATIONS LAB

**Course Code: CSC 321** **Credit Unit: 01**
**Total Hours: 20**

## Course Objective:

- To provide an overview on IoT tools and applications wireless sensor network.
- To introduce hands-on IoT concepts including sensing, actuation, and communication through lab exercises with IoT development kits.

**Program List:**

1. Use NSM Tools to Analyze Data Categories**: (2 Hours)**
2. Explore Cryptographic Technologies and TCP/IP Attacks**: (2 Hours)**
3. Explore Endpoint Security and Investigate Hacker Methodology**: (2 Hours)**
4. Hunt Malicious Traffic and using Penetration Testing**: (2 Hours)**
5. Correlate Event Logs, Packet Captures (PCAPs), and Alerts of an Attack**: (2 Hours)**
6. Investigate Browser-Based Attacks**: (2 Hours)**
7. Analyze Suspicious Domain Name System (DNS) Activity**: (2 Hours)**
8. Explore Security Data for Analysis**: (2 Hours)**
9. Investigate Suspicious Activity Using Security Onion and Advanced Persistent Threats**: (2 Hours)**
10. Explore SOC Playbooks**: (2 Hours)**

## Course Outcomes:

The student will learn

- Understand key Cyber Security concepts, IDP, IDS with the help of penetration testing.

**Examination Scheme:**

| IA | | | EE | | | |
|---|---|---|---|---|---|---|
| **A** | **PR** | **Practical Based Test** | **Major Experiment** | **Minor Experiment** | **LR** | **Viva** |
| 5 | 10 | 15 | 35 | 15 | 10 | 10 |

Note: IA –Internal Assessment, EE- External Exam, A- Attendance PR- Performance, LR – Lab Record, V –Viva.

## Text & References:


- Cybersecurity Operations Handbook by John Ritting, William M. Hancock.
- CCNA Cybersecurity Operations Companion Guide by Cisco Networking Academy
- Cyber Operations: Building, Defending, and Attacking Modern Computer Networks by Mike O'Leary
- Principles for Cyber Security Operations by Hinne Hettema

# APPLIED CRYPTOGRAPHY AND NETWORK SECURITY

**Course Code: CSC 401** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The Internet is changing life as we know it – bringing new economic and social opportunities to communities throughout the world and increasing the global demand for information and communication technology (ICT) skills. Security and risk management skills are among the most highly sought-after skills in networking, and demand continues to grow. Organizations around the world are experiencing a shortage of qualified ICT candidates with the specialized knowledge and skills needed to administer devices and applications in a secure infrastructure, recognize network vulnerabilities and mitigate security threats.

- Understanding about the fundamental concepts of Network Security and role of cryptography.
- To transfer a message securely over insecure channel.
- To be able to maintain the confidentiality, Integrity and Availability of a data transferred over a Network.

**Course Contents:**
**Module I: Introduction to Applied Cryptosystems: (4 Hours)**
Protocols for identification and login: Interactive protocols, ID protocols, Password protocols, Challenge-response protocols, Schnorr's identification protocol, Proving properties in zero knowledge, One-sided authenticated key exchange, Security of protocol AKE1, Protocol PAKE0, Protocol PAKE1, Protocol PAKE2.
**Module II: Fundamentals of Security Protocols and usage: (6 Hours)**
Security Protocols and Standards, SCP, SSH, SSL, TLS, STARTTLS, IPSec, VPN, HTTPS; Encrypting and Signing Emails: PGP- GPG/open PGP, DKIM and SPF; Single Sign On (SSO)-OAUTH and OPENID, Signature and Anomaly based detection, Honeypots and Honeynets, Network Log management-syslog or SPLUNK; RBAC: Role mining; DNS-Dig tool: DNSSEC-DS and NSEC records
**Module III: Implementation of Cryptosystems: (4 Hours)**
Authenticated Key Exchange: Goals for authentication and Key Establishment, encryption-based protocol and its attacks, Perfect forward secrecy, Protocol based on ephemeral encryption, Attacks on Insecure variations, Identity protection, Password authenticated key exchange – Phishing attacks, Explicit key confirmation.
**Module IV: Network Security Primitives (4 Hours)**
Classes of Key Agreement protocols, Pairing based cryptographic protocol, ID based encryption schemes, Conference Key protocols, Security goals, Static and dynamic groups, Key exchange protocol, Techniques for Network Protection, Monitoring and Detection, Firewalls, packet filter and stateful firewalls, application aware firewalls, personal firewalls, Proxies, NAT, ACL.
**Module V: Security issues and solutions: (8 Hours)**
Intrusion Detection System-Snort, Attack Techniques: Network reconnaissance-Nmap and vulnerability audits-openVAS; DNS based attacks, Phishing-DNSTwist; Network based malware attacks: Remote access Trojan Poison Ivy and Domain name generation algorithm based Botnets; LAN attacks: ARP Cache poisoning- Ettercap/arp spoof, MAC flooding, Man in the middle attacks, Port Stealing, DHCP attacks, VLAN hopping; Network Sniffing - Wireshark and Password Cracking-John the Ripper; Attacks on SSL/TLS: SSL stripping, Drown and Poodle attack; Network packet creation and Manipulation using scapy and dpkt libraries.
**Module VI: Protecting the Network Infrastructure: (4 Hours)**
Network Services such as NTP, SNMP are used to provide facilities such as time synchronization among all devices, health status, etc. If these Services are not configured properly, these become vulnerable to attacks, VPN, IPSec, RADIUS and TACACS+, Intrusion Prevention System, Operation of Host-Based and Network-Based Intrusion Prevention Systems, Content and Endpoint Security.

## Course Outcomes:
The student will learn

- Understand various techniques for Network Protection and explore new tools and attacks in network security domain
- Exploring DNS, DNS based attacks and DNSSEC

- Familiarize the LAN based attacks and its mitigations
- Exploring Secure Network Communication protocols and attacks

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

A: Attendance, CT: Class Test, S/V/Q/HA: Seminar/Viva/Quiz/ Home Assignment, EE: End Semester Examination.

## Text & References:


- William Stallings, Cryptography and Network Security: Principles and Practice,8th Edition, Pearson edition, 2020.
- Behrouz A. Forouzan, Cryptography & Network Security, McGraw-Hill.
- W. Stallings, Network Security Essentials: Applications and Standards, Pearson Prentice Hall.
- Bryan Sullivan and Vincent Liu, Web Application Security, A Beginner's Guide, McGraw-Hill Education.
- C. Kaufman, R. Perlman and M. Speciner, Network Security: Private Communication in a Public World, 2nd Edition, Prentice Hall PTR, 2002.
- Boyd, Colin, Anish Mathuria, and Douglas Stebila. Introduction to Authentication and Key Establishment. Protocols for Authentication and Key Establishment. Springer, Berlin, Heidelberg; 2020
- Boneh, Dan, and Victor Shoup. A graduate course in applied cryptography.

# APPLIED CRYPTOGRAPHY AND NETWORK SECURITY LAB

**Course Code: CSC 421** | **Credit Unit: 01**
**Total Hours: 20**

**Course Objective:**
IoT Fundamentals curriculum provides students with a comprehensive understanding of the Internet of Things (IoT). It develops foundational skills using hands-on lab activities that stimulate the students in applying creative problem-solving and rapid prototyping in the interdisciplinary domain of electronics, networking, security, data analytics, and business.

**Program List:**
1. Describe the security threats facing modern network infrastructures**: (2 Hours)**
2. Secure network device access and Administer effective security policies**: (2 Hours)**
3. Implement AAA on network devices**: (2 Hours)**
4. Mitigate threats to networks using ACLs**: (2 Hours)**
5. Implement secure network management and reporting**: (2 Hours)**
6. Mitigate common Layer 2 attacks**: (2 Hours)**
7. Implement the Cisco IOS firewall feature set**: (2 Hours)**
8. Implement an ASA**: (2 Hours)**
9. Implement the Cisco IOS IPS feature set**: (2 Hours)**
10. Implement site-to-site IPSec VPNs**: (2 Hours)**

## Course Outcomes:
The student will learn
- Understand key IoT concepts with Big Data.
- Understand Data Analytics and Machine Learning.
- How IOT work with Big Data.

**Examination Scheme:**

| IA | | | EE | | | |
|---|---|---|---|---|---|---|
| **A** | **PR** | **Practical Based Test** | **Major Experiment** | **Minor Experiment** | **LR** | **Viva** |
| 5 | 10 | 15 | 35 | 15 | 10 | 10 |

Note: IA –Internal Assessment, EE- External Exam, A- Attendance PR- Performance, LR – Lab Record, V –Viva.

## Text & References:

- W. Stallings, Network Security Essentials: Applications and Standards, Pearson Prentice Hall.
- Bryan Sullivan and Vincent Liu, Web Application Security, A Beginner's Guide, McGraw-Hill Education.
- C. Kaufman, R. Perlman and M. Speciner, Network Security: Private Communication in a Public World, 2nd Edition, Prentice Hall PTR, 2002.

# CYBER LAWS & CYBER FORENSICS

**Course Code: CSC 501** **Credit Units: 03**
**Total Hours: 30**

**Course Objectives:**

- To provide the fundamentals of digital and cyber space, impact of the activities.
- To cover the fundamentals of cyber-crime and steps involved in collecting the evidence through various tools.
- To provide basics of Cyber-crime incidents and implementing cyber law based on IT Act

**Course Contents:**

**Module I: Introduction to cyber laws & cyber forensics: (6 Hours)**
Classifications of Cyber Crimes against individuals, property and nation, Need for Digital forensics and steps in digital forensics (scientific methods), Number System: Binary, Decimal, Hexadecimal, ASCII, and Unicode representation of data, Arenas for digital forensics: disk, network, wireless, database, mobile, e-mail, GPS and memory, Incident handling and response with forensic triage, Ethical Hacking and future of cybercrime.

**Module II: Fundamentals for Cyber Forensics: (6 Hours)**
Locard's exchange principle and digital forensic investigation models, types: artifacts, identifying raw and proprietary forensic storage formats, identification of potential evidence: slack space, swap space, steganography, recovery of hidden, deleted and corrupt data, standard file formats with their headers and forensic file carving, planning your investigation, order of volatility and forensic triage, overview of file systems.

**Module III: Rules for Cyber Security and Digital Forensics: (6 Hours)**
Rules of collecting Digital Evidence, Standard collection procedures: seizure, write blockers, bit-stream imaging, hashing, Chain of Custody (COC), evidence bags and SOP for collecting evidence, Source and Location of Digital Evidence, Duplicating and Preserving Digital Evidence, Importance of MAC timings, Types of System logs and Windows Registry.

**Module IV: Implementation of Cyber Law and Digital Forensics: (6 Hours)**
Forensic laboratory requirements: setting up of lab, evaluating lab staff, selection of appropriate forensic workstations, backup and recovery plans, generating forensically sound reports, IPR and Cyber Laws in India - IT Act 2000 and 2008 Amendment and like-minded IPC sections, Code of Ethics, Expert Witness and analyzing sample forensic reports.

**Module V: Practical approaches of Cyber Forensics: (6 Hours)**
Validating and gathering evidence using DOS Commands and Unix/Linux Commands, Forensic imaging using DD commands, Software tools - Open Source and proprietary digital forensic frameworks, Hardware tools - write blockers, images and evidence protection containers/bags, NIST tools - CFReDS, CTFF and NSRL and analyzing e-mail headers and network packets.

## Course Outcomes:

The student will learn

- Explain the concept of digital forensics and cyber forensics
- Understand and able to perform cyber forensics for the cybercrime incident
- Able to use different forensics tools and standard to report the real-world cyber incidents
- Familiarizing the fundamentals of Anti-forensics and Cyber laws.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

A: Attendance, CT: Class Test, S/V/Q/HA: Seminar/Viva/Quiz/ Home Assignment, EE: End Semester Examination.

**Text & References:**


- E. Casey, Handbook of Digital Forensics and Investigation, Academic Press; 2010.

- David Cowen, Computer Forensics: A Beginners Guide, McGraw Hill Education.
- Bill Nelson, Amelia Phillips, Christopher Steuart, Guide to Computer Forensics and Investigations.
- Brian Carrier, File System Forensic Analysis, Pearson.
- Marjie T. Britz, Computer Forensics and Cyber Crime, Pearson**.**

# CYBER FORENSICS LAB

**Course Code: CSC 521** **Credit Unit: 01**
**Total Hours: 20**

**Course Objectives:**
Cyber Security enables the stakeholders to use various range of tools, software and equipment's to enhance the knowledge in Information security and Cyber Forensics for the purpose of consulting and training.

- Understand key terms and concepts in cyber law, intellectual property and cyber-crimes, trademarks and domain theft.
- To understand important cyber security legal principles that need to be made as an integral component and part of the growth and further evolution of emerging technologies.

**Program List :**

1. How implement security and privacy concerns**: (2 Hours)**
2. Implement Mobile Forensics**: (2 Hours)**
3. Understanding Digital Forensics**: (2 Hours)**
4. Understanding Cell Site Analyzer**: (2 Hours)**
5. Use of Computer Forensic Investigation and Cyber Terrorism**: (2 Hours)**
6. Use of XG-1541 Base pfSense+ Security Gateway**: (2 Hours)**
7. Implementing System Security and System Monitoring**: (2 Hours)**
8. Implement Security Auditing**: (2 Hours)**
9. Design Information Security Virtual Lab: **(2 Hours)**
10. Highly scalable infrastructure to create Virtualized environnement for Virtual machine server consolidation and Creating and managing server profiles for target users: **(2 Hours)**

**Course Outcomes :**
Upon completion of this course, students will be able to:

- Describe and analyze the hardware, software, components of a network and the interrelations.
- Explain networking protocols and their hierarchical relationship hardware and software. Compare protocol models and select appropriate protocols for a particular design.
- Manage multiple operating systems, systems software, network services and security. Evaluate and compare systems software and emerging technologies.
- Develop solutions for networking and security problems, balancing business concerns, technical issues and security.

**Examination Scheme:**

| IA | | | EE | | | |
|---|---|---|---|---|---|---|
| **A** | **PR** | **Practical Based Test** | **Major Experiment** | **Minor Experiment** | **LR** | **Viva** |
| 5 | 10 | 15 | 35 | 15 | 10 | 10 |

Note: IA –Internal Assessment, EE- External Exam, A- Attendance PR- Performance, LR – Lab Record, V –Viva.

**Text & References:**


- David Cowen, Computer Forensics: A Beginners Guide, McGraw Hill Education.
- Bill Nelson, Amelia Phillips, Christopher Steuart, Guide to Computer Forensics and Investigations.
- Brian Carrier, File System Forensic Analysis, Pearson.
- Marjie T. Britz, Computer Forensics and Cyber Crime, Pearson
- Cyber Security Law by Pavan Duggal

# WEB APPLICATION SECURITY AND PENETRATION TESTING DESIGN

**Course Code: CSC 601** **Credit Units: 03**
**Total Hours: 30**

**Course Objectives:**

- The course will cover the concepts involved in web application development.
- The course will introduce to various vulnerabilities in web applications and their mitigation techniques.

**Course Contents:**

**Module I: Introduction: (8 Hours)**
Web application development – Introduction - Architecture – Client-side technologies and frameworks – HTML – CSS – Java Script - Ajax/Fetch - Data interchange formats – XML, JSON. Sever-side scripting and technologies - development – technologies - Handling client requests – Database connectivity – Sessions – Cookies

**Module II: Security threats and Vulnerabilities: (6 Hours)**
Web application vulnerabilities – Client-side Vulnerabilities - Cross Site Scripting (XSS) - Cross Site Request Forgery (CSRF) - Cross-origin resource sharing (CORS) – Clickjacking; Server-side Vulnerabilities - SQL injection - OS command injection - Directory traversal - Authentication - Server-side request forgery (SSRF).

**Module III: Protocol engineering: (4 Hours)**
Experiments with open-source network simulators (NS2 and NS3): Installation and configuration, Creation of network topology and understanding of packet switched network, Simulation and visualization of different types of traffic—congestion controlled, and non-congestion controlled, Trace analysis and visualization of protocol dynamics.

**Module IV: Implementing network security Protocols: (4 Hours)**
Simulation with active queue management schemes, Simulation and visualization of attacks (e.g. IP spoofing and reflection attacks). Socket programming: implementation of IP spoofing and reflection DDoS attacks. Linux Kernel: Familiarization with Linux kernel protocol implementation (TCP/IP) implementation, Tracing and debugging of Linux Kernel TCP/IP source code, Kernel modification and recompilation, Implementation of a non-attack in Linux kernel Network Emulation and testbeds: Network emulation and traffic control using tc (traffic control), dummynet and other advanced tools, Familiarization with advanced testbed technologies (e.g. Emulab, DETER and PlanetLab, etc.), formal verification of protocol: SPIN, UPPAL.

**Module V: Design and Implementation of Penetration Testing: (8 Hours)**
Causes of Vulnerabilities, Penetration Testing Tools, Use external penetration testers to find problems, Planning and reconnaissance, scanning of ports, Penetration testing methods, Feedback results to the defect management and mitigation system, Scheduling of periodic penetration tests for application coverage, use external penetration testers to perform deep-dive analysis, Customize penetration testing tools.

## Course Outcomes:

The student will learn

- Apply client-side web development to design interactive front-end web user interfaces.
- Use server-side web application concepts to develop back-end web server application
- Identify and mitigate various client-side web application security vulnerabilities
- Identify and mitigate various server-side web application security vulnerabilities

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

A: Attendance, CT: Class Test, S/V/Q/HA: Seminar/Viva/Quiz/ Home Assignment, EE: End Semester Examination.

## Text & References:


- W. Stallings, Network Security Essentials: Applications and Standards,6th Edition, Pearson Prentice Hall, 2016.
- Bryan Sullivan and Vincent Liu, Web Application Security, A Beginner's Guide, McGraw-Hill Education, 2012.
- C. Kaufman, R. Perlman and M. Speciner, Network Security: Private Communication in a Public World, 2nd Edition, Prentice Hall PTR, 2002

# WEB APPLICATION SECURITY AND PENETRATION TESTING DESIGN LAB

**Course Code: CSC 621** **Credit Unit: 01**
**Total Hours: 20**

**Course Objectives:**

- This course provides a quick overview of understanding the network topology and its attacks by visualizing it with network simulators.
- It also focusses on exploring network protocols and its attacks in Linux environment.
- Providing a platform to experiment with advanced testbed technologies, and formal verification of protocols.

**Programs List:**

1. Apply OWASP's methodology to your web application penetration tests to ensure they are consistent, reproducible, rigorous, and under quality control**: (2 Hours)**.
2. Analyze the results from automated web testing tools to validate findings, determine their business impact, and eliminate false positives**: (2 Hours)**.
3. Manually discover key web application flaws and create testing and exploitation scripts during a penetration test**: (2 Hours)**.
4. Discover and exploit SQL Injection flaws to determine true risk to the victim organization**: (2 Hours)**.
5. Understand and exploit insecure deserialization vulnerabilities with ysoserial and similar tools**: (2 Hours)**.
6. Create configurations and test payloads within other web attacks and Fuzz potential inputs for injection attacks, Explain the impact of exploitation of web application flaws**: (2 Hours)**.
7. Analyze traffic between the client and the server application using tools such as the Zed Attack Proxy and BurpSuite Pro to find security issues within the client-side application code**: (2 Hours)**.
8. Manually discover and exploit Cross-Site Request Forgery (CSRF) attacks**: (2 Hours)**.
9. Use the Browser Exploitation Framework (BeEF) to hook victim browsers, attack client software and the network, and evaluate the potential impact that XSS flaws have within an application**: (2 Hours)**.
10. Perform two complete web penetration tests, one during the five sections of course instruction, and the other during the Capture the Flag exercise**: (2 Hours)**.

## Course Outcomes:

The student will learn

- Familiarization of open-source network simulators and its experiments.
- Understanding the protocol dynamics, simulation with active queue management schemes and visualization of attacks.
- Familiarization with Linux Kernel Protocol implementation, kernel modification and recompilation.
- Exploring the formal verification of protocols, network emulation, and testbed technologies.

**Examination Scheme:**

| IA | | | EE | | | |
|---|---|---|---|---|---|---|
| A | PR | Practical Based Test | Major Experiment | Minor Experiment | LR | Viva |
| 5 | 10 | 15 | 35 | 15 | 10 | 10 |

Note: IA –Internal Assessment, EE- External Exam, A- Attendance PR- Performance, LR – Lab Record, V –Viva.

## Text & References:


- W. Stallings, Network Security Essentials: Applications and Standards,6th Edition, Pearson Prentice Hall, 2016.
- Bryan Sullivan and Vincent Liu, Web Application Security, A Beginner's Guide, McGraw-Hill Education, 2012.
- C. Kaufman, R. Perlman and M. Speciner, Network Security: Private Communication in a Public World, 2nd Edition, Prentice Hall PTR, 2002.

# Bachelor of Technology
# (Civil Engineering)

# CE

# CURRICULUM

# (2018-22 Batch)

# (AICTE)

# Bachelor of Technology
# (Civil Engineering)

## Duration – 4 Years Full Time

## Programme Structure
## &
## Curriculum & Scheme of Examination

## 2018-22
## (Based on AICTE)

# AMITY UNIVERSITY
## MADHYA PRADESH

# PREAMBLE

Amity University aims to achieve academic excellence by providing multi-faceted education to students and encourage them to reach the pinnacle of success. The University has designed a system that would provide rigorous academic programme with necessary skills to enable them to excel in their careers.

This booklet contains the Programme Structure, the Detailed Curriculum and the Scheme of Examination. The Programme Structure includes the courses (Core and Elective), arranged semester wise. The importance of each course is defined in terms of credits attached to it. The credit units attached to each course has been further defined in terms of contact hours i.e. Lecture Hours (L), Tutorial Hours (T), Practical Hours (P). Towards earning credits in terms of contact hours, 1 Lecture and 1 Tutorial per week are rated as 1 credit each and 2 Practical hours per week are rated as 1 credit. Thus, for example, an L-T-P structure of 3-0-0 will have 3 credits, 3-1-0 will have 4 credits, and 3-1-2 will have 5 credits.

The Curriculum and Scheme of Examination of each course includes the course objectives, course contents, scheme of examination and the list of text and references. The different codes used for the components of evaluation are given below:-

| **Components** | **Codes** |
|---|---|
| Case Discussion/ Presentation/ Analysis | C |
| Home Assignment | H |
| Project | P |
| Seminar | S |
| Viva | V |
| Quiz | Q |
| Class Test | CT |
| Attendance | A |
| End Semester Examination | ESE |

It is hoped that it will help the students study in a planned and a structured manner and promote effective learning. Wishing you an intellectually stimulating stay at Amity University.

April, 2019

# PROGRAM OUTCOMES

**PO1**. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

**PO2. Problem Analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

**PO3. Design/Development of Solutions: Design** solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

**PO4. Conduct Investigations of Complex Problems: Use** research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

**PO5. Modern Tool Usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

**PO6. The Engineer and Society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

**PO7. Environment and Sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**PO8. Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

**PO9. Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**PO10. Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

**PO11. Life-long Learning**: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

**PO12. Project Management and Finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

## PROGRAM SPECIFIC OUTCOMES

**PSO1.** Apply principles of mechanics and basic sciences to analyze civil engineering structures
**PSO2.** Survey, map, measure and analyze data for sustainable infrastructure planning.
**PSO3.** Characterize and evaluate materials for adoptability in civil engineering projects.
**PSO4.** Analyze and design concrete & steel structures, earthen embankments, irrigation structures, water supply, waste treatment systems and transport systems.
**PSO5.** Apply best management practices for construction and maintenance of infrastructure facilities.
**PSO6.** Predict and forecast societal needs, floods, droughts, pollution and travel demand.
**PSO7.** Work and lead in multi-disciplinary projects and demonstrate social responsibility and professional ethics.
**PSO8.** Engage in research and life-long learning to adapt to changing environment.

## PROGRAMME STRUCTURE

| FIRST SEMESTER | | | | | | |
|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Lecture (L) Hours Per week** | **Tutorial (T) Hours Per week** | **Practical (P) Hours Per week** | **Total Credits** | **Page No** |
| **Compulsory Courses:** | | | | | | |
| BTCE 101 | Mathematics – I<br>(Calculus and Linear Algebra) | 3 | 1 | - | 4 | |
| BTCE 102 | Chemistry – I<br>(Concepts in Chemistry for Engineering) | 3 | 1 | - | 4 | |
| BTCE 103 | Basic Electrical Engineering | 3 | 1 | - | 4 | |
| BTCE 104 | Engineering Graphics & Design | 1 | - | - | 1 | |
| BTCE 120 | Chemistry – I Lab | - | - | 4 | 2 | |
| BTCE 121 | Basic Electrical Engineering Lab | - | - | 2 | 1 | |
| BTCE 122 | Engineering Graphics & Design Lab | - | - | 4 | 2 | |
| BTCE 142 | Environmental Studies – I | 2 | - | - | 2 | |
| | **TOTAL** | | | | **20** | |
| **Optional Courses - Value Added Courses; Any Three: Hrs/Semester** | | | | | | |
| BTCE 141 | Communication Skill – I<br>(English Language Usage Essentials) | 30 | | | | |
| BTCE 143 | Behavioural Science – I | 30 | | | | |
| BTCE 144<br>BTCE 145<br>BTCE 146<br>BTCE 147<br>BTCE 148 | Foreign Language - I<br>French<br>German<br>Spanish<br>Japanese<br>Chinese | 30 | | | | |
| **CBCS** | | | | | 3 | |
| **TOTAL CREDITS (Including CBCS)** | | | | | **27** | |
| **Total Hrs Including CBCS per week** | | | | | **32** | |
| **Total Hrs in the Semester** | | | | | **320** | |

| SECOND SEMESTER | | | | | | |
|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Lecture (L) Hours Per week** | **Tutorial (T) Hours Per week** | **Practical (P) Hours Per week** | **Total Credits** | **Page No** |
| **Compulsory Courses:** | | | | | | |
| BTCE 201 | Mathematics – II (Ordinary Differential Equations and Complex Variable) | 3 | 1 | - | 4 | |
| BTCE 202 | Physics (Mechanics) | 3 | 1 | - | 4 | |
| BTCE 203 | Programming for Problem Solving | 3 | - | - | 3 | |
| BTCE 204 | Workshop/ Manufacturing Practices | 1 | - | - | 1 | |
| BTCE 220 | Physics (Mechanics) Lab | - | - | 4 | 2 | |
| BTCE 221 | Programming for Problem Solving Lab | - | - | 4 | 2 | |
| BTCE 222 | Workshop/ Manufacturing Practices Lab | - | - | 4 | 2 | |
| BTCE 242 | Environmental Studies - II | 2 | - | - | 2 | |
| | **TOTAL** | | | | **20** | |
| **Optional Courses - Value Added Courses; Any Three: Hrs/Semester** | | | | | | |
| BTCE 241 | Communication Skill-II (Introduction to Communication Skill) | 30 | | | | |
| BTCE 243 | Behavioural Science - II | 30 | | | | |
| BTCE 244<br>BTCE 245<br>BTCE 246<br>BTCE 247<br>BTCE 248 | Foreign Language - II<br>French<br>German<br>Spanish<br>Japanese<br>Chinese | 30 | | | | |
| **CBCS** | | 3 | - | - | 3 | |
| **TOTAL CREDITS (Including CBCS)** | | | | | **27** | |
| **Total Hrs Including CBCS** | | | | | **33** | |
| **Total Hrs in the Semester** | | | | | **330** | |
| TERM PAPER DURING SUMMER BREAK | | | | | | |

| THIRD SEMESTER | | | | | | |
|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Lecture (L) Hours Per week** | **Tutorial (T) Hours Per week** | **Practical (P) Hours Per week** | **Total Credits** | **Page No** |
| **Compulsory Courses:** | | | | | | |
| BTCE 301 | Applied Mathematics – III (Transform, Numerical and Discrete Mathematics) | 3 | - | - | 3 | |
| CIV 302 | Computer-Aided Civil Engineering Drawing | 2 | - | - | 2 | |
| CIV 303 | Engineering Mechanics | 3 | 1 | - | 4 | |
| CIV 304 | Energy Science & Engineering | 1 | 1 | - | 2 | |
| CIV 305 | Basic Civil Engineering | 2 | - | - | 2 | |
| BME 104 | Mechanical Engineering | 2 | - | - | 2 | |
| ECE 307 | Basic Electronics | 2 | - | - | 2 | |
| CIV 306 | Biology for Engineers | 2 | - | - | 2 | |
| CIV 307 | Life Science | 2 | - | - | 2 | |
| CIV 322 | Computer-aided Civil Engineering Drawing Lab | - | - | 2 | 1 | |
| ECE 327 | Basic Electronics Lab | - | - | 2 | 1 | |
| NTP 330 | **Term paper (Evaluation)** | - | - | - | 2 | |
| | **TOTAL** | | | | **25** | |
| **Optional Courses - Value Added Courses; Any Three: Hrs/Semester** | | | | | | |
| BCU 341 | Communication Skills – III | 30 | | | | |
| BSU 343 | Behavioural Science – III | 30 | | | | |
| FLU 344<br>FLU 345<br>FLU 346<br>FLU 347<br>FLU 348 | Foreign Language – III<br>French<br>German<br>Spanish<br>Japanese<br>Chinese | 30 | | | | |
| **CBCS** | | | - | - | 3 | |
| **TOTAL CREDITS (Including CBCS)** | | | | | **32** | |
| **Total Hrs. including CBCS** | | | | | **32** | |
| **Total Hrs in the Semester** | | | | | **320** | |

| FOURTH SEMESTER | | | | | | |
|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Lecture (L) Hours Per week** | **Tutorial (T) Hours Per week** | **Practical (P) Hours Per week** | **Total Credits** | **Page No** |
| **Compulsory Courses:** | | | | | | |
| CIV 401 | Materials, Testing & Evaluation | 2 | - | - | 2 | |
| CIV 402 | Engineering Geology | 2 | - | - | 2 | |
| CIV 403 | Surveying | 1 | 1 | - | 2 | |
| CIV 404 | Fluid Mechanics | 2 | - | - | 2 | |
| CIV 405 | Solid Mechanics | 2 | - | - | 2 | |
| CIV 406 | Disaster Preparedness & Planning | 1 | 1 | - | 2 | |
| CIV 407 | Civil Engineering - Societal & Global Impact | 1 | 1 | - | 2 | |
| ECE 407 | Instrumentation & Sensor Technologies for Civil Engineering Applications | 2 | - | - | 2 | |
| CIV 421 | Materials Testing and Evaluation Lab | - | - | 2 | 1 | |
| CIV 422 | Engineering Geology Lab | - | - | 2 | 1 | |
| CIV 423 | Surveying lab | - | - | 2 | 1 | |
| CIV 424 | Fluid Mechanics Lab | - | - | 2 | 1 | |
| ECE 427 | Instrumentation & Sensor Technologies for Civil Engineering Applications Lab | - | - | 2 | 1 | |
| | **TOTAL** | | | | **23** | |
| **Optional Courses - Value Added Courses; Any Three: Hrs/Semester** | | | | | | |
| BCU 441 | Communication Skills – IV | 30 | | | | |
| BSU 443 | Behavioural Science – IV | 30 | | | | |
| <br>FLU 444<br>FLU 445<br>FLU 446<br>FLU 447<br>FLU 448 | Foreign Language – IV<br>French<br>German<br>Spanish<br>Japanese<br>Chinese | 30 | | | | |
| **CBCS** | | | | - | 4 | |
| **TOTAL CREDITS (Including CBCS)** | | | | | **29** | |
| **Total Hours including CBCS** | | | | | **34** | |
| **Total Hours in the Semester** | | | | | **340** | |
| INDUSTRIAL PRACTICAL TRAINING – I: 6 – 8 WEEKS | | | | | | |

| FIFTH SEMESTER | | | | | | |
|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Lecture (L) Hours Per week** | **Tutorial (T) Hours Per week** | **Practical (P) Hours Per week** | **Total Credits** | **Page No** |
| **Compulsory Courses:** | | | | | | |
| CIV 501 | Mechanics of Materials | 3 | - | - | 3 | |
| CIV 502 | Hydraulic Engineering | 2 | - | - | 2 | |
| CIV 503 | Structural Engineering | 3 | - | - | 3 | |
| CIV 504 | Geotechnical Engineering | 2 | - | - | 2 | |
| CIV 505 | Hydrology & Water Resources Engineering | 3 | - | - | 3 | |
| CIV 506 | Environmental Engineering – I | 3 | - | - | 3 | |
| CIV 507 | Transportation Engineering | 2 | - | - | 2 | |
| CIV 522 | Hydraulic Engineering Lab | - | - | 2 | 1 | |
| CIV 524 | Geotechnical Engineering Lab | - | - | 2 | 1 | |
| CIV 527 | Transportation Engineering Lab | - | - | 2 | 1 | |
| NPT 550 | **Industrial Practical Training – I (Evaluation)** | - | - | - | 3 | |
| | **TOTAL** | | | | **24** | |
| **Optional Courses - Value Added Courses; Any Three: Hrs/Semester** | | | | | | |
| BCU 541 | Communication Skills – V | 30 | | | | |
| BSU 543 | Behavioural Science – V | 30 | | | | |
| <br>FLU 544<br>FLU 545<br>FLU 546<br>FLU 547<br>FLU 548 | Foreign Language – V<br>French<br>German<br>Spanish<br>Japanese<br>Chinese | 30 | | | | |
| **CBCS** | | | | - | 4 | |
| **TOTAL CREDIT (Including CBCS)** | | | | | **32** | |
| **Total Hours including CBCS** | | | | | **32** | |
| **Total hours in semester** | | | | | **320** | |

| **SIXTH SEMESTER** | | | | | | |
|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Lecture (L) Hours Per week** | **Tutorial (T) Hours Per week** | **Practical (P) Hours Per week** | **Total Credits** | **Page No** |
| **Compulsory Courses:** | | | | | | |
| CIV 601 | Construction Engineering & Management | 2 | 1 | - | 3 | |
| CIV 602 | Geometric Design of Highways | 3 | - | - | 3 | |
| CIV 603 | Environmental Engineering – II | 3 | - | - | 3 | |
| CIV 604 | Estimating and Costing | 2 | - | - | 2 | |
| CIV 622 | Geometric Design of Highways Lab | - | - | 2 | 1 | |
| CIV 623 | Environmental Engineering – II Lab | - | - | 2 | 1 | |
| CIV 624 | Estimating and Costing Lab | - | - | 2 | 1 | |
| BCH 620 | Engineering Economics | 2 | 1 | | 3 | |
| **ELECTIVES (Any one from following with Practical)** | | | | | 4 | |
| CIV 605 | River Engineering | 3 | - | - | - | - |
| CIV 606 | Open Channel Flow | 3 | - | - | - | - |
| CIV 607 | Solid and Hazardous Waste Management | 3 | - | - | - | - |
| CIV 625 | River Engineering Lab | - | - | 2 | - | - |
| CIV 626 | Open Channel Flow Lab | - | - | 2 | - | - |
| CIV 627 | Solid and Hazardous Waste Management Lab | - | - | 2 | - | - |
| NMP 660 | **Minor Project** | - | - | - | 2 | - |
| | **TOTAL** | | | | **23** | |
| **Optional Courses - Value Added Courses; Any Three: Hrs/Semester** | | | | | | |
| BCU 641 | Communication Skills – VI | 30 | | | | |
| BSU 643 | Behavioural Science – VI | 30 | | | | |
| FLU 644<br>FLU 645<br>FLU 646<br>FLU 647<br>FLU 648 | Foreign Language – VI<br>French<br>German<br>Spanish<br>Japanese<br>Chinese | 30 | | | | |
| **CBCS** | | - | - | - | 1 | - |
| **TOTAL CREDIT (Including CBCS)** | | | | | **28** | |
| **Total Hours per week** | | | | | **29** | |
| **Total hours in semester** | | | | | **290** | |
| INDUSTRIAL PRACTICAL TRAINING II: 6-8 WEEKS | | | | | | |

| SEVENTH SEMESTER | | | | | | |
|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Lecture (L) Hours Per week** | **Tutorial (T) Hours Per week** | **Practical (P) Hours Per week** | **Total Credits** | **Page No** |
| **Compulsory Courses:** | | | | | | |
| CIV 701 | Design of Concrete Structures | 3 | 1 | | 4 | |
| **ELECTIVES (Any one from each category)**<br>A. (With Practical) | | | | | 4 | |
| CIV 702 | Surface Hydrology | 3 | - | - | - | |
| CIV 703 | Water Resources Field Methods | 3 | - | - | - | |
| CIV 704 | Environmental Fluid Mechanics | 3 | - | - | - | |
| CIV 722 | Surface Hydrology Lab | - | - | 2 | - | |
| CIV 723 | Water Resources Field Methods Lab | - | - | 2 | - | |
| CIV 724 | Environmental Fluid Mechanics Lab | - | - | 2 | - | |
| **ELECTIVES (Any one from each category)**<br>B. (Without Practical) | | | | | 3 | |
| CIV 705 | Concrete Technology | 3 | - | - | - | |
| CIV 706 | Pres-stressed Concrete | 3 | - | - | - | |
| CIV 707 | Masonry Structures | 3 | - | - | - | |
| NPT 750 | **Industrial Practical Training–II (Evaluation)** | - | - | - | 5 | |
| NMP 760 | **Major Project – I** | - | - | - | 6 | |
| **Optional Courses - Value Added Courses; Any Three: Hrs/Semester** | | | | | | |
| BCU 741 | Communication Skills – VII | 30 | | | | |
| BSU 743 | Behavioural Science – VII | 30 | | | | |
| <br>FLU 744<br>FLU 745<br>FLU 746<br>FLU 747<br>FLU 748 | Foreign Language – VII<br>French<br>German<br>Spanish<br>Japanese<br>Chinese | 30 | | | | |
| **TOTAL CREDIT** | | | | | **26** | |
| **Total hours per week** | | | | | **16** | |
| **Total hours in semester** | | | | | **160** | |

| EIGHTH SEMESTER | | | | | | |
|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Lecture (L) Hours Per week** | **Tutorial (T) Hours Per week** | **Practical (P) Hours Per week** | **Total Credits** | |
| **Compulsory Courses:** | | | | | | |
| CIV 801 | Design of Steel Structures | 3 | 1 | - | 4 | |
| CIV 802 | Airport Planning and Design | 3 | - | - | 3 | |
| **ELECTIVES (Any one from following with Practical)** | | | | | 4 | |
| CIV 803 | Foundation Engineering | 3 | - | - | - | |
| CIV 804 | Structural Geology | 3 | - | - | - | |
| CIV 805 | Rock Mechanics | 3 | - | - | - | |
| CIV 823 | Foundation Engineering Lab | - | - | 2 | - | |
| CIV 824 | Structural Geology Lab | - | - | 2 | - | |
| CIV 825 | Rock Mechanics Lab | - | - | 2 | - | |
| NMP 860 | **Major Project – II** | - | - | - | 9 | |
| | **TOTAL** | | | | **20** | |
| **Optional Courses - Value Added Courses; Any Three: Hrs/Semester** | | | | | | |
| BCU 841 | Communication Skills – VIII | 30 | | | | |
| BSU 843 | Behavioral Science – VIII | 30 | | | | |
| <br>FLU 844<br>FLU 845<br>FLU 846<br>FLU 847<br>FLU 848 | Foreign Language – VIII<br>French<br>German<br>Spanish<br>Japanese<br>Chinese | 30 | | | | |
| **TOTAL CREDIT** | | | | | **24** | |
| **Total hours per week** | | | | | **16** | |
| **Total hours in semester** | | | | | **160** | |

# Bachelor of Technology
# (Civil Engineering)

# Duration – 4 Years Full Time
## (2018-22)

## OVERALL CREDIT

| Sr. No. | Semester | No. of Credits | No. of Hours |
|---|---|---|---|
| 1 | I | 27 | 32 |
| 2 | II | 27 | 33 |
| 3 | III | 32 | 32 |
| 4 | IV | 29 | 34 |
| 5 | V | 32 | 32 |
| 6 | VI | 28 | 29 |
| 7 | VII | 26 | 16 |
| 8 | VIII | 24 | 16 |
| **Total Credits** | | **225** | **224** |

# MATHEMATICS I (CALCULUS AND LINEAR ALGEBRA)

**Course Code: BTCE 101** **Credit Units: 04**
**Total Hours: 40**

**Course Objective:**
The objective of this course is to familiarize the prospective engineers with techniques in calculus, multivariate analysis and linear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

**Module 1: Calculus (9 Hours)**
Evolutes and involutes; Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions ,Rolle’s Theorem, Mean value theorems, Taylor’s and Maclaurin theorems with remainders; indeterminate forms and L'Hospital's rule; Maxima and minima.

**Module 2: Sequences and series (7 Hours)**
Convergence of sequence and series, tests for convergence; Power series, Taylor's series, series for exponential, trigonometric and logarithm functions; Fourier series: Half range sine and cosine series, Parseval’s theorem.

**Module 3: Multivariable Calculus (Differentiation) (9 Hours)**
Limit, continuity and partial derivatives, directional derivatives, total derivative; Tangent plane and normal line; Maxima, minima and saddle points; Jacobians and transformations of coordinates Method of Lagrange multipliers; Gradient, curl and divergence.

**Module 4: Matrices and Vector Space (8 Hours)**
Inverse and rank of a matrix, rank-nullity theorem; System of linear equations; Symmetric, skew-symmetric and orthogonal matrices; Determinants; Eigenvalues and eigenvectors; Diagonalization of matrices; Cayley-Hamilton Theorem, and Orthogonal transformation, Vector Space, linear dependence of vectors, basis, dimension; Linear transformations (maps), range and kernel of a linear map, rank and nullity, Inverse of a linear transformation, rank- nullity theorem, composition of linear maps, Matrix associated with a linear map. Inner product spaces, Gram-Schmidt orthogonalization.

**Module 5: Multivariable Calculus (Integration) (7 Hours)**
Multiple Integration: Double integrals (Cartesian), change of order of integration in double integrals, Change of variables (Cartesian to polar), Applications: areas and volumes, Center of mass and Gravity (constant and variable densities); Triple integrals (Cartesian), orthogonal curvilinear coordinates, Simple applications involving cubes, sphere and rectangular parallelepipeds; Scalar line integrals, vector line integrals, scalar surface integrals, vector surface integrals, Theorems of Green, Gauss and Stokes.

## Course Outcomes

- To apply differential and integral calculus to notions of curvature and to improper integrals. Apart from some other applications they will have a basic understanding of Beta and Gamma functions.
- The fallouts of Rolle’s Theorem that is fundamental to application of analysis to Engineering problems.
- The tool of power series and Fourier series for learning advanced Engineering Mathematics.
- To deal with functions of several variables that are essential in most branches of engineering.
- The essential tool of matrices and linear algebra in a comprehensive manner.
- The mathematical tools needed in evaluating multiple integrals and their usage.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

**Textbooks/References:**


- G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
- Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
- Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
- Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11thReprint, 2010.
- D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
- N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
- (vii)B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.Course Outcomes

# CHEMISTRY-I (CONCEPTS IN CHEMISTRY FOR ENGINEERING)

**Course Code: BTCE 102** **Credit Units: 04**
**Total Hours: 40**

**Course Objective:**
Technology is being increasingly based on the electronic, atomic and molecular level modifications. The course will have a strong emphasis on the concepts that will aid in quantification of several concepts in chemistry that have been introduced at the 10+2 levels in schools. Quantum theory is more than 100 years old and to understand phenomena at nanometer levels, one has to base the description of all chemical processes at molecular levels. The course will emphasize on learning microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces. Principles of different spectroscopic techniques will be introduced and some applications will be considered. Bulk properties and processes will be analysed using thermodynamic considerations. There will also be outlines of periodic properties, stereochemistry, chemical reactions and synthesis. The chemistry laboratory course will consist of experiments illustrating the principles of chemistry that have been learnt so far, as well as others relevant to the study of science and engineering.

**Module 1: Atomic and molecular structure (12 hours)**
Schrodinger equation. Particle in a box solutions and their applications for conjugated molecules and nanoparticles. Forms of the hydrogen atom wave functions and the plots of these functions to explore their spatial variations. Molecular orbitals of diatomic molecules and plots of the multicentre orbitals. Equations for atomic and molecular orbitals. Energy level diagrams of diatomics. Pi-molecular orbitals of butadiene and benzene and aromaticity. Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties. Band structure of solids and the role of doping on band structures.

**Module 2: Spectroscopic techniques and applications (8 hours)**
Principles of spectroscopy and selection rules. Electronic spectroscopy. Fluorescence and its applications in medicine. Vibrational and rotational spectroscopy of diatomic molecules. Applications. Nuclear magnetic resonance and magnetic resonance imaging, surface characterisation techniques. Diffraction and scattering.

**Module 3: Intermolecular forces and potential energy surfaces (4 hours)**
Ionic, dipolar and van Der Waals interactions. Equations of state of real gases and critical phenomena. Potential energy surfaces of $H_3$, $H_2F$ and HCN and trajectories on these surfaces.

**Module 4: Use of free energy in chemical equilibria (6 hours)**
Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies. Free energy and emf. Cell potentials, the Nernst equation and applications. Acid base, oxidation reduction and solubility equilibria. Water chemistry. Corrosion. Use of free energy considerations in metallurgy through Ellingham diagrams.

**Module 5: Periodic properties (4 hours)**
Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states, coordination numbers and geometries, hard soft acids and bases, molecular geometries.

**Module 6: Stereochemistry (4 hours)**
Representations of 3 dimensional structures, structural isomers and stereoisomers, configurations and symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis. Isomerism in transitional metal compounds.

**Module 7: Organic reactions and synthesis of a drug molecule (2 hours)**
Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings. Synthesis of a commonly used drug molecule.

## Course Outcomes:

The concepts developed in this course will aid in quantification of several concepts in chemistry that have been introduced at the 10+2 levels in schools. Technology is being increasingly based on the electronic, atomic and molecular level modifications. Quantum theory is more than 100 years old and to understand phenomena at nanometer levels, one has to base the description of all chemical processes at molecular levels. The course will enable the student to:

- Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
- Rationalise bulk properties and processes using thermodynamic considerations.
- Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques
- Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.
- List major chemical reactions that are used in the synthesis of molecules.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **ESE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

A: Attendance, CT: Class Test, S/V/Q/HA - Seminar/Viva/Quiz/Home Assignment, ESE - End Semester Examination.

**Text & References:**

- University chemistry, by B. H. Mahan
- Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane
- Fundamentals of Molecular Spectroscopy, by C. N. Banwell
- Engineering Chemistry (Web-book), B. L. Tembe, Kamaluddin and M. S. Krishnan
- Physical Chemistry, by P. W. Atkins
- Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore.

# BASIC ELECTRICAL ENGINEERING

**Course Code: BTCE 103** **Credit Units: 04**
**Total Hours: 40**

**Course Objective:**
The objective of the course is to provide a brief knowledge of Electrical Engineering to students of all disciplines. This Course includes some theorems related to electrical, some law's related to flow of current, voltages, basic knowledge of Transformer, basic knowledge of electromagnetism, basic knowledge of electrical network.

**Module 1: DC Circuits (8 hours)**
Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff's current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin's and Norton's Theorems. Time-domain analysis of first-order RL and RC circuits.

**Module 2: AC Circuits (8 hours)**
Representation of sinusoidal waveforms, peak and R.M.S. values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance. Three- phase balanced circuits, voltage and current relations in star and delta connections.

**Module 3: Transformers (6 hours)**
Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.

**Module 4: Electrical Machines (8 hours)**
Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor. Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited dc motor. Construction and working of synchronous generators.

**Module 5: Power Converters (5 hours)**
DC-DC buck and boost converters, duty ratio control. Single-phase and three-phase voltage source inverters; sinusoidal modulation.

**Module 6: Electrical Installations (5 hours)**
Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

## Course Outcomes:

- To understand and analyze basic electric and magnetic circuits.
- To study the working principles of electrical machines and power converters.
- To introduce the components of low voltage electrical installations.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

**Text & References:**

- D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering" , Tata McGraw Hill, 2010.
- D. C. Kulshreshtha, " Basic Electrical Engineering", McGraw Hill, 2009.
- L. S. Bobrow, " Fundamentals of Electrical Engineering", Oxford University Press, 2011.
- E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
- V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

# ENGINEERING GRAPHICS & DESIGN

**Course Code: BTCE 104** **Credit Units: 01**
**Total Hours: 10**

***Except the basic essential concepts, most of the teaching part can happen concurrently in the laboratory itself***

**Course Objective:**
This course will provide students concepts on the drawings of different curves like straight line, parabola, ellipse etc. After completion of this course, students will be able to draw different figures manually and will be capable of using various instruments involved in drawings.

**Module 1:** Introduction to Engineering Drawing, Orthographic Projections, Projections of Regular Solids, Sections and Sectional Views of Right Angular Solids. **(3 Hours)**

**Module 2:** Sections and Sectional Views of Right Angular Solids, Isometric Projections, Overview of Computer Graphics. **(3 Hours)**

**Module 3:** Customization & CAD Drawing, Annotations, layering & other functions, Demonstration of a simple team design project. **(4 Hours)**

## Course Outcomes:

- To prepare students to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- To prepare students to use the techniques, skills, and modern engineering tools necessary for engineering practice
- To prepare for actual work situations through practical training in a new state-of-the-art computer designed CAD laboratory using engineering software.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:


- M.B. Shah & B.C. Rana, Engineering Drawing, Pearson Education, 2007
- PS Gill, Engineering Drawing, Kataria Publication
- ND Bhatt, Engineering Drawing, Charotar publications
- N Sidheshwar, Engineering Drawing, Tata McGraw Hill
- CL Tanta, Mechanical Drawing, “Dhanpat Rai”
- Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication
- Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers
- (Corresponding set of) CAD Software Theory and User Manuals

# CHEMISTRY LABORATORY

**Course Code: BTCE 120** **Credit Units: 1.5**
**Total Hours: 30**

## List of experiments/demonstrations:

1. Determination of surface tension of a given liquid. **(2 Hours)**
2. Determination of viscosity of a given liquid. **(2 Hours)**
3. Thin layer chromatography. **(1 Hour)**
4. Ion exchange column for removal of hardness of water. **(2 Hours)**
5. Determination of chloride content of water. **(1 Hour)**
6. Colligative properties using freezing point depression. **(2 Hours)**
7. Determination of the rate constant of a reaction. **(2 Hours)**
8. Determination of cell constant and conductance of solutions. **(2 Hours)**
9. Potentiometry - determination of redox potentials and emfs. **(2 Hours)**
10. Synthesis of a polymer/drug. **(1 Hour)**
11. Saponification/acid value of an oil. **(2 Hours)**
12. Chemical analysis of a salt. **(1 Hour)**
13. Lattice structures and packing of spheres **(1 Hour)**
14. Models of potential energy surfaces. **(1 Hour)**
15. Chemical oscillations- Iodine clock reaction. **(1 Hour)**
16. Determination of the partition coefficient of a substance between two immiscible liquids. **(3 Hours)**
17. Adsorption of acetic acid by charcoal. **(2 Hours)**
18. Use of the capillary viscosimeters to demonstrate the isoelectric point as the pH of minimum viscosity for gelatin sols and/or coagulation of the white part of the egg. **(2 Hours)**

## Laboratory Outcomes:

- The chemistry laboratory course will consist of experiments illustrating the principles of chemistry relevant to the study of science and engineering. The students will learn to:
- Estimate rate constants of reactions from concentration of reactants/products as a
- function of time
- Measure molecular/system properties such as surface tension, viscosity,
- conductance of solutions, redox potentials, chloride content of water, etc
- Synthesize a small drug molecule and analyse a salt sample

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

# BASIC ELECTRICAL ENGINEERING LABORATORY

**Course Code: BTCE 121** **Credit Units: 01**
**Total Hours: 20**

**List of experiments/demonstrations:**

1. Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors. **(2 Hours)**

2. Measuring the steady-state and transient time-response of R-L, R-C, and R-L-C circuits to a step change in voltage (transient may be observed on a storage oscilloscope). **(2 Hours)**

3. Sinusoidal steady state response of R-L, and R-C circuits – impedance calculation and verification. Observation of phase differences between current and voltage. Resonance in R-L-C circuits. **(2 Hours)**

4. Transformers: Observation of the no-load current waveform on an oscilloscope (non- sinusoidal wave-shape due to B-H curve nonlinearity should be shown along with a discussion about harmonics). Loading of a transformer: measurement of primary and secondary voltages and currents, and power. **(2 Hours)**

5. Three-phase transformers: Star and Delta connections. Voltage and Current relationships (line-line voltage, phase-to-neutral voltage, line and phase currents). Phase-shifts between the primary and secondary side. Cumulative three-phase power in balanced three-phase circuits. **(2 Hours)**

6. Demonstration of cut-out sections of machines: dc machine (commutator-brush arrangement), induction machine (squirrel cage rotor), synchronous machine (field winging - slip ring arrangement) and single-phase induction machine. **(2 Hours)**

7. Torque Speed Characteristic of separately excited dc motor. **(2 Hours)**

8. Synchronous speed of two and four-pole, three-phase induction motors. Direction reversal by change of phase-sequence of connections. Torque-Slip Characteristic of an induction motor. Generator operation of an induction machine driven at super- synchronous speed. **(2 Hours)**

9. Synchronous Machine operating as a generator: stand-alone operation with a load. Control of voltage through field excitation. **(2 Hours)**

10. Demonstration of (a) dc-dc converters (b) dc-ac converters – PWM waveform (c) the use of dc-ac converter for speed control of an induction motor and (d) Components of LT switchgear. **(2 Hours)**

## Laboratory Outcomes:

- Get an exposure to common electrical components and their ratings.
- Make electrical connections by wires of appropriate ratings.
- Understand the usage of common electrical measuring instruments.
- Understand the basic characteristics of transformers and electrical machines.
- Get an exposure to the working of power electronic converters.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

# ENGINEERING GRAPHICS & DESIGN LABORATORY

**Course Code: BTCE 122** **Credit Units: 02**
**Total Hours: 40**

**List of experiments/demonstrations:**

**Module 1: Introduction to Engineering Drawing (4 Hours)**
Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales – Plain, Diagonal and Vernier Scales

**Module 2: Orthographic Projections (4 Hours)**
Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes; Projections of planes inclined Planes - Auxiliary Planes

**Module 3: Projections of Regular Solids (4 Hours)**
Those inclined to both the Planes- Auxiliary Views; Draw simple annotation, dimensioning and scale. Floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc.

**Module 4: Sections and Sectional Views of Right Angular Solids (4 Hours)**
Prism, Cylinder, Pyramid, Cone – Auxiliary Views; Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry and dwellings (foundation to slab only)

**Module 5: Isometric Projections (4 Hours)**
Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions

**Module 6: Overview of Computer Graphics (4 Hours)**
Listing the computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.; Isometric Views of lines, Planes, Simple and compound Solids

**Module 7: Customization & CAD Drawing (4 Hours)**
consisting of set up of the drawing page and the printer, including scale settings, Setting up of units and drawing limits; ISO and ANSI standards for coordinate dimensioning and tolerancing; Orthographic constraints, Snap to objects manually and automatically; Producing drawings by using various coordinate input entry methods to draw straight lines, Applying various ways of drawing circles

**Module 8: Annotations, layering & other functions (6 Hours)**
Applying dimensions to objects, applying annotations to drawings; Setting up and use of Layers, layers to create drawings, Create, edit and use customized layers; Changing line lengths through modifying existing lines (extend/lengthen); Printing documents to paper using the print command; orthographic projection techniques; Drawing sectional views of composite right regular geometric solids and project the true shape of the sectioned surface; Drawing annotation, Computer-aided design (CAD) software modeling of parts and assemblies. Parametric and non-parametric solid, surface, and wireframe models. Part editing and two-dimensional documentation of models. Planar projection theory, including sketching of perspective, isometric, multiview, auxiliary, and section views. Spatial visualization exercises. Dimensioning guidelines, tolerancing techniques; dimensioning and scale multi views of dwelling

**Module 9: Demonstration of a simple team design project (6 hours)**
Geometry and topology of engineered components: creation of engineering models and their presentation in standard 2D blueprint form and as 3D wire-frame and shaded solids; meshed topologies for engineering analysis and tool-path generation for component manufacture; geometric dimensioning and tolerancing; Use of solid-modeling software for creating associative models at the component and assembly levels; floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc. Applying colour coding according to building drawing practice; Drawing sectional elevation showing foundation to ceiling; Introduction to Building Information Modelling (BIM)

## Laboratory Outcomes

- Introduction to engineering design and its place in society
- Exposure to the visual aspects of engineering design
- Exposure to engineering graphics standards
- Exposure to solid modelling
- Exposure to computer-aided geometric design
- Exposure to creating working drawings
- Exposure to engineering communication

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

# COMMUNICATION SKILLS-I
# (ENGLISH LANGUAGE USAGE ESSENTIALS)

**Course Code: BTCE 141** **Credit Units: 01**
**Total Hours: 10**

**Course Objective** The course is intended to familiarize students with the basics of English language and help them to learn to identify language structures for correct English usage.

**Module I: Essentials of English Grammar (4 Hours)**
- Common Errors, Parts of Speech, Collocations, Relative Pronoun, Subject-Verb Agreement, Articles , Punctuation, Sentence Structure- 'Wh' Questions

**Module II: Written English Communication (2 Hours)**
- Paragraph Writing, Essay Writing

**Module III: Spoken English Communication (2 Hours)**
- Introduction to Phonetics, Syllable-Consonant and Vowel Sounds, Stress and Intonation

**Module IV: Prose (2 Hours)**
- "Friends, Romans, countrymen, lend me your ears" Speech by Marc Anthony in Julius Caeser

## Learning Outcomes:
- The students should be able to :
- Identify Common Errors and Rectify Them
- Develop and Expand Writing Skills Through Controlled and Guided Activities
- To Develop Coherence, Cohesion and Competence in Oral Discourse through Intelligible Pronunciation

| **Examination Scheme:** | | | | |
|---|---|---|---|---|
| **Components (Drop down)** | CIE | Mid Sem | Attendance | ESE |
| **Weightage (%)** | 30% | 15% | 5% | 50% |

**CIE: Continuous Internal Evaluation, Mid Sem, Attendance, ESE: End Semester Examination**

## Text & References:

### Text:
- Rosenblum, M. How to Build Better Vocabulary, London: Bloomsbury Publication
- Verma, Shalini. Word Power made Handy, S. Chand Publications
- High School English Grammar & Composition by Wren & Martin

### References:
- K.K.Sinha , Business Communication, Galgotia Publishing Company
- Additional Reading: Newspapers and Journals

# ENVIRONMENTAL STUDIES-I

**Course Code: BTCE 142** **Credit Units: 02**
**Total Hours: 20**

**Course Objective**
The objective of environmental studies is to enlighten the masses about the importance of the protection and conservation of our environment and control of human activities which has an adverse effect on the environment.

**Module I: The multidisciplinary nature of environmental studies (2 Hours)**
Environmental Education, Environmental Organizations & Environmentalists, Environment & its Segments, Case Studies, Role of Teachers and Students in Environmental Protection

**Module II: Natural Resources Renewable and non-renewable resources: (6 Hours)**
Natural resources and associated problems, Introduction and Forest Resources, Water Resources, Land Resources, Mineral Resources, Energy Resources, Food Resources, Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

**Module III: Ecosystems (6 Hours)**
Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids, Introduction, types, characteristic features, structure and function of the following ecosystem: Forest ecosystem, Grassland ecosystem , Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, ocean estuaries)

**Module IV: Biodiversity and its conservation (6 Hours)**
Introduction – Definition: genetic, species and ecosystem diversity Biogeographical classification of India, Value of biodiversity: consumptive use, productive use, social, ethical aesthetic and option values Biodiversity at global, national and local levels, India as a mega-diversity nation, Hot-spots of biodiversity, Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts, Endangered and endemic species of India, Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity

## Learning Outcomes – **Upon course completion, students will be able to understand:**
The multidisciplinary nature of environmental studies, Our natural resources The ecosystem its structure and function, ecological succession, Biodiversity and its conservation and Biological classification of India.

**Examination Scheme:**

| Components | CT | HA | S/V/Q | A | ESE |
|---|---|---|---|---|---|
| Weightage (%) | 15 | 10 | 20 | 5 | 50 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:

- Chauhan B. S. 2009: Environmental Studies,University Science Press New Delhi.
- Dhameja S.K., 2010; Environmental Studies, Katson Publisher, New Delhi.
- Smriti Srivastava, 2011: Energy Environment Ecology and Society, Katson Publisher, New Delhi.
- Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumabai, 1196p
- De A.K., Environmental Chemistry, Wiley Eastern Ltd. Down to Earth, Centre for Science and Environment (R)
- Gleick, H.P. 1993. Water in Crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford Univ. Press. 473p

# BEHAVIOURAL SCIENCE-I
# (UNDERSTANDING SELF FOR EFFECTIVENESS)

**Course Code: BTCE 143** **Credit Units: 01**
**Total Hours: 10**

**Course Objective**:
This course aims at imparting an understanding of:

- Understanding self & process of self exploration
- Learning strategies for development of a healthy self esteem
- Importance of attitudes and its effective on personality
- Building Emotional Competency

**Course Contents:**

**Module I: Self: Core Competency (2 Hours)**

- Understanding of Self
- Components of Self – Self identity
- Self concept
- Self confidence
- Self image

**Module II: Techniques of Self Awareness (2 Hours)**

- Exploration through Johari Window
- Mapping the key characteristics of self
- Framing a charter for self
- Stages – self awareness, self acceptance and self realization

**Module III: Self Esteem & Effectiveness (2 Hours)**

- Meaning
- Importance
- Components of self esteem
- High and low self esteem
- Measuring your self esteem

**Module IV: Building Positive Attitude (2 Hours)**

- Meaning and nature of attitude
- Components and Types of attitude
- Importance and relevance of attitude

**Module V: Building Emotional Competence (2 Hours)**

- Emotional Intelligence – Meaning, components, Importance and Relevance
- Positive and negative emotions
- Healthy and Unhealthy expression of emotions

**Module VI: End-of-Semester Appraisal**

- Viva - Voce based on personal journal
- Assessment of Behavioral change as a result of training
- Exit Level Rating by Self and Observer

## Course Outcome:

Through this course,

- The knowledge of self will be utilized by students to resolve their personal, interpersonal and life problems
- Rather than extrinsic locus of control, students will acquire an intrinsic approach towards life
- The heightened awareness of self, attitudes and emotions will help students to work towards removal of obstacles created by self-limitations and enhance their full potential in their education and career.

**Examination Scheme:**

| Components | SAP | A | Mid Term Test (CT) | VIVA | Journal for Success (JOS) |
|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 05 | 20 | 30 | 25 |

## Suggested Readings:

- Organizational Behaviour, Davis, K.
- Hoover, Judhith D. Effective Small Group and Team Communication, 2002,Harcourt College Publishers
- Dick, Mc Cann & Margerison, Charles: Team Management, 1992 Edition, viva books
- Bates, A. P. and Julian, J.: Sociology - Understanding Social Behaviour
- Dressler, David and Cans, Donald: The Study of Human Interaction
- Lapiere, Richard. T – Social Change
- Lindzey, G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology, Addison – Welsley, US.
- Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.
- LaFasto and Larson: When Teams Work Best, 2001, Response Books (Sage), New Delhi
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 2, Group (1996); Pfeiffer & Company
- Smither Robert D.; The Psychology of Work and Human Performance, 1994, Harper Collins College Publishers

# FRENCH-I (FRANÇAIS POUR LA TECHNOLOGIE –I)

**Course Code: BTCE 144** **Credit Units: 02**
**Total Hours: 20**

## Course Objective:

To enable the students to take position as a foreigner speaking French and establish contacts and speak about self.
To provide an understanding of the basics of French lexicology, grammar and phonetics
To familiarize the students

- with the manners and socio-cultural aspects
- with the transparent words in science and specialties
- with formal and informal language

**Course Contents:** pp. 1 to 28: Unité 1
This course is structured based on the text book Tech French: French for Science and Technology and prepares the Students for A1 / A2 of DELF.

**Unité 1: Premiers pas en France**
**Actes de Communication : (12 Hours)**
Saluer - accueillir, identifier, nommer quelqu'un
Se présenter, présenter quelqu'un - nom, âge, nationalité, profession, spécialisation, ville, pays
Aborder une personne - prise de contact, politesse, famille
Présenter des renseignements personnels - remplir un formulaire, adresse, numéro de téléphone
Demander des nouvelles - comprendre et poser des questions
Parler de soi - de ses activités, de ses loisirs, exprimer ses goûts

**Grammaire : (8 Hours)**
Articles indéfinis et définis
Accord - masculin et féminin
Pronoms personnels sujets, toniques, on, c'est/il est + profession
Verbes au présent : du 1$^{er}$ groupe -er (habiter), être, avoir, faire, savoir, aller
Formes : négation, interrogation
Prépositions de lieu
Adjectifs possessifs - un seul possesseur et plusieurs possesseurs
Partitif – faire/ jouer + à/ de…

## Course Outcomes:

- To understand basic French. Able to read, write basic French
- To express basic day to day activities in French

**Examination Scheme:**

| | Internal exam | | | | End semester | Grand total |
|---|---|---|---|---|---|---|
| **Components** | Mid-Sem | Viva-Voce | Attendance | **TOTAL** | | |
| **Weightage (%)** | 15 | 30 | 5 | **50** | **50** | **100** |

## Text & References:

**Text:**

- **Le livre à suivre:** Le Gargasson, Ingrid, Shariva Naik et Claire Chaize. Tech French: French for Science and Technology. Delhi: Goyal Publishers & Distributors Pvt. Ltd., 2011.

## References:

Girardeau, Bruno et Nelly Mous. Réussir le DELF A1. Paris: Didier, 2010.

# MATHEMATICS-II
## (ORDINARY DIFFERENTIAL EQUATIONS AND COMPLEX VARIABLE)

**Course Code: BTCE 201** **Credit Units: 04**
**Total Hours: 40**

**Course Objectives :**
The objective of this course is to familiarize the prospective engineers with techniques in multivariate integration, ordinary and partial differential equations and complex variables. It aims to equip the students to deal with advanced level of mathematics and applications that would be essential for their disciplines.

**Module 1: First order ordinary differential equations: (6 Hours)**
Exact, linear and Bernoulli's equations, Euler's equations, Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

**Module 2: Ordinary differential equations of higher orders: (8 Hours)**
Second order linear differential equations with variable coefficients, method of variation of parameters, Cauchy-Euler equation; Power series solutions; Legendre polynomials, Bessel functions of the first kind and their properties.

**Module 3: Partial Differential Equations (10 Hours)**
Definition of Partial Differential Equations, First order partial differential equations, solutions of first order linear PDEs; Solution to homogenous and non-homogenous linear partial differential equations of second order by complimentary function and particular integral method. Second-order linear equations and their classification, Initial and boundary conditions, D'Alembert's solution of the wave equation; Duhamel's principle for one dimensional wave equation. Heat diffusion and vibration problems, Separation of variables method to simple problems in Cartesian coordinates. The Laplacian in plane, cylindrical and spherical polar coordinates, solutions with Bessel functions and Legendre functions. One dimensional diffusion equation and its solution by separation of variables.

**Module 4: Complex Variable – Differentiation: (7 Hours)**
Differentiation, Cauchy-Riemann equations, analytic functions, harmonic functions, finding harmonic conjugate; elementary analytic functions (exponential, trigonometric, logarithm)and their properties; Conformal mappings, Mobius transformations and their properties.

**Module 5: Complex Variable – Integration: (9 Hours)**
Contour integrals, Cauchy-Goursat theorem (without proof), Cauchy Integral formula(without proof), Liouville's theorem and Maximum-Modulus theorem (without proof);Taylor's series, zeros of analytic functions, singularities, Laurent's series; Residues, Cauchy Residue theorem (without proof), Evaluation of definite integral involving sine and cosine, Evaluation of certain improper integrals using the Bromwich contour.

## Course Outcomes:
- Upon completion of this course, students will be able to solve field problems in engineering involving PDEs.
- The effective mathematical tools for the solutions of differential equations that model physical processes.
- The tools of differentiation and integration of functions of a complex variable that are used in various techniques dealing engineering problems.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Suggested Text/Reference Books

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson,Reprint, 2002.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9th Edn., Wiley India, 2009.
4. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.
5. E. A. Coddington, an Introduction to Ordinary Differential Equations, Prentice Hall India, 1995.
6. E. L. Ince, Ordinary Differential Equations, Dover Publications, 1958.
7. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Ed., Mc-Graw Hill, 2004.
8. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
9. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

# PHYSICS (MECHANICS)

**Course Code: BTCE 202** **Credit Units: 04**
**Total Hours: 40**

**Course Objective:**
Aim of this course is to introduce the fundamentals of Mechanics and to develop problem solving approach of the engineering/technology

**Module 1:** (**8 hours**)
Transformation of scalars and vectors under Rotation transformation; Forces in Nature; Newton's laws and its completeness in describing particle motion; Form invariance of Newton's Second Law; Solving Newton's equations of motion in polar coordinates; Problems including constraints and friction; Extension to cylindrical and spherical coordinates

**Module 2:** (**7 hours**)
Potential energy function; F = - Grad V, equi-potential surfaces and meaning of gradient; Conservative and non-conservative forces, curl of a force field; Central forces; Conservation of Angular Momentum; Energy equation and energy diagrams; Elliptical, parabolic and hyperbolic orbits; Kepler problem; Application: Satellite manoeuvres;

**Module 3:** (**6 hours**)
Non-inertial frames of reference; Rotating coordinate system: Five-term acceleration formula- Centripetal and Coriolis accelerations; Applications: Weather systems, Foucault pendulum;

**Module 4:** (**6 hours**)
Harmonic oscillator; Damped harmonic motion – over-damped, critically damped and lightly-damped oscillators; Forced oscillations and resonance

**Module 5: (6 hours)**
Definition and motion of a rigid body in the plane; Rotation in the plane; Kinematics in a coordinate system rotating and translating in the plane; Angular momentum about a point of a rigid body in planar motion; Euler's laws of motion, their independence from Newton's laws, and their necessity in describing rigid body motion; Examples

**Module 6: (7 hours)**
Introduction to three-dimensional rigid body motion — only need to highlight the distinction from two-dimensional motion in terms of (a) Angular velocity vector, and its rate of change and (b) Moment of inertia tensor; Three-dimensional motion of a rigid body wherein all points move in a coplanar manner: e.g. Rod executing conical motion with center of mass fixed — only need to show that this motion looks two-dimensional but is three-dimensional, and two dimensional formulation fails.

## Course Outcomes:

Upon completion of this course students will have the knowledge and skills to
- Identify and manipulate forces and their resultant in one, two and three dimensions
- Recognise and classify moments and couples created by them.
- Analyse and demonstrate the stability conditions of mechanical strain.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

A: Attendance,CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination;

## Text & References:

**References:**


- Engineering Mechanics, 2nd ed. — MK Harbola
- Introduction to Mechanics — MK Verma
- An Introduction to Mechanics — D Kleppner & R Kolenkow
- Principles of Mechanics — JL Synge & BA Griffiths
- Mechanics — JP Den Hartog
- Engineering Mechanics - Dynamics, 7th ed. - JL Meriam
- Mechanical Vibrations — JP Den Hartog
- Theory of Vibrations with Applications — WT Thomson

# PROGRAMMING FOR PROBLEM SOLVING

**Course Code: BTCE 203** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The objective of this course module is to acquaint the students with the basics of computers system, its components, data representation inside computer and to get them familiar with various important features of procedure oriented programming language i.e. C.

**Module 1: Introduction to Programming (3 hours)**
Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.) Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/ Pseudocode with examples. From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code.

**Module 2: Programming Essential (8 hours)**
Arithmetic expressions and precedence, Conditional Branching and Loop, Writing and evaluation of conditionals and consequent branching , Iteration and loops.

**Module 3: Arrays (4 hours)**
Arrays (1-D, 2-D), Character arrays and Strings.

**Module 4: Basic Algorithms (3 hours)**
Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required)

**Module 5: Function (3 hours)**
Functions (including using built in libraries), Parameter passing in functions, call by value, Passing arrays to functions: idea of call by reference

**Module 6: Recursion (3 hours)**
Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort.

**Module 7: Structure (2 hours)**
Structures, Defining structures and Array of Structures.

**Module 8: Pointers (2 hours)**
Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation)

**Module 9: File handling(2 hours)**
Basics of file Handling.

## Course Outcomes:
The student will learn
- To formulate simple algorithms for arithmetic and logical problems.
- To translate the algorithms to programs (in C language).
- To test and execute the programs and correct syntax and logical error
- To implement conditional branching, iteration and recursion.
- To decompose a problem into functions and synthesize a complete program using divide and conquer approach.
- To use arrays, pointers and structures to formulate algorithms and programs.
- To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.
- To apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:


- Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
- E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill
- Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India

# WORKSHOP/ MANUFACTURING PRACTICES

**Course Code: BTCE 204** **Credit Units: 01**
**Total Hours: 10**

**Course Objective:**
The objective of this course is to impart the basic knowledge of Manufacturing methods, CNC machines, materials & their properties and various manufacturing processes to the students of all engineering discipline.

**Module 1:** Manufacturing Methods- casting, forming, machining, joining, advanced manufacturing methods **(3 hours)**
**Module 2:** CNC machining, Additive manufacturing, Fitting operations & power tools **(2 hours)**
**Module 3:** Electrical &Electronics, Carpentry, Plastic moulding, glass cutting **(3 hours)**
**Module 4:** Metal casting, Welding (arc welding & gas welding), brazing **(2 hours)**

## Course Outcomes:

- To gain knowledge of the different manufacturing processes which are commonly employed in the industry
- To fabricate components using different materials

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:


- Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., “ Elements of Workshop Technology” , Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.
- Kalpakjian S. And Steven S. Schmid, “ Manufacturing Engineering and Technology” , 4th edition, Pearson Education India Edition, 2002.
- Gowri P. Hariharan and A. Suresh Babu,” Manufacturing Technology – I” Pearson Education, 2008.
- Roy A. Lindberg, “ Processes and Materials of Manufacture”, 4th edition, Prentice Hall India, 1998.
- Rao P.N., “ Manufacturing Technology” , Vol. I and Vol. II, Tata McGrawHill House, 2017.

# PHYSICS (MECHANICS) LAB

**Course Code: BTCE 220** **Credit Units: 1.5**
**Total Hours: 30**

**Course Objectives**

To develop experimental skills, analysis/interpretation of data, and synthesis of the information to provide valid conclusions towards theoretical concepts of applied mechanics**.**

**List of Experiments**

1. To determine the frequency of an electrically maintained tunning fork by Melde's method. **(2 hours)**
2. To determine the frequency of AC mains using sonometer. **(2 hours)**
3. To determine the acceleration due to gravity ("g") using Keter's reversible pendulum. **(2 hours)**
4. To determine the value of acceleration due to gravity ("g") in the laboratory using bar pendulum. **(2 hours)**
5. To determine the moment of inertia of a flywheel about its own axis of rotation. **(2 hours)**
6. To determine the density of material of the given wire with the help of sonometer. **(2 hours)**
7. Determination of Modulus of rigidity 'η' of rod by Searle's method. **(3 hours)**
8. Measurement of Young's modulus by bending of beam method. **(3 hours)**
9. To determine the coefficient of viscosity of a liquid by poiseuille's method. **(3 hours)**
10. To determine the rigidity modulus of the suspension wire using torsion pendulum. **(3 hours)**
11. To determine the surface tension of a liquid (water) by Jaeger's method. **(3 hours)**
12. To determine the surface tension of a liquid (water) by Searle's apparatus. **(3 hours)**

## Course Outcomes:

Upon completion of the experiments students will develop understanding to:

- Elasticity and modulus of elasticity.
- concept of resonance and its application
- C.G. and its importance in different engineering problems

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

# PROGRAMMING FOR PROBLEM SOLVING LAB

**Course Code: BTCE 221** **Credit Units: 02**
**Total Hours: 40**

**List of experiments/demonstrations:**

**Tutorial 1**: Problem solving using computers: **(2 hours)**
**Lab1**: Familiarization with programming environment

**Tutorial 2**: Variable types and type conversions: **(2 hours)**
**Lab 2**: Simple computational problems using arithmetic expressions

**Tutorial 3:** Branching and logical expressions: **(4 hours)**
**Lab 3:** Problems involving if-then-else structures

**Tutorial 4**: Loops, while and for loops: **(4 hours)**
**Lab 4:** Iterative problems e.g., sum of series

**Tutorial 5**: 1D Arrays: searching, sorting**: (4 hours)**
**Lab 5**: 1D Array manipulation

**Tutorial 6**: 2D arrays and Strings**: (4 hours)**
**Lab 6**: Matrix problems, String operations

**Tutorial 7**: Functions, call by value: **(4 hours)**
**Lab 7**: Simple functions

**Tutorial 8 &9**: Numerical methods (Root finding, numerical differentiation, numerical integration): **(4 hours)**
**Lab 8 and 9:** Programming for solving Numerical methods problems

**Tutorial 10**: Recursion, structure of recursive calls: **(4 hours)**
**Lab 10:** Recursive functions

**Tutorial 11**: Pointers, structures and dynamic memory allocation: **(4 hours)**
**Lab 11**: Pointers and structures

**Tutorial 12**: File handling: **(4 hours)**
**Lab 12**: File operations

## Laboratory Outcomes:

- To formulate the algorithms for simple problems
- To translate given algorithms to a working and correct program
- To be able to correct syntax errors as reported by the compilers
- To be able to identify and correct logical errors encountered at run time
- To be able to write iterative as well as recursive programs
- To be able to represent data in arrays, strings and structures and manipulate them through a program
- To be able to declare pointers of different types and use them in defining self- referential structures.
- To be able to create, read and write to and from simple text files.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

# WORKSHOP/ MANUFACTURING PRACTICES LAB

**Course Code: BTCE 222** **Credit Units: 02**
**Total Hours: 40**

**List of experiments/demonstrations:**

1. Machine shop **(4 hours)**
2. Fitting shop **(4 hours)**
3. Carpentry **(4 hours)**
4. Electrical & Electronics**(6 hours)**
5. Welding shop **( 8 hours) (Arc welding 4 hrs + gas welding 4 hrs)**
6. Casting **(4 hours)**
7. Smithy **(4 hours)**
8. Plastic moulding & Glass Cutting (**6 hours**)

Examinations could involve the actual fabrication of simple components, utilizing one or more of the techniques covered above.

## Laboratory Outcomes:

- Upon completion of this laboratory course, students will be able to fabricate components with their own hands.
- They will also get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.
- By assembling different components, they will be able to produce small devices of their interest.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

# COMMUNICATION SKILLS-II
# (INTRODUCTION TO COMMUNICATION SKILLS)

**Course Code: BTCE 241** **Credit Units: 01**
**Total Hours: 10**

**Course Objectives:**

To understand the different aspects of communication using the four macro skills – LSRW (Listening, Speaking, Reading, Writing)

**Course Contents / Syllabus:**
**Module I Communication (2 Hours)**
Process and Importance, Models of Communication (Linear & Shannon Weaver), Role and Purpose, Types & Channels, Communication Networks, Principles & Barriers

**Module II Verbal Communication (4 Hours)**
Oral Communication: Forms, Advantages & Disadvantages Written Communication: Forms, Advantages & Disadvantages Introduction of Communication Skills (Listening, Speaking, Reading, Writing)

**Module III Non-Verbal Communication (2 Hours)**
Principles & Significance of Nonverbal Communication, KOPPACT (Kinesics, Oculesics, Proxemics, Para-Language, Artifacts, Chronemics, Tactilics) , Visible Code

**Module IV Prose (2 Hours)**
TEXT: APJ Abdul Kalam and Arun Tiwari. *Wings of Fire: An Autobiography*, Universities Press, 2011

## Student Learning Outcomes:

- The students should be able to: Apply Verbal and Non-Verbal Communication Techniques in the Professional Environment
- The students should be able to :Apply Verbal and Non-Verbal Communication Techniques in the Professional Environment

**Examination Scheme:**

| **Components (Drop down)** | **CIE** | **Mid Sem** | **Attendance** | **ESE** |
|---|---|---|---|---|
| **Weightage (%)** | 30% | 15% | 5% | 50% |

CIE: Continuous Internal Evaluation, Mid Sem, ESE: End Semester Examination

## Text & References

**Text:** *Rosenblum, M. How to Build Better Vocabulary, London: Bloomsbury Publication. Verma, Shalini. Word Power made Handy, S. Chand Publications. High School English Grammar & Composition by Wren & Martin.*

**Reference:** *K.K.Sinha , Business Communication, Galgotia Publishing Company. Alan Pease : Body Language* Additional Reading: Newspapers and Journals.

# ENVIRONMENTAL STUDIES-II

**Course Code: BTCE 242** **Credit Units: 02**
**Total Hours: 20**

**Course Objectives –**

- To understand various types of environmental pollution.
- To educate masses, in general and students, in particular about the issues related to degradation of environment and also social issues related to environment.
- To understand sustainable development.
- To understand environmental assets, local flora and fauna through field surveys.

**Module I: Environmental Pollution (7 Hours)**
Definition, causes, effects and control measures of: Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear pollution, Solid waste management: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies. Disaster management: floods, earthquake, cyclone and landslides.

**Module II: Social Issues and the Environment (7 Hours)**
From unsustainable to sustainable development, Urban problems and related to energy, Water conservation, rain water harvesting, watershed management, Resettlement and rehabilitation of people; its problems and concerns Case studies. Environmental ethics: Issues and possible solutions Climate change, Global warming, Acid rain, Ozone layer depletion, Nuclear Accidents and Holocaust case studies. Fireworks/Crackers – Introduction, ill effects on environment and humans.

Wasteland reclamation, Consumerism and waste products, Environmental Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act Issues involved in enforcement of environmental legislation Public awareness

**Module III: Human Population and the Environment (5 Hours)**
Population growth, variation among nations, Population explosion – Family Welfare Programmes
Environment and human health, Human Rights, Value Education, HIV / AIDS, Women and Child Welfare, Role of Information Technology in Environment and Human Health, Case Studies

**Module IV: Field Work (1 Hour)**
Visit to a local area to document environmental assets-river / forest/ grassland/ hill/ mountain. Visit to a local polluted site – Urban / Rural / Industrial / Agricultural. Study of common plants, insects, birds. Study of simple ecosystems-pond, river, hill slopes, etc (Field work equal to 5 lecture hours)

## Learning Outcomes – <u>**Upon course completion, students will be able to:**</u>
Explain various types of environmental pollutions. Understand role of individual in abatement of environmental pollution. Explain methods to mitigate disasters. Learn various environmental protection laws. Learn role of IT in environment and human health

**Examination Scheme:**

| Components | CT | HA | S/V/Q | A | ESE |
|---|---|---|---|---|---|
| Weightage (%) | 15 | 10 | 20 | 5 | 50 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:


- Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
- Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad 380 013, India, Email:mapin@icenet.net (R)
- De A.K., Environmental Chemistry, Wiley Eastern Ltd. Down to Earth, Centre for Science and Environment (R)
- Trivedi R. K. and P.K. Goel, Introduction to air pollution, Techno-Science Publication (TB)

# BEHAVOURAL SCIENCE-II (INDIVIDUAL, SOCIETY AND NATION)

**Course Code: BTCE 243** **Credit Units: 01**

**Total Hours: 10**

**Course Objective:**

This course aims at enabling students towards:

- Understand the importance of individual differences
- Better understanding of self in relation to society and nation
- Facilitation for a meaningful existence and adjustment in society
- Inculcating patriotism and national pride

**Course Contents:**

**Module I: Individual differences & Personality (2 Hours)**

- Personality: Definition& Relevance
- Importance of nature & nurture in Personality Development
- Importance and Recognition of Individual differences in Personality
- Accepting and Managing Individual differences
- Intuition, Judgment, Perception & Sensation (MBTI)
- BIG5 Factors

**Module II: Managing Diversity (2 Hours)**

- Defining Diversity
- Affirmation Action and Managing Diversity
- Increasing Diversity in Work Force
- Barriers and Challenges in Managing Diversity

**Module III: Socialization (2 Hours)**

- Nature of Socialization
- Social Interaction
- Interaction of Socialization Process
- Contributions to Society and Nation

**Module IV: Patriotism and National Pride (2 Hours)**

- Sense of pride and patriotism
- Importance of discipline and hard work
- Integrity and accountability

**Module V: Human Rights, Values and Ethics (2 Hours)**

- Meaning and Importance of human rights
- Human rights awareness
- Values and Ethics- Learning based on project work on Scriptures like- Ramayana, Mahabharata, Gita etc.

**Module VI: End-of-Semester Appraisal**

- Viva - Voce based on personal journal
- Assessment of Behavioral change as a result of training
- Exit Level Rating by Self and Observer

## Course Outcomes:

Through this course,

- Students will get aware of their personality through the use of various tests, and utilize this information to apply in everyday life events.
- The knowledge of socialization process will help students identify the source of their behavior patterns and help them change destructive and problematic behaviors.
- Students will learn to appreciate the diversity in human nature and bring it to their benefit at a workplace situation.
- Students will learn about the societal and national identities, and be able to shape their goals in accordance with such knowledge.

**Examination Scheme:**

| Components | SAP | A | Mid Term Test (CT) | VIVA | Journal for Success (JOS) |
|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 05 | 20 | 30 | 25 |

## Suggested Readings:

- Davis, K. Organizational Behaviour,
- Bates, A. P. and Julian, J.: Sociology - Understanding Social Behaviour
- Dressler, David and Cans, Donald: The Study of Human Interaction
- Lapiere, Richard. T – Social Change
- Lindzey, G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology, Addison – Welsley, US.
- Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.
- Robbins O.B.Stephen;. Organizational Behaviour

# FRENCH-II (FRANÇAIS POUR LA TECHNOLOGIE –II)

**Course Code: BTCE 244** **Credit Units: 02**
**Total Hours: 20**

**Course Objective:**

To enable students

- To perform simple communicative tasks of day to day life like talking about time, places, giving directions, advice
- To understand/ present facts, plans, itineraries, schedules with precision
- To familiarize the students
- with the life of a student in a French university
- with diminutives and abbreviations
- with «grandes écoles françaises » and famous scientists

**Course Contents:** pp. 29 to 54: Unité 2
This course is structured based on the text book Tech French: French for Science and Technology and prepares the students for A1/A2 of DELF.

**Unité 2: Universités et grandes écoles**
**Actes de Communication : (12 Hours)**
S'excuser
Comprendre/ rédiger un mail
Demander son chemin, indiquer une direction, lire un plan de métro et RER
Décrire un logement, Exprimer un souhait, Demander une information
Comprendre et présenter un emploi du temps, dire l'heure, s'informer sur les horaires
Donner un ordre, un conseil
Comprendre un court article sur internet, Comprendre / rédiger une courte biographie/ présenter un scientifique

**Grammaire : (8 Hours)**
Articles indéfinis et définis
Accord - masculin et féminin des noms de métiers scientifiques
Adjectifs de nationalités
Verbes au présent : du groupe -er (commencer), -ir (finir), aller, vouloir, pouvoir
Impératif
Conditionnel de Politesse
Prépositions de lieu
Prépositions de temps
« Il y a »

## Course Outcomes:

- To understand and read official mail in French.
- To understand and present biography of Scientist in French
- Able to write, read and understand simple scientific article in French

**Examination Scheme:**

| | Internal Exam | | | | End Semester | Grand Total |
|---|---|---|---|---|---|---|
| **Components** | Mid-Sem | Viva-Voce | Attendance | **Total** | | **100** |
| **Weightage (%)** | 15 | 30 | 5 | **50** | **50** | |

***Text:***

- **Le livre à suivre :** Le Gargasson, Ingrid, Shariva Naik et Claire Chaize. Tech French: French for Science and Technology. Delhi: Goyal Publishers & Distributors Pvt. Ltd., 2011.

***References:***

- Girardeau, Bruno et Nelly Mous. Réussir le DELF A1. Paris: Didier, 2010.

# APPLIED MATHEMATICS-III
# (TRANSFORM, NUMERICAL AND DISCRETE MATHEMATICS)

**Course Code : BTCE 301** **Credit Units: 03**
**Total Hours: 30**

**Course Objectives:**

- To introduce the solution methodologies for second order Partial Differential Equations with applications in engineering
- To provide an overview of probability and statistics to engineers

**Course Contents:**

**Module I: Transform Calculus : (9 Hours)**
Polynomials–Orthogonal Polynomials–Lagrange's, Chebysev Polynomials; Trigonometric Polynomials. Laplace Transform, Properties of Laplace Transform, Laplace transform of periodic functions. Finding inverse Laplace transform by different methods, convolution theorem. Evaluation of integrals by Laplace transform, solving ODEs and PDEs by Laplace Transform method. Fourier transforms, Z-transform and Wavelet transforms: properties, methods, inverses and their applications.

**Module II Numerical Methods : (7 Hours)**
Solution of polynomial and transcendental equations – Bisection method, Newton-Raphson method and Regula-Falsi method. Finite differences, Relation between operators, Interpolation using Newton's forward and backward difference formulae. Interpolation with unequal intervals: Newton's divided difference and Lagrange's formulae. Numerical Differentiation, Numerical integration: Trapezoidal rule and Simpson's 1/3rd and 3/8 rules. Ordinary differential equations: Taylor's series, Euler and modified Euler's methods. Runge-Kutta method of fourth order for solving first and second order equations. Milne's and Adam's predicator-corrector methods. Partial differential equations: Finite difference solution two dimensional Laplace equation and Poission equation, Implicit and explicit methods for one dimensional heat equation (Bender-Schmidt and Crank-Nicholson methods), Finite difference explicit method for wave equation.

**Module-III : Set Theory and Partial ordered Set: (5 Hours)**
Sets, relations and functions: Basic operations on sets, Cartesian products, disjoint union(sum), and power sets. Different types of relations, their compositions and inverses. Different types of functions, their compositions and inverses. Partially ordered sets: Complete partial ordering, chain, lattice, complete, distributive, modular and complemented lattices. Boolean and pseudo Boolean lattices.

**Module-IV Propsitions and Algebraic Structure : (5 Hours)**
Propositional Logic : Syntax and semantics, proof systems, satisfiability, validity, soundness, completeness, deduction theorem, etc. Decision problems of propositional logic. Introduction to first order logic and first order theory. Algebraic Structures: Algebraic structures with one binary operation – semi group, monoid and group. Co-sets, Lagrange's theorem, normal subgroup, homomorphic subgroup. Congruence relation and quotient structures. Error correcting code. Algebraic structures with two binary operations- ring, integral domain, and field. Boolean algebra and Boolean ring (Definitions and simple examples only).

**Module-V Introduction to Counting and Graph Theory : (4 Hours)**
Basic counting techniques – inclusion and exclusion, pigeon-hole principle, permutation, combination, summations. Introduction to recurrence relation and generating functions.Graphs and their basic properties – degree, path, cycle, subgraph, isomorphism, Eulerian and Hamiltonian walk, trees.

## Course Outcomes:
They can also formulate and solve problems involving random variables andapply statistical methods for analyzing experimental data.

**Examination Scheme**:

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | **5** | **15** | **10** | **70** |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

**Textbooks/References:**


- Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006.
- N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
- P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003 (Reprint).
- S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.

# COMPUTER-AIDED CIVIL ENGINEERING DRAWING

**Course Code: CIV 302** | **Credit Units: 02**
**Total Hours: 20**

**Course Objective:**

The students will be able to
(a) Develop Parametric design and the conventions of formal engineering drawing including elements of buildings, building bye-laws, perspective drawing etc
(b) Produce and interpret 2D & 3D drawings
(c) Communicate a design idea/concept graphically/ visually

**Module 1: Basics of Auto Cad (2-D) and Auto Cad (3-D) (4 Hours)**
Two-dimensional drafting work to be handled in detail on Auto Cad. Complete Drafting, Editing and modification work to be done and presentations be made.Basic commands and usage of 3d Auto Cad drawing. Drafting basic geometrical forms and combinations of the same in three dimensions and their editing.

**Module 2: Elements of Building Drawing: (4 Hours)**
Symbols and sing Conventions used for materils, plumbing, rebar drawing, electrical fittings. Masonry Bonds details, one brick wall and one and half brick wall, wall connections, . RCC beam, column, footings, foundation plan,load wearing wall.

**Module3: Building Drawing**: **(4 Hours)**
Detail drawing of single story building Plan, Elevation, Sectional Elevation. Standard fittings, drawings of different types of buildings. .

**Module 4: Building Bye-laws**: **(4 Hours)**
Building Planning – Provisions of National Building Code, open area,setbacks, FAR terminology, principles of planning, orientation. site selection, types of drawings. Types of buildings. Classification of structure, Load bearing structure, Framed structure, Composite structure.

**Module 5: Perspective Drawing**: **(4 Hours)**
Elements of perspective drawing involving simple problems, one point and two point perspectives.

## Course Outcomes:

The course should enable the students to
- To develop graphical skills for communicating concepts, ideas and designs of engineering products graphically/ visually as well as understand another person's designs, and to get exposure to national standards relating to technical drawings using Computer Aided Design and Drafting practice
- Develop Parametric design and the conventions of formal engineering drawing
- Produce and interpret 2D & 3D drawings
- Examine a design critically and with understanding of CAD - The student learn to interpret drawings, and to produce designs using a combination of 2D and 3D software.
- Do a detailed study of an engineering artefact
- Develop drawings for conventional structures using practical norms.

## Examination Scheme:

| Components | A | CT | S/V/Q/ HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Building Drawing Shah M. G. Kale C. M, Tata McGraw-Hill Education
- Planning & Designing of Building Sane Y. S, Allies Book Stall
- Architectural Design Ernest Pickering, J. Wiley & Sons
- National Building Code-2005
- Malik & Meo; Building Design and Drawing
- Gurucharan Singh & Jgdish Singh Building Planning, Design and Scheduling
- Balagopal T S Prabhu, Building Drawing and Detailing, Spades Publishers.
- V.B. Sikka : Civil Engineering Drawing

# ENGINEERING MECHANICS

**Course Code: CIV 303** **Credit Units: 04**
**Total Hours: 40**

**Course Objective**

The objective of this Course is to provide an introductory treatment of Engineering Mechanics to all the students of engineering, with a view to prepare a good foundation for taking up advanced courses in the area in the subsequent semesters. A working knowledge of statics with emphasis on force equilibrium and free body diagrams. Provides an understanding of the kinds of stress and deformation and how to determine them in a wide range of simple, practical structural problems, and an understanding of the mechanical behavior of materials under various load conditions. Lab should be taken concurrently

**Course Contents:**

**Module 1: Introduction to Engineering Mechanics covering: (10 hours)**

Introduction to Engineering Mechanics covering, Force Systems Basic concepts, Particle equilibrium in 2-D & 3-D; Rigid Body equilibrium; System of Forces, Coplanar Concurrent Forces, Components in Space – Resultant- Moment of Forces and its Application; Couples and Resultant of Force System, Equilibrium of System of Forces, Free body diagrams, Equations of Equilibrium of Coplanar Systems and Spatial Systems; Static Indeterminacy.

**Module 2: Centroid and Centre of Gravity covering: (10 hours)**

Centroid and Centre of Gravity covering, Centroid of simple figures from first principle, centroid of composite sections; Centre of Gravity and its implications; Area moment of inertia- Definition, Moment of inertia of plane sections from first principles, Theorems of moment of inertia, Moment of inertia of standard sections and composite sections; Mass moment inertia of circular plate, Cylinder, Cone, Sphere, Hook.

**Module 3: Basic Structural Analysis: (5 hours)**

Basic Structural Analysis covering, Equilibrium in three dimensions; Method of Sections; Method of Joints; How to determine if a member is in tension or compression; Simple Trusses; Zero force members; Beams & types of beams; Frames & Machines, Friction covering, Types of friction, Limiting friction, Laws of Friction, Static and Dynamic Friction; Motion of Bodies, wedge friction, screw jack & differential screw jack;

**Module 4: Virtual Work and Energy Method: (5 hours)**

Virtual Work and Energy Method- Virtual displacements, principle of virtual work for particle and ideal system of rigid bodies, degrees of freedom. Active force diagram, systems with friction, mechanical efficiency. Conservative forces and potential energy (elastic and gravitational), energy equation for equilibrium. Applications of energy method.

**Module 5: Review of particle Kinematics, dynamics a**nd **Mechanical Vibrations : (10 hours)**

Introduction to Kinematics of Rigid Bodies covering, Basic terms, general principles in dynamics; Types of motion, Instantaneous centre of rotation in plane motion and simple problems; D'Alembert's principle and its applications in plane motion and connected bodies; Work energy principle and its application in plane motion of connected bodies; Kinetics of rigid body rotation; Review of particle dynamics- Rectilinear motion; Plane curvilinear motion (rectangular, path, and polar coordinates). 3-D curvilinear motion; Relative and constrained motion; Newton's 2nd law (rectangular, path, and polar coordinates). Work-kinetic energy, power, potential energy. Impulse-momentum (linear, angular); Impact (Direct and oblique), Mechanical Vibrations covering, Basic terminology, free and forced vibrations, resonance and its effects; Degree of freedom; Derivation for frequency and amplitude of free vibrations without damping and single degree of freedom system, simple problems, types of pendulum, use of simple, compound and torsion pendulums

## Course outcomes:

- Confidently tackle equilibrium equations, moments and inertia problems
- Master calculator/computing basic skills to use to advantage in solving mechanics problems.
- Gain a firm foundation in Engineering Mechanics for furthering the career in Engineering
- Use scalar and vector analytical techniques for analysing forces in statically determinate structures
- Apply fundamental concepts of kinematics and kinetics of particles to the analysis of simple, practical problems
- Apply basic knowledge of maths and physics to solve real-world problems
- Understand measurement error, and propagation of error in processed data
- Understand basic kinematics concepts – displacement, velocity and acceleration (and their angular counterparts);
- Understand basic dynamics concepts – force, momentum, work and energy; Understand and be able to apply Newton's laws of motion;

**Examination Scheme:**

| **Components** | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text/Reference Books:


- Irving H. Shames (2006), Engineering Mechanics, 4th Edition, Prentice Hall
- F. P. Beer and E. R. Johnston (2011), Vector Mechanics for Engineers, Vol I - Statics, Vol II, – Dynamics, 9th Ed, Tata McGraw Hill
- R. C. Hibbler (2006), Engineering Mechanics: Principles of Statics and Dynamics, Pearson Press.
- Andy Ruina and Rudra Pratap (2011), Introduction to Statics and Dynamics, Oxford University Press
- Shanes and Rao (2006), Engineering Mechanics, Pearson Education, Hibler and Gupta (2010), Engineering Mechanics (Statics, Dynamics) by Pearson Education
- Reddy Vijaykumar K. and K. Suresh Kumar (2010), Singer's Engineering Mechanics
- Bansal R.K. (2010), A Text Book of Engineering Mechanics, Laxmi Publications
- Khurmi R.S. (2010), Engineering Mechanics, S. Chand & Co.
- Tayal A.K. (2010), Engineering Mechanics, Umesh Publications

# ENERGY SCIENCE & ENGINEERING

**Course Code: CIV 304** **Credit Units: 02**
**Total Hours: 20**

**Course Objective:**

The objective of this Course is to provide an introduction to energy systems and renewable energy resources, with a scientific examination of the energy field and an emphasis on alternative energy sources and their technology and application. The class will explore society's present needs and future energy demands, examine conventional energy sources and systems, including fossil fuels and nuclear energy, and then focus on alternatives, renewable energy sources such as solar, biomass (conversions), wind power, waves and tidal, geothermal, ocean thermal, hydro and nuclear. Energy conservation methods will be emphasized from Civil Engineering perspective. The knowledge acquired lays a good foundation for design of various civil engineering systems/ projects dealing with these energy generation paradigms in an efficient manner.

**Course Contents:**

**Module 1:** Introduction to Energy Science: Scientific principles and historical interpretation to place energy use in the context of pressing societal, environmental and climate issues; Introduction to energy systems and resources; Introduction to Energy, sustainability & the environment **: (4 Hours)**

**Module 2:** Energy Sources: Overview of energy systems, sources, transformations, efficiency, and storage. Fossil fuels (coal, oil, oil-bearing shale and sands, coal gasification) - past, present & future, Remedies & alternatives for fossil fuels - biomass, wind, solar, nuclear, wave, tidal and hydrogen; Sustainability and environmental trade-offs of different energy systems; possibilities for energy storage or regeneration (Ex. Pumped storage hydro power projects, superconductor-based energy storages, high efficiency batteries) **: (4 Hours)**

**Module 3:** Energy & Environment: Energy efficiency and conservation; introduction to clean energy technologies and its importance in sustainable development; Carbon footprint, energy consumption and sustainability; introduction to the economics of energy; How the economic system determines production and consumption; linkages between economic and environmental outcomes; How future energy use can be influenced by economic, environmental, trade, and research policy **: (4 Hours)**

**Module 4:** Civil Engineering Projects connected with the Energy Sources: Coal mining technologies, Oil exploration offshore platforms, Underground and under-sea oil pipelines, solar chimney project, wave energy caissons, coastal installations for tidal power, wind mill towers; hydro power stations above-ground and underground along with associated dams, tunnels, penstocks, etc.; Nuclear reactor containment buildings and associated buildings, design and construction constraints and testing procedures for reactor containment buildings; Spent Nuclear fuel storage and disposal systems **: (4 Hours)**

**Module 5**: Engineering for Energy conservation: Concept of Green Building and Green Architecture;Green building concepts (Green building encompasses everything from the choice of building materials to where a building is located, how it is designed and operated); LEED ratings; Identification of energy related enterprises that represent the breath of the industry and prioritizing these as candidates; Embodied energy analysis and use as a tool for measuring sustainability. Energy Audit of Facilities and optimization of energy consumption **: (4 Hours)**

## Course Outcomes:

- List and generally explain the main sources of energy and their primary applications nationally and internationally
- Have basic understanding of the energy sources and scientific concepts/principles behind them
- Describe the challenges and problems associated with the use of various energy sources, including fossil fuels, with regard to future supply and the impact on the environment.
- List and describe the primary renewable energy resources and technologies.
- To quantify energy demands and make comparisons among energy uses, resources, and technologies.
- Collect and organize information on renewable energy technologies as a basis for further analysis and

evaluation.

- Understand the Engineering involved in projects utilising these sources

**Examination Scheme:**

| **Components** | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Boyle, Godfrey (2004), Renewable Energy (2nd edition). Oxford University Press
- Boyle, Godfrey, Bob Everett, and Janet Ramage (Eds.) (2004), Energy Systems and Sustainability: Power for a Sustainable Future. Oxford University Press
- Schaeffer, John (2007), Real Goods Solar Living Sourcebook: The Complete Guide to Renewable Energy Technologies and Sustainable Living, Gaiam
- Jean-Philippe; Zaccour, Georges (Eds.), (2005), Energy and Environment Set: Mathematics of Decision Making, Loulou, Richard; Waaub, XVIII,
- Ristinen, Robert A. Kraushaar, Jack J. AKraushaar, Jack P. Ristinen, Robert A. (2006) Energy and the Environment, 2nd Edition, John Wiley
- UNDP (2000), Energy and the Challenge of Sustainability, World Energy assessment
- E H Thorndike (1976), Energy & Environment: A Primer for Scientists and Engineers, Addison-Wesley Publishing Company
- Related papers published in international journals

# BASIC CIVIL ENGINEERING

**Course Code: CIV 305** **Credit Units: 02**
**Total Hours: 20**

**Course Objective:**
To give an understanding to the students of the vast breadth and numerous areas of engagement available in the overall field of Civil Engineering. To motivate the student to pursue a career in one of the many areas of Civil Engineering with deep interest and keenness. To expose the students to the various avenues available for doing creative and innovative work in this field by showcasing the many monuments and inspiring projects of public utility.

**Course Contents:**

**Module 1: Basic Understanding: (4 Hours)**
What is Civil Engineering/ Infrastructure? Basics of Engineering and Civil Engineering; Broad disciplines of Civil Engineering; Importance of Civil Engineering, Possible scopes for a career. Early constructions and developments over time; Ancient monuments & Modern marvels; Development of various materials of construction and methods of construction; Works of Eminent civil engineers.

**Module 2: Fundamentals of Architecture & Town Planning: (4 Hours)**
Aesthetics in Civil Engineering, Examples of great architecture, fundamentals of architectural design & town planning; Building Systems (HVAC, Acoustics, Lighting, etc.); LEED ratings; Development of Smart cities.

**Module 3: Fundamentals of Building Materials: (4 Hours)**
Stones, bricks, mortars, Plain, Reinforced & Prestressed Concrete, Construction Chemicals; Structural Steel, High Tensile Steel, Carbon Composites; Plastics in Construction; 3D printing; Recycling of Construction & Demolition wastes. Types of buildings; tall structures; various types of bridges; Water retaining structures; Other structural systems; Experimental Stress Analysis; Wind tunnel studies.

**Module 4: Environmental Engineering & Sustainability: (4 Hours)**
Water treatment systems; Effluent treatment systems; Solid waste management; Sustainability in Construction; **Geotechnical Engineering:**-(Basics of soil mechanics, rock mechanics and geology; various types of foundations) **Hydraulics, Hydrology &Water Resources Engineering: (**Fundamentals of fluid flow, basics of water supply systems; Underground Structures)

**Module 5: Surveying & Geometrics: (2 Hours)**
Traditional surveying techniques, Total Stations, Development of Digital Terrain Models; GPS, LIDAR**. Traffic &Transportation Engineering: (**Development in India for different modes of transport; Developments and challenges in integrated transport development in India: road, rail, port and harbour and airport sector; PPP in transport sector; Intelligent Transport Systems; Urban Public and Freight Transportation; Road Safety under heterogeneous traffic; Sustainable and resilient pavement materials)

**Module 6: Repairs & Rehabilitation of Structures: (2 Hours)**
Basics of corrosion phenomena and other structural distress mechanisms; some simple systems of rehabilitation of structures; Non- Destructive testing systems; Use of carbon fibre wrapping and carbon composites in repairs. Typical software used in Civil Engineering- Finite Element Method, Modelling; highlighting typical available software systems (SAP, STAAD, ABAQUS, MATLAB, ETAB, REVIT, AUTOCAD, PRIMAVERA)

**Module 7: Industrial Visit.**
At least one day visit to local industry in the field of Civil Engineering.

## Course Outcomes:

- Introduction to what constitutes Civil Engineering
- Identifying the various areas available to pursue and specialize within the overall field of Civil Engineering
- Highlighting the depth of engagement possible within each of these areas
- Exploration of the various possibilities of a career in this field
- Understanding the vast interfaces this field has with the society at large
- Providing inspiration for doing creative and innovative work
- Showcasing the many monuments, heritage structures, nationally important infrastructure, and impressive projects to serve as sources of inspiration
- Highlighting possibilities for taking up entrepreneurial activities in this field
- Providing a foundation for the student to launch off upon an inspired academic pursuit into this branch of engineering

**Examination Scheme:**

| **Components** | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text/Reference Books:


- Patil, B.S.(1974), Legal Aspects of Building and Engineering Contract
- The National Building Code, BIS, (2017)
- RERA Act, (2017)
- Meena Rao (2006), Fundamental concepts in Law of Contract, 3rd Edn. Professional Offset
- Chandiramani, Neelima (2000), The Law of Contract: An Outline, 2nd Edn. Avinash Publications Mumbai
- Avtarsingh (2002), Law of Contract, Eastern Book Co.
- Dutt (1994), Indian Contract Act, Eastern Law House
- Anson W.R.(1979), Law of Contract, Oxford University Press
- Kwatra G.K.(2005), The Arbitration & Conciliation of Law in India with case law on UNCITRAL Model Law on Arbitration, Indian Council of Arbitration
- Avtarsingh (2005), Law of Arbitration and Conciliation, Eastern Book Co.
- Wadhera (2004), Intellectual Property Rights, Universal Law Publishing Co.
- P. S. Narayan (2000), Intellectual Property Rights, Gogia Law Agency
- T. Ramappa (2010), Intellectual Property Rights Law in India, Asia Law House
- Bare text (2005), Right to Information Act
- O.P. Malhotra, Law of Industrial Disputes, N.M. Tripathi Publishers
- K.M. Desai(1946), The Industrial Employment (Standing Orders) Act
- Rustamji R.F., Introduction to the Law of Industrial Disputes, Asia Publishing House
- Vee, Charles & Skitmore, Martin (2003) Professional Ethics in the Construction Industry, Engineering Construction and Architectural management, Vol.10, Iss. 2, pp 117-127, MCB UP Ltd
- American Society of Civil Engineers (2011) ASCE Code of Ethics – Principles Study and Application
- Ethics in Engineering- M.W.Martin& R.Schinzinger, McGraw-Hill

# MECHANICAL ENGINEERING

**Course Code: BME 104** **Credit Units: 02**
**Total Hours: 20**

**Course Objective**
Ability to apply mathematics, science, and engineering, Ability to design and conduct experiments, as well as to analyze and interpret data, Ability to identify, formulate, and solve engineering problems

**Module 1: Basic Concepts- Basic concepts: (4 Hours)**
concept of continuum, macroscopic approach, Thermodynamic systems - closed, open and isolated. Property, state, path and process, quasistatic process, work, modes of work. Zeroth law of thermodynamics, concept of temperature and heat. Concept of ideal and real gases.

**Module 2: First Law of Thermodynamics: (4 Hours)**
Concepts of Internal Energy, Specific Heat Capacities, Enthalpy. Energy Balance for Closed and Open Systems, Energy Balance for Steady-Flow Systems. Steady-Flow Engineering Devices. Energy Balance for Unsteady-Flow.

**Module 3: Second Law of Thermodynamics: (4 Hours)**
Thermal energy reservoirs, heat engines energy conversion, Kelvin's and Clausius statements of second law, the Carnot cycle, the Carnot Theorem, Carnot heat engine, efficiency, the Carnot refrigerator and heat pump, COP. Clausius inequality, concept of entropy, reversible and irreversible processes, Entropy change of pure substances, isentropic processes.

**Module 4: Properties of Pure Substance: (4 Hours)**
Properties of pure substances. Thermodynamic properties of pure substances in solid, liquid and vapour phases. Phase rule, P-V, P-T, T-V, T-S, H-S diagrams, PVT surfaces. Thermodynamic properties of steam. Calculations of work done and heat transfer in non- flow and flow processes.

**Module 5: Power Cycles: (4 Hours)**
Vapour and combined power cycles, including the Carnot vapor cycle, Rankine cycle, Gas power cycles, Otto cycle, diesel engine cycle, gas-turbine Brayton cycle.

## Course Outcomes:

- Ability to design and conduct experiments, as well as to analyze and interpretdata
- Ability to apply modern engineering tools, techniques and resources to solve complex mechanical engineering activities with an understanding of thelimitations.
- Ability to comprehend the thermodynamics and their corresponding processes that influence the behaviour and response of structuralcomponents

**Examination Scheme:**

| **Components** | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text/Reference Books:


- Nag.P.K., "Engineering Thermodynamics", Tata McGraw-Hill, NewDelhi.
- Cengel, Thermodynamics - AnEngineeringApproach *Tata McGraw Hill, New*Delhi.
- Sonntag, R. E., Borgnakke, C., &Wylen, G. J. V. Fundamentals of thermodynamics: Wiley.
- Moran, M. J., Shapiro, H. N., Boettner, D. D., & Bailey, M. Fundamentals of Engineering
- Thermodynamics: John Wiley & Sons.
- Jones, J. B., & Dugan, R. E. Engineering thermodynamics: Prentice Hall.
- Potter, M. C., & Somerton, C. W. Schaum's Outline of Thermodynamics for Engineers,McGraw-Hill.

# BASIC ELECTRONICS

**Course Code: ECE 307** **Credit Units: 02**
**Total Hours: 20**

**Course Objective:**
The objective of this Course is to provide the students with an introductory and broad treatment of the field of Electronics Engineering to facilitate better understanding of the devices, instruments and sensors used in Civil & Mechanical Engineering applications. Lab should be taken concurrently. This course emphasizes more on the laboratory/practical use of the knowledge gained from the course lectures.

**Course contents:**

**Module 1: Diodes and Applications: (5 Hours)**
Semiconductor Diode - Ideal versus Practical, Diode Equivalent Circuits, Load Line Analysis; Diode as a Switch, Diode as a Rectifier, Half Wave and Full Wave Rectifiers; Breakdown Mechanisms, Zener Diode – Operation and Applications; Opto-Electronic Devices – LEDs, Clipper and clampers.

**Module 2: Transistor Characteristics: (5 Hours)**
Bipolar Junction Transistor (BJT) –Construction, Operation, Amplifying Action, Common Base, Common Emitter and Common Collector Configurations, Operating Point, Voltage Divider Bias Configuration.
Introduction to FET, Feedback Amplifiers – Principle, Advantages of Negative Feedback, Topologies, Current Series and Voltage Series Feedback Amplifiers.

**Module 3: Operational Amplifiers and Applications: (5 Hours)**
Introduction to Op-Amp, Differential Amplifier Configurations, CMRR, PSRR, Slew Rate; Block Diagram, Pin Configuration of 741 Op-Amp, Characteristics of Ideal Op-Amp, Concept of Virtual Ground; inverting and non-inverting amplifier applications: summing and difference amplifier, unity gain buffer, comparator, integrator and differentiator.

**Module 4: Digital Electronics Fundamentals: (5 Hours)**
Difference between analog and digital signals, Boolean algebra, Basic and Universal Gates, Symbols, Truth tables, logic expressions, Logic simplification using K- map, Logic ICs, half and full adder/subtractor, multiplexers, de- multiplexers

## Course Outcomes:

- Know broadly the concepts and functionalities of the electronic devices, tools and instruments
- Understand use, general specifications and deploy abilities of the electronic devices, and assemblies
- Confidence in handling and usage of electronic devices, tools and instruments in engineering applications

## Examination Scheme:

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Suggested Text/Reference Books


- David. A. Bell (2003), Laboratory Manual for Electronic Devices and Circuits, Prentice Hall, India
- SantiramKal (2002), Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall, India
- Thomas L. Floyd and R. P. Jain (2009), Digital Fundamentals by Pearson Education,
- Paul B. Zbar, A.P. Malvino and M.A. Miller (2009), Basic Electronics – A Text-Lab. Manual, TMH
- R. T. Paynter (2009), Introductory Electronic Devices & Circuits, Conventional Flow Version, Pearson

# BIOLOGY FOR ENGINEERS

**Course Code: CIV 306** **Credit Units : 02**
**Total Hours : 20**

**Course Objectives**
To gain knowledge of the subject biology, its importance, to provide basic knowledge about plant physiology, ecology, ecosystems, population ecology, environmental management, protection Acts & elementary principles of biostatical methods & tools.

**Course Contents:**

**Module 1: Why we need to study biology? (5 Hours)**
To convey that Biology is as important a scientific discipline as Mathematics, Physics and Chemistry Bring out the fundamental differences between science and engineering. Mention the most exciting aspect of biology as an independent scientific discipline. Why we need to study biology? Discuss how biological observations of 18th Century that lead to major discoveries.

**Module 2: Plant Physiology: (3 Hours)**
Transpiration; Mineral nutrition

**Module 3: Ecology, Ecosystems & Population Ecology: (6 Hours)**
Components, types, flow of matter and energy in an ecosystem; Community ecology- Characteristics, frequency, life forms, and biological spectrum; Ecosystem structure- Biotic and a-biotic factors, food chain, food web, ecological pyramids.
Population characteristics, ecotypes; Population genetics- Concept of gene pool and genetic diversity in populations, polymorphism and heterogeneity;

**Module 4: Environmental Management: (3 Hours)**
Perspectives concerns and management strategies; Policies and legal aspects- Environment Protection Acts and modification, International Treaties; Environmental Impact Assessment- Case studies (International Airport, thermal power plant)

**Module 5: Introduction to Biostatistics: (3 Hours)**
Terms used, types of data; Measures of Central Tendencies- Mean, Median, Mode, Normal and Skewed distributions; Analysis of Data- Hypothesis testing and ANNOVA (single factor)

## Course outcome:
After completion of this course students will be able to understand
- The significance of biological sciences
- Develop an understanding of the ecosystems, community ecology, ecosystem structure etc.
- Understand the concept of population characteristics, ecotypes; population genetics.
- Develop an insight into the various environmental management covering principles environment protection Acts. Environmental Impact Assessment
- Understanding the concept of biostatical analysis which will provide a foundation for laboratory & fieldworks.

**Examination Scheme:**

| **Components** | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text References:

- Biology: A global approach: Campbell, N. A.; Reece, J. B.; Urry, Lisa; Cain, M, L.; Wasserman, S. A.; Minorsky, P. V.; Jackson, R. B. Pearson Education Ltd.
- Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
- Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T.2001, Environmental Encyclopedia,Jaico Publ.House,Mumabai, 1196p
- Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House,Delhi 284 p. Mckinney, M.L. &School, R.M. 1996.Environmental Science Systems &Solutions, Web enhanced edn. 639p

# LIFE SCIENCE

**Course Code: CIV 307** **Credit Units: 02**
**Total Hours: 20**

**Course Objective:**
To understand cellularity in structural development, classification of species, the metabolism processes Elementary principles of genetics, Structures of DNA and RNA, Molecular genetics, Biostatistics, Biotechnology.

**Course Contents:**

**Module 1: Unicellular or multicellular: (5 Hours)**
Classification per se is not what biology is all about (The underlying criterion, such as morphological, biochemical or ecological be highlighted). Hierarchy of life forms at phenomenological level. Classification based on (a) cellularity- Unicellular or multicellular (b) ultrastructure- prokaryotes or eucaryotes. (c) energy and Carbon utilization -Autotrophs, heterotrophs, lithotropes (d) Ammonia excretion – aminotelic, uricoteliec, ureotelic (e) Habitats- acquatic or terrestrial.

**Module 2: Concepts of recessiveness and dominance: (5 Hours)**
Principles of Genetics in biology are like Newton’s laws to Physical Sciences. Mendel’s laws, Concept of segregation and independent assortment. Concept of allele. Gene mapping, Gene interaction, Epistasis. Meiosis and Mitosis (be taught as a part of genetics. Emphasis to be give not to the mechanics of cell division nor the phases but how genetic material passes from parent to offspring). Concepts of recessiveness and dominance. Concept of mapping of phenotypes to genes. Single gene disorders in humans. Concept of complementation using human genetics.

**Module 3: Molecules of Life: (5 Hours)**
All forms of life has the same building blocks (yet the manifestations are as diverse as one can imagine Molecules of life). Discuss monomeric units and polymeric structures. Discuss about sugars, starch and cellulose. Amino acids and proteins, Lipids. Nucleotides and DNA/RNA.

**Module 4: Molecular Genetics: (2 hours)**
Structures of DNA and RNA; Concept of Gene, Gene regulation, e.g., Operon concept;

**Module 5: Basic concepts of Biotechnology: (3 hours)**
Totipotency and Cell manipulation; Plant & Animal tissue culture- Methods and uses in agriculture, medicine and health; Recombinant DNA Technology- Techniques and applications;

## Course Outcomes:
After completion of this course students will be able to understand
- Cellular structures of living forms.
- Classification of biology and biomolecule
- About metabolism and Enzimes
- About DNA and biological structure
- About the species
- Exploring Molecular Genetics
- Understand the basic principles & techniques of biotechnology.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

**Text & References:**

- Biology: A global approach: Campbell, N. A.; Reece, J. B.; Urry, Lisa; Cain, M, L.; Wasserman, S. A.; Minorsky, P. V.; Jackson, R. B. Pearson Education Ltd
- Outlines of Biochemistry, Conn, E.E; Stumpf, P.K; Bruening, G; Doi, R.H. John Wiley and Sons
- Principles of Biochemistry (V Edition), By Nelson, D. L.; and Cox, M. M.W.H. Freeman and Company
- Molecular Genetics (Second edition), Stent, G. S.; and Calender, R. W.H. Freeman and company, Distributed by Satish Kumar Jain for CBS Publisher
- Microbiology, Prescott, L.M J.P. Harley and C.A. Klein 1995. 2nd edition Wm, C. Brown Publishers

# COMPUTER-AIDED CIVIL ENGINEERING DRAWING LAB

**Course Code: CIV 322** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
The objective of the job is to train civil engineering students of making drawings using computer. The drawings are to be prepared as per specifications.

**Course Contents:**

Planning, designing from given requirements of areas and specifications and preparation of sketch design and working drawings for: using drawing sheets and AutoCad (2-D and 3-D)

**List of Drawing Experiments:**
1. Basic of 2-D Auto CAD **(2 hours)**
2. Drawing of Elements of Buildings, column, beam, footings by 2-D Auto CAD**. (2 hours)**
3. Drawing of RCC Details by Auto CAD **(2 hours)**
4. Drawing of Residential Building, and school Building by Auto CAD. **(2 hours**)
5. Types of stair, RCC stair case, septic tank, Soak pit. **(2 hours)**
6. Paneled, doors, windows and ventilators in wood, Glazed paneled, wooden doors: **(2 Hours)**
7. Residential building- with load wearing walls, including details of doors and windows: **(2 Hours)**
8. Preparation of site plans and service plans as per Building Rules: **(2 Hours**)
9. Roof trusses. Industrial buildings: **(2 Hours)**
10. Perspective view of single story buildings. **(2 Hours)**

## Course outcome:
Student would be able to do planning, designing from given requirements of areas and specifications and preparation of sketch design and working drawings for: using drawing sheets and AutoCad (2-D and 3-D)

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

## Text & References:

- National Building Code of India
- Local Building Bye-laws
- Callender, John Hancock, Time Saver Standards for Architectural Design Data, Tata McGraw Hill.
- Chiara, Callender, John Hancock, Time Saver Standards for Building Type, McGraw Hill
- Chiara, Joseph De, Time Saver Standards for Site Planning, McGraw Hill
- Ching, Francis D K, Architectural Graphics. John Wiley

# BASIC ELECTRONICS LAB

**Course Code : ECE 327** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
The objective of the job is to train students of making drawings using computer. The drawings are to be prepared as per specifications.

**List of Experiments**

1. To study and verify the VI characteristic of a diode. **(2 Hours)**
2. To study the Zener diode in breakdown region. **(2 Hours)**
3. To study diode as a half wave rectifier. **(2 Hours)**
4. To study diode as a full wave rectifier. **(2 Hours)**
5. To study the characteristics of a CE Transistor. (**2 Hours)**
6. To study the VI characteristic of CB &CC Transistor **(2 Hours)**
7. To study transistor as an a amplifiers **(2 Hours)**
8. To study the JFET operation. **(2 Hours)**
9. To study OP Amp. As inverting and non-inverting Amp. **(2 Hours)**
10. To study OP Amp in open loop and close loop. **(2 Hours)**

## Course Outcomes:

- Know broadly the concepts and functionalities of the electronic devices, tools and instruments
- Understand use, general specifications and deploy abilities of the electronic devices, and assemblies
- Confidence in handling and usage of electronic devices, tools and instruments in engineering applications

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# COMMUNICATION SKILLS – III

**(Effective Written Communication)**

**Course Code: BCU 341** **Credit Units: 01**
**Total Hours: 10**

**Course Objective:**

To emphasize the essential aspects of effective written communication necessary for professional success.

**Prerequisites:** NIL

<table>
<tr><td colspan="3">Course Contents / Syllabus:</td></tr>
<tr><td>1.</td><td>Module I Principles of Effective Writing</td><td>35% Weightage</td></tr>
<tr><td></td><td>• Spellings-100 Most Misspelled Words in English<br>• Web Based Writing<br>• Note Taking: Process & Techniques</td><td></td></tr>
<tr><td>2.</td><td>Module II Formal Letter Writing</td><td>35% Weightage</td></tr>
<tr><td></td><td>• Block Format<br>• Types of Letters<br>• E-mail<br>• Netiquette</td><td></td></tr>
<tr><td>3.</td><td>Module III Business Memos<br>• Format & Characteristics</td><td>20% Weightage</td></tr>
<tr><td>4.</td><td>Module IV Short Stories</td><td>10% Weightage</td></tr>
<tr><td></td><td>• Stench of Kerosene-Amrita Pritam<br>• A Flowering Tree-A.K. Ramanujan<br>• The Gift of the Magi- O. Henry<br>• A Fly in Buttermilk-James Baldwin</td><td></td></tr>
<tr><td>5.</td><td>Student Learning Outcomes:<br>The students should be able to write correctly and properly with special reference to Letter writing.</td><td></td></tr>
<tr><td>6.</td><td>Pedagogy for Course Delivery:<br>• Workshop<br>• Group Discussions<br>• Presentations<br>• Lectures</td><td></td></tr>
<tr><td>7.</td><td>Assessment/ Examination Scheme:
<table>
<tr><th>Theory L/T (%)</th><th>Lab/Practical/Studio (%)</th><th>End Term Examination</th></tr>
<tr><td>100%</td><td>NA</td><td>70%</td></tr>
</table>
Theory Assessment (L&T):
<table>
<tr><th>Components (Drop down)</th><th>ClE</th><th>Mid Sem</th><th>Attendance</th><th>End Term Examination</th></tr>
<tr><td>Weightage (%)</td><td>10%</td><td>15%</td><td>5%</td><td>70%</td></tr>
</table>
</td><td></td></tr>
</table>

**Text:** ***Rai, Urmila & S.M. Rai. Business Communication, Mumbai: Himalaya Publishing House, 2002.***
***K.K.Sinha, Business Communication, Galgotia Publishing Company.***

**Reference:** ***Sanjay Kumar & Pushp Lata, Communication Skills, Oxford University Press.***

**Additional Reading: Newspapers and Journals**

# BEHAVIOURAL SCIENCE - III

**Course Code: BSU 343** **Credit Units: 01**
**Total Hours: 10**

**Course Objective:**
To enable the students:
- Understand the process of problem solving and creative thinking.
- Facilitation and enhancement of skills required for decision-making.

**Course Contents:**

**Module I: Thinking as a tool for Problem Solving** **(2 Hours)**
- What is thinking: The Mind/Brain/Behavior
- Critical Thinking and Learning:
  - Making Predictions and Reasoning
  - Memory and Critical Thinking
  - Emotions and Critical Thinking
- Thinking skills

**Module II: Hindrances to Problem Solving Process** **(2 Hours)**
- Perception
- Expression
- Emotion
- Intellect
- Work environment

**Module III: Problem Solving** **(2 Hours)**
- Recognizing and Defining a problem
- Analyzing the problem (potential causes)
- Developing possible alternatives
- Evaluating Solutions
- Resolution of problem
- Implementation
- Barriers to problem solving:
  - Perception
  - Expression
  - Emotion
  - Intellect
  - Work environment

**Module IV: Plan of Action** **(2 Hour)**
- Construction of POA
- Monitoring
- Reviewing and analyzing the outcome

**Module V: Creative Thinking** **(2 Hours)**
- Definition and meaning of creativity
- The nature of creative thinking
  - Convergent and Divergent thinking
  - Idea generation and evaluation (Brain Storming)
  - Image generation and evaluation
  - Debating
- The six-phase model of Creative Thinking: ICEDIP model

## Student learning outcomes

- Student will be able to understand and solve the problems effectively in their personal and professional life.
- Students will outline multiple divergent solutions to a problem,
- Student will able to create and explore risky or controversial ideas, and synthesize ideas/expertise to generate innovations.

**Examination Scheme:**

| Evaluation Components | Attendance | Journal of Success (JOS) | Social Awareness Program (SAP) SAP Report/SAP Presentation | End Semester Exam | Total |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 15 | 70 | 100 |

## Suggested Readings:

- Michael Steven: How to be a better problem solver, Kogan Page, New Delhi, 1999
- Geoff Petty: How to be better at creativity; Kogan Page, New Delhi, 1999
- Richard Y. Chang and P. Keith, Kelly: Wheeler Publishing, New Delhi, 1998.
- Phil Lowe Koge Page: Creativity and Problem Solving, New Delhi, 1996
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 3, Management (1996); Pfeiffer & Company
- Bensley, Alan D.: Critical Thinking in Psychology – A Unified Skills Approach, (1998), Brooks/Cole Publishing Company.

# FRENCH – III

**Course Code: FLU 344** **Credit Units: 02**

**Total Hours: 20**

**Course Objective:**

To enable the students

- to talk about the qualities and defects of people.
- to ask/give directions, to enquire about a lodging.
- to ask and give informations about a certain place.
- to describe events in past tense.

**Course Contents:**

**Dossiers 5,6 – pg 45-64**

**Dossier 5 : Ici et là**

**Actes de Communication :**
Exprimer l'obligation et l'interdiction, parler des qualités et des défauts de quelqu'un, demander son chemin, indiquer un itinéraire, se situer dans l'espace, se renseigner sur un logement.

**Dossier 6 : Ailleurs**
**Actes de Communication :**
S'exprimer au passé composé, raconter un voyage, se situer dans le monde, exprimer le temps (avec indicateurs detemps – il y a, depuis), se renseigner sur un hébergement, exprimer la satisfaction et l'insatisfaction.

**Grammaire :**

1. les adjectifs démonstratifs
2. les verbes : 'ir groupe' devoir, falloir
3. les prépositions de lieu, de pays
4. l'impératif, le passé composé, forme et accord du participe passé, la négation au passé composé
5. les indicateurs de temps (il y a, depuis)

**Examination Scheme:**

| | **INTERNAL** | | | | **EXTERNAL** | **GRAND TOTAL** |
|---|---|---|---|---|---|---|
| **Components** | MID-SEM | VIVA-VOCE | ATTENDANCE | **TOTAL** | **END SEMESTER** | |
| **Weightage (%)** | 15 | 10 | 5 | **30** | **70** | **100** |

**Text & References:**

***Text:***

**Le livre à suivre:**

· Andant, Christine et al. A propos A1 Livre de l'élève. Grenoble: Presses universitaires de Grenoble, 2010.

· Andant, Christine et al. A propos A1 Cahier d'exercices. Grenoble: Presses universitaires de Grenoble, 2010.

***Références :***

- Girardeau, Bruno et Nelly Mous. Réussir le DELF A1. Paris: Didier, 2010.

# MATERIALS, TESTING & EVALUATION

**Course Code: CIV 401** **Credit Units: 02**
**Total Hours: 20**

**Course Objective:**
**The objective** of this Course is to deal with an experimental determination and evaluation of mechanical characteristics and advanced behavior of metallic and non-metallic structural materials. The course deals with explanation of deformation and fracture behavior of structural materials. The main goal of this course is to provide students with all information concerning principle, way of measurement, as well as practical application of mechanical characteristics.

- Make measurements of behavior of various materials used in Civil Engineering.
- Provide physical observations to complement concepts learnt
- Introduce experimental procedures and common measurement instruments, equipment, devices.

**Course Contents:**
**Module 1**: **Introduction to Engineering Materials covering: (6 hours)**
Cements, M-Sand, Concrete (plain, reinforced and steel fibre/ glass fibre-reinforced, light-weight concrete, High Performance Concrete, Polymer Concrete) Ceramics, and Refractories, Bitumen and asphaltic materials, Timbers, Glass and Plastics, Structural Steel and other Metals, Paints and Varnishes, Acoustical material and geo-textiles, rubber and asbestos, laminates and adhesives, Graphene, Carbon composites and other engineering materials including properties and uses of these

**Module 2**: **Introduction to Material Testing covering I: (3 hours)**
What is the " Material Engineering" ?; Mechanical behavior and mechanical characteristics; Elasticity – principle and characteristics; Plastic deformation of metals; Tensile test – standards for different material (brittle, quasi-brittle, elastic and so on) True stress – strain interpretation of tensile test; hardness tests; Bending and torsion test; strength of ceramic.

**Module 3**: **Introduction to Material Testing covering II: (4 hours)**
Internal friction, creep – fundaments and characteristics; Brittle fracture of steel – temperature transition approach; Background of fracture mechanics; Discussion of fracture toughness testing – different materials; concept of fatigue of materials; Structural integrity assessment procedure and fracture mechanics

**Module 4**: **Standard Testing & Evaluation Procedures covering: (7 hours)**
Laboratory for mechanical testing; Discussion about mechanical testing; Naming systems for various irons, steels and nonferrous metals; Discussion about elastic deformation; Plastic deformation; Impact test and transition temperatures; Fracture mechanics – background; Fracture toughness – different materials; Fatigue of material; Creep.

**Module 5: Testing (tutorials )** *from the above modules covering*, Understanding i) Tests & testing of bricks, ii) Tests & testing of sand, iii) Tests & testing of concrete, iv) Tests & testing of soils, v) Tests & testing of bitumen & bituminous mixes, vi) Tests & testing of polymers and polymer based materials, vii) Tests & testing of metals & viii) Tests & testing of other special materials, composites and cementitious materials. Explanation of mechanical behavior of these materials.

## Course Outcomes:
One should be able to:

- Calibrate electronic sensors
- Operate a data acquisition system
- Operate various types of testing machines
- Configure a testing machine to measure tension or compression behavior
- Compute engineering values (e.g. stress or strain) from laboratory measures
- Analyze a stress versus strain curve for modulus, yield strength and other related attributes
- Identify modes of failure
- Write a technical laboratory report

**Examination Scheme:**

| **Components** | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text/Reference Books:


- Chudley, R., Greeno (2006), 'Building Construction Handbook' (6th ed.),R. Butterworth- Heinemann
- Khanna, S.K., Justo, C.E.G and Veeraragavan, A, ' Highway Materials and Pavement Testing', Nem Chand& Bros, Fifth Edition
- Various related updated & recent standards of BIS, IRC, ASTM, RILEM, AASHTO, etc. corresponding to materialsused for Civil Engineering applications
- Kyriakos Komvopoulos (2011), Mechanical Testing of Engineering Materials, Cognella
- E.N. Dowling (1993), Mechanical Behaviour of Materials,Prentice Hall International Edition
- American Society for Testing and Materials (ASTM), *Annual Book of ASTM Standards* (post 2000)
- Related papers published in international journals

# ENGINEERING GEOLOGY

**Course Code: CIV 402** **Credit Units: 02**
**Total Hours: 20**

**Course Objective:**
This Course is to focus on the core activities of engineering geologists – site characterization and geologic hazard identification and mitigation. Through lectures, labs, and case study examination student will learn to couple geologic expertise with the engineering properties of rock and unconsolidated materials in the characterization of geologic sites for civil work projects and the quantification of processes such as rock slides, soil-slope stability, settlement, and liquefaction. Engineering geology is an applied geology discipline that involves the collection, analysis, and interpretation of geological data and information required for the safe development of civil works. Engineering geology also includes the assessment and mitigation of geologic hazards such earthquakes, landslides, flooding; the assessment of timber harvesting impacts; and groundwater remediation and resource evaluation. Engineering geologists are applied geoscientists with an awareness of engineering principles and practice-they are not engineers.

**Course Contents:**

**Module 1: Branches and scope of geology, Physical geology: (3 Hours)**
Structure of the earth, Geological agents and their action, physical and chemical weathering, geological work done by wind, river, river meandering, glacial formation, coastal formation, underground water.

**Module 2: Mineralogy and Elements of crystallography: (5 Hours)**
study of properties of minerals, formation, various groups of minerals, silicate, Felspar, pyroxene, mica. Various important minerals hornblende, Muscovite, Quartz, Corundum, calcite, Anthophyllite etc. Elements of a crystal, Cristallographique Axis, Crystal classes and system, Isométric, Tétragonal, Hexagonal, Orthorhombic, Monoclinic, Triclinic, System.

**Module 3**: **Petrology: (3 Hours)**
Study of Igneous, Sedimentary, and metamorphic Rocks. Their texture, classification structure, forms, and engineering Use, Important rocks Granite, Gabbro, Dolerite, Pegmatite, Breccia, Sandstone, Shale, Limestone, Coals, Gypsum, Slate, Gneiss, Quartzite,

**Module 4: Structural geology and Ground Water: (5 Hours)**
Types of folds, faults and joints, their classification and causes. Earthquake, volcanism and plate tectonics, Slope failures and landslides, elements of rock Mechanics. Hydrogeology Groundwater and occurrence, investigations, quality, artificial recharge

**Module 5: Geology in Civil Engineering, Stratigraphy and Geology of India: (4 Hours)**
Tunnels, dams, reservoirs, Tunnels, Roads. Types of structures and classification and their effect on civil Engineering projects. Types, age and occurrence of rock formations and economic importance, study of Cuddapah, Vindhyan Dharwar, Deccan, and Gondwana group. Indian mineral deposits Coal, Petroleum, metallic and nonmetallic ores.

## Course Outcomes:

- Site characterization and how to collect, analyze, and report geologic data using standards in engineering practice
- The fundamentals of the engineering properties of earth materials and fluids.
- Rock mass characterization and the mechanics of planar rock slides and topples.
- Soil characterization and the Unified Soil Classification System.
- The mechanics of soils and fluids and their influence on settlement, liquefaction, and soil slope stability.

**Examination Scheme:**

| **Components** | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Parbin Singh, Engineering & General Geology, S.K. Kataria & Sons, New Delhi (2008)
- Bangar, K.M., Principles of Engineering Geology, Standard Publishers Distributors, Delhi (2009)
- Billings, Marland P., Structural Geology, 3rd ed., Prentice-Hall India, New Delhi.
- Todd, D.K., Ground Water Hydrology, 2nd ed., Wiley India, New Delhi (2008)
- Engineering and General Geology, Parbin Singh, 8th Edition (2010), S K Kataria & Sons.
- Text Book of Engineering Geology, N. Chenna Kesavulu, 2nd Edition (2009), Macmillan Publishers India.
- Geology for Geotechnical Engineers, J.C.Harvey, Cambridge University Press (1982).

# SURVEYING

**Course Code: CIV 403** **Credit Units: 02**
**Total Hours: 20**

**Course Objectives:**
With the successful completion of the course, the student should have the capability to describe the function of surveying in civil engineering construction, Work with survey observations, and perform calculations, Customary units of measure. Identify the sources of measurement errors and mistakes; understand the difference between accuracy and precision as it relates to distance, differential leveling, and angular measurements, Be familiar with the principals of recording accurate, orderly, complete, and logical field notes from surveying operations, whether recorded manually or with automatic data collection methods, Identify and calculate the errors in measurements and to develop corrected values for differential level circuits, horizontal distances and angles for open or closed-loop traverses, Operate an automatic level to perform differential and profile leveling; properly record notes; mathematically reduce and check levelling measurements etc.

**Course Contents:**

**Module 1: Introduction to Surveying: (4 Hours):**
Principles, Linear, angular and graphical methods, Survey stations, Survey lines- ranging, bearing of survey lines, Levelling: Plane table surveying, Principles of levelling- booking and reducing levels; differential, reciprocal leveling, profile levelling and cross sectioning. Digital and Auto Level, Errors in levelling; contouring: Characteristics, methods, uses; areas and volumes. Theodolite survey: Instruments, Measurement of horizontal and vertical angle; Horizontal and vertical control - methods -triangulation - network- Signals. Baseline - choices - instruments and accessories - extension of base lines - corrections - Satellite station - reduction to centre - Intervisibility of height and distances - Trigonometric leveling - Axis single corrections.

**Module 2**: **Curves: (4 Hours)**
Elements of simple and compound curves – Method of setting out– Elements of Reverse curve - Transition curve – length of curve – Elements of transition curve - Vertical curves

**Module 3**: **Modern Field Survey Systems: (4 Hours)**
Principle of Electronic Distance Measurement, Modulation, Types of EDM instruments, Distomat, Total Station – Parts of a Total Station – Accessories –Advantages and Applications, Field Procedure for total station survey, Errors in Total Station Survey; Global Positioning Systems- Segments, GPS measurements, errors and biases, Surveying with GPS, Co-ordinate transformation, accuracy considerations.

**Module 4: Photogrammetry Surveying: (4 Hours)**
Introduction, Basic concepts, perspective geometry of aerial photograph, relief and tilt displacements, terrestrial photogrammetry, flight planning; Stereoscopy, ground control extension for photographic mapping- aerial triangulation, radial triangulation, methods; photographic mapping- mapping using paper prints, mapping using stereoplotting instruments, mosaics, map substitutes.

**Module 5**: **Remote Sensing: (4 Hours)**
Introduction –Electromagnetic Spectrum, interaction of electromagnetic radiation with the atmosphere and earth surface, remote sensing data acquisition: platforms and sensors; visual image interpretation; digital image processing.

## Course Outcomes:
Students would be able to:
- Apply the knowledge, techniques, skills, and applicable tools of the discipline to engineering and surveying activities
- Translate the knowledge gained for the implementation of Civil infrastructure facilities
- Relate the knowledge on Surveying to the new frontiers of science like Hydrographic surveying, Electronic Distance Measurement, Global Positioning System, Photogrammetry and Remote Sensing.

**Examination Scheme:**

| **Components** | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text/Reference Books:


- Madhu, N, Sathikumar, R and Satheesh Gobi, Advanced Surveying: Total Station, GIS and Remote Sensing, Pearson India, 2006.
- Manoj, K. Arora and Badjatia, Geomatics Engineering, Nem Chand & Bros, 2011
- Bhavikatti, S.S., Surveying and Levelling, Vol. I and II, I.K. International, 2010
- Chandra, A.M., Higher Surveying, Third Edition, New Age International (P) Limited, 2002.
- Anji Reddy, M., Remote sensing and Geographical information system, B.S. Publications, 2001.
- Arora, K.R., Surveying, Vol-I, II and III, Standard Book House, 2015.

# FLUID MECHANICS

**Course Code: CIV 404** **Credit Units: 02**
**Total Hours: 20**

**Course Objectives:**
The course will help students to understand the various properties, types and characteristics of fluid. It will help students to design pipes, pipe bents, pipe surface design etc.

**Course Contents:**

**Module 1: Basic Concepts and Definitions: (4 Hours)**
Distinction between a fluid and a solid; Density, Specific weight, Specific gravity, Kinematic and dynamic viscosity; variation of viscosity with temperature, Newton law of viscosity; vapour pressure, boiling point, cavitation; surface tension, capillarity, Bulk modulus of elasticity, compressibility.

**Module 2: Fluid Statics: (4 Hours)**
Fluid Pressure: Pressure at a point, Pascals law, pressure variation with temperature, density and altitude. Piezometer, U-Tube Manometer, Single Column Manometer, U-Tube Differential Manometer, Micromanometers. pressure gauges, Hydrostatic pressure and force: horizontal, vertical and inclined surfaces. Buoyancy and stability of floating bodies.

**Module 3: Fluid Kinematics: (4 Hours)**
Classification of fluid flow: steady and unsteady flow; uniform and non-uniform flow; laminar and turbulent flow; rotational and irrotational flow; compressible and incompressible flow; ideal and real fluid flow; one, two and three dimensional flows; Stream line, path line, streak line and stream tube; stream function, velocity potential function. One-, two- and three -dimensional continuity equations in Cartesian coordinates

**Module 4: Fluid Dynamics: (4 Hours)**
Surface and body forces; Equations of motion - Euler's equation; Bernoulli's equation – derivation; Energy Principle; Practical applications of Bernoulli's equation: venturimeter, orifice meter and pitot tube; Momentum principle; Forces exerted by fluid flow on pipe bend; Vortex Flow – Free and Forced; Dimensional Analysis and Dynamic Similitude - Definitions of Reynolds Number, Froude Number, Mach Number, Weber *Number and Euler Number; Buckingham's* $\pi$-Theorem. Notches and Weirs.

**Module 5: Fluid Dynamics: (4 Hours)**
Boundary layer theory, drag and lift force, drag on a sphere, rough and smooth boundaries, concept of mixing length, boundary layer distribution for various shapes and for various Reynold's number.

## Course Outcomes:
Students should understand the:
properties of fluids, pressure measurement devices, hydraulic forces on surfaces, bouncy and flotation in fluids, kinematics and static behavior of fluids, dimension and model analysis, laminar and turbulent flow, flow through pipes and orifices, boundary layer theory.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***

- R.K. Bansal, "Fluid Mechanics & Hydraulic Machines", Laxmi Publications (P) Ltd., 2002.
- Gupta, S. C., Fluid Mechanics and Hydraulic Machines, Pearson Education, 2007
- D.S. Kumar, "Fluid Mechanics and Fluid Power Engineering", S.K. Kataria & Sons, 2000.


***References:***

- F. M. White, Introduction to Fluid Mechanics, McGraw Hill
- I.H. Shames, "Mechanics of Fluids", Tata McGraw Hill
- Douglas, J. F., Gasiorek, J.M. and Swaffield, J., Fluid Mechanics, Pearson Education, 4/e, 2006

- V.L. Streeter and E.B. Wylie, “Fluid Mechanics”, Tata McGraw Hill Massey B S, Mechanics of Fluids, Van Nostrand Reinhold Co

# SOLID MECHANICS

**Course Code: CIV 405** **Credit Units: 02**
**Total Hours: 20**

**Course Objectives:**
To student will understand simples stresses and strains, compound stresses and strains, bending moments and shear strains, flexural stresses etc.

**Module1: Simple Stresses and Strains: (4 Hours)**
Concept of stress and strain, St. Venant's principle, stress and strain diagram, Elasticity and plasticity – Types of stresses and strains, Hooke's law-stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio and volumetric strain – Elastic moduli and the relationship between them – Bars of varying section – composite bars – Temperature stresses. Strain Energy – Resilience-Gradual, sudden, impact and shock loadings – simple applications.

**Module 2: Compound Stresses and Strains: (3 Hours)**
Two-dimensional system, stress at a point on a plane, principal stresses and principal planes, Mohr circle of stress, ellipse of stress and their applications. Two-dimensional stress-strain system, principal strains and principal axis of strain, circle of strain and ellipse of strain. Relationship between elastic constants.

**Module 3: Bending moment and Shear Force Diagrams: (4 Hours)**
Bending moment (BM) and shear force (SF) diagrams.BM and SF diagrams for cantilevers simply supported and fixed beams with or without overhangs. Calculation of maximum BM and SF and the point of contra flexure under concentrated loads, uniformly distributed loads over the whole span or part of span, combination of concentrated loads (two or three) and uniformly distributed loads, uniformly varying loads, application of moments.

**Module 4: Flexural Stresses-Theory of simple bending: (3 Hours)**
Assumptions – Derivation of bending equation: M/I = f/y = E/R - Neutral axis – Determination of bending stresses – Section modulus of rectangular and circular sections (Solid and Hollow), I,T, Angle and Channel sections – Design of simple beam sections.

**Module 5: Shear Stresses- Derivation of formula: (3 Hours)**
Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T angle sections.Relationship between moment, slope and deflection, Moment area method, Macaulay's method. Use of these methods to calculate slope and deflection for determinant beams.

**Module 6: Torsion: (3 Hours)**
Derivation of torsion equation and its assumptions. Applications of the equation of the hollow and solid circular shafts, torsional rigidity, Combined torsion and bending of circular shafts, principal stress and maximum shear stresses under combined loading of bending and torsion.. Derivation of formulae and calculations of hoop stress, longitudinal stress in a cylinder, and sphere subjected to internal pressures.

## Course Outcomes:
Students will understand the following.

(1) Simple Stresses and Strains
(2) Compound Stresses and Strains
(3) Bending moment and Shear Force Diagrams

They will develop skills to problem solving in solid mechanics.

**Examination Scheme:**

| **Components** | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:
***Text:***

- Jindal U.C., "Strength of Materials", Galgotia Publication, New Delhi, 1998.
- Ryder G.H., "Strength of Materials", Macmillan, Delhi, 2003.
- R.K. Bansal, "Strength of Materials", Laxmi Publication, New Delhi, 2001.

***References:***


- Sadhu Singh, "Strength of Materials", Khanna Publishers, New Delhi, 2000.
- Timoshenko S.P., "Elements of Strength of Materials", East-West affiliated, New Delhi, 2000.
- Hibbler R.C., "Mechanics of Materials", Prentice Hall, New Delhi, 1994.
- Popov Eger P., "Engg. Mechanics of solids", Prentice Hall, New Delhi, 1998.
- Fenner, Roger. T, "Mechanics of Solids", U.K. B.C. Publication, New Delhi, 1990.
- Srinath L.S. et.al., "Strength of Materials", McMillan, New Delhi,2001

# DISASTER PREPAREDNESS & PLANNING MANAGEMENT

**Course Code: CIV 406** **Credit Units: 02**
**Total Hours: 20**

**Course Objective**
The overall aim of this course is to provide broad understanding about the basic concepts of Disaster Management with preparedness as a Civil Engineer. Further, the course introduces the various natural hazards that can pose risk to property, lives, and livestock, etc. and understanding of the social responsibility as an engineer towards preparedness as well as mitigating the damages. The objectives of the course are i) To Understand basic concepts in Disaster Management ii) To Understand Definitions and Terminologies used in Disaster Management iii) To Understand Types and Categories of Disasters iv). To Understand the Challenges posed by Disasters vi) To understand Impacts of Disasters Key Skills

**Course Contents:**

**Module 1: Introduction: (4 Hours)**
Concepts and definitions: disaster, hazard, vulnerability, risks- severity, frequency and details, capacity, impact, prevention, mitigation).

**Module 2: Disasters: (4 Hours)**
Disasters classification; natural disasters (floods, draught, cyclones, volcanoes, earthquakes, tsunami, landslides, coastal erosion, soil erosion, forest fires etc.); manmade disasters (industrial pollution, artificial flooding in urban areas, nuclear radiation, chemical spills, transportation accidents, terrorist strikes, etc.); hazard and vulnerability profile of India, mountain and coastal areas, ecological fragility.

**Module 3: Disaster Impacts: (4 Hours)**
Disaster impacts (environmental, physical, social, ecological, economic, political, etc.); health, psycho-social issues; demographic aspects (gender, age, special needs); hazard locations; global and national disaster trends; climate change and urban disasters.

**Module 4: Disaster Risk Reduction (DRR): (4 Hours)**
Disaster management cycle – its phases; prevention, mitigation, preparedness, relief and recovery; structural and non-structural measures; risk analysis, vulnerability and capacity assessment; early warning systems, Post-disaster environmental response (water, sanitation, food safety, waste management, disease control, security, communications); Roles and responsibilities of government, community, local institutions, DRR programmes in India and the activities of National Disaster Management Authority.

**Module 5: Disasters, Environment and Development: (4 Hours)**
Factors affecting vulnerability such as impact of developmental projects and environmental modifications (including of dams, land- use changes, urbanization etc.), sustainable and environmental friendly recovery; reconstruction and development methods.

## Course Outcomes:

- The application of Disaster Concepts to Management
- Analyzing Relationship between Development and Disasters
- Ability to understand Categories of Disasters and realization of the responsibilities to society

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text/Reference Books:


- http://ndma.gov.in/ (Home page of National Disaster Management Authority)
- http://www.ndmindia.nic.in/ (National Disaster management in India, Ministry of Home Affairs).
- Pradeep Sahni, 2004, Disaster Risk Reduction in South Asia, Prentice Hall.
- Singh B.K., 2008, Handbook of Disaster Management: Techniques & Guidelines, Rajat Publication.
- Ghosh G.K., 2006, Disaster Management, APH Publishing Corporation
- Disaster Medical Systems Guidelines. Emergency Medical Services Authority, State of California, EMSA no.214, June 2003
- Inter Agency Standing Committee (IASC) (Feb. 2007). IASC Guidelines on Mental Health and Psychosocial Support in Emergency Settings. Geneva: IASC

# CIVIL ENGINEERING – SOCIETAL & GLOBAL IMPACT

**Course Code: CIV 407** **Credit Units: 02**
**Total Hours: 20**

**Course Objective:**
The course is designed to provide a better understanding of the impact which Civil Engineering has on the Society at large and on the global arena. Civil Engineering projects have an impact on the Infrastructure, Energy consumption and generation, Sustainability of the Environment, Aesthetics of the environment, Employment creation, Contribution to the GDP, and on a more perceptible level, the Quality of Life. It is important for the civil engineers to realise the impact which this field has and take appropriate precautions to ensure that the impact is not adverse but beneficial.

**Course Contents:**

**Module 1: Introduction to Course and Overview: (4 Hours)**
Understanding the past to look into the future: Pre-industrial revolution days, Agricultural revolution, first and second industrial revolutions, IT revolution; Recent major Civil Engineering breakthroughs and innovations; Present day world and future projections, Evaluating future requirements for various resources; GIS and applications for monitoring systems; Human Development Index and Ecological Footprint of India Vs other countries and analysis;

**Module 2: Understanding the importance of Civil Engineering in shaping and impacting the world: (4 Hours)**
The ancient and modern Marvels and Wonders in the field of Civil Engineering; Future Vision for Civil Engineering

**Module 3: Infrastructure - Habitats, Megacities, Smart Cities, futuristic visions: (3 Hours)**
Transportation (Roads, Railways & Metros, Airports, Seaports, River ways, Sea canals, Tunnels (below ground, under water); Futuristic systems (ex, Hyper Loop)); Energy generation (Hydro, Solar (Photovoltaic, Solar Chimney), Wind, Wave, Tidal, Geothermal, Thermal energy); Water provisioning; Telecommunication needs (towers, above-ground and underground cabling).

**Module 4: Environment: (3 Hours)**
Traditional & futuristic methods; Solid waste management, Water purification, Wastewater treatment & Recycling, Hazardous waste treatment; Flood control (Dams, Canals, River interlinking), Multi-purpose water projects, Atmospheric pollution;

**Module 5: Built environment: (3 Hours)**
Recycling, Temperature/ Sound control in built environment, Conservation, Repairs & Rehabilitation of Structures & Heritage structures; Innovations and methodologies for ensuring Sustainability

**Module 6: Civil Engineering Projects**: **(3 Hours)**
Environmental Impact Analysis procedures; Waste (materials, manpower, equipment) avoidance/ Efficiency increase; Advanced construction techniques for better sustainability; Techniques for reduction of Green House Gas emissions in various aspects of Civil Engineering Projects; contribution of Civil Engineering to GDP.

## Outcome of the course:

- The impact which Civil Engineering projects have on the Society at large and on the global arena and using resources efficiently and effectively.
- The extent of Infrastructure, its requirements for energy and how they are met: past, present and future
- The Sustainability of the Environment, including its Aesthetics,
- The potentials of Civil Engineering for Employment creation and its Contribution to the GDP
- The Built Environment and factors impacting the Quality of Life

**Examination Scheme:**

| **Components** | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

**Text/ Reference Books:**


- *Žiga* Turk (2014), Global Challenges and the Role of Civil Engineering, Chapter 3 in: Fischinger M. (eds) Performance-Based Seismic Engineering: Vision for an Earthquake Resilient Society. Geotechnical, Geological and Earthquake Engineering, Vol. 32. Springer, Dordrecht
- Brito, Ciampi, Vasconcelos, Amarol, Barros (2013) Engineering impacting Social, Economic and Working Environment, 120th ASEE Annual Conference and Exposition
- NAE Grand Challenges for Engineering (2006), Engineering for the Developing World, The Bridge, Vol 34, No.2, Summer 2004.
- Allen M. (2008) Cleansing the city. Ohio University Press. Athens Ohio.
- Ashley R., Stovin V., Moore S., Hurley L., Lewis L., Saul A. (2010). London Tideway Tunnels Programme – Thames Tunnel Project Needs Report – Potential source control and SUDS applications: Land use and retrofit options
- http://www.thamestunnelconsultation.co.uk/consultation-documents.aspx
- Ashley R M., Nowell R., Gersonius B., Walker L. (2011). Surface Water Management and Urban Green Infrastructure. Review of Current Knowledge. Foundation for Water Research FR/R0014
- Barry M. (2003) Corporate social responsibility – unworkable paradox or sustainable paradigm? Proc ICE Engineering Sustainability 156. Sept Issue ES3 paper 13550. p 129-130
- Blackmore J M., Plant R A J. (2008). Risk and resilience to enhance sustainability with application to urban water systems. J. Water Resources Planning and Management. ASCE. Vol. 134, No. 3, May.
- Bogle D. (2010) UK's engineering Council guidance on sustainability. Proc ICE Engineering Sustainability 163. June Issue ES2 p61-63
- Brown R R., Ashley R M., Farrelly M. (2011). Political and Professional Agency Entrapment: An Agenda for Urban Water Research**.** Water Resources Management. Vol. 23, No.4. European Water Resources Association (EWRA) ISSN 0920-4741.
- Brugnach M., Dewulf A., Pahl-Wostl C., Taillieu T. (2008) Toward a relational concept of uncertainty: about knowing too little, knowing too differently and accepting not to know. Ecology and Society 13 (2): 30
- Butler D., Davies J. (2011). Urban Drainage. Spon. 3rd Ed.
- Cavill S., Sohail M. (2003) Accountability in the provision of urban services. Proc. ICE. Municipal Engineer 156. Issue ME4 paper 13445, p235-244.
- Centre for Water Sensitive Cities (2012) Blueprint for a water sensitive city. Monash University.
- Charles J A. (2009) Robert Rawlinson and the UK public health revolution. Proc ICE Eng History and Heritage. 162 Nov. Issue EH4. p 199-206

# INSTRUMENTATION & SENSOR TECHNOLOGIES FOR CIVIL ENGINEERING APPLICATIONS

**Course Code : ECE 407** **Credit Units: 02**
**Total Hours: 20**

**Course Objective:**
The objective of this Course is to understand instrumentation, sensor theory and technology, data acquisition, digital signal processing, damage detection algorithm, life time analysis and decision making. It will cover the principles of state-of-the-art systems being used in physical infrastructure/bridges/buildings/pavements, etc.

**Course Contents:**

**Module 1: Fundamentals of Measurement, Sensing and Instrumentation: (5 Hours)**
Definition of measurement and instrumentation, physical variables, common types of sensors; Describe the function of these sensors; Use appropriate terminology to discuss sensor applications; and qualitatively interpret signals from a known sensor type, types of instrumentation, Sensor Specifics, Permanent installations, Temporary installations;

**Module 2: Sensor Installation and Operation: (5 Hours)**
Predict the response of sensors to various inputs, construct a conceptual instrumentation and monitoring program, Describe the order and methodology for sensor installation, differentiate between types of sensors and their modes of operation and measurement and Approach to Planning Monitoring Programs, Define target, Sensor selection, Sensor siting, Sensor Installation & Configuration, Advanced topic, Sensor design, Measurement uncertainty

**Module 3: Data Analysis and Interpretation covering: (5 Hours)**
Fundamental statistical concepts, Data reduction and interpretation, Piezometer, Inclinometer, Strain gauge, etc. Time domain signal processing, Discrete signals, Signals and noise and a few examples of statistical information to calculate are: Average value (mean), On average, how much each measurement deviates from the mean (standard deviation), Midpoint between the lowest and highest value of the set (median), Most frequently occurring value (mode), Span of values over which your data set occurs (range)

**Module 4: Frequency Domain Signal Processing and Analysis: (5 Hours)**
Explain the need for frequency domain analysis and its principles; Draw conclusions about physical processes based on analysis of sensor data; Combine signals in a meaningful way to gain deeper insight into physical phenomena, Basic concepts in frequency domain signal processing and analysis, Fourier Transform, FFT (Fast Fourier Transform), Example problems: Noise reduction with filters, Leakage, Frequency resolution

## Course Outcomes:

- To analyze the errors during measurements
- To specify the requirements in the calibration of sensors and instruments
- To describe the noise added during measurements and transmission
- To describe the measurement of electrical variables
- To describe the requirements during the transmission of measured signals
- To construct Instrumentation/Computer Networks
- To suggest proper sensor technologies for specific applications
- To design and set up measurement systems and do the studies

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:


- Alan S Morris (2001), Measurement and Instrumentation Principles,3rd/e, Butterworth Hienemann

# MATERIAL TESTING AND EVALUATION LAB

**Course Code: CIV 421** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
The course is designed to provide a better understanding of coarse and fine aggregates, tensile Strength of materials & concrete composites etc. To Understand the engineering properties of various materials used in construction.

**List of Practicals:**
1. Gradation of coarse and fine aggregates. Different corresponding tests and need/ application of these tests in design and quality control**. (2 Hours)**
2. Concrete permeability test, and tiles abrasion test **(1 Hour )**
3. Tensile Strength of materials & concrete composites. Compressive strength test on aggregates **(1 Hour)**
4. Tension I-Elastic Behaviour of metals & materials. Tension II-Failure of Common Materials: **(2 Hours)**
5. Direct Shear-Frictional Behaviour. Concrete I-Early Age Properties: **(2 Hours)**
6. Concrete II-Compression and Indirect Tension. Compression-Directionality: **(2 Hours)**
7. Soil Classification. Consolidation and Strength Tests: **(2 Hours)**
8. Tension III-Heat Treatment. Torsion test: **(2 Hours)**
9. Hardness tests (Brinnel's and Rockwell). Tests on closely coiled and open coiled springs: **(2 Hours)**
10. Theories of Failure and Corroboration with Experiments. Tests on unmodified bitumen and modified binders with polymers: **(2 Hours)**
11. Bituminous Mix Design and Tests on bituminous mixes - Marshall method. Concrete Mix Design as per BIS: **(2 Hours)**

## Laboratory Outcomes:
Upon completion of this laboratory course students will demonstrate the ability to
- Gradation of coarse and fine aggregates
- Different corresponding tests and need/application of these tests in design and quality control
- Tensile Strength of materials & concrete composites
- Compressive strength test on aggregates

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

# ENGINEERING GEOLOGY LAB

**Course Code: CIV 422** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
The course is designed to provide the students a knowledge of geology, mineral properties, Rock properties. To understand the field problems related to Engineering Geology.

**List of Practicals:**
1. Study of physical properties of minerals: **(2 Hours)**
2. Study of sp gravity of minerals and rocks **(2 Hours)**
3. Study of different group of minerals: **(2 Hours)**
4. Study of Crystal and Crystal system: **(2 Hours)**
5. Identification of minerals: Silica group: Quartz, Amethyst, Opal; Feldspar group: Orthoclase, Plagioclase; Cryptocrystalline group: Jasper; Carbonate group: Calcite; Element group: Graphite; Pyroxene group: Talc; Mica group: Muscovite; Amphibole group: Asbestos, Olivine, Hornblende, Magnetite, Hematite, Corundum, Kyanite, Garnet, Galena, Gypsum: **(2 Hours)**
6. Identification of rocks (Igneous Petrology): Acidic Igneous rock: Granite and its varieties, Syenite, Rhyolite, Pumice, Obsidian, Scoria, Pegmatite, Volcanic Tuff. Basic rock: Gabbro, Dolerite, Basalt and its varieties, Trachyte. **(2 Hours)**
7. Identification of rocks (Sedimentary Petrology): Conglomerate, Breccia, Sandstone and its varieties, Laterite, Limestone and its varieties, Shales and its varieties. **(2 Hours)**
8. Identification of rocks (Metamorphic Petrolody): Marble, slate, Gneiss and its varieties, Schist and its varieties. Quartzite, Phyllite. **(2 Hours)**
9. Study of topographical features from Geological maps. Identification of symbols in maps : **(2 Hours)**
10. Field study of foulds and faults **(2 Hours)**
11. Project :- working modal on advance technology is mandatory for each students

## Laboratory Outcomes:
Upon completion of this laboratory course students will demonstrate the ability to
- Identification of rocks (Igneous Petrology)
- Identification of rocks (Sedimentary Petrology)
- Identification of rocks (Metamorphic Petrolody)
- Minerals and crystallography.

**Examination Scheme:**

| Components | A | CT | Project | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

# SURVEYING LAB

**Course Code: CIV 423** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
The course is designed to provide and train students of civil surveying. Demonstrate how to use various surveying equipments/machines. Scaling of maps and vice versa would be taught in this course.

**List of Practicals:**

1. Chain survey-Traversing and plotting of details: **(2 Hours)**
2. Chain survey-Measurement of Area by offsetting: **(2 Hours)**
3. Compass survey - Traversing with compass and calculation of Interior angles: **(2 Hours)**
4. Plane table survey-Method of Radiation: **(2 Hours)**
5. Plane table survey-Method of Intersection: **(2 Hours)**
6. Levelling Fly Leveling-Plane of collimation method: **(2 Hours)**
7. Levelling Fly leveling-Rise and Fall method: **(2 Hours)**
8. Total station uses in angles and sop distance measurement.: **(2 Hours)**
9. Total station levelling and Contour surveying, Topographical maps.: **(2 Hours)**
10. Theodolite surveying-Measurement of horizontal angle by method of repetition and reiteration: **(2 Hours)**

## Laboratory Outcomes:
Upon completion of this laboratory course students will demonstrate the ability to
- Chain survey - Traversing and plotting of details.
- Chain survey – Measurement of Area by offsetting.
- Compass survey - Traversing with compass and calculation of Interior angles
- The use of advance survey instrument, Total station, the odolite etc.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

# FLUID MECHANICS LAB

**Course Code: CIV 424** **Credit Units: 01**
**Total Hours: 20**

**Course Objective**
The course is designed to provide and train students of fluid mechanics. Demonstrate how to use various fluid mechanics instruments, study river flow, pipe flow etc.

**Lab Experiments**

1. Measurement of viscosity: **(2 Hours)**
2. Study of Pressure Measuring Devices: **(2 Hours)**
3. Stability of Floating Body: (2 **Hours**)
4. Hydrostatics Force on Flat Surfaces/ Curved Surfaces: (2 **Hours**)
5. Verification of Bernoulli's Theorem: (2 **Hours)**
6. Venturimeter: (2 **Hours**)
7. Orifice meter: (2 **Hours**)
8. Impacts of jets: (2 **Hours**)
9. Flow Visualisation -Ideal Flow: (2 **Hours**)
10. Length of establishment of flow, velocity distribution in pipes, Laminar Flow: (2 **Hours**)

**Laboratory Outcomes:**
Upon completion of this laboratory course students will demonstrate the ability to

- To measure pipe flow –
- To measure river flow
- To measure erosion
- To measure impact of jets etc

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

# INSTRUMENTATION & SENSOR TECHNOLOGIES FOR CIVIL ENGINEERING APPLICATIONS LABORATORY

**Course Code : ECE 427** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
The objective of this Course is to understand instrumentation, sensor theory and technology, data acquisition, digital signal processing, damage detection algorithm, life time analysis and decision making. It will cover the principles of state-of-the-art systems being used in physical infrastructure/ bridges/ buildings/ pavements, etc.

**List of Experiments**

1. Measurement of resolution and sensitivity of thermocouple: **(2 Hours)**
2. Measurement of resolution, sensitivity and non-linearity of thermistor: **(2 Hours)**
3. Measurement of thickness of LVDT: **(2 Hours)**
4. Measurement of resolution of LVDT (and displacement measurement): **(2 Hours)**
5. Vibration measurement by stroboscope: **(2 Hours)**
6. Angular frequency (speed of rotating objects) measurement by stroboscope: **(2 Hours)**
7. Pressure transducer study and calibration: **(2 Hours)**
8. Proving ring (force measurement): **(2 Hours)**
9. Study of Torque cell: **(2 Hours)**
10. Closed loop study of an electric circuit: **(2 Hours)**

## Laboratory Outcomes:

Upon completion of this laboratory course students will demonstrate the ability to
- Measure the resolution and sensitivity of thermocouple, thermistor and LVDT
- To analyze the errors during measurements
- To specify the requirements in the calibration of sensors and instruments
- To describe the measurement of electrical variables

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

A: Attendance, CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;

# COMMUNICATION SKILLS-IV

**Course Code: BCU 441** **Credit Units: 01**
**Total Hours: 10**

**Course Objective:**

This course is designed to develop the skills of the students in preparing job search artifacts and negotiating their use in GDs and interviews.
**Prerequisites:** NIL

| **Course Contents / Syllabus:** | | |
|---|---|---|
| **1.** | **dule I Employment-Related Correspondence** | **35% Weightage** |
| | • Resume Writing<br>• Covering Letters<br>• Follow Up Letters | |
| **2.** | **Module II Dynamics of Group Discussion** | **35% Weightage** |
| | • Significance of GD<br>• Methodology & Guidelines | |
| **3.** | **Module III Interviews**<br>• Types & Styles of Interviews<br>• Fundamentals of facing Interviews<br>• Interview-Frequently Asked Questions | **20% Weightage** |
| **4.** | **Module IV Short Stories** | **10% Weightage** |
| | • Proof of the Pudding - O. Henry<br>• “The Lottery” 1948 – Shirley Jackson<br>• The Eyes Have it- Ruskin Bond<br>• Kallu- Ismat Chughtai<br>All the four stories will be discussed in one class.<br>One Long Question will be set in the Exam from the Text. | |
| **5.** | **Student Learning Outcomes:**<br>• Develop a resume for oneself<br>• Ability to handle the interview process confidently<br>• Learn the subtle nuances of an effective group discussion | |
| **6.** | **Pedagogy for Course Delivery:**<br>• Workshop<br>• Group Discussions<br>• Presentations<br>• Lectures | |
| **7.** | **Assessment/ Examination Scheme:** | |

| **Theory L/T (%)** | **Lab/Practical/Studio (%)** | **End Term Examination** |
|---|---|---|
| 100% | NA | 70% |

**Theory Assessment (L&T):**

| **Components (Drop down)** | CIE | Mid Sem | Attendance | **End Term Examination** |
|---|---|---|---|---|
| **Weightage (%)** | 10% | 15% | 5% | 70% |

**Text:** ***Sharma, R.C. & Krishna Mohan. Business Correspondence and Report Writing: A Practical approach to Business & Technical Communication, New Delhi: Tata McGraw Hill & Co. Ltd., 2002.***
***Rai, Urmila & S.M. Rai. Business Communication, Mumbai: Himalaya Publishing House, 2002.***
***Rizvi, M.Ashraf. Effective Technical Communication, New Delhi: Tata McGraw Hill, 2007.***
**Reference:** ***Brusaw, Charles T., Gerald J. Alred & Walter E. Oliu. The Business Writer’s Companion, Bedford: St. Martin’s Press, 2010.***
***Lewis, Norman. How to Read Better and Faster. New Delhi: Binny Publishing House.***

- **Additional Reading: Newspapers and Journals**

# BEHAVIOURAL SCIENCE - IV

**Course Code: BSU 443** **Credit Units: 01**
**Total Hours: 10**

**Course Objective:**
This course aims at imparting an understanding of Values, Ethics & Morality among students for making a balanced choice between personal & professional development.

**Course Contents:**

**Module I: Introduction to Values & Ethics** **(2 Hours)**

Meaning & its type
Relationship between Values and Ethics
Its implication in one's life

**Module II: Values Clarification & Acceptance** **(2Hours)**

Core Values-Respect, Responsibility, Integrity, Resilience, Care, & Harmony
Its process-Self Exploration
Nurturing Good values

**Module III: Morality** **(2 Hours)**
Difference between morality, ethics &values
Significance of moral values

**Module IV: Ethical Practice** **(2 Hours)**

Ethical Decision making
Challenges in its implementation
Prevention of Corruption &Crime

**Module V: Personal & Professional Values** **(2 Hours)**
Personal values-Empathy, honesty, courage, commitment
Professional Values-Work ethics, respect for others
Its role in personality development
Character building-"New Self awareness"

**Student learning outcomes**
- Able to answer the question: What do I stand for?
- Ability to apply a coherent set of moral principles within professional and specialized contexts
- Willing to make unpopular but right decision
- Committed to working for justice and peace locally and globally

**Examination Scheme:**

| Evaluation Components | Attendance | Journal of Success (JOS) | Social Awareness Program (SAP) SAP Report/SAP Presentation | End Semester Exam | Total |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 15 | 70 | 100 |

**Text & References:**


- Cassuto Rothman, J. (1998). From the Front Lines, Student Cases in Social Work Ethics. Needham Heights, MA: Allyn and Bacon.
- Gambrill, E. & Pruger, R. (Eds). (1996). Controversial Issues in Social Work Ethics, Values, & Obligations. Needham Heights, MA: Allyn and Bacon, Inc.

# FRENCH – IV

**Course Code: FLU 444** **Credit Unit: 02**
**Total Hours: 20**

**Course Objective:**
To strengthen the language of the students in both oral and written
To revise the grammar in application and the communication tasks related to topics covered already
To get acquainted with the current social communication skills, oral (dialogue, telephone conversations, etc.) and written and perform simple communication tasks such as

- talking about personal habits
- narrating events in the past, marking the stages, using appropriate connectors
- holding conversations on telephone
- asking for /giving advices

**Course Contents:**

**Dossier 7 – pg 65-74, Dossiers 1, 2**

**and 3 (révision) Dossier 7 : au boulot**
**Actes de Communication :**
Parler des habitudes et décrire une situation à l'imparfait, comparer (nom et verbe), qualifier (qui, que) s'exprimer
au téléphone, demander et donner un avis.

**Dossiers 1, 2, 3 – Révision**
Exercices d'écoute, production orale et écrite.

**Grammaire :**
1. l'imparfait,
2. la comparaison du verbe/du nom ; mieux/meilleur
3. les pronoms relatifs

**Examination Scheme:**

| | INTERNAL | | | | EXTERNAL | GRAND TOTAL |
|---|---|---|---|---|---|---|
| **Components** | MID-SEM | VIVA-VOCE | ATTENDANCE | **TOTAL** | **END SEMESTER** | |
| **Weightage (%)** | 15 | 10 | 5 | **30** | **70** | **100** |

**Text & References:**

***Text:***
**Le livre à suivre:**
· Andant, Christine et al. A propos A1 Livre de l'élève. Grenoble: Presses universitaires de Grenoble, 2010.
· Andant, Christine et al. A propos A1 Cahier d'exercices. Grenoble: Presses universitaires de Grenoble, 2010.

***Références :***
· Girardeau, Bruno et Nelly Mous. Réussir le DELF A1. Paris: Didier, 2010.

# MECHANICS OF MATERIALS

**Course Code: CIV 501** **Credit Units: 03**
**Total Hours: 30**

**Course Objectives:**

The course is designed to provide and train students of mechanics of materials. The course will introduce students to various material properties, mechanics under different loading condition etc.

**Course Contents:**

The objective of this Course is to introduce to continuum mechanics and material modeling of engineering materials based on first energy principles.

**Module 1: Introduction to Stress and Strain: (8 hours)**
Deformation and Strain covering description of finite deformation, Infinitesimal deformation; Analysis of statically determinate trusses; Stability of dams, retaining walls and chimneys; Stress analysis of thin, thick and compound cylinder.

**Module 2: Failure Theories: (7 hours)**
Generalized state of stress and strain: Stress and strain tensor, Yield criteria and theories of failure; Tresca, Von-Mises, Hill criteria, Heigh-Westerguard's stress space.

**Module 3: Bending Moments Diagrams: (5 hours)**
Momentum Balance and Stresses covering Forces and Moments Transmitted by Slender Members, Shear Force and Bending Moment Diagrams, Momentum Balance, Stress States / Failure Criterion.

**Module 4: Determinacy and Indeterminacy of Structures: (5 hours)**
Mechanics of Deformable Bodies covering Force-deformation Relationships and Static Indeterminacy, Uniaxial Loading and Material Properties, Trusses and Their Deformations, Statically Determinate and Indeterminate Trusses,

**Module 5: Pressure Vessels and Torsion: (5 hours)**
Force-Stress-Equilibrium covering Multiaxial Stress and Strain, Thin-walled Pressure Vessels,Stress and strain Transformations and Principal Stress, Failure of Materials. Statically Indeterminate Beams, Shear and Torsion, Torsion and Twisting.

**Course Outcome:-**

- Understand the deformation and strains under different load action and response in terms of forces and moments
- Understand the behaviour under different loading actions

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text/Reference Books:


- Norris, C.H. and Wilber, J. B. and Utku, S. "Elementary Structural Analysis" Mc Graw Hill, Tokyo, Japan.
- Timoshenko, S. and Young, D. H., "Elements of Strength of Materials", DVNC, New York, USA. 3. Kazmi, S. M. A., 'Solid Mechanics" TMH, Delhi, India.
- Hibbeler, R. C. Mechanics of Materials. 6th ed. East Rutherford, NJ: Pearson Prentice Hall, 2004

# HYDRAULIC ENGINEERING

**Course Code: CIV 502** | **Credit Units: 02**
**Total Hours: 20**

**Course Objectives:**
The course is designed to provide and train students of hydraulic engineering. The course will introduce students to various fluid properties, and their behavior under different condition.

**Course Content**
To introduce the students to various hydraulic engineering problems like open channel flows and hydraulic machines.

**Module 1: Introduction to Different Types of Flow: (3 Hours)**
Laminar Flow- Laminar flow through: circular pipes, annulus and parallel plates. Stoke's law, Measurement of viscosity.

**Module 2: Flow Types and Profile Determination: (5 Hours)**
Turbulent Flow- Reynolds experiment, Transition from laminar to turbulent flow. Definition of turbulence, scale and intensity, Causes of turbulence, instability, mechanism of turbulence and effect of turbulent flow in pipes. Reynolds stresses, semi-empirical theories of turbulence, Prandtl's mixing length theory, universal velocity distribution equation. Resistance to flow of fluid in smooth and rough pipes, Moody's diagram.

**Module 3: Boundary Layer Theory: (4 Hours)**
Boundary Layer Analysis-Assumption and concept of boundary layer theory. Boundary-layer thickness, displacement, momentum & energy thickness, laminar and Turbulent boundary layers on a flat plate; Laminar sub-layer, smooth and rough boundaries. Local and average friction coefficients. Separation and Control.

**Module 4: Different Types of Model Law: (4 Hours)**
Dimensional Analysis and Hydraulic Similitude: Dimensional homogeneity, Rayleigh method, Buckingham's Pi method and other methods. Dimensionless groups. Similitude, Model studies, Types of models. Application of dimensional analysis and model studies to fluid flow problem. AICTE Model Curriculum for Undergraduate degree in Civil Engineering (Engineering & Technology) 133 | Page

**Module 5: Introduction to Open Channel Flow: (4 Hours)**
Introduction to Open Channel Flow-Comparison between open channel flow and pipe flow, Loss of head through pipes, Darcy-Wiesbatch equation, minor losses, total energy equation, hydraulic gradient line, Pipes in series, equivalent pipes, pipes in parallel, flow through laterals, flows in dead end pipes, siphon, power transmission through pipes, nozzles.

## Course Outcome:
- The students will be able to apply their knowledge of fluid mechanics in addressing problems in open channels

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text/Reference Books:

- Hydraulics and Fluid Mechanics, P.M. Modi and S.M. Seth, Standard Book House
- Theory and Applications of Fluid Mechanics, K. Subramanya, Tata McGraw Hill.
- Open channel Flow, K. Subramanya, Tata McGraw Hill.

# STRUCTURAL ENGINEERING

**Course Code: CIV 503** **Credit Units: 03**
**Total Hours: 30**

**Course Objectives:**

This course aims at providing students with a solid background on principles of structural engineering design.

**Course Content**

**Module 1: Introduction Concepts of Energy Principles: (6 Hours)**
Introduction- concepts of energy principles, safety, sustainable development in performance; what makes a structure; principles of stability, equilibrium; what is a structural engineer, role of engineer, architect, user, builder; what are the functions' what do the engineers design, first principles of process of design

**Module 2: Different Types of Loads on Structures: (6 Hours)**
Planning and Design Process; Materials, Loads, and Design Safety; Behaviour and Properties of Concrete and Steel; Wind and Earthquake Loads.

**Module 3: Structural Design Criteria: (6 Hours)**
Materials and Structural Design Criteria: Introduction to the analysis and design of structural systems. Analyses of determinate and indeterminate trusses, beams, and frames, and design philosophies for structural engineering. Laboratory experiments dealing with the analysis of determinate and indeterminate structures.

**Module 4: Different Types of Structural Elements: (6 Hours)**
Design of Structural Elements; Concrete Elements, Steel Elements, Structural Joints; Theories and concepts of both concrete and steel design and analysis both at the element and system levels. Approximate Analysis Methods as a Basis for Design; Design of AICTE Model Curriculum for Undergraduate degree in Civil Engineering (Engineering & Technology) 135 | Page Reinforced Concrete Beams for Flexure; Design of Reinforced Concrete Beams for Shear; Bond, Anchorage, and Serviceability; Reinforced Concrete Columns; Reinforced Concrete Slabs; Introduction to Steel Design; Tension Members and Connections; Bending Members; Structural Systems.

**Module 5: Prestress Concrete Design: (6 Hours)**
System Design Concepts; Special Topics that may be Covered as Part of the Design Project Discussions; Cable Structures; Prestressed Concrete Bridges; Constructability and Structural Control; Fire Protection.

## Course Outcome:

- The students will be able to apply their knowledge of structural mechanics in addressing design problems of structural engineering.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text/Reference Books:


- Nilson, A. H. Design of Concrete Structures. 13th edition. McGraw Hill, 2004
- McCormac, J.C., Nelson, J.K. Jr., Structural Steel Design. 3rd edition. Prentice Hall, N.J., 2003.
- Galambos, T.V., Lin, F.J., Johnston, B.G., Basic Steel Design with LRFD, Prentice Hall, 1996
- Segui, W. T., LRFD Steel Design, 2nd Ed., PWS Publishing, Boston.
- Salmon, C.G. and Johnson, J.E., Steel Structures: Design and Behavior, 3rd Edition, Harper & Row, Publishers, New York, 1990.
- MacGregor, J. G., Reinforced Concrete: Mechanics and Design, 3rd Edition, Prentice Hall, New Jersey, 1997.

# GEOTECHNICAL ENGINEERING

**Course Code: CIV 504** **Credit Units: 02**
**Total Hours: 20**

**Course Objectives:**
The student has basic knowledge about soil and different types of soil based on Indian classification and different soil property.

**Course Content**

**Module 1: Introduction–Types of Soils, Their Formation and Deposition: (3 Hours)**
Introduction–Types of soils, their formation and deposition, Definitions: soil mechanics, soil engineering, rock mechanics, geotechnical engineering. Scope of soil engineering. Comparison and difference between soil and rock. Basic Definitions and Relationships-Soil as three-phase system in terms of weight, volume, voids ratio. porosity. Definitions: moisture content, unit weights, degree of saturation, voids ratio, porosity, specific gravity, mass specific gravity.

**Module 2: Different Soil Properties and Relations: (4 Hours)**
Plasticity Characteristics of Soil - Introduction to definitions of: plasticity of soil, consistency limits-liquid limit, plastic limit, shrinkage limit, plasticity, liquidity and consistency indices, flow & toughness indices, definitions of activity and sensitivity. Determination of: liquid limit, plastic limit and shrinkage limit. Use of consistency limits. Classification of Soils-Introduction of soil classification: particle size classification, textural classification, unified soil classification system, Indian standard soil classification system.

**Module 3: Determination of Coefficient of Permeability: (4 Hours)**
Permeability of Soil - Darcy's law, validity of Darcy's law. Determination of coefficient of permeability: Laboratory method: constant-head method, falling-head method. Field method: pumping- in test, pumping- out test. Permeability aspects: permeability of stratified soils, factors affecting permeability of soil. Seepage Analysis- Introduction, stream and potential functions, characteristics of flow nets.

**Module 4: Stresses Coming on Soil Specimen: (4 Hours)**
Effective Stress Principle - Introduction, effective stress principle, nature of effective stress, effect of water table. Fluctuations of effective stress, effective stress in soils saturated by capillary action, seepage pressure, quick sand condition.

**Module 5: Compaction of Soil: (2 Hours)**
Compaction of Soil-Introduction, theory of compaction, laboratory determination of optimum moisture content and maximum dry density. Compaction in field, compaction specifications and field control.

**Module 6: Consolidation of Soil: (3 Hours)**
Consolidation of Soil - Introduction, comparison between compaction and consolidation, initial, primary & secondary consolidation, spring analogy for primary consolidation, interpretation of consolidation test results, Terzaghi's theory of consolidation, final settlement of soil deposits, computation of consolidation settlement and secondary consolidation. Introduction, stresses due to point load, line load, strip load, uniformly loaded circular area, rectangular loaded area. Influence factors, Isobars, Boussinesq's equation, Newmark's Influence Chart.

## Course Outcome:
- Specify a strategy for site investigation to identify the soil deposits and determine the depth and spatial extent within the ground.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text/Reference Books:

- Soil Mechanics by Craig R.F., Chapman & Hall
- Fundamentals of Soil Engineering by Taylor, John Wiley & Sons
- An Introduction to Geotechnical Engineering, by Holtz R.D. and Kovacs, W.D., Prentice Hall, NJ 4. Principles of Geotechnical Engineering, by Braja M. Das, Cengage Learning
- Principles of Foundation Engineering, by Braja M. Das, Cengage Learning

# HYDROLOGY & WATER RESOURCES ENGINEERING

**Course Code: CIV 505** **Credit Units: 03**
**Total Hours: 30**

**Course Objectives:**

The main objective of this course is to make student aware about various forms of precipitation and about different theories about water calculation.

**Course Content**
**Module 1: Introduction to Hydrology: (5 Hours)**
Introduction - hydrologic cycle, water-budget equation, history of hydrology, world water balance, applications in engineering, sources of data.

**Module 2: Different Forms of Precipitation: (5 Hours)**
Precipitation - forms of precipitation, characteristics of precipitation in India, measurement of precipitation, rain gauge network, mean precipitation over an area, deptharea-duration relationships, maximum intensity/depth-duration-frequency relationship, Probable Maximum Precipitation (PMP), rainfall data in India.

**Module 3: Different Methods for Rainfall Calculation: (7 Hours)**
Abstractions from precipitation - evaporation process, evaporimeters, analytical methods of evaporation estimation, reservoir evaporation and methods for its reduction, evapotranspiration, measurement of evapotranspiration, evapotranspiration equations, potential evapotranspiration over India, actual evapotranspiration, interception, depression storage, infiltration, infiltration capacity, measurement of infiltration, modelling infiltration capacity, classification of infiltration capacities, infiltration indices.

**Module 4: SCS-CN Method of Estimating Runoff: (6 Hours)**
Runoff - runoff volume, SCS-CN method of estimating runoff volume, flow duration curve, flow-mass curve, hydrograph, factors affecting runoff hydrograph, components of hydrograph, base flow separation, effective rainfall, unit hydrograph surface water resources of India, environmental flows.

**Module 5: Ground Water and Well Hydrology: (7 Hours)**
Ground water and well hydrology - forms of subsurface water, saturated formation, aquifer properties, geologic formations of aquifers, well hydraulics: steady state flow in wells, equilibrium equations for confined and unconfined aquifers, aquifer tests. Design of channels- rigid boundary channels, alluvial channels, Kennedy's and Lacey's theory of regime channels. Water logging: causes, effects, consumptive use, irrigation requirement, frequency of irrigation; Methods of applying water to the fields: surface, sub-surface, sprinkler and trickle / drip irrigation.

## Course Outcome:

- Understand the interaction among various processes in the hydrologic cycle ¬ Apply the application of fluid mechanics and use of computers in solving problems.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text/Reference Books:


- K Subramanya, Engineering Hydrology, Mc-Graw Hill.
- K N Muthreja, Applied Hydrology, Tata Mc-Graw Hill.
- K Subramanya, Water Resources Engineering through Objective Questions, Tata McGraw Hill.
- G L Asawa, Irrigation Engineering, Wiley Eastern

# ENVIRONMENTAL ENGINEERING – I

**Course Code: CIV 506** **Credit Units: 03**
**Total Hours: 30**

**Course Objectives:**

The students are able to understand various impurities present in water and different techniques used for purification of water.

**Course Content**

**Module 1: Basic water Qualities: (6 Hours)**
Water: -Sources of Water and quality issues, water quality requirement for different beneficial uses, Water quality standards, water quality indices, water safety plans, Water Supply systems, Need for planned water supply schemes, Water demand industrial and agricultural water requirements, Components of water supply system; Transmission of water, Distribution system, Various valves used in W/S systems, service reservoirs and design. Water Treatment: aeration, sedimentation, coagulation flocculation, filtration, disinfection, advanced treatments like adsorption, ion exchange, membrane processes.

**Module 2: Sewage and Its Disposal: (6 Hours)**
Sewage- Domestic and Storm water, Quantity of Sewage, Sewage flow variations. Conveyance of sewage- Sewers, shapes design parameters, operation and maintenance of sewers, Sewage pumping; Sewerage, Sewer appurtenances, Design of sewerage systems. Small bore systems, Storm Water- Quantification and design of Storm water; Sewage and Sullage, Pollution due to improper disposal of sewage, National River cleaning plans.

**Module 3: Air Quality and Pollutants: (6 Hours)**
Air - Composition and properties of air, Quantification of air pollutants, Monitoring of air pollutants, Air pollution- Occupational hazards, Urban air pollution automobile pollution, Chemistry of combustion, Automobile engines, quality of fuel, operating conditions and interrelationship. Air quality standards, Control measures for Air pollution, construction and limitations

**Module 4: Solid Waste Management: (4 Hours)**
Noise- Basic concept, measurement and various control methods. Government authorities and their roles in water supply, sewerage disposal. Solid waste management and monitoring/control of environmental pollution.

**Module 5: Physical and Methods for Waste Management: (5 Hours)**
Solid waste management-Municipal solid waste, Composition and various chemical and physical parameters of MSW, MSW management: Collection, transport, treatment and disposal of MSW. Special MSW: waste from commercial establishments and other urban areas, solid waste from construction activities, biomedical wastes, Effects of solid waste on environment: effects on air, soil, water surface and ground health hazards. Disposal of solid waste-segregation, reduction at source, recovery and recycle. Disposal methods Integrated solid waste management. Hazardous waste: Types and nature of hazardous waste as per the HW Schedules of regulating authorities.

**Module 6: Home Plumbing Systems for Water Supply: (3 Hours)**
Building Plumbing-Introduction to various types of home plumbing systems for water supply and waste water disposal, high rise building plumbing, Pressure reducing valves, Break pressure tanks, Storage tanks, Building drainage for high rise buildings, various kinds of fixtures and fittings used.

## Course Outcome:

- Understand the impact of humans on environment and environment on humans ¬ Be able to identify and value the effect of the pollutants on the environment: atmosphere, water.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text/Reference Books:

- Introduction to Environmental Engineering and Science by Gilbert Masters, Prentice Hall, New Jersey.
- Introduction to Environmental Engineering by P. Aarne Vesilind, Susan M. Morgan, Thompson /Brooks/Cole; Second Edition 2008.

- Peavy, H.s, Rowe, D.R, Tchobanoglous, G. Environmental Engineering, Mc-Graw - Hill International Editions, New York 1985.

# TRANSPORTATION ENGINEERING

**Course Code: CIV 507** **Credit Units: 02**
**Total Hours: 20**

**Course Objectives:**

Student will get knowledge on various types of highway properties and alignment different types of pavement design and classification of highway and planning of highway design.

**Course Contents:**

**Module 1: Highway Planning: (4 Hours)**
Highway development and planning-Classification of roads, road development in India, Current road projects in India; highway alignment and project preparation.

**Module 2: Geometric Properties of Highway: (4 Hours)**
Geometric design of highways-: Introduction; highway cross section elements; sight distance, design of horizontal alignment; design of vertical alignment; design of intersections, problems

**Module 3: Traffic Engineering & Control: (4 Hours)**
Traffic engineering & control- Traffic Characteristics, traffic engineering studies, traffic flow and capacity, traffic regulation and control; design of road intersections; design of parking facilities; highway lighting; problems

**Module 4: Pavement Design: (4 Hours)**
Pavement materials- Materials used in Highway Construction- Soils, Stone aggregates, bituminous binders, bituminous paving mixes; Portland cement and cement concrete: desirable properties, tests, requirements for different types of pavements. Problems

**Module 5: Flexible and IRC Guidelines: (4 Hours)**
Design of pavements- Introduction; flexible pavements, factors affecting design and performance; stresses in flexible pavements; design of flexible pavements as per IRC; rigid pavements- components and functions; factors affecting design and performance of CC pavements; stresses in rigid pavements; design of concrete pavements as per IRC; problems.

## Course Outcome:

- Carry out surveys involved in planning and highway alignment ¬ design the geometric elements of highways and expressways

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text/Reference Books:


- Khanna, S.K., Justo, C.E.G and Veeraragavan, A, 'Highway Engineering', Revised 10th Edition, Nem Chand & Bros, 2017
- Kadiyalai, L.R., ' Traffic Engineering and Transport Planning', Khanna Publishers.
- Partha Chakraborty, ' Principles Of Transportation Engineering, PHI Learning,

# HYDRAULIC ENGINEERING LAB

**Course Code: CIV 522** **Credit Units: 02**
**Total Hours: 20**

**Course Objective:**
To introduce the students to various hydraulic engineering problems like open channel flows and hydraulic machines. At the completion of the course, the student should be able to relate the theory and practice of problems in hydraulic engineering

**Practical Work:**

1. Flow Visualization**: (2 Hours)**
2. Studies in Wind Tunnel**: (2 Hours)**
3. Boundary Layer**: (2 Hours)**
4. Flow around an Aerofoil / circular cylinder**: (2 Hours)**
5. Uniform Flow**: (2 Hours)**
6. Velocity Distribution in Open channel flow**: (2 Hours)**
7. Venturi Flume**,** Standing Wave, Flume**: (2 Hours)**
8. Gradually Varied Flow, Flow through pipes**: (2 Hours)**
9. Turbulent flow through pipes**: (2 Hours)**
10. Flow visualization**: (2 Hours)**

## Course Outcomes:

- The students will be able to apply their knowledge of fluid mechanics in addressing problems in open channels.
- They will possess the skills to solve problems in uniform, gradually and rapidly varied flows in steady state conditions.
- They will have knowledge in hydraulic machineries (pumps and turbines).

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

## Text/Reference Books:


- Hydraulics and Fluid Mechanics, P.M. Modi and S.M. Seth, Standard Book House
- Theory and Applications of Fluid Mechanics, K. Subramanya, Tata McGraw Hill.
- Open channel Flow, K. Subramanya, Tata McGraw Hill.

# GEOTECHNICAL ENGINEERING LAB

**Course Code: CIV 524** **Credit Units: 02**
**Total Hours: 20**

**Course Objectives:**
To introduce basic soil properties and their significance to the students and to have a understanding of different soil properties and their uses in engineering.

**Practical Work:**

1. Field Density using Core Cutter method**: (1 Hour)**
2. Field Density using Sand replacement method**: (1 Hour)**
3. Natural moisture content using Oven Drying method**: (1 Hour)**
4. Field identification of Fine Grained soils**: (1 Hour)**
5. Specific gravity of Soils**: (1 Hour)**
6. Grain size distribution by Sieve Analysis**: (1 Hour)**
7. Grain size distribution by Hydrometer Analysis**: (2 Hours)**
8. Consistency limits by Liquid limit**: (2 Hours)**
9. Consistency limits by Plastic limit**: (2 Hours)**
11. Consistency limits by Shrinkage limit**: (2 Hours)**
12. Permeability test using Constant-head test method**: (2 Hours)**
13. Permeability test using Falling-head. Triaxial Test (UU) **: (2 Hours)**
14. Vane Shear Test**: (1 Hours)**
15. Direct Shear Test**: (1 Hours)**

## Course Outcome:

- Specify a strategy for site investigation to identify the soil deposits and determine the depth and spatial extent within the ground;
- Understand various site investigation techniques and their in-situ applications;

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

## Text/Reference Books:

- Soil Mechanics by Craig R.F., Chapman & Hall
- Fundamentals of Soil Engineering by Taylor, John Wiley & Sons
- An Introduction to Geotechnical Engineering, by Holtz R.D. and Kovacs, W.D., Prentice Hall, NJ

# TRANSPORTATION ENGINEERING LAB

**Course Code: CIV 527** **Credit Units: 02**
**Total Hours: 20**

**Course Objective:**
To impart knowledge about different geometric properties of highway and different highway materials used in the construction.

1. Los Angles Abrasion Test**: (2 Hours)**
2. Crushing test**: (2 Hours)**
3. Impact test for aggregates**: (2 Hours)**
4. Elongation and flakiness index test**: (2 Hours)**
5. Marshall Stability test**: (2 Hours)**
6. Flash point test**: (2 Hours)**
7. Fire Test**: (2 Hours)**
8. Ductility test**: (2 Hours)**
9. Penetration test for bitumen**: (1 Hour)**
10. Specific gravity and water absorption of Aggregate**: (1 Hour)**
11. Viscosity test**: (1 Hours)**
12. Aggregate crushing value**: (1 Hour)**

## Course Outcome:

- Carry out surveys involved in planning and highway alignment design the geometric elements of highways and expressways.
- Carry out traffic studies and implement traffic regulation and control measures and intersection design characterize pavement materials and design flexible and rigid pavements

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

## Text/Reference Books:


- Khanna, S.K., Justo, C.E.G and Veeraragavan, A, 'Highway Engineering', Revised 10th Edition, Nem Chand & Bros, 2017
- Kadiyalai, L.R., ' Traffic Engineering and Transport Planning', Khanna Publishers.
- Partha Chakraborty, ' Principles Of Transportation Engineering, PHI Learning

# COMMUNICATION SKILLS – V
# (RECEPTIVE AND EXPRESSIVE COMMUNICATION SKILLS)

**Course Code: BCU 541** **Credit Units: 01**
**Total Hours: 10**

**Course Objective:**
- To enable the students to adopt strategies for effective reading and writing skills.
- The course would enhance student's vocabulary, language and fluency. It would also teach the students to deliver professional presentations.

**Prerequisites:** NIL

| **Course Contents / Syllabus:** | | |
|---|---|---|
| **1.** | **Module I Vocabulary** | **35% Weightage** |
| | • Define Vocabulary<br>• Significance of Vocabulary<br>• One Word Substitution, Synonyms & Antonyms and Idioms & Phrases<br>• Define and Differentiate Homonyms, Homophones and Homographs<br>• Vocabulary Drills<br>• Foreign Words | |
| **2.** | **Module II Comprehension Skills** | **25% Weightage** |
| | • Reading Comprehension-SQ3R Reading Techniques<br>• Summarising and Paraphrasing<br>• Précis Writing<br>• Listening Comprehension | |
| **3.** | **Module III Presentation Skills**<br>• Discussing the Significance of Audio-visual Aids, Audience and Feedback in Presentation Skills<br>• Analyzing the Significance of Non-Verbal Communication | **30% Weightage** |
| **4.** | **Module IV Prose**<br>• How Far is the River-Ruskin Bond<br>• My Wood-E.M.Forster<br>• I have a Dream-Martin Luther King<br>• Spoken English and Broken English-G.B. Shaw | **10% Weightage** |
| **5.** | **Student Learning Outcomes:**<br>• Communicate fluently and sustain comprehension of an extended discourse.<br>• Demonstrate ability to interpret texts and observe the rules of good writing.<br>• Prepare and present effective presentations aided by ICT tools. | |
| 6. | **dagogy for Course Delivery:** Workshop<br>• Group Discussions<br>• Presentations<br>• Lectures | |
| **7.** | **Assessment/ Examination Scheme:** | |

| **Theory L/T (%)** | **Lab/Practical/Studio (%)** | **End Term Examination** |
|---|---|---|
| 100% | NA | 70% |

**Theory Assessment (L&T):**

| **Components (Drop down)** | CIE | Mid Sem | Attendance | **End Term Examination** |
|---|---|---|---|---|
| **Weightage (%)** | 10% | 15% | 5% | 70% |

**Text:Jaffe, C.I. Public Speaking: Concepts and Skills for a Diverse Society, 4th ed. Belmont, CA: Wadsworth, 2004.**

**Effective English for Engineering Students, B Cauveri, Macmillan India**

***Creative English for Communication*, Krishnaswamy N, Macmillan**

**Reference:** ***A Textbook of English Phonetics*, Balasubramanian T, Macmillan**

**Additional Reading: Newspapers and Journals**

# BEHAVIOURAL SCIENCE – V
# GROUP DYNAMICS AND TEAM BUILDING

**Course Code: BSU 543** **Credit Units: 01**
**Total Hours: 10**

Course Objective:

- To inculcate in the students an elementary level of understanding of group/team functions
- To develop team spirit and to know the importance of working in teams

**Course Contents:**

**Module I: Group formation: (02 Hours)**

- Definition and Characteristics
- Importance of groups
- Classification of groups
- Stages of group formation
- Benefits of group formation

**Module II: Group Functions: (02 Hours)**

- External Conditions affecting group functioning: Authority, Structure, Org. Resources, Organizational policies etc.
- Internal conditions affecting group functioning: Roles, Norms, Conformity, Status, Cohesiveness, Size, Inter group conflict.
- Group Cohesiveness and Group Conflict
- Adjustment in Groups

**Module III: Teams: (02 Hours)**

- Meaning and nature of teams
- External and internal factors effecting team
- Building Effective Teams
- Consensus Building
- Collaboration

**Module IV:Leadership: (02 Hours)**

- Meaning, Nature and Functions
- Self leadership
- Leadership styles in organization
- Leadership in Teams

**Module V: Power to empower: Individual and Teams: (02 Hours)**

- Meaning and Nature
- Types of power
- Relevance in organization and Society

## Student learning outcomes

- Students will Develop critical and reflective thinking abilities
- Students will Demonstrate an understanding of group dynamics and effective teamwork
- Student will develop a range of leadership skills and abilities such as effectively leading change, resolving conflict, and motivating others
- Student will Gain knowledge and understanding of organization resources, policies, and involvement opportunities.
- Student will Develop strategies to recruit, retain, and continually motivate contributing members to the organization

**Examination Scheme:**

| Evaluation Components | Attendance | Journal of Success (JOS) | Social Awareness Program (SAP) SAP Report/SAP Presentation | End Semester Exam | Total |
|---|---|---|---|---|---|
| **Weightage (%)** | **5** | **10** | **15** | **70** | **100** |

## Suggested Readings:


- Organizational Behaviour, Davis, K.
- Hoover, Judhith D. Effective Small Group and Team Communication, 2002, Harcourt College Publishers
- Dick, Mc Cann & Margerison, Charles: Team Management, 1992 Edition, viva books
- Bates, A. P. and Julian, J.: Sociology - Understanding Social Behaviour
- Dressers, David and Cans, Donald: The Study of Human Interaction
- Lapiere, Richard. T – Social Change
- Lindzey, G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology, Addison – Welsley, US.
- Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.
- LaFasto and Larson: When Teams Work Best, 2001, Response Books (Sage), New Delhi
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 2, Group (1996); Pfeiffer & Company
- Smither Robert D.; The Psychology of Work and Human Performance, 1994, Harper Collins College Publishers.

# FRENCH – V
# PROGRAMMED'ETUDESPOURLEFRANÇAIS

**CourseCode: FLU 544** **CreditUnits: 02**
**Total Hours: 20**

**CourseObjective:**
Tostrengthenthe language ofthe students inbothoral andwritten
Torevise the grammarinapplicationandthe communicationtasksrelatedtotopicscoveredalready
Toget acquaintedwiththe current socialcommunicationskills,oral(dialogue,telephone conversations,etc.)and writtenandperformsimple communicationtaskssuchas

- narratingevents inthe past,markingthestages,usingappropriateconnectors
- expressingcausesandconsequences,usingappropriate logical connectors
- presentingabiography

**CourseContents:**
**Dossier8–Pg75-84Dossiers4,5and6(révision)**
**Dossier8:Vivre ensemble**
**ActesdeCommunication:**
Exprimerlacause,l'opposition,laconséquence,décrirelesétapesd'uneaction,s'exprimersurl'environnement, l'écologie, identifieret décrirelesdifférencesde comportement, décrire le fonctionnementd'une association, fairela biographied'une personne.

**Dossiers4, 5,6–Révision**
Exercicesd'écoute,productionorale et écrite.

**Grammaire :**
1. le présent (révision),lepassé composé(révision)
2. lespronomscomplémentsdirects,lespronomscompléments indirects
3. lesmarqueurschronologiques
4. lesarticulateurslogiques

**ExaminationScheme:**

| | **INTERNAL** | | | | **EXTERNAL** | **GRAND TOTAL** |
|---|---|---|---|---|---|---|
| **Components** | MID-SEM | VIVA-VOCE | ATTENDANCE | **TOTAL** | **END SEMESTER** | |
| **Weightage (%)** | 15 | 10 | 5 | **30** | **70** | **100** |

## Text &References:

***Text:***
**Le livre àsuivre:**
· Andant,Christineet al.A proposA1Livre del'élève.Grenoble:Pressesuniversitairesde Grenoble,2010.
· Andant,Christineet al.A proposA1Cahierd'exercices.Grenoble:Pressesuniversitairesde Grenoble,2010.
***Références:***
· Girardeau,Brunoet NellyMous.Réussirle DELFA1.Paris:Didier,2010.

# INDUSTRIAL PRACTICAL TRAINING – I

**Course Code: NPT 550** **Credit Units: 03**

**Course Objectives:**
This course will enable the students to explore the preferred field of specialization and develop analytical / hardware / software / experimental / observation skills. It will help them to manage the technical content and work. It will also help them to prepare and present technical report.

**Methodology:**
Practical training is based on the theoretical subjects studied by students. It can be arranged within the college or in any related industrial unit. The students are to learn various industrial, technical and administrative processes followed in the industry. In case of on-campus training the students will be given specific task of fabrication/assembly/testing/analysis. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation on same.

**Course Outcome:**
After successful completion of the course, the students will be able to

- Explore the preferred field of specialization and develop analytical / hardware / software / experimental / observation skills.
- Manage the technical content and work.
- Learn the various administrative process followed in industry.
- Prepare and present technical report.

**Examination Scheme:**

| | |
|---|---|
| Feedback from industry/work place | 20 |
| Training Report | 40 |
| Viva | 15 |
| Presentation | 25 |
| **Total** | **100** |

# CONSTRUCTION ENGINEERING & MANAGEMENT

**Course Code: CIV 601** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
To train the students with the latest and the best in the rapidly changing fields of Construction Engineering, Technology and Management. To prepare the students to be industry leaders who implement the best engineering and management practices and technologies in the construction industry. To continually work with industry to enhance the program's effectiveness and the opportunities for innovation in the construction industry. To conduct research to develop advanced technologies and management approaches.

**Course Contents:**

**Module I: (5 Hours)**
Basics of Construction- Unique features of construction, construction projects types and features, phases of a project, agencies involved and their methods of execution;

**Module II: (5 Hours)**
Construction project planning- Stages of project planning: pre-tender planning, pre-construction planning, detailed construction planning, role of client and contractor, level of detail. Process of development of plans and schedules, work break-down structure, activity lists, assessment of work content, concept of productivities, estimating durations; Networks: basic terminology, types of precedence relationships, preparation of CPM networks: activity on link and activity on node representation, computation of float values, critical and semi critical paths, calendaring networks. PERT- Assumptions underlying PERT analysis, determining three time estimates, analysis, slack computations.

**Module III: (5 Hours)**
Construction Methods basics: Types of foundations and construction methods; Basics of Formwork and Staging; Common building construction methods (conventional walls and slabs; conventional framed structure with blockwork walls; Modular construction methods for repetitive works; Precast concrete construction methods; Basics of Slip forming for tall structures; Basic construction methods for steel structures; Basics of construction methods for Bridges. Construction Equipment basics: Conventional construction methods Vs Mechanized methods and advantages of latter; Equipment for Earthmoving, Dewatering; Concrete mixing, transporting & placing; Cranes, Hoists and other equipment for lifting; Equipment for transportation of materials. Equipment Productivities.

**Module IV: (5 Hours)**
Planning and organizing construction site and resources- Site: site layout including enabling structures, developing site organization, Documentation at site; Manpower: planning, organizing, staffing, motivation; Materials: concepts of planning, procurement and inventory control; Equipment: basic concepts of planning and organizing; Funds: cash flow, sources of funds; Histograms and S-Curves. Earned Value; Resource Scheduling- Bar chart, line of balance technique, resource constraints and conflicts; resource aggregation, allocation, smoothening and leveling. Common Good Practices in Construction

**Module V: (5 Hours)**
Contracts Management basics: Importance of contracts; Types of Contracts, parties to a contract; Common contract clauses (Notice to proceed, rights and duties of various parties, notices to be given, Contract Duration and Price. Performance parameters; Delays, penalties and liquidated damages; Force Majeure, Suspension and Termination. Changes & variations, Dispute Resolution methods. Construction Costs: Make-up of construction costs; Classification of costs, timecost trade-off in construction projects, compression and decompression.

## Course Outcomes:
At the end of the course, the student will have

- An ability to apply Stages of project planning
- An idea of how structures are built and projects are developed on the field
- An understanding of modern construction practices

- A good idea of basic construction dynamics- various stakeholders, project objectives, processes, resources required and project economics an ability to develop plans and schedules an ability to apply Common building construction methods

**Examination Scheme:**

| Components | HA | V/S/Q | CT | AT | ESE |
|---|---|---|---|---|---|
| **Weightage (%)** | 7 | 8 | 10 | 5 | 70 |

## Text & References:


- Varghese, P.C., "Building Construction", Prentice Hall India, 2007.
- National Building Code, Bureau of Indian Standards, New Delhi, 2017.
- Chudley, R., Construction Technology, ELBS Publishers, 2007.
- Peurifoy, R.L. Construction Planning, Methods and Equipment, McGraw Hill, 2011
- Nunnally, S.W. Construction Methods and Management, Prentice Hall, 2006
- Jha, Kumar Neeraj., Construction Project management, Theory & Practice, Pearson Education India, 2015
- Punmia, B.C., Khandelwal, K.K., Project Planning with PERT and CPM, Laxmi Publications, 2016.

# GEOMETRIC DESIGN OF HIGHWAYS

**Course Code: CIV 602** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
Classification of rural highways and urban roads, Objectives and requirements of highway geometric design; Horizontal alignment, design of expressways, IRC standards and guidelines for design problems.

**Course Contents:**

**Module I: Introduction:** Classification of rural highways and urban roads. Objectives and requirements of highway geometric design; Design Controls: Topography, vehicle characteristics and design vehicle, driver characteristics, speed, traffic flow and capacity, levels of service, pedestrian and other facilities, environmental factors; Design Elements: Sight distances**: (5 Hours)**

**Module II:** Horizontal alignment - design considerations, stability at curves, super elevation, widening, transition curves; curvature at intersections, vertical alignment - grades, ramps, design of summit and valley curves, combination of vertical and horizontal alignment including design of hair pin bends, design of expressways**: (5 Hours)**

**Module III:** IRC standards and guidelines for design problems; Cross Section Elements: Right of way and width considerations, roadway, shoulders, kerbs traffic barriers, medians, frontage roads; Facilities for pedestrians, bicycles, buses and trucks, Pavement surface characteristics - types, cross slope, skid resistance, unevenness; Design Considerations: Design considerations for rural and urban arterials, freeways, and other rural and urban roads; Design Of Intersections: Characteristics and design considerations of at-grade intersections;; Rotary intersections; Grade separations and interchanges -; Design of Parking lots**: (10 Hours)**

**Module IV:** Aircraft characteristics; Aircraft performance characteristics: Airport planning and air travel demand forecasting: Airport Site Selection; Geometric Design of the Airfield: Determination of Runway Capacity and Delay - Taxiway and Gate Capacity - Holding Aprons - Terminal Aprons – Airport drainage - Function of Airport Passenger and Cargo Terminal - Design of Air Freight Terminals - Airport access - Airport Landside planning - Capacity**: (10 Hours)**

**Course Outcomes:**
At the end of the course, the student will have
- An ability to apply Stages of project planning
- An idea of how structures are built and projects are developed on the field
- An understanding of modern construction practices
- A good idea of basic construction dynamics- various stakeholders, project objectives, processes, resources required and project economics an ability to develop plans and schedules an ability to apply Common building construction methods

**Examination Scheme:**

| Components | HA | V/S/Q | CT | AT | ESE |
|---|---|---|---|---|---|
| Weightage (%) | 7 | 8 | 10 | 5 | 70 |

**Text & References:**

- Khanna, S.K., Justo, C.E.G and Veeraragavan, A, 'Highway Engineering', Revised 10th Edition, Nem Chand & Bros, 2017
- Kadiyalai, L.R., ' Traffic Engineering and Transport Planning', Khanna Publishers.
- Partha Chakraborty, ' Principles Of Transportation Engineering, PHI Learning, Tomlinson
- Fred L. Mannering, Scott S. Washburn, Walter P. Kilareski,'Principles of Highway Engineering and Traffic Analysis', 4th Edition, John Wiley
- Srinivasa Kumar, R, Textbook of Highway Engineering, Universities Press, 2011.
- Paul H. Wright and Karen K. Dixon, Highway Engineering, 7th Edition, Wiley Student Edition, 2009.

# ENVIRONMENTAL ENGINEERING – II

**Course Code: CIV 603** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The objective of the course is to make students gain insight into how the water and wastewater gets transported through conduits and open channels, and use the same for the design, operation and maintenance of these systems, to provide an in depth understanding of physical and physico-chemical processes used for water and wastewater treatment systems and to provide capability to design such systems.

**Course Contents:**

**Module I: Water Quality Engineering**. Fundamental theory underlying the unit processes utilized in the treatment of water for domestic and industrial usage, and in the treatment of domestic and industrial wastewaters**: (5 Hours)**

**Module II: Transport of wastewater:** Sanitary Sewerage Systems: Flow estimation, sewer materials, hydraulics of flow in sewers, sewer lay out, sewer transitions, materials for sewers, appurtenances, manholes, sewer design, conventional and model based design, sewage pumps and pumping stations, corrosion prevention, operation and maintenance, safety. Storm water Drainage Systems: Drainage layouts, storm runoff estimation, hydraulics of flow in storm water drains, materials, cross sections, design of storm water drainage systems, inlets, storm water pumping, operation and maintenance**: (10 Hours)**

**Module III: Physico-Chemical Processes for wastewater treatment.**
Water purification in natural systems, physical processes, chemical processes and biological processes. Primary, secondary and tertiary treatment. Unit operations, unit processes. Aeration and gas transfer. Sedimentation, different types of settling, sedimentation tank design. Coagulation and flocculation, coagulation processes, stability of colloids, destabilization of colloids, destabilization in water and wastewater treatment, transport of colloidal particles, design aspects**: (5 Hours)**

**Module IV: Biological processes for contaminant removal**
Characterization of waste. Aerobic, anaerobic and anoxic systems. Suspended and attached growth biological systems. Activated Sludge processand process modifications, Process design considerations, Treatment Ponds and aerated Lagoons, aerobic pond, facultative pond, anaerobic ponds, polishing ponds, constructed wet lands etc. Attached Growth Biological Treatment Systems, Trickling Filters, Rotating Biological Contactors, Activated Biofilters, Moving bed biological reactor (MBBR), Sequential Batch reactors (SBR), Membrane Biological Reactors (MBR) etc. Anaerobic processes, Process fundamentals, Standard, high rate and hybrid reactors, Anaerobic filters, Expanded /fluidized bed reactors, Upflow anaerobic sludge blanket reactors, Performance and design aspects, Expanded granular bed reactors, Two stage/phase anaerobic reactors. Sludge Digestion, anaerobic digestion, aerobic digestion**: (10 Hours)**

## Course Outcomes:
After successfully studying this course, students will:
- Able to make students gain insight into how the water and wastewater gets transported through conduits and open channels, and use the same for the design, operation and maintenance of these systems, able to provide an in depth understanding of physical and physico-chemical processes used for water and wastewater treatment systems and to provide capability to design such systems.
- Develop understanding of basics of microbiology, metabolism and energetic, bio kinetic parameter, reactors and reactor analyses.

**Examination Scheme:**

| Components | HA | V/S/Q | CT | AT | ESE |
|---|---|---|---|---|---|
| Weightage (%) | 7 | 8 | 10 | 5 | 70 |

**Text & References:**


- Introduction to Environmental Engineering and Science by Gilbert Masters, Prentice Hall, New Jersey.
- Introduction to Environmental Engineering by P. Aarne Vesilind, Susan M. Morgan, Thompson /Brooks/Cole; Second Edition 2008.
- Peavy, H.s, Rowe, D.R, Tchobanoglous, G. *Environmental Engineering*, Mc-Graw - Hill International Editions, New York 1985.
- MetCalf and Eddy. Wastewater Engineering, Treatment, Disposal and Reuse, Tata McGraw-Hill, New Delhi.
- Manual on Water Supply and Treatment. Ministry of Urban Development, New Delhi.
- Plumbing Engineering. Theory, Design and Practice, S.M. Patil, 1999
- Integrated Solid Waste Management, Tchobanoglous, Theissen & Vigil. McGraw Hill Publication
- Manual on Sewerage and Sewage Treatment Systems, Part A, B and C. Central Public Health and Environmental Engineering Organization, Ministry of Urban Development.

# ESTIMATING AND COSTING

**Course Code: CIV 604** **Credit Units: 02**
**Total Hours: 20**

**Course Objectives:**
This course has courses Quantity Surveying 1 and 2 as prerequisites and as such its main objective is to develop in the student the art and skill whereby a monetary value can be placed on the volume of work previously measured. To develop an awareness of those factors that affect the cost of construction work and to analyze the influences that effect change in these factors. To encourage the habit of systematically recording all those statistics which are the stock in trade of the good estimator.

**Course Contents:**

**Module I: (5 Hours)**
Basic Principles and Methodology of Economics. Demand/Supply – elasticity – Government Policies and Application. Theory of the Firm and Market Structure. Basic Macro-economic Concepts (including GDP/GNP/NI/Disposable Income) and Identities for both closed and open economies. Aggregate demand and Supply (IS/LM). Price Indices (WPI/CPI), Interest rates, Direct and Indirect Taxes

**Module II: (5 Hours)**
Public Sector Economics –Welfare, Externalities, Labour Market. Components of Monetary and Financial System, Central Bank –Monetary Aggregates; Commercial Banks & their functions; Capital and Debt Markets. Monetary and Fiscal Policy Tools & their impact on the economy – Inflation and Phillips Curve. Indian economy - Brief overview of post-independence period – plans. Post reform Growth, Structure of productive activity. Issues of Inclusion – Sectors, States/Regions, Groups of people (M/F), Urbanization. Employment– Informal, Organized, Unorganized, Public, Private. Challenges and Policy Debates in Monetary, Fiscal, Social, External sectors.

**Module III: (10 Hours)**
Estimation / Measurements for various items- Introduction to the process of Estimation; Use of relevant Indian Standard Specifications for the same, taking out quantities from the given requirements of the work, comparison of different alternatives, Bar bending schedules, Mass haul Diagrams, Estimating Earthwork and Foundations, Estimating Concrete and Masonry, Finishes, Interiors, MEP works; BIM and quantity take-offs; adding equipment costs; labour costs; rate analysis;

**Module IV: (10 Hours)**
Specifications-Types, requirements and importance, detailed specifications for buildings, roads, minor bridges and industrial structures. Rate analysis-Purpose, importance and necessity of the same, factors affecting, task work, daily output from different equipment/ productivity. Tender- Preparation of tender documents, importance of inviting tenders, contract types, relative merits, prequalification. general and special conditions, termination of contracts, extra work and Changes, penalty and liquidated charges, Settlement of disputes, R.A. Bill & Final Bill, Payment of advance, insurance, claims, price variation, etc. Preparing Bids- Bid Price buildup: Material, Labour, Equipment costs, Risks, Direct & Indirect Overheads, Profits; Bid conditions, alternative specifications; Alternative Bids. Bid process Management Introduction to Acts pertaining to-Minimum wages, Workman's compensation, Contracts, Arbitration, Easement rights.

## Course Outcomes:

- Have an idea of Economics in general, Economics of India particularly for public sector agencies and private sector businesses
- Be able to perform and evaluate present worth, future worth and annual worth analyses on one of more economic alternatives.
- Be able to carry out and evaluate benefit/cost, life cycle and breakeven analyses on one or more economic alternatives.
- Be able to understand the technical specifications for various works to be performed for a project and how they impact the cost of a structure.
- Be able to quantify the worth of a structure by evaluating quantities of constituents, derive their cost rates and build up the overall cost of the structure.
- Be able to understand how competitive bidding works and how to submit a competitive bid proposal.

**Examination Scheme:**

| Components | HA | V/S/Q | CT | AT | ESE |
|---|---|---|---|---|---|
| Weightage (%) | 7 | 8 | 10 | 5 | 70 |

## Text & References:

- Mankiw Gregory N. (2002), *Principles of Economics,* Thompson Asia
- V. Mote, S. Paul, G. Gupta(2004), *Managerial Economics,* Tata McGraw Hill
- Misra, S.K. and Puri (2009), *Indian Economy*, Himalaya
- Pareek Saroj (2003), *Textbook of Business Economics,* Sunrise Publishers
- M Chakravarty, Estimating, Costing Specifications & Valuation
- Joy P K, Handbook of Construction Management, Macmillan
- B.S. Patil, Building & Engineering Contracts
- Relevant Indian Standard Specifications.
- World Bank Approved Contract Documents.
- FIDIC Contract Conditions.
- Acts Related to Minimum Wages, Workmen's Compensation, Contract, and Arbitration
- Typical PWD Rate Analysis documents.
- UBS Publishers & Distributors, Estimating and Costing in Civil Engineering: Theory and Practice including Specification and Valuations,2016
- Dutta, B.N., Estimating and Costing in Civil Engineering (Theory & Practice), UBS Publishers, 2016

# GEOMETRIC DESIGN OF HIGHWAYS LAB

**Course Code: CIV 622** | **Credit Units: 01**
**Total Hours: 20**

**Course Objectives:**
The following Geometric Design laboratory files are for instruction and hands-on learning of computer-aided design (CAD) software in the context of highway alignments. The roadway-design software used is that favored by the Texas Department of Transportation (TxDOT) & many others is GEOPAK. This software runs through MicroStation (a common CAD package).

**Course Contents:**

**List of experiments/demonstrations:**
**Lab 1:** Introduction to MicroStation - Learn the basics of MicroStation required to operate GEOPAK. **(1 Hour)**
**Lab 2:** Leg Centerline and Lanes using MicroStation - Learn the basics of MicroStation required to operate GEOPAK by drawing a simple leg centerline and lanes. **(1 Hour)**
**Lab 3:** Areas & Dimensioning using MicroStation - Learn the concepts of points, lines, direction, distance, traverse, bearing and distance, Northing and Easting, dimensioning, and area measurement. **(1 Hour)**
**Lab 4:** Pavement Edge Design using a Simple Arc with & without a Taper using MicroStation - Learn pavement edge design & vehicle off-tracking concepts using IGIDS-created vehicle turn template. Observe the reduction in circular arc radius and area when a taper section is added. **(1 Hour)**
**Lab 5:** Horizontal Circular Curve using GEOPAK - Learn how to place a horizontal circular curve using GEOPAK. **(1 Hour)**
**Lab 6:** Performing Lab 2 (Leg Centerline & Lanes) using GEOPAK - Learn horizontal alignment design using GEOPAK. **(1 Hour)**
**Lab 7:** Define Superelevation Runoff using GEOPAK - Learn superelevation runoff design using GEOPAK. **(1 Hour)**
**Lab 8:** Define a Spiral Curve using GEOPAK - Learn spiral curve design using GEOPAK. **(2 Hour)**
**Lab 9:** Define a Vertical Profile using GEOPAK - Learn vertical alignment design using GEOPAK **(2 Hour)**.
**Lab 10**: Design Project Part 1 - Define the Vertical Alignment for Road 2000 over the Freeway using GEOPAK**(2 Hour)**
**Lab 11:** Design Project Part 2 - Design the Intersection Channelization of the Grade-Separated, Two-Quadrant, Partial Cloverleaf A Interchange using MicroStatio. **(2 Hour)**
**Lab 12:** Design Project Part 3 - Design the Freeway Entrance Ramp of the Grade-Separated, Two-Quadrant, Partial Cloverleaf A Interchange using GEOPAK **(2 Hour)**
**Lab 13:** Design Project Part 4 - Design the Freeway Exit Ramp of the Grade-Separated, Two-Quadrant, Partial Cloverleaf A Interchange using GEOPAK **(2 Hour)**
**Lab 14:** Design Project Part 5 - Define the Superelevation & Complete the Grade-Separated, Two-Quadrant, Partial Cloverleaf A Interchange using MicroStation and GEOPAK **(2 Hour)**

## Course Outcomes:

- Students will be able to use the features of MicroStation, GEOPAK, and engineering judgment to design one side of a grade-separated, Two-Quadrant, Partial Cloverleaf A Interchange as depicted in AASHTO 2004 on page 791. Learn to work on a team and make effective project presentations. Recognize the value of interactions with other professional disciplines.

**Examination Scheme:**

| IA | | | EE | | | |
|---|---|---|---|---|---|---|
| **A** | **PR** | **Practical Based Test** | **Major Experiment** | **Minor Experiment** | **LR** | **Viva** |
| 5 | 10 | 15 | 35 | 15 | 10 | 10 |

Note: IA –InternalAssessment, EE- External Exam, A- Attendance PR- Performance, LR – Lab Record, V – Viva.

## Text & References:


- Khanna, S.K., Justo, C.E.G and Veeraragavan, A, 'Highway Engineering', Revised 10th Edition, Nem Chand & Bros, 2017
- Kadiyalai, L.R., ' Traffic Engineering and Transport Planning', Khanna Publishers.
- Partha Chakraborty, ' Principles Of Transportation Engineering, PHI Learning, Tomlinson
- Fred L. Mannering, Scott S. Washburn, Walter P. Kilareski,'Principles of Highway Engineering and Traffic Analysis', 4th Edition, John Wiley
- Srinivasa Kumar, R, Textbook of Highway Engineering, Universities Press, 2011.
- Paul H. Wright and Karen K. Dixon, Highway Engineering, 7th Edition, Wiley Student Edition, 2009.

# ENVIRONMENTAL ENGINEERING – II LAB

**Course Code: CIV 623** | **Credit Units: 01**
**Total Hours: 20**

## Course Objectives:

To help students to understand various types of chemicals that contaminates water. Student will learn how the level of water contamination could be found out. The acidic level of water, the hardness and alkalinity of water would be known by proper chemical analysis.

## Course Contents:

1. Determination of solids (total, dissolved, organic, inorganic and settle able) in water **(2 hours)**
2. Determination of turbidity and the optimum coagulant dose **(2 hours)**
3. Determination of alkalinity and pH of water **(2 hours)**
4. Determination of hardness and chlorides in water **(2 hours)**
5. Determination of iron and manganese in water **(2 hours)**
6. Determination of sulphates and sulphides in water **(2 hours)**
7. Determination of D.O and B.O.D of waste water **(2 hours)**
8. Determination of available chlorine in bleaching powder and the chlorine dose required to treat the given water sample **(2 hours)**
9. Determination of coliforms in water **(2 hours)**
10. Demonstration of Instrumental methods of pollutant analysis **(2 hours)**

## Course Outcome:
Students will learn to find out various percentage of water contamination. COD and BOD information on liquid helps to find the water purity.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

## Text & References:

- Standard method for the examination of water and waste water, 2005, APHA, AWWA, WPCF Publication

# ESTIMATING AND COSTING LAB

**Course Code: CIV 624** | **Credit Units: 01**
**Total Hours: 20**

**Course Objectives:**

This course has courses Quantity Surveying 1 and 2 as prerequisites and as such its main objective is to develop in the student the art and skill whereby a monetary value can be placed on the volume of work previously measured. To develop an awareness of those factors that affect the cost of construction work and to analyze the influences that effect change in these factors. To encourage the habit of systematically recording all those statistics which are the stock in trade of the good estimator.

**List of experiments/demonstrations:**

1. Deriving an approximate estimate for a multistoried building by approximate methods.
2. Detailed estimate for the following with the required material survey for the same.
   (a) Ground plus three storied RCC Framed structure building with blockwork walls
   (b) bridge with minimum 2 spans
   (c) factory building
   (d) road work
   (e) cross drainage work
   (f) Ground plus three storied building with load-bearing walls
   (g) Cost of finishes, MEP works for (f) above
3. Preparation of valuation report in standard Government form.
4. Assignments on rate analysis, specifications and simple estimates.
5. Detailed estimate of minor structure.
6. Preparation of Bar bending schedule.

## Course Outcomes:

- Be able to perform and evaluate present worth, future worth and annual worth analyses on one of more economic alternatives.
- Be able to carry out and evaluate benefit/cost, life cycle and breakeven analyses on one or more economic alternatives.
- Be able to understand the technical specifications for various works to be performed for a project and how they impact the cost of a structure.
- Be able to quantify the worth of a structure by evaluating quantities of constituents, derive their cost rates and build up the overall cost of the structure.

**Examination Scheme:**

| IA | | | EE | | | |
|---|---|---|---|---|---|---|
| **A** | **PR** | **Practical Based Test** | **Major Experiment** | **Minor Experiment** | **LR** | **Viva** |
| 5 | 10 | 15 | 35 | 15 | 10 | 10 |

Note: IA –InternalAssessment, EE- External Exam, A- Attendance PR- Performance, LR – Lab Record, V – Viva.

## Text & References:


- Mankiw Gregory N. (2002), *Principles of Economics,* Thompson Asia
- V. Mote, S. Paul, G. Gupta(2004), *Managerial Economics,* Tata McGraw Hill
- Misra, S.K. and Puri (2009), *Indian Economy,* Himalaya
- Pareek Saroj (2003), *Textbook of Business Economics,* Sunrise Publishers
- M Chakravarty, Estimating, Costing Specifications & Valuation
- Joy P K, Handbook of Construction Management, Macmillan
- B.S. Patil, Building & Engineering Contracts
- Relevant Indian Standard Specifications.
- World Bank Approved Contract Documents.
- FIDIC Contract Conditions.
- Acts Related to Minimum Wages, Workmen’s Compensation, Contract, and Arbitration
- Typical PWD Rate Analysis documents.
- UBS Publishers & Distributors, Estimating and Costing in Civil Engineering: Theory and Practice including Specification and Valuations, 2016
- Dutta, B.N., Estimating and Costing in Civil Engineering (Theory & Practice), UBS Publishers, 2016

# RIVER ENGINEERING

**Course Code: CIV 605** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
This course provides an in depth understanding of Mechanics of alluvial rivers, River Channel patterns, River Channel patterns, Rivers and restoration structures. Some basics of River Training and Protection are also provided.

**Course Contents:**

**Module I:** Introduction, classification of Rivers, Mechanics of alluvial rivers including channel and flood plain features, Sediment transport and budgets, River morphology and various classification schemes**: (5 Hours)**

**Module II:** Behaviour of Rivers: Introduction, River Channel patterns, Straight river channels, causes, characteristics and shapes of meanders and control, cutoff, Braided Rivers, Bed forms, Instability of rivers, Hydraulic geometry, Delta formation and control**: (5 Hours)**

**Module III:** Mechanics of Alluvial Rivers, Rivers and restoration structures, Socio-cultural influences and ethics of stream restoration. Bio-engineering Techniques, Classification review, Natural Channel Design Analysis, Time Series, Analysis of flow, Sediment and channel geometry data**: (10 Hours)**

**Module IV:** River Training and Protection Works: Introduction, Classification of River Training, Types of training works, Protection for Bridges with reduced waterway, Design of Guide Band, embankment and spurs/dampners and other river/ flood protection works**: (10 Hours)**

## Course Outcomes:

- After successfully studying this course, The students will be able to develop understanding of Mechanics of alluvial rivers, River Channel patterns, River Channel patterns, Rivers and restoration structures. Some basics of River Training and Protection are also provided.

**Examination Scheme:**

| Components | HA | V/S/Q | CT | AT | ESE |
|---|---|---|---|---|---|
| Weightage (%) | 7 | 8 | 10 | 5 | 70 |

## Text & References

- River Behaviour Management and Training (Vol. I & II), CBI&P, New Delhi
- Irrigation & Water Power Engineering- B. C. Punmia and Pande B. B. Lal.
- River Engineering by Margeret Peterson

# OPEN CHANNEL FLOW

**Course Code: CIV 606** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
To introduce the students to various hydraulic engineering problems like open channel flows and hydraulic machines. At the completion of the course, the student should be able to relate the theory and practice of problems in hydraulic engineering**:**

**Course Contents:**

**Module I:** Introduction to Open Channel Flow-Comparison between open channel flow and pipe flow, geometrical parameters of a channel, classification of open channels, classification of open channel flow, Velocity Distribution of channel section**: (5 Hours)**

**Module II:** Uniform Flow-Continuity Equation, Energy Equation and Momentum Equation, Characteristics of uniform flow, Chezy's formula, Manning's formula. Factors affecting Manning's Roughness Coefficient "n_.*Most economical section of ch*annel. Computation of Uniform flow, Normal depth**: (10 Hours)**

**Module III:** Non-Uniform Flow- Specific energy, Specific energy curve, critical flow, discharge curve Specific force Specific depth, and Critical depth. Channel Transitions. Measurement of Discharge and Velocity – Venturi Flume, Standing Wave Flume, Parshall Flume, Broad Crested Weir. Measurement of Velocity- Current meter, Floats, Hot-wire anemometer. Gradually Varied Flow-Dynamic Equation of Gradually Varied Flow, Classification of channel bottom slopes, Classification of surface profile, Characteristics of surface profile. Computation of water surface profile by graphical, numerical and analytical approaches. Direct Step method, Graphical Integration method and Direct integration method**: (10 Hours)**

**Module IV:** Hydraulic Jump- Theory of hydraulic jump, Elements and characteristics of hydraulic jump in a rectangular Channel, length and height of jump, location of jump, Types,applications and location of hydraulic jump. Energy dissipation and other uses, surge as a moving hydraulic jump. Positive and negative surges. Dynamics of Fluid Flow- Momentum principle, applications: Force on plates, pipe bends, moments of momentum equation**: (5 Hours)**

## Course Outcomes:

- After successfully studying this course, the students will be able to apply their knowledge of fluid mechanics in addressing problems in open channels.

**Examination Scheme:**

| Components | HA | V/S/Q | CT | AT | ESE |
|---|---|---|---|---|---|
| Weightage (%) | 7 | 8 | 10 | 5 | 70 |

## Text & References:


- Hydraulics and Fluid Mechanics, P.M. Modi and S.M. Seth, Standard Book House
- Theory and Applications of Fluid Mechanics, K. Subramanya, Tata McGraw Hill.
- Open channel Flow, K. Subramanya, Tata McGraw Hill.
- Open Channel Hydraulics, Ven Te Chow, Tata McGraw Hill.
- Burnside, C.D., "Electromagnetic Distance Measurement," Beekman Publishers, 1971.

# SOLID AND HAZARDOUS WASTE MANAGEMENT

**Course Code: CIV 607** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
This course provides an in depth understanding of solid and hazardous waste characteristics and management. Some basics of radioactive waste characterization and handling are also provided.

**Course Contents:**

**Module 1:** Solid and hazardous waste management. Solid Wastes: Origin, Analysis, Composition and Characteristics. Integrated Solid Waste Management System: Collection, Storage, Segregation, Reuse and Recycling possibilities, Transportation, Treatment / Processing and Transformation Techniques, Final Disposal**: (5 Hours)**

**Module 2:** Management of: Municipal, Biomedical, Nuclear, Electronic and Industrial Solid Wastes and the rules and regulations. Introduction to Hazardous wastes, Definition of Hazardous waste, The magnitude of the problem; Hazardous waste: Risk assessment, Environmental legislation, Characterization and site assessment, Waste minimization and resource recovery**: (5 Hours)**
.

**Module 3:** Transportation of hazardous waste, Physical, chemical and biological treatment, Ground water contamination, Landfill disposal, Current Management Practices, Environmental audit, Pollution Prevention, Facility Development and operation, Site Remediation: Quantitative risk assessment, site and subsurface characterization, Containment, remedial alternatives**: (10 Hours)**

**Module 4:** Chemical treatment processes for MSW (combustion, stabilization and solidification of hazardous wastes); physicochemical processes for hazardous wastes (soil vapour extraction, air stripping, chemical oxidation); ground water contamination and remediation. Composting; bioreactors; anaerobic decomposition of solid waste; principles of biodegradation of toxic waste; inhibition; co-metabolism; oxidative and reductive processes; slurry phase bioreactor; in-situ remediation**: (10 Hours)**

## Course Outcomes:
After successfully studying this course, the students will be able to develop understanding of solid and hazardous waste characteristics and management. Some basics of radioactive waste characterization and handling are also provided.

**Examination Scheme:**

| Components | HA | V/S/Q | CT | AT | ESE |
|---|---|---|---|---|---|
| Weightage (%) | 7 | 8 | 10 | 5 | 70 |

## Text & References:

- John Pichtel Waste Management Practices CRC Press, Taylor and Francis Group 2005.
- LaGrega, M.D.Buckingham,P.L. and Evans, J.C. Hazardous Waste Management, McGraw Hill International Editions, New York, 1994.
- Richard J. Watts, Hazardous Wastes - Sources, Pathways, Receptors John Wiley and Sons, New York, 1997.

# RIVER ENGINEERING LAB

**Course Code: CIV 625** **Credit Units: 01**
**Total Hours: 20**

**Course Objectives:**
This course provides an in depth understanding of Mechanics of alluvial rivers, River Channel patterns, River Channel patterns, rivers and restoration structures. Some basics of River Training and Protection are also provided.

**List of experiments/demonstrations:**
1. Flow Visualization **(2 hours)**
2. Velocity Distribution in Open channel flow **(3 hours)**
3. Venturi Flume **(3hours)**
4. Standing Wave Flume **(3 hours)**
5. Gradually Varied Flow **(3 hours)**
6. Hydraulic Jump **(3 hours)**
7. River training work **(3 hours)**

## Course Outcome:
After successfully studying this course, the students will be able to develop understanding of Mechanics of alluvial rivers, River Channel patterns, River Channel patterns, rivers and restoration structures. Some basics of River Training and Protection are also provided.

**Examination Scheme:**

| IA | | | EE | | | |
|---|---|---|---|---|---|---|
| **A** | **PR** | **Practical Based Test** | **Major Experiment** | **Minor Experiment** | **LR** | **Viva** |
| 5 | 10 | 15 | 35 | 15 | 10 | 10 |

Note: IA –InternalAssessment, EE- External Exam, A- Attendance PR- Performance, LR – Lab Record, V – Viva.

**Text & References:**
- River Behaviour Management and Training (Vol. I & II), CBI&P, New Delhi
- Irrigation & Water Power Engineering- B. C. Punmia and Pande B. B. Lal.
- River Engineering by Margeret Peterson

# OPEN CHANNEL FLOW LAB

**Course Code: CIV 626** **Credit Units: 01**
**Total Hours: 20**

**Course Objectives:**
To introduce the students to various hydraulic engineering problems like open channel flows and hydraulic machines. At the completion of the course, the student should be able to relate the theory and practice of problems in hydraulic engineering:

**List of experiments/demonstrations:**
1. Flow Visualization **(2 hours)**
2. Uniform Flow **(2 hours)**
3. Velocity Distribution in Open channel flow **(2 hours)**
4. Venturi Flume **(2 hours)**
5. Standing Wave Flume **(2 hours)**
6. Gradually Varied Flow **(2 hours)**
7. Hydraulic Jump **(2 hours)**
8. Flow through pipes **(2 hours)**
9. Turbulent flow through pipes **(2 hours)**
10. Laminar flow through pipes **(2 hours)**

## Course Outcomes:
The students will be able to apply their knowledge of fluid mechanics in addressing problems in open channels. They will possess the skills to solve problems in uniform, gradually and rapidly varied flow in steady state conditions.

**Examination Scheme:**

| IA | | | EE | | | |
|---|---|---|---|---|---|---|
| **A** | **PR** | **Practical Based Test** | **Major Experiment** | **Minor Experiment** | **LR** | **Viva** |
| 5 | 10 | 15 | 35 | 15 | 10 | 10 |

Note: IA –InternalAssessment, EE- External Exam, A- Attendance PR- Performance, LR – Lab Record, V – Viva.

**Text & References:**

- Hydraulics and Fluid Mechanics, P.M. Modi and S.M. Seth, Standard Book House
- Theory and Applications of Fluid Mechanics, K. Subramanya, Tata McGraw Hill.
- Open channel Flow, K. Subramanya, Tata McGraw Hill.
- Open Channel Hydraulics, Ven Te Chow, Tata McGraw Hill.
- Burnside, C.D., “Electromagnetic Distance Measurement,” Beekman Publishers, 1971.

# SOLID AND HAZARDOUS WASTE MANAGEMENT LAB

**Course Code: CIV 627** **Credit Units: 01**
**Total Hours: 20**

**Course Objectives:**
This course provides an in depth understanding of solid and hazardous waste chemical and physical characteristics.

**List of experiments/demonstrations:**
1. Estimation of physico-chemical parameters of the following Industrial Effluents **(2 hours)**
2. Food Processing **(2 hours)**
3. Diary **(2 hours)**
4. Fertilizer **(2 hours)**
5. Steel plant **(2 hours)**
6. Metal Plate **(2 hours)**
7. Petroleum refinery **(3 hours)**
8. Any other available effluent **(3 hours)**

## Course Outcomes:
The students will be able to apply their knowledge in identifying chemical and physical characteristics of solid and hazardous waste.

**Examination Scheme:**

| IA | | | EE | | | |
|---|---|---|---|---|---|---|
| **A** | **PR** | **Practical Based Test** | **Major Experiment** | **Minor Experiment** | **LR** | **Viva** |
| 5 | 10 | 15 | 35 | 15 | 10 | 10 |

Note: IA –InternalAssessment, EE- External Exam, A- Attendance PR- Performance, LR – Lab Record, V – Viva.

**Text & References:**

- John Pichtel Waste Management Practices CRC Press, Taylor and Francis Group 2005.
- LaGrega, M.D.Buckingham,P.L. and Evans, J.C. Hazardous Waste Management, McGraw Hill International Editions, New York, 1994.
- Richard J. Watts, Hazardous Wastes - Sources, Pathways, Receptors John Wiley and Sons, New York, 1997.

# ENGINEERING ECONOMICS

**Course Code: BCH 620** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The main objective of this course is to provide basic knowledge of application of Economics, Management and quantity surveying.

**Course Contents:**

**Module I:**
Basic Principles and Methodology of Economics. Demand/Supply – elasticity – Government Policies and Application. Theory of the Firm and Market Structure. Basic Macro-economic Concepts (including GDP/GNP/NI/Disposable Income) and Identities for both closed and open economies**: (5 Hours)**

**Module II:**
Public Sector Economics –Welfare, Externalities, Labour Market. Components of Monetary and Financial System, Central Bank –Monetary Aggregates; Commercial Banks & their functions; Capital and Debt Markets. Monetary and Fiscal Policy Tools & their impact on the economy – Inflation and Phillips Curve**: (10 Hours)**

**Module III:**
Elements of Business/Managerial Economics and forms of organizations. Cost & Cost Control –Techniques, Types of Costs, Lifecycle costs, Break even Analysis, Capital Budgeting. Investment Analysis – NPV, ROI, IRR, Payback Period, Depreciation, Time value of money (present and future worth of cash flows). Business Forecasting – Elementary techniques**: (5 Hours)**

**Module IV:**
Replacement and Maintenance analysis – Types of maintenance, types of replacement problem, determination of economic life of an asset, Replacement of an asset with a new asset – capital recovery with return and concept of challenger and defender, Simple probabilistic model for items which fail completely.
Functions and objectives of Inventory management – Decision models – Economic Order Quantity (EOQ) model. Quality control: concept of quality, quality of constructed structure, use of manuals and checklists for quality control, role of inspection, basics of statistical quality control**: (10 Hours)**

## Course Outcomes:
The students will be able to apply their knowledge of engineering economics. They will possess the skills to solve problems in uniform, gradually and rapidly varied social and economical problems of engineering economy.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

- Engineering Economy, (DeGarmo,Sullivan & Canada), Collier Macmillan.
- Engineering Economy, (Thuesen & Fabrycky), Pearson.
- Engineering Economics, (R. Panneerselvam), PHI.
- Engineering Economic Analysis, (Newnan, Eschenbach & Lavelle), Oxford University Press.
- Engineering Economy, (Blank & Tarquin), McGraw-Hill.

# COMMUNICATION SKILLS – VI
# SOCIAL COMMUNICATION

**Course Code: BCU 641** **Credit Units: 01**
**Total Hours: 10**

**Course Objective:** The main emphasis of this course is to enable students to learn the dynamics of social communication and to demonstrate the ability to learn the nuances of informal communication.
**Prerequisites:** NIL

| Course Contents / Syllabus: | | |
|---|---|---|
| **1.** | **Module I:Social Communication Essentials**<br>• Small talk/Building rapport<br>• Expand social and Corporate Associations<br>• Informal Communication: Grapevine, Chat | **30% Weightage** |
| **2.** | **Module II: Workplace Interpersonal Skills**<br>• Understanding Social Communication in Workplace environment.<br>• Employee feedback: Assess employee performance and satisfaction.<br>• Simulation<br>➢ **Humour in Communication-Use of 'Puns'**<br>➢ **Entertainment and Communication (Infotainment)**<br>• Infotainment and Social Media<br>• Entertainment in Journalism<br>➢ **Social Networking** | **25% Weightage** |
| **3.** | **Module III: Verbal Ability**<br>• **Comprehension**<br>• **Antonyms, Synonyms**<br>• **Idioms & Phrases**<br>• **Analogy**<br>• **Sentence Order**<br>• **Active and Passive Voice**<br>• **Error Sorting** | **35% Weightage** |
| **4.** | **Module IV: Prose**<br>• Secret of Socrates - Dale Carnegie<br>• My Financial Career-Stephen Leacock<br>• The Luncheon - W. Somerset Maugham<br>• The National Flag - Jawahar Lal Nehru<br>All the four stories will be discussed in one class<br>One Long Question will be set in the Exam from the Text | **10% Weightage** |
| **5.** | **Student Learning Outcomes:**<br>• To communicate contextually in specific personal and professional situations with courtesy.<br>• To inject humour in their regular interactions.<br>• To strengthen their creative learning process through individual expression and collaborative peer activities. | |
| **6.** | **Pedagogy for Course Delivery:**<br>• Workshop<br>• Group Discussions<br>• Presentations<br>• Lectures | |
| **7.** | **Assessment/ Examination Scheme:** (see below) | |

**Assessment/ Examination Scheme:**

| Theory L/T (%) | Lab/Practical/Studio (%) | End Term Examination |
|---|---|---|
| 100% | NA | 70% |

**Theory Assessment (L&T):**

| **Components (Drop down)** | CIE | Mid Sem | Attendance | **End Term Examination** |
|---|---|---|---|---|
| **Weightage (%)** | 10% | 15% | 5% | 70% |

**Text:** ***Krizan, Merrier, Logan & Williams. Effective Business Communication, New Delhi: Cengage, 2011***
- ***Communication and Organizational Culture*. Keyton. Joann. Sage Publications**
- ***Social Communication (Frontiers of Social Psychology)*.Fiedler, Klaus. Psychology Press**

**Reference:** ***Cypherpunks: Freedom and the Future of the* Internet.** Assange, Julian Assange. **OR Books.**

- **Additional Reading: Newspapers and Journals**

# BEHAVIOURAL SCIENCE - VI
# STRESS & COPING STRATEGIES

**Course Code: BSU 643** **Credit Units: 01**
**Total Hours: 10**

**Course Objective:**
- To develop an understanding the concept of stress its causes, symptoms and consequences.
- To develop an understanding the consequences of the stress on one's wellness, health, and work performance.

**Course Contents:**
**Module I: Stress** **(02 Hours)**
- Meaning & Nature
- Characteristics
- Types of stress

**Module II: Stages and Models of Stress** **(02 Hours)**
- Stages of stress
- The physiology of stress
- Stimulus-oriented approach.
- Response-oriented approach.
- The transactional and interact ional model.
- Pressure – environment fit model of stress.

**Module III: Causes and symptoms of stress** **(02 Hours)**
- Personal
- Organizational
- Environmental

**Module IV: Consequences of stress** **(02 Hours)**
- Effect on behavior and personality
- Effect of stress on performance
- Individual and Organizational consequences with special focus on health

**Module V: Strategies for stress management** **(02 Hours)**
- Importance of stress management
- Healthy and Unhealthy strategies
- Peer group and social support
- Happiness and well-being

**Student learning outcomes:**
- Student will able demonstrate thorough understanding of stress and its effects
- Student will able to learn various coping strategies to deal stress effectively so to overcome the consequences and impact of stress on their health and wellbeing, ultimately it will enhance their performance.

**Examination Scheme:**

| Evaluation Components | Attendance | Journal of Success (JOS) | Social Awareness Program (SAP) SAP Report/SAP Presentation | End Semester Exam | Total |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 15 | 70 | 100 |

## Suggested Readings:

- Blonna, Richard; Coping with Stress in a Changing World: Second edition
- Pestonjee, D.M, Pareek, Udai, Agarwal Rita; Studies in Stress And its Management
- Pestonjee, D.M.; Stress and Coping: The Indian Experience

# FRENCH – VI
# PROGRAMMED’ETUDESPOURLEFRANÇAIS FOREIGNLANGUAGE

**Français-VI**

**CourseCode: FLU 644** **Credit Units:02**
**Total Hours: 20**

## CourseObjective:

Toprovide the studentswiththelinguistictoolstoenhance socialcommunicationskills andbe able

- Toapprove ordisapprove abehavior
- Tocongratulate somebody
- To express possession

**CourseContents:Dossier1–pg7-16,**
**Dossier1:Aufil dutemps**
**ActesdeCommunication:**
Approuveroudésapprouverl’attitudede quelqu’un(désapprouverle comportementdesparents) Féliciterquelqu’un(féliciterunparticipant dansle courrierdeslecteurs) Parlerde sasanté(exprimerlesproblèmesde santéchez lemédecin) Accueillir/Interpeller(conversationentrel’invitéet l’hôte)

**Thèmesabordés:**
Lestrentenaires(diresi l’onpartage lesvaleursetlesattentesdestrentenaires)
Le sport(sportet famille,dusportpourtouslesgoûts)
Laprofession: Lespsychologues(débats-pouroucontrelebesoind’unpsy,la télé-confession)

**Grammaire :**

1. Le présent (révision)
2. Lesprépositionset lesverbes
3. Lespronomspossessifs
4. Lesverbesréciproques

**ExaminationScheme:**

| | INTERNAL | | | | EXTERNAL | GRAND TOTAL |
|---|---|---|---|---|---|---|
| **Components** | MID-SEM | VIVA-VOCE | ATTENDANCE | **TOTAL** | **END SEMESTER** | **100** |
| **Weightage (%)** | 15 | 10 | 5 | **30** | **70** | |

## Text &References:

***Text:***

**Le livre àsuivre:**

- Carenzi-Vialaneix,Christelle et al. A proposA2Livre de l’élève.Grenoble:PressesuniversitairesdeGrenoble,2010.
- Carenzi-Vialaneix,Christelle et al. A proposA2Cahierd’exercices.Grenoble:PressesuniversitairesdeGrenoble,2010.

***Références:***

- Girardeau,Brunoet Mous,Nelly.Réussir leDELFA1.Paris:LesÉditionsDidier,2010.

# MINOR PROJECT

**Course Code: NMP 660** **Credit Units: 02**

**Course objectives:**

The objective of Minor project is to enable the student to take up investigative study in the broad field of Engineering, either fully theoretical/practical or involving both theoretical and practical work to be assigned by the Department on an individual basis or two/three students in a group, under the guidance of a Supervisor.

**Methodology:**

Topics of project are to be based on the latest trends, verifying engineering concepts /principals and should involve elementary research work. The projects may involve design, fabrications, testing, computer modeling, and analysis of any engineering problem. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation on same.

## Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Conceive a problem statement either from rigorous literature survey or from the requirements raised from need analysis.
2. Design, implement and test the prototype/algorithm in order to solve the conceived problem.
3. Write comprehensive report on mini project work.

**Examination Scheme:**

| | |
|---|---|
| Literature study/ Fabrication/ Experimentation | 40 |
| Written Report | 20 |
| Viva | 15 |
| Presentation | 25 |
| **Total** | **100** |

# DESIGN OF CONCRETE STRUCTURES

**Course Code: CIV 701** **Credit Units: 04**
**Total Hours: 40**

**Course Objective:**
This course deals with the design concept of designing concrete structure. As a prerequisite the students should have knowledge of principal of structural design.

**Course Contents:**

**Module I: (8 Hours)**
Study of the strength, behavior, and design of indeterminate reinforced concrete structures, Load and stresses, load combinations, Working stress and limit state approach.

**Module II: (8 Hours)**
Analysis and design of sections in bending – working stress and limit state method, Rectangular and T-sections, Beams with reinforcement in compression. Design for shear and bond, Mechanism of shear and bond failure, Design of shear using limit state concept, Development length of bars; Design of sections in torsion.

**Module III: (8 Hours)**
One-way slab, Design of two-way slabs; Design of flat slab – direct method; Circular slab; Slab type staircase, Placement of reinforcement in slabs; Voided slab.

**Module IV: (8 Hours)**
Design of compression members, Short column, Columns with uni-axial and bi-axial bending; Long columns, use of design charts.

**Module V: (8 Hours)**
Design of foundation; Wall footing, Isolated and combined footing for columns.

**Note:** All designs to be as per the most recent BIS standards as applicable

## Course Outcomes:

- By learning this course, the students will be able to design different RCC structures such as beam, columns, slabs and foundations. The students will learn the behavior of different RCC structures upon action of different types of loads.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Pillai S.U. & Menon D., Reinforced Concrete Design Tata McGraw Hill, 2003
- Varghese P.C., Limit State Design of Reinforced Concrete, Prentice Hall of India, 2003
- Mallick S.K. & Gupta A.K., Reinforced Concrete, Oxford & IBH, 1982
- Jain A.K., Reinforced Concrete - Limit State Design, Standard Book House, 1998
- Punmia B.C., Reinforced Concrete Structures Vol. I, Standard Book House,2005
- Jain & Jaikrishna, Plain & Reinforced Concrete Vol. I, Nemchand, 2000
- Sinha S.N., Reinforced Concrete Design, Tata McGraw Hill, 2005
- BIS codes ( IS 456, SP 16, SP 24, SP 34)

# SURFACE HYDROLOGY

**Course Code: CIV 702** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
This course deals with advanced concept of hydrology.

**Course Contents:**

**Module I: (7 Hours)**
Introduction hydrologic cycle, water budget equations, world water balance, application in engineering. Precipitation: Forms of precipitation, measurement, depth-area-duration & intensity- duration- frequency relationships, probable maximum precipitation.

**Module II: (8 Hours)**
Abstraction from Precipitation: Evaporation – process, measurement and estimation; Evapotranspiration- measurement and estimation; Initial Losses- Interception & Depression storage; Infiltration- process, capacities, indices, measurement & estimation

**Module III: Runoff and Hydrographs: (7 Hours)**
Hydrograph, runoff characteristics of stream, Yield, Rainfall-runoff correlations, flow duration curve, mass curve, droughts and floods. Factors affecting flood hydrographs, unit hydrograph and its analysis, s-curve hydrograph, synthetic and instantaneous unit hydrographs.

**Module IV: Flood: (8 Hours)**
Rational method, empirical formulae, unit hydrograph method, flood frequency studies, statistical analysis, regional flood frequency analysis, design storm & design flood, risk/reliability and safety factor; Flood Routing: Basic equation, hydrologic storage routing & attenuation, hydrologic channel routing, flood forecasting & control, hydraulic method of flood routing.

## Course Outcomes:

- This course will provide students with a strong understanding of how water moves across Earth's surface. Students will gain an in-depth knowledge of surface hydrology. Students will be able to apply hydrologic principles in considering management of water resources to achieve social objectives.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- 'Hydrology for Engineers' by Linsley R. K., Kohler M. A. and Paulhus J. L. H.
- 'Engineering Hydrology' by K. Subramanya
- 'Hydrology: Principles. Analysis. Design' by Raghunath H. M.
- 'Handbook of Applied Hydrology' by Chow V. T.
- 'Irrigation: Theory & Practice' by Michael A. M.

# WATER RESOURCES FIELD METHODS

**Course Code: CIV 703** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
To understand the concept of planning of water resources projects including feasibility studies and to learn the concept of relevant mathematical tools.

**Course Contents:**

**Module I**: Project Planning, Elements of Water Resources Development, Issues in Planning: **(6 Hours)**

**Module II**: Planning Process Data Needed for Planning, Project analysis: **(6 Hours)**

**Module III**: Integrated River Basin Development, Water Resources Planning: **(6 Hours)**

**Module IV**: Systems Engineering, Linear Programming, Dynamic Programming: **(6 Hours)**

**Module V**: Projects Economics, Comparison of Alternatives: **(6 Hours)**

## Course Outcomes:

- Students will be able to make use of concept of planning, optimal design criteria and application of economics in water resources projects.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Water Resources Systems Engineering, Hall and Dracup, Mc-Graw Hill. 1970
- Economics of Water Resources Planning, James – Lee,Mc-Graw Hill 1971
- Water Resources Engineering, Linsley and Franzini, Mc-Graw Hill. 1955
- Optimization Theory and Applications, S.S.Rao, Wiliey East. Ltd. 1978

# ENVIRONMENTAL FLUID MECHANICS

**Course Code: CIV 704** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
To apply the knowledge of fluid mechanics to analyze and predict mixing in natural bodies of water and study the hydrodynamic aspects of water quality management in natural bodies of water.

**Course Contents:**

**Module I: Introduction to Environmental Transport Processes: (6 Hours)**
Concentration and units of measure – Conservation laws – Systems and Control Volume approach –Differential element approach – Sources, Sinks and box-models – Mixing. Advection-Diffusion equation. Analytical and numerical solution to Advection-Diffusion equation.

**Module II: Groundwater Flow and Quality Modeling: (6 Hours)**
Dupuit‟s approximation – Basic contaminant transport equation – Application of boundary layer approximations – Saltwater intrusion into aquifers – Non-aqueous phase liquid (NAPL) in groundwater – numerical modeling.

**Module III: Transport Processes in Rivers: (6 Hours)**
Mixing in Rivers – Continuous point discharges – Two rivers mixing – Dispersion in rivers.

**Module IV: TRANSPORT PROCESSES IN LAKES AND RESERVOIRS (6 Hours)**
Reservoir classification – External energy sources – Surface layer – mixing in the hypolimnion – inflows and outflows.

**Module V: Transport Processes in The Estuaries: (6 Hours)**
Classification – Forces – wind, tides, rivers – Trapping and pumping – Estuarine Circulation.

## Course Outcomes:

- The students will be able to gain a basic knowledge advection-dispersion processes in the environment. They will gain the skills to take up research activities solving environmental problems involving fluid motions.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

**Text & References:**


- Fischer, H.B., List, E.G., Koh, R.C.Y., Imberger, J and Brooks, N.H. "Mixing in Inland and Coastal Waters" Academic Press, New York, 1979.
- Clark, M.M., "Transport Modeling for Environmental Engineers and Scientists" John Wiley and Sons, New York. 1996.
- Martin J.L. and McCutcheon S.C. "Hydrodynamics and Transport for Water Quality Modeling" CRC Press, Inc. ISBN:0-87371-612-4, 1999.
- Chapra, S.C. "Surface Water Quality Modeling" McGraw Hill Book Co. Singapore, 1997.
- M.Thomann, R.V. and Mueller, J.A. "Principles of Surface Water Quality Modeling and Control" Harper and Row, New York, 1987.
- Csanady, G.T., "Turbulent Diffusion in the Environmen"t D.Reidel Publishing Co. Holland, 1973.
- Rubin H. and Atkinson J. "Environmental Fluid Mechanics" Marcel Dekker, Inc. New York. 2001

# SURFACE HYDROLOGY LAB

**Course Code: CIV 722** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
Students will learn how to plot depth area graph, hydrograph etc.

**List of Experiments:**

1. To draw the hydrological cycle showing different transportation and storage components**: (2 Hours)**
2. To draw the depth-area-duration relationship for a particular catchment area**: (2 Hours)**
3. To draw the intensity- duration- frequency relationship for a particular catchment area**: (2 Hours)**
4. To study the rainfall-runoff correlations for a particular catchment area**: (2 Hours)**
5. To draw the flow duration curve for a particular catchment area**: (2 Hours)**
7. To draw the mass curve for a particular catchment area**: (2 Hours)**
8. To draw the flood hydrograph for a particular catchment area and particular storm**: (2 Hours)**
9. To draw the unit hydrograph for a particular catchment area and particular storm**: (2 Hours)**
10. To construct the unit hydrograph of different duration with the help of method of superposition**:(2 Hours)**
11. To construct the unit hydrograph of different duration with the help of S-curve method**: (2 Hours)**

## Course Outcomes:

- Students will learn on different transportation and storage components.
- Students will know how to access different hydrograph etc.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# WATER RESOURCES FIELD METHODS LAB

**Course Code: CIV 723** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
Student will learn the mechanism of centrifugal pumps, turbines, head loss in pipes.

**List of Experiments:**

1. To conduct a test on Centrifugal Pump and plot its characteristics**: (2 Hours)**
2. To Plot the characteristics of Pelton turbine**: (2 Hours)**
3. To conducts an experiment on Francis turbine**: (2 Hours)**
4. To study the effect of a draft tube on reaction turbines**: (2 Hours)**
5. To find the friction factor for flow through pipes**: (2 Hours)**
6. To study the hydraulic controls rig**: (2 Hours)**
7. To conduct an experiment for verifying model laws**: (2 Hours)**
8. To study the cavitations phenomenon in turbines**: (3 Hours)**
9. Study of hydraulic couplings and torque converters**: (3 Hours)**

## Course Outcomes:

- Students will learn the mechanism on which centrifugal pumps flow.
- Students will learn functions of turbines.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# ENVIRONMENTAL FLUID MECHANICS LAB

**Course Code: CIV 724** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
Students will learn the Bernoulli's theorem, use of venture-meter, triangular orifice etc.
**List of Experiments:**

1. Verification of Bernoulli's Theorem**: (3 Hours)**
2. Experiment using Venturimeter**: (3 Hours)**
3. Determination of coefficient of Discharge $C_d$, $C_c$, $C_!$ Using**: (3 Hours)**
4. Circular/triangular/rectangular orifice**: (3 Hours)**
5. To find major head losses in a pipe line**: (4 Hours)**
6. To find minor head losses in a pipe line (sudden expansion/contraction/bend)**: (4 Hours)**

## Course Outcomes:

- Students will have knowledge on Bernoulli's Theorem, methods on measurement of fluid discharge.
- Students will learn to measure speed of fluid in different flow condition.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# CONCRETE TECHNOLOGY

**Course Code: CIV 705** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
Types of concrete and their manufacture and applications are covered in this course.

**Course Contents:**

**Module I: Materials: (7 Hours)**
Materials: cement - different types - chemical composition and physical properties - tests on cement - I.S. specifications - aggregates - classification - mechanical properties and tests as per I.S. - alkali aggregate reaction - grading requirements - heavy weight - light weight - normal weight - aggregate - sampling of aggregate - water - quality of water - permissible impurities as per I.S - admixtures - accelerators - retarders - water reducing agents – super plasticizers- use of silica fumes.

**Module II: Manufacture: (8 Hours)**
Manufacture of concrete - measurement of materials - storage and handling - batching plant and equipment - mixing - types of mixers - transportation of concrete - pumping of concrete - placing of concrete - under water concreting - compaction of concrete - curing of concrete - ready mixed concrete - mix design - nominal mixes - design mixes - factors influencing mix design - A.C.I method - I.S method - design for high strength mixes.

**Module III: Properties of Concrete: (7 Hours)**
Properties of concrete - fresh concrete - workability - factors affecting workability - tests for workability - segregation and bleeding - hardened concrete - factors affecting strength of concrete - strength of concrete in compression, tension and flexure - stress- strain characteristics and elastic properties - shrinkage and creep - durability of concrete - permeability - chemical attack - sulphate attack - resistance to abrasion and cavitaion - resistance to freezing and thawing - resistance to fire - marine atmosphere - quality control - frequency of sampling - test specimens - statistical analysis of test results - standard deviation - acceptance criteria

**Module IV: Special Concretes: (8 Hours)**
Special concrete - light weight concrete - high density concrete - vacuum concrete - shotcrete - Fibre reinforced concrete-polymer concrete - ferrocement - high performance concrete - self compacting concrete - types of failure - diagnosis of distress in concrete - crack control - leak proofing - guniting and jacketing techniques.

## Course Outcomes:

- By learning this course, students will be able to learn about different types of materials used in the manufacturing of concrete. The students will be able to learn how the concrete is manufactured in the field and what are the diferent properties of fresh and hardened concrete. In the end students will learn about different types of modern concrete used for some special purpose.

**Examination Scheme:**

| Components | A | CT | S/V/Q/ HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Neville A.M., Properties of Concrete, Pitman
- Shetty M.S., Concrete Technology, S I Chand & Company, 1993.
- Gambhir M.L., Concrete Technology, Tata McGraw Hill, 1995.
- Orchard D.F., Concrete Technology Vol. I & II, 1968.
- Krishna Raju N., Design of Concrete Mixes, CBS publishers, 1988.
- Raina V.K., Concrete for Construction-Facts & Practices, Tata McGraw Hill publishing co. 1988.
- John. H. Bungey, The Testing of Concrete in Structures, Urrey University of Press Hall
- Akroyd T.N.W., Concrete: Properties & Manufacture, Pergamon Press, 1962.
- Murdock L.J., Concrete: Materials & Practice, Edward Arnold, 1968.

# PRE-STRESSED CONCRETE

**Course Code: CIV 706** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
This course deals with advanced concept of structural concrete design.

**Course Contents:**

**Module I: Materials for Prestressed Concrete and Prestressing Systems: (8 Hours)**
High strength concrete and high tensile steel – tensioning devices – pretensioning systems – post tensioning systems.

**Module II: Analysis of Prestress and Bending Stresses: (7 Hours)**
Analysis of prestress – resultant stresses at a sector – pressure line or thrust line and internal resisting couple – concept of load balancing – losses of prestress – deflection of beams.

**Module III: Strength of Prestressed Concrete Sections in Flexure, Shear and Torsion: (8 Hours)**
Types of flexural failure – strain compatibility method – IS code procedure – design for limit state of shear and torsion.

**Module IV: Design of Prestressed Concrete Beams and Slabs: (7 Hours)**
Transfer of prestress in pre tensioned and post tensioned members – design of anchorage zone reinforcement – design of simple beams – cable profiles – design of slabs.
*A design project for the design and detailing of a large span beam is envisaged at this stage.*

## Course Outcomes:

- By learning this course, the students will be able to learn about prestressed concrete used in the field. The students will learn how the pre-tensioning and post-tensioning are carried out in the field. The dstudents students will learn different types of losses occured in pre-stressing. Students will learn design of different prestressed concrete members such as beams, slabs etc.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- N. Krishna Raju, Prestressed concrete, Tata McGraw Hill, 2000
- T.Y. Lin, Ned H. Burns, Design of Prestressed Concrete Structures, John Wiley & Sons, 2004.
- P. Dayaratnam, Prestressed Concrete, Oxford & IBH,1982
- R. Rajagopalan, Prestressed Concrete, Narosa publishers, 2004.
- BIS codes ( IS 1343 )

# MASONRY STRUCTURES

**Course Code: CIV 707** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The course will provide basic knowledge in calculation and design of masonry structures and masonry buildings.

**Course Contents:**

**Module I: Loadbearing Masonry Buildings: (8 Hours)**
Advantages and development of load bearing masonry, Basic design considerations, Structural safety: limit state design, Foundations, Reinforced and prestressed masonry

**Module II: Bricks, Blocks and Mortars: (7 Hours)**
Bricks and blocks, Mortar, Lime: non-hydraulic or semi-hydraulic lime, Sand, Water, Plasticized Portland cement mortar, Use of pigments, Frost inhibitors, Proportioning and strength, Choice of unit and mortar, Wall ties, Concrete infill and grout, Reinforcing and prestressing steel

**Module III: Masonry Properties: (8 Hours)**
General, Compressive strength, Strength of masonry in combined compression and shear, The tensile strength of masonry, Stress-strain properties of masonry, Effects of workmanship on masonry strength

**Module IV: Reinforced Masonry: (7 Hours)**
Introduction , Flexural strength, Shear strength of reinforced masonry, Deflection of reinforced masonry beams, Reinforced masonry columns**.**

## Course Outcomes:

- This course provides students with an appreciation of the potential of using masonry in the built environment. Describe conventional and innovative forms of masonry construction. Enable students to select appropriate masonry materials taking into account masonry movement and durability. Develop conceptual design approaches to masonry construction.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- A.W.Hendry, B.P.Sinha and S.R.Davies, Design of Masonry Structures, E & FN SPON, 2004.
- Roberts, J.J., Tovey, A.K., Cranston, W.B. and Beeby, A.W. (1983) Concrete Masonry Designer's Handbook, Viewpoint, Leatherhead.
- Hendry, A.W. (1990) Structural Masonry, Macmillan, Basingstoke
- Hendry, A.W. (ed.) (1991) Reinforced and Prestressed Masonry, Longman, Harlow

# COMMUNICATION SKILLS – VII
# WORKPLACE COMMUNICATION

**Course Code:** **BCU 741** **Credit Units: 01**
**Total Hours: 10**

**Course Objective:**
The course is designed to empower students to carry out day to day communication at the work place by adequate understanding of various types of communication to facilitate efficient interpersonal communication.

**Prerequisites:** NIL

<table>
<tr><td colspan="3">Course Contents / Syllabus:</td></tr>
<tr><td>1.</td><td>Module I Meetings<br>• Notices<br>• Circulars<br>• Agenda<br>• Minutes</td><td>30% Weightage</td></tr>
<tr><td>2.</td><td>Module II Report Writing & Telephony Skills<br>➢ Report Writing<br>• Purpose/Significance<br>• Types<br>• Format<br>➢ Telephony Skills<br>• Call Receiving/ Handling/ Concluding Etiquette<br>• Voice Modulation<br>• Effective Listening<br>• Dos and Don’ts of Telephony Skills</td><td>25% Weightage</td></tr>
<tr><td>3.</td><td>Module III Negotiation Skills<br>• Definition/Concept<br>• Purpose/ Significance<br>• Checklist- Good & Bad Practices</td><td>35% Weightage</td></tr>
<tr><td>4.</td><td>Module IV Prose<br>• The Great Trial-Robert Payne<br>• The Home Coming - Rabindra Nath Tagore<br>• How Much Land does a Man Need? - Leo Tolstoy<br>• Valiant Vicky, The Brave Weaver - Flora Anne Steel<br>All the four stories will be discussed in one class<br>One Long Question will be set in the Exam from the Text</td><td>10% Weightage</td></tr>
<tr><td colspan="3">5. Student Learning Outcomes:<br>• Conduct all business activities related to the workplace with technical efficiency.<br>• Contribute positively to the overall growth of the organization.</td></tr>
<tr><td>6.</td><td colspan="2">Pedagogy for Course Delivery:<br>• Workshop<br>• Group Discussions<br>• Presentations<br>• Lectures</td></tr>
<tr><td>7.</td><td colspan="2">Assessment/ Examination Scheme:</td></tr>
</table>

| Theory L/T (%) | Lab/Practical/Studio (%) | End Term Examination |
|---|---|---|
| 100% | NA | 70% |

**Theory Assessment (L&T):**

| Components (Drop down) | CIE | Mid Sem | Attendance | End Term Examination |
|---|---|---|---|---|
| **Weightage (%)** | 10% | 15% | 5% | 70% |

**Text:** ***Penrose, Rasberry & Myers. Business Communication for Managers: An Advanced Approach, New Delhi: Cengage, 2012.***
***T.N Chabbra , Business Communication , Sun India Publication.***
***Sanjay Kumar &Pushplata , Communication skills , Oxford University Press.***

**Reference:** ***Jones, Working in English, First Edition, Cambridge, CUP, 2001.***

**Additional Reading: Newspapers and Journals**

# BEHAVIOURAL SCIENCE – VII
# CAREER PLANNING & DEVELOPMENT

**Course Code: BSU 743** **Credit Units: 01**
**Total Hours: 10**

**Course Objective:**
This course will help the students to:
- Explore interest and attitude
- Explore career opportunities
- Set career goals
- Developing attributes that employers value

**Course Contents:**

**Module I: Career Planning: (02 Hours)**
- Importance of Career Planning & Development
- Career Development Plan
- Assessment of Career Development

**Module II: Career Success: Interest, Aptitude & Attitude (Personality): (02 Hours)**
- Interest, Aptitude & Attitude
- Knowing and assessing one's Interest
- Knowing and assessing one's Aptitude

**Module III: Explore Career for Growth: (02 Hours)**
- Selecting from available resources
- Career selection (Jobs)
- Career planning and development

**Module IV: Self Reliance and Employability skills: (02 Hours)**
- Self awareness, Self promotion and Presentation, Self confidence
- Action planning, Networking, Negotiation
- Political awareness, Coping with uncertainty,
- Developing positive attributes at work place (personal and professional)
- Time Management as Self Management

**Module V: Impression Management for Career Enhancement: (02 Hours)**
- Meaning & Components of Impression Management
- Impression Management Techniques(Influencing Tactics)
- Impactof Impression Management on Career Planning and Development

## Student learning outcomes
- Students develop the ability to identify suitable career options and to create a suitable career plan based on the utilization of the counseling process, assessment tools, and other resources.
- Students will know how to assess their skills, interests and values.
- Students will know how to make informed career choices based on their self- assessment.
- Students will know how to explore relevant career options and build skills pertinent to those of greatest interest.

**Examination Scheme:**

| Evaluation Components | Attendance | Journal of Success (JOS) | Social Awareness Program (SAP) SAP Report/SAP Presentation | End Semester Exam | Total |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 15 | 70 | 100 |

## Suggested Readings:


- Organizational Behaviour, Davis, K.
- Hoover, Judhith D. Effective Small Group and Team Communication, 2002,Harcourt College Publishers
- Dick, Mc Cann & Margerison, Charles: Team Management, 1992 Edition, viva books
- Bates, A. P. and Julian, J.: Sociology - Understanding Social Behaviour
- Dressers, David and Cans, Donald: The Study of Human Interaction
- Lapiere, Richard. T – Social Change
- Lindzey, G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology, Addison – Welsley, US.
- Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.
- LaFasto and Larson: When Teams Work Best, 2001, Response Books (Sage), New Delhi
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 2, Group (1996); Pfeiffer & Company
- Smither Robert D.; The Psychology of Work and Human Performance, 1994, Harper Collins College Publishers

# FRENCH – VII
# PROGRAMME D'ETUDES POUR LE FRANÇAIS

**Français - VII**

**CourseCode: FLU 744** **Credit Units: 02**
**Total Hours: 20**

**CourseObjective:**
Toprovide the studentswiththelinguistictoolstoenhance socialcommunicationskillsand be able

- Todescribe anobject,compare objectsandevaluate
- Toaskforinformation,precision
- Tomake claims

**CourseContents:**

**Dossier2–pg17-28,**

**Dossier2:64millionsde consommateurs**
**ActesdeCommunication:**
Décrireunobjet(unbijouunique,unvoyageextraordinaire,unnouvelappareil photo)
Évaluerune chose (acheteruncadeau,discuterleprix)
Ouvriruncompteà la banque (demanderdesrenseignementsaubanquierafind'ouvriruncompte) Demanderdes informations/précisions(précisionssurunproblème danslerelevéde compte)
Faire uneréclamation(s'adresserauservice après-vente pouréchangerunproduit défectueux)

**Thèmesabordés:**
S'habillerbonmarché (commentvoushabillez-vousbonmarché ?)
Le e-commerce (le portrait del'e-acheteurde votre pays)
Lesproduitscontrefaits(parlerdesproduitscontrefaits)
Laprofession:Lesmaraîchers(débats:commentéviterlegaspillage?lamodedeviedesdécroissants,privilégie-t-onla qualité oule prixlorsd'unachat?)

**Grammaire :**
1. Le pronom <<en>>
2. Laplace de l'adjectif
3. Le présent progressif
4. Le passé récent
5. Le futurproche(révision)
6. Le comparatifet le superlatif

**ExaminationScheme:**

| | **INTERNAL** | | | | **EXTERNAL** | **GRAND TOTAL** |
|---|---|---|---|---|---|---|
| **Components** | MID-SEM | VIVA-VOCE | ATTENDANCE | **TOTAL** | **END SEMESTER** | |
| **Weightage (%)** | 15 | 10 | 5 | **30** | **70** | **100** |

**Text &References:**
***Text:***
**Le livre àsuivre:**


- Carenzi-Vialaneix,Christelle et al. A proposA2Livre de l'élève.Grenoble:PressesuniversitairesdeGrenoble,2010.
- Carenzi-Vialaneix,Christelle et al. A proposA2Cahierd'exercices.Grenoble:PressesuniversitairesdeGrenoble,2010.


***Références:***


- Girardeau,Brunoet Mous,Nelly.Réussir leDELFA1.Paris:LesÉditionsDidier,2010.

# INDUSTRIAL PRACTICAL TRAINING – II

**Course Code: NPT 750** **Credit Units: 05**

**Course objectives:**

1. To expose students to the 'real' working environment and get acquainted with the organization structure, business operations and administrative functions.
2. To have hands-on experience in the students' related field so that they can relate and reinforce what has been taught at the university.
3. To promote cooperation and to develop synergetic collaboration between industry and the university in promoting a knowledgeable society.
4. To set the stage for future recruitment by potential employers.

**Methodology:**

Practical training is based on the theoretical subjects studied by students. It can be arranged within the college or in any related industrial unit. The students are to learn various industrial, technical and administrative processes followed in the industry. In case of on-campus training the students will be given specific task of fabrication/assembly/testing/analysis. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation on same.

## Course Outcome:

After successful completion of the course, the students will be able to

- Explore the preferred field of specialization and develop analytical / hardware / software / experimental / observation skills.
- Manage the technical content and work.
- Learn the various administrative process followed in industry.
- Prepare and present technical report.

**Examination Scheme:**

| | |
|---|---|
| Feedback from industry/work place | 20 |
| Training Report | 40 |
| Viva | 15 |
| Presentation | 25 |
| **Total** | **100** |

# MAJOR PROJECT – I

**Course Code: NMP 760** **Credit Units: 06**

**Course Objectives:**
The object of Major Project I is to enable the student to extend further the investigative study taken up under NMP 660, either fully theoretical/practical or involving both theoretical and practical work, under the guidance of a Supervisor from the Department alone or jointly with a Supervisor drawn from R&D laboratory/Industry. This is expected to provide a good training for the student(s) in R&D work and technical leadership. The aim is to provide students an opportunity to exercise their creative and innovative qualities in a group project environment and to excite the imagination of aspiring engineers, innovators and technopreneurs.

**Methodology:**

Topics of project are to be based on the latest trends, verifying engineering concepts /principals and should involve elementary research work. The projects may involve design, fabrications, testing, computer modeling, and analysis of any engineering problem. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation on same.

## Course Outcomes:
On successful completion of the course students will be able to:

- Demonstrate a sound technical knowledge of their selected project topic.
- Undertake problem identification, formulation and solution.
- Design engineering solutions to complex problems utilising a systems approach.
- Conduct an engineering project
- Communicate with engineers and the community at large in written an oral forms.
- Demonstrate the knowledge, skills and attitudes of a professional engineer.
- Write comprehensive report on project work.

**Examination Scheme:**

| | |
|---|---|
| Literature study/ Fabrication/ Experimentation | 40 |
| Written Report | 20 |
| Viva | 15 |
| Presentation | 25 |
| **Total** | **100** |

# DESIGN OF STEEL STRUCTURES

**Course Code: CIV 801**

**Credit Units: 04**
**Total Hours: 40**

**Course Objective**
This course aims at providing students with a solid background on principles of steel structural engineering design. Students will be exposed to the theories and concepts of steel design and analysis both at the element and system levels. Hands-on design experience and skills will be gained and learned through problem sets and a comprehensive design project. An understanding of real-world open-ended design issues will be developed. Weekly recitations and project discussions will be held besides lectures.

**Module 1: Introduction To Load and Stresses on Steel Structures: (8 Hours)**
Properties of materials; loads and stresses, design of semi-rigid, rigid and moment resistant connections.

**Module 2: Design of Tension and Compression Members: (8 Hours)**
Built-up sections, design of tension members subjected to axial tension and bending, splicing of tension member, design of compression members, beam-column connections.

**Module 3: Column Design: (8 Hours)**
Design of columns and their bases Design of flexural members and Plate girder; loads, specification and design Industrial buildings; loads.

**Module 4: Purlins, Trusses and Girders: (8 Hours)**
Design of purlins, trusses, bracings, gantry girders, introduction to Plastic analysis.

**Module 5: Overview on Beams and Frames: (8 Hours)**
Simple cases of beams and frames.

## Course Outcomes:

- Ability to design and analyze steel structures.
- The students will be able to apply their knowledge of steel structural mechanics in addressing design problems of steel structural engineering.
- They will possess the skills to solve problems dealing with different loads and steel.
- They will have knowledge in steel structural engineering.

**Examination Scheme:**

| **Components** | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text/Reference Books:


- McCormac, J.C., Nelson, J.K. Jr., *Structural Steel Design*. 3rd edition. Prentice Hall, N.J., 2003.
- Galambos, T.V., Lin, F.J., Johnston, B.G., *Basic Steel Design with LRFD*, Prentice Hall, 1996
- Segui, W. T., *LRFD Steel Design*, 2nd Ed., PWS Publishing, Boston.
- Salmon, C.G. and Johnson, J.E., *Steel Structures: Design and Behavior*, 3rd Edition, Harper & Row, Publishers, New York, 1990.

# AIRPORT PLANNING AND DESIGN

**Course Code: CIV 802**

**Credit Units: 03**
**Total Hours: 30**

**Course Objective**
This course aims at providing students with a solid background on principles of airport planning and design. Students will be exposed to the theories and concepts of airport design. Hands-on design experience and skills will be gained and learned through problem sets and a comprehensive design project.

**Module 1: Introduction: (6 Hours)**
Aircraft characteristics, aircraft performance characteristics, airport planning and air travel demand forecasting.

**Module 2: Airport Site Selection and Geometric Design: (6 Hours)**
Airport site selection, geometric design of the airfield, determination of runway capacity and delay, taxiway and gate capacity, holding aprons, terminal aprons, airport drainage.

**Module 3: Function of Airport Passenger and Cargo Terminal: (6 Hours)**
Function of Airport Passenger and Cargo Terminal - Design of Air Freight Terminals, Airport access - Airport Landside planning – Capacity.

**Module 4: Air Traffic Management: (6 Hours)**
Air Traffic Management, navigational aids, ground based systems, satellite based systems.

**Module 5: Air Traffic Control and Surveillance Facilities: (6 Hours)**
Air traffic control and surveillance facilities, airfield lighting, air traffic management.

## Course Outcomes:

- Ability to design and analyze airports.
- They will possess the skills to solve problems dealing with different airport design problems.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text/Reference Books:

- “Planning and Design of Airports” by Robert Horonjeff Francis X. McKelvey William J. Sproule Seth B. Young, Fifth Edition, Mcgraw Hill, 2010.

# FOUNDATION ENGINEERING

## Course Code: CIV 803

**Credit Units: 03**
**Total Hours: 30**

**Course Objective**
This course aims at providing students with a background on principles of foundation design. Students will be exposed to the theories and concepts of foundation design. Skills will be gained and learned through problem sets and a comprehensive design projects.

**Module 1: Introduction to Different Types of Foundation: (6 Hours)**
Analysis and design of foundations, types of foundations. Different types of foundation suitable for structures based on soil type and design requirements.

**Module 2: Settlement of Foundation: (6 Hours)**
Bearing capacity and settlement of foundations; ground movements due to construction. Soil properties for foundation design. Soil improvement requirement theory discussion.

**Module 3: Design of Excavation: (6 Hours)**
Analysis and design of excavations, retaining walls, cuts & excavations.

**Module 4: Underground Structures: (6 Hours)**
Sheet piles, slopes and underground structures. Design and analysis.

**Module 5: Pile Foundations: (6 Hours)**
Design of strap footings, isolated footing, pile foundations etc. Theory of design of foundations.

## Course Outcomes:
After successful completion of this course, the students would:
- Learn about types and purposes of different foundation systems and structures.
- Have an exposure to the systematic methods for designing foundations.
- Be able evaluate the feasibility of foundation solutions to different types of soil conditions considering the time effect on soil behaviour.
- Have necessary theoretical background for design and construction of foundation systems.

**Examination Scheme:**

| **Components** | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text/Reference Books:

- Singh, Modern Geotechnical Engineering, 3rd Ed., CBS Publishers, New Delhi, 1999.
- B.M. Das, Principles of Foundation Engineering, 5th Ed., Thomson Asia, Singapore, 2003.
- N. Som, Theory and Practice of Foundation Design, Prentice Hall, New Delhi, 2003.

# STRUCTURAL GEOLOGY

**Course Code: CIV 804** **Credit Units: 03**
**Total Hours: 30**

**Course Objective**
This course aims at providing students with a background on principles of structural geology. Students will be exposed to the theories and concepts of structural geology. Skills will be gained and learned through problem sets and a comprehensive examples.

**Module 1: Description, Classification, and Origin of Earth Structures: (6 Hours)**
Description, classification, and origin of earth structures. Ways in which the continental crust can deform; link scales of structure from the field.

**Module 2: Outcrops, Hand Specimen and Thin Section: (6 Hours)**
Outcrops, hand specimen, thin section by integrating analytical techniques with practical examples.

**Module 3: Incremental Strain and Kinematics: (6 Hours)**
Theoretical and meso to microscale analysis of structures developed through a linked series of lectures and practicals; practical 2D strain analysis; 3D strain concepts; incremental strain, kinematics and polyphase deformations.

**Module 4: Fault and Fold Mechanics: (6 Hours)**
Fold construction and classes; fault evolution and section balancing; fault rock microstructures; fault and fold mechanics, current concepts in plate tectonics.

**Module 5: Structural Interpretation of Seismic Data: (6 Hours)**
Cross-section construction techniques, structural interpretation of seismic data, structural styles in different tectonic settings (thrust and fold belts, rifts, strike and slip, gravity tectonics, inversion), structural geology of reservoir units.

## Course Outcomes:
On successful completion of this course the students will be able to:
- Acquire knowledge on the geometry and type of structures present in earth.
- Understand and describe the features formed in rocks when subjected to stress.
- Understand the impact of structural geology to active tectonic settings
- Understand micro and macro scale deformation mechanisms (viz., brittle, ductile).
- Portray 2D and 3D strain analysis for various deformation behaviours.
- Interpret graphs and models used in structural geology to understand and demonstrate poly phase deformations.

**Examination Scheme:**

| **Components** | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text/Reference Books:

- Ghosh, S.K., Structural Geology: Fundamentals and Modern Developments, Elsevier; First edition.

# ROCK MECHANICS

**Course Code: CIV 805** **Credit Units: 03**
**Total Hours: 30**

**Course Objective**
This course aims at providing students with a background on rock mechanics. Students will be exposed to the theories and concepts of rock mechanics. Skills will be gained and learned through problem sets and a comprehensive hand on examples.

**Module 1: Properties of Rocks: (6 Hours)**
Determination of physical properties of rocks, failure criterion, rock mass classification, stress around mine openings, strain and displacement of the rock mass, rock reinforcement and support, subsidence.

**Module 2: Field & Laboratory Tests on Rocks: (6 Hours)**
Rocks and engineering characteristics or rocks masses, structural geology of rocks. Classification of rocks, Field & laboratory tests on rocks.

**Module 3: Stress Deformation of Rocks: (6 Hours)**
Stress deformation of rocks, failure theories and sheer strength of rocks, bearing capacity of rocks.

**Module 4: Methods to Improve Rock Mass Responses: (6 Hours)**
Grouting in Rocks, Rock bolting, Rock Anchors. Failure criteria for rock and rock masses, Mohr Coulomb Yield Criterion, Drucker-Prager Criterion, Hoek-Brown Criterion, Tensile Yield Criterion.

**Module 5: Numerical Modeling of Rocks : (6 Hours)**
Numerical modeling of rocks and rock masses, Application to tunnels, slopes. Stability of rock slopes, Modes of failure, Plane failure, Wedge failure, Circular failure, Toppling failure.

## Course Outcomes:
On successful completion of this course the students will be able to:
- Define the properties (viz., physical, mechanical) of rocks and failure criterion of rock mass.
- Use engineering rock mass classification (RMR, Q-system, RQD)
- Analyze the stress distribution in-situ and around an opening in underground structures (viz., mine openings, tunnels).
- Determine the relation between strain and displacement components of rock mass.
- Perform field Instrumentation techniques and laboratory studies.
- Understand the fundamentals of ground subsidence.

**Examination Scheme:**

| **Components** | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text/Reference Books:
- Engineering Rock Mechanics: An Introduction to the Principles by J. A. Hudson and J. P. Harrison
- Rock Mechanics: For Underground Mining by Barry H.G. Brady.
- Fundamentals of Rock Mechanics, 4th Edition, John Conrad Jaeger, Neville G. W. Cook, Robert Zimmerman

# FOUNDATION ENGINEERING LAB

**Course Code: CIV 823** **Credit Units: 01**
**Total Hours: 20**

**Course Objective**

This course aims at providing students with a background on principles of foundation design. Students will be exposed to the theories and concepts of foundation design. Skills will be gained and learned through problem sets and a comprehensive design projects.

**List of Drawing Experiments:**

1. Drawing different elements of isolated footing. **(2 Hours)**
2. Drawing different elements of strap footing. **(2 Hours)**
3. Drawing different elements of pile foundation. **(2 Hours)**
4. Drawing different elements of retaining walls. **(2 Hours)**
5. Drawing different elements of sheet piles. **(2 Hours)**
6. Drawing different elements of grouting for soil stabilization. **(2 Hours)**
7. Drawing different elements of well foundation. **(2 Hours)**
8. Drawing different elements of seepage (flow lines, equipotential lines) under water dams. **(2 Hours)**
9. Drawing different elements of negative skin friction location on pile foundations. **(2 Hours)**
10. Identification of earth quake zones. Show different earth quake zones in India. **(2 Hours)**

## Course Outcomes:

After successful completion of this course, the students would:

- Learn about types and purposes of different foundation systems and structures.
- Have an exposure to the systematic methods for designing foundations.
- Be able evaluate the feasibility of foundation solutions to different types of soil conditions considering the time effect on soil behaviour.
- Have necessary theoretical background for design and construction of foundation systems.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

## Text/Reference Books:


- Singh, Modern Geotechnical Engineering, 3rd Ed., CBS Publishers, New Delhi, 1999.
- B.M. Das, Principles of Foundation Engineering, 5th Ed., Thomson Asia, Singapore, 2003.
- N. Som, Theory and Practice of Foundation Design, Prentice Hall, New Delhi, 2003.

# STRUCTURAL GEOLOGY LAB

**Course Code: CIV 824** | **Credit Units: 01**
**Total Hours: 20**

**Course Objective**
This course aims at providing students with a background on structural geology. Students will be able identify different geological. Skills will be gained and learned through problem sets and a comprehensive design projects.

**List of Drawing/lab Experiments:**

Lab 1 - Lines and Planes **(2 Hours)**

Lab 2 - Outcrop Patterns and Structure Contours **(2 Hours)**

Lab 3 - Introduction to Geologic Maps **(2 Hours)**

Lab 4 - More Geologic Maps and Cross-Sections **(2 Hours)**

Lab 5 - Introduction to Stereonets **(3 Hours)**

Lab 6 - Analysis of Folds in Outcrop **(3 Hours)**

Lab 7 - Stereonet Analysis of Folds **(3 Hours)**

Lab 8 - Introduction to Faults **(3 Hours)**

## Course Outcomes:
After successful completion of this course, the students would:
- Learn about types and purposes of different structural geology.
- Have an exposure to the systematic methods for geology.
- Be able evaluate the feasibility of structural geology solutions to different types of soil conditions considering the time effect on soil behaviour.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

## Text/Reference Books:

- Ghosh, S.K., Structural Geology: Fundamentals and Modern Developments, Elsevier; First edition.

# ROCK MECHANICS LAB

**Course Code: CIV 825** **Credit Units: 01**
**Total Hours: 20**

**Course Objective**
This course aims at providing students with a background on structural geology. Students will be able identify different geological. Skills will be gained and learned through problem sets and a comprehensive design projects.

**List of Drawing/lab Experiments:**

Lab 1 – Grain size distribution. Draw plot and show the distribution. Use specific sievev **(4 Hours)**

Lab 2 – Rock abrasion test **(2 Hours)**

Lab 3 – Hardness test, toughness test, durability test **(2 Hours)**

Lab 4 – Shape test of rocks **(2 Hours)**

Lab 5 - Grouting in Rocks, Rock bolting, Rock Anchors **(3 Hours)**

Lab 6- Stability of rock slopes, Modes of failure (draw different types). **(3 Hours)**

**Lab 7- Plane failure, Wedge failure, Circular failure, Toppling failure. Draw all the elements. (4 Hours)**

## Course Outcomes:
After successful completion of this course, the students would:
- Learn about types and purposes of different structural geology.
- Have an exposure to the systematic methods for geology.
- Be able evaluate the feasibility of structural geology solutions to different types of soil conditions considering the time effect on soil behaviour.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

## Text/Reference Books:
- Engineering Rock Mechanics: An Introduction to the Principles by J. A. Hudson and J. P. Harrison
- Rock Mechanics: For Underground Mining by Barry H.G. Brady.
- Fundamentals of Rock Mechanics, 4th Edition, John Conrad Jaeger, Neville G. W. Cook, Robert Zimmerman

# COMMUNICATION SKILLS – VIII
# CROSS CULTURAL COMMUNICATION

**Course Code: BCU 841** **Credit Units: 01**
**Total Hours: 10**

**Course Objective:**

This course is designed to hone the creative minds of students to develop knowledge of diverse ethnic groups and cultures and to increase self-awareness for cultural competence and sensitivity.

**Prerequisites:** NIL

| Course Contents / Syllabus: | | |
|---|---|---|
| 1. | **dule I Speaking in Public**<br>• Essentials in Public Speaking<br>• Parameters of Public Speaking | **45% Weightage** |
| 2. | **dule II Cross Cultural Communication**<br>• Culture and Context<br>• Awareness & Significance of Understanding Culture<br>• Ethnocentrism, Stereotyping and Cultural Relativism<br>• Cultural Shock and Social Change | **45% Weightage** |
| 3. | **Module III Prose** | **10% Weightage** |
| 4. | • India Cinema: Tradition & Change-Chidananda Das Gupta<br>• Kabuliwala-Rabindranath Tagore<br>• The Duchess and the Jewelller -Virginia Woolf<br>• The Park- James Mathews<br>All the four stories will be discussed in one class<br>One Long Question will be set in the Exam from the Text | |
| | **Student Learning Outcomes:**<br>• Students will be able to navigate cross cultural encounters in a global economy.<br>• Facilitate students to develop learning to construct and deliver messages that incorporate the appropriate use of organizing content, language, vocabulary, kinesics, eye contact, appearance, visual aids, and time constraints. | |
| 5. | **Pedagogy for Course Delivery:**<br>• Workshop<br>• Group Discussions<br>• Presentations<br>• Lectures | |
| 6. | **Assessment/ Examination Scheme:** | |

| Theory L/T (%) | Lab/Practical/Studio (%) | End Term Examination |
|---|---|---|
| 100% | NA | 70% |

**Theory Assessment (L&T):**

| Components (Drop down) | CIE | Mid Sem | Attendance | End Term Examination |
|---|---|---|---|---|
| Weightage (%) | 10% | 15% | 5% | 70% |

**Text:** ***Penrose, Rasberry & Myers. Business Communication for Managers: An Advanced Approach, New Delhi: Cengage, 2012.***
***Raman, Meenakshi. Business Communication, Oxford***
***Krizan, Merrier, Logan & Williams. Effective Business Communication, New Delhi: Cengage, 2011***
**References:**
***Beamer, Linda. Intercultural Communication in the Global Workplace, Irwin/McGraw-Hill, 2005.***
***Reynolds, Sana & Deborah Valentine. Guide to Cross-cultural Communication, Prentice Hall, 2003.***
**Additional Reading: Newspapers and Journals**

# BEHAVIOURAL SCIENCE – VIII
# POSITIVE PERSONAL GROWTH

**Course Code: BSU 843** **Credit Units: 01**
**Total Hours: 10**

**Course Objective:**
- To have a great deal of insight into one's character.
- Understanding of positive emotions
- To explore the dimensions of happiness, well-being, Optimism and hope
- Quick understanding of different situations and grasp new concepts.

**Course Contents:**

**Module I: Positivity in personality: (02 Hours)**
- Importance of Positivity in personality
- Positivity Vs. Negativity
- Introspection and personal growth

**Module II: Positive Emotions: (02 Hours)**
- Understanding positive emotions
- Importance of Positive emotion
- Types and identification of positive emotions (Love, happiness, Contentment, Resilience, etc.)

**Module III: Hope, Optimism and Resilience: (02 Hours)**
- Positive approach towards future
- Benefits of Positive approach
- Resilience during challenge and loss

**Module IV: Application of Positive Emotions: (02 Hours)**
- Application of positive emotions in relationships, and organizations
- Creating healthy organizational climate
- Positive emotions enhances performance

**Module V: Happiness and Well Being: (02 Hours)**
- Concept of Happiness & Well-Being
- Secret of happy mind and healthy life
- Work life balance

## Course outcome:
- Students develop the ability to identify and regulate positive emotions for personal and professional excellence.
- Students will know how to develop resilience.
- Students will know how to role of happiness to attain wellbeing.
- Students will know how to nurture personality by positivity.

**Examination Scheme:**

| Evaluation Components | Attendance | Journal of Success (JOS) | Social Awareness Program (SAP) SAP Report/SAP Presentation | End Semester Exam | Total |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 15 | 70 | 100 |

## Suggested Readings:
- Raman, A.T. (2003) Knowledge Management: A Resource Book. Excel Books, Delhi.
- Kamalavijayan D. (2005). Information and Knowledge Management Macmillan India Ltd. Delhi

# FRENCH – VIII
# PROGRAMME D'ÉTUDES POUR LE FRANÇAIS

## Français - VIII

**CourseCode: FLU 844** **Credit units: 02**
**Total Hours: 20**

**CourseObjective:**
Toprovide the studentswiththelinguistictoolstoenhance socialcommunicationskillsand beable
- Toexpressanintention,announce a news,enquireaboutanevent
- To speakaboutthe future
- Todiscussthemedia

**CourseContents:**
**Dossier3–pg29-40,Dossiers1&2(révision). Dossier3:Médias.fr**
**ActesdeCommunication:**
Parlerdel'avenir(lesavantageset lesinconvénientsdesréseauxsociaux)
Exprimeruneintention(poserdesquestionssurunforum) Parlerdesmédias
Engager/ terminerune conversation(demanderpourquoionn'a pasréponduaumèl)
Interrogersurunévénement (vol,accident) Annoncerunenouvelle (celle de démission)

**Thèmesabordés:**
LesFrançaiset la presse (débat: Croyez-vousauxlégendesurbaines?)
LesFrançaisetInternet(débat:lesinformationsdelapresseécritesontplusfiablesquelesinformationssurInternet ?)
LatélévisiondesFrançais
Laprofession: Lesanimateursradio(débat : pouroucontre le téléchargement illégal de la musique oudesfilms)

**Grammaire :**
1. Le futursimple
2. L'hypothèse surlefutur
3. Lesformesde la négation
4. Lespronomscomplémentsdirectset indirects(révision)

**ExaminationScheme:**

| | **INTERNAL** | | | | **EXTERNAL** | **GRAND TOTAL** |
|---|---|---|---|---|---|---|
| **Components** | MID-SEM | VIVA-VOCE | ATTENDANCE | **TOTAL** | **END SEMESTER** | |
| **Weightage (%)** | 15 | 10 | 5 | **30** | **70** | **100** |

## Text &References:

***Text:***
**Le livre àsuivre:**
- Carenzi-Vialaneix,Christelle et al. A proposA2Livre de l'élève.Grenoble:PressesuniversitairesdeGrenoble, 2010.
- Carenzi-Vialaneix,Christelle et al. A proposA2Cahierd'exercices.Grenoble:PressesuniversitairesdeGrenoble, 2010.

***Références:***
- Girardeau,Brunoet Mous,Nelly.Réussir leDELFA1.Paris:LesÉditionsDidier,2010.

# MAJOR PROJECT – II

**Course Code: NMP 860** **Credit Units: 09**

**Course Objectives:**
The objective of Major project is to enable the student to take up investigative study in the broad field of Engineering, either fully theoretical/practical or involving both theoretical and practical work to be assigned by the Department on an individual basis or two/three students in a group, under the guidance of a Supervisor. The aim is to provide students an opportunity to exercise their creative and innovative qualities in a group project environment and to excite the imagination of aspiring engineers, innovators and technopreneurs.

**Methodology:**
Topics of project are to be based on the latest trends, verifying engineering concepts /principals and should involve elementary research work. The projects may involve design, fabrications, testing, computer modelling, and analysis of any engineering problem. On completion of the project the students are to present a report covering various aspects learnt by them and give a presentation on same.

## Course Outcome:
On successful completion of the course students will be able to:

- Apply critical and creative thinking in the design of engineering projects
- Plan and manage time effectively as a team.
- Consider the business context and commercial positioning of designed devices or systems.
- Apply knowledge of the 'real world' situations that a professional engineer can encounter.
- Use fundamental knowledge and skills in engineering and apply it effectively on a project.
- Design and develop a functional product prototype while working in a team.
- Use various tools and techniques to study existing systems.
- Achieve precision in uses of the tools related to their experiments/fabrication.
- Timely reflect on peers' technical and non-technical learning.
- Orally present and demonstrate your product to peers, academics, general and industry community. Write comprehensive report on project work.

**Examination Scheme:**

| | |
|---|---|
| Literature study/ Fabrication/ Experimentation | 40 |
| Written Report | 20 |
| Viva | 15 |
| Presentation | 25 |
| **Total** | **100** |

# Bachelor of Technology
# (Electronics & Communication Engineering)

## Programme Code: BTE

## Duration – 4 Years Full Time

## Programme Structure
## and
## Curriculum & Scheme of Examination

## 2017-18

# AMITY UNIVERSITY
## MADHYA PRADESH

# PREAMBLE

Amity University aims to achieve academic excellence by providing multi-faceted education to students and encourage them to reach the pinnacle of success. The University has designed a system that would provide rigorous academic programme with necessary skills to enable them to excel in their careers.

This booklet contains the Programme Structure, the Detailed Curriculum and the Scheme of Examination. The Programme Structure includes the courses (Core and Elective), arranged semester wise. The importance of each course is defined in terms of credits attached to it. The credit units attached to each course has been further defined in terms of contact hours i.e. Lecture Hours (L), Tutorial Hours (T), Practical Hours (P). Towards earning credits in terms of contact hours, 1 Lecture and 1 Tutorial per week are rated as 1 credit each and 2 Practical hours per week are rated as 1 credit. Thus, for example, an L-T-P structure of 3-0-0 will have 3 credits, 3-1-0 will have 4 credits, and 3-1-2 will have 5 credits.

The Curriculum and Scheme of Examination of each course includes the course objectives, course contents, scheme of examination and the list of text and references. The scheme of examination defines the various components of evaluation and the weightage attached to each component. The different codes used for the components of evaluation and the weightage attached to them are:

| Components | Codes | Weightage (%) |
|---|---|---|
| Case Discussion/ Presentation/ Analysis | C | 05 - 10 |
| Home Assignment | H | 05 - 10 |
| Project | P | 05 - 10 |
| Seminar | S | 05 - 10 |
| Viva | V | 05 - 10 |
| Quiz | Q | 05 - 10 |
| Class Test | CT | 10 - 15 |
| Attendance | A | 05 |
| End Semester Examination | EE | 70 |

It is hoped that it will help the students study in a planned and a structured manner and promote effective learning. Wishing you an intellectually stimulating stay at Amity University.

July, 2010

# PROGRAMME STRUCTURE

## FIRST SEMESTER

| Course Code | Course Title | Lecture (L) Hours Per week | Tutorial (T) Hours Per week | Practical (P) Hours Per week | Total Credits |
|---|---|---|---|---|---|
| BTE 101 | Applied Mathematics - I | 3 | - | - | 3 |
| BTE 102 | Applied Physics - I – Fields & Waves | 2 | 1 | - | 3 |
| BTE 103 | Element of Mechanical Engineering | 2 | - | - | 2 |
| BTE 104 | IntroductiontoComputers& Programming in C | 2 | 1 | - | 3 |
| BTE 105 | Electrical Science | 2 | 1 | - | 3 |
| BTE 106 | Environmental studies -I | 2 | - | - | 2 |
| BTE 120 | Applied Physics Lab – I | - | - | 2 | 1 |
| BTE 121 | Element of Mechanical Engineering Lab | - | - | 2 | 1 |
| BTE 122 | Programming in C Lab | - | - | 2 | 1 |
| BTE 123 | Electrical Science Lab | - | - | 2 | 1 |
| BTE 124 | Engineering Graphics Lab | - | - | 2 | 1 |
| BTE 141 | English Language Usage Essentials | 1 | - | - | 1 |
| BTE 143 | Behavioural Science - I | 1 | - | - | 1 |
| <br>BTE 144<br>BTE 145<br>BTE 146<br>BTE 147<br>BTE 148 | Foreign Language – I<br>French<br>German<br>Spanish<br>Japanese<br>Chinese | 2 | - | - | 2 |
| | **TOTAL** | | | | **25** |

## SECOND SEMESTER

| | | | | | |
|---|---|---|---|---|---|
| BTE 201 | Applied Mathematics – II | 3 | - | - | 3 |
| BTE 202 | Applied Physics - II – Modern Physics | 2 | 1 | - | 3 |
| BTE 203 | Applied Chemistry | 2 | 1 | - | 3 |
| BTE 204 | Object Oriented Programming using $C^{++}$ | 2 | 1 | - | 3 |
| BTE 205 | Engineering Mechanics | 2 | 1 | - | 3 |
| BTE 206 | Environmental Studies -II | 2 | - | | 2 |
| BTE 220 | Applied Physics Lab – II | - | - | 2 | 1 |
| BTE 221 | Applied Chemistry Lab | - | - | 2 | 1 |
| BTE 222 | Object Oriented Programming using $C^{++}$ Lab | - | - | 2 | 1 |
| BTE 223 | Engineering Mechanics Lab | - | - | 2 | 1 |
| BTE 241 | Introduction to Communication Skills | 1 | - | - | 1 |
| BTE 243 | Behavioural Science - II | 1 | - | - | 1 |
| <br>BTE 244<br>BTE 245<br>BTE 246<br>BTE 247<br>BTE 248 | Foreign Language – II<br>French<br>German<br>Spanish<br>Japanese<br>Chinese | 2 | - | - | 2 |
| | **TOTAL** | | | | **25** |

**TERM PAPER DURING SUMMER BREAK**

## THIRD SEMESTER

| | | | | | |
|---|---|---|---|---|---|
| BTE 301 | Applied Mathematics - III | 3 | 1 | - | 4 |
| BTE 302 | Analog Electronics - I | 3 | 1 | - | 4 |
| BTE 303 | Circuits and Systems | 3 | 1 | - | 4 |
| BTE 304 | Electromagnetic Field Theory | 3 | - | - | 3 |
| BTE 305 | Java Programming | 3 | - | - | 3 |
| BTE 320 | Analog Electronics Lab - I | - | - | 2 | 1 |
| BTE 321 | Circuits & Systems Lab | - | - | 2 | 1 |

| | | | | | |
|---|---|---|---|---|---|
| BTE 322 | Java Programming Lab | - | - | 2 | 1 |
| BTE 341 | Effective Written Communication | 1 | - | - | 1 |
| BTE 343 | Behavioural Science - III | 1 | - | - | 1 |
| <br>BTE 344<br>BTE 345<br>BTE 346<br>BTE 347<br>BTE 348 | Foreign Language – III<br>French<br>German<br>Spanish<br>Japanese<br>Chinese | 2 | - | - | 2 |
| BTE 330 | Term Paper (Evaluation) | - | - | - | 2 |
| | **TOTAL** | | | | **27** |

## FOURTH SEMESTER

| | | | | | |
|---|---|---|---|---|---|
| BTE 401 | Digital Circuits & Systems - I | 3 | 1 | - | 4 |
| BTE 402 | Communication Systems | 3 | 1 | - | 4 |
| BTE 403 | Analog Electronics - II | 3 | 1 | - | 4 |
| BTE 404 | Signals & Systems | 3 | 1 | - | 4 |
| BTE 420 | Digital Circuits & Systems Lab - I | - | - | 2 | 1 |
| BTE 421 | Communication Systems Lab | - | - | 2 | 1 |
| BTE 422 | Analog Electronics Lab - II | - | - | 2 | 1 |
| BTE423 | Electronics Workshop Lab | | | | 2 |
| BTE 441 | Professional Communication for Recruitment & Employability | 1 | - | - | 1 |
| BTE 443 | Behavioural Science - IV | 1 | - | - | 1 |
| <br>BTE 444<br>BTE 445<br>BTE 446<br>BTE 447<br>BTE 448 | Foreign Language – IV<br>French<br>German<br>Spanish<br>Japanese<br>Chinese | 2 | - | - | 2 |
| | **TOTAL** | | | | **25** |

## PRACTICAL TRAINING: 6 – 8 WEEKS

## FIFTH SEMESTER

| | | | | | |
|---|---|---|---|---|---|
| BTE 501 | Digital Circuits & Systems - II | 3 | 1 | - | 4 |
| BTE 502 | Microprocessor Systems | 3 | 1 | - | 4 |
| BTE 503 | Telecommunication Networks | 3 | - | - | 3 |
| BTE 504 | Digital Communications | 3 | - | - | 3 |
| BTE 505 | Microwave Engineering | 3 | - | - | 3 |
| BTE 520 | Digital Circuits & Systems Lab - II | - | - | 2 | 1 |
| BTE 521 | Microprocessor Systems Lab | - | - | 2 | 1 |
| BTE 522 | Telecommunication Networks Lab | - | - | 2 | 1 |
| BTE 523 | Microwave Engineering Lab | - | - | 2 | 1 |
| BTE 524 | MATLAB Lab | - | - | 2 | 1 |
| BTE 541 | Receptive and Expressive Communication Skills | 1 | - | - | 1 |
| BTE 543 | Behavioural Science -V | 1 | - | - | 1 |
| <br>BTE 544<br>BTE 545<br>BTE 546<br>BTE 547<br>BTE 548 | Foreign Language – V<br>French<br>German<br>Spanish<br>Japanese<br>Chinese | 2 | - | - | 2 |
| BTE 550 | Practical Training (Evaluation) | - | - | - | 3 |
| | **TOTAL** | | | | **29** |

## SIXTH SEMESTER

| | | | | | |
|---|---|---|---|---|---|
| BTE 601 | VLSI Design | 3 | 1 | - | 4 |

| | | | | | |
|---|---|---|---|---|---|
| BTE 602 | Digital Signal Processing | 3 | 1 | - | 4 |
| BTE 603 | Control Systems | 3 | 1 | - | 4 |
| BTE 604 | Antenna & Wave Propagation | 3 | 1 | - | 4 |
| BTE 605 | Measurement & Measuring Instruments | 3 | - | - | 3 |
| BTE 620 | VLSI Design Lab | - | - | 2 | 1 |
| BTE 621 | Digital Signal Processing Lab | - | - | 2 | 1 |
| BTE 622 | Control Systems Lab | - | - | 2 | 1 |
| BTE 641 | Social Communication | 1 | - | - | 1 |
| BTE 643 | Behavioural Science - VI | 1 | - | - | 1 |
| <br>BTE 644<br>BTE 645<br>BTE 646<br>BTE 647<br>BTE 648 | Foreign Language – VI<br>French<br>German<br>Spanish<br>Japanese<br>Chinese | 2 | - | - | 2 |
| | **TOTAL** | | | | **26** |

## INDUSTRIAL TRAINING

## SEVENTH SEMESTER

| | | | | | |
|---|---|---|---|---|---|
| BTE 701 | Radar & Satellite Communications | 3 | 1 | - | 4 |
| BTE 702 | Data Communications & Networking | 3 | - | - | 3 |
| BTE 720 | Radar & Satellite Communications Lab | - | - | 2 | 1 |
| BTE 721 | Data Communications & Networking Lab | - | - | 2 | 1 |
| BTE 722 | ORCAD Lab | - | - | 2 | 1 |
| BTE 741 | Workplace Communication | 1 | - | - | 1 |
| BTE 743 | Behavioural Science - VII | 1 | - | - | 1 |
| <br>BTE 744<br>BTE 745<br>BTE 746<br>BTE 747<br>BTE 748 | Foreign Language – VII<br>French<br>German<br>Spanish<br>Japanese<br>Chinese | 2 | - | - | 2 |
| BTE 750 | Industrial Training (Evaluation) | - | - | - | 6 |
| BTE760 | Project | | | | 6 |
| **Elective A (Any one from each category)with Practical** | | | | | |
| BTE 703 | Analog CMOS IC Design | 3 | 1 | - | 4 |
| BTE 704 | Optical Communications | 3 | 1 | - | 4 |
| BTE 705 | Software Engineering | 3 | 1 | - | 4 |
| BTE 723 | Analog CMOS IC Design Lab | - | - | 2 | 1 |
| BTE 724 | Optical Communications Lab | - | - | 2 | 1 |
| BTE 725 | Software Engineering Lab | - | - | 2 | 1 |
| **Elective B (Any one from each category)Without Practical** | | | | | |
| BTE 706 | Mobile Communications | 3 | - | - | 3 |
| BTE 707 | Power Electronics | 3 | - | - | 3 |
| BTE 708 | Bio-Medical Engineering | 3 | - | - | 3 |
| BTE 709 | Television Principle | 3 | - | - | 3 |
| BTE 710 | Computer Architecture | 3 | - | - | 3 |
| | | | | | |
| | **TOTAL** | | | | **34** |

## EIGHTH SEMESTER

| | | | | | |
|---|---|---|---|---|---|
| BTE 801 | Information theory and Coding | 3 | - | - | 3 |
| BTE 802 | C based Embedded System Design | 3 | - | - | 3 |
| BTE 820 | Information theory and Coding Lab | - | - | 2 | 1 |
| BTE 821 | C based Embedded System Design Lab | - | - | 2 | 1 |

| | | | | | |
|---|---|---|---|---|---|
| BTE 841 | Cross Cultural Communication | 1 | - | - | 1 |
| BTE 843 | Behavioural Science - VIII | 1 | - | - | 1 |
| <br>BTE 844<br>BTE 845<br>BTE 846<br>BTE 847<br>BTE 848 | Foreign language – VIII<br>French<br>German<br>Spanish<br>Japanese<br>Chinese | 2 | - | - | 2 |
| BTE 860 | Project | - | - | - | 09 |
| **Elective A (Any one from each category)with Practical** | | | | | |
| BTE 803 | Instrumentation | 3 | - | - | 3 |
| BTE 804 | Artificial Neural Networks | 3 | - | - | 3 |
| BTE 805 | RTOS Programming | 3 | - | - | 3 |
| BTE 806 | Verilog Programming | 3 | - | - | 3 |
| BTE 807 | Advanced Networking | 3 | - | - | 3 |
| BTE 808 | Database Management Systems | 3 | - | - | 3 |
| BTE 809 | Advanced Java Programming | 3 | - | - | 3 |
| BTE 810 | Digital Image Processing | 3 | - | - | 3 |
| BTE 822 | Instrumentation Lab | - | - | 2 | 1 |
| BTE 823 | Artificial Neural Networks Lab | - | - | 2 | 1 |
| BTE 824 | RTOS Programming Lab | - | - | 2 | 1 |
| BTE 825 | Verilog Programming Lab | - | - | 2 | 1 |
| BTE 826 | Advanced Networking Lab | - | - | 2 | 1 |
| BTE 827 | Database Management Systems Lab | - | - | 2 | 1 |
| BTE 828 | Advanced Java Programming Lab | - | - | 2 | 1 |
| BTE 829 | Digital Image Processing Lab | - | - | 2 | 1 |
| | **TOTAL** | | | | **25** |

**Notes:**

A student can opt for one course of BSI/ $EMC^2$/ Campus Connect/ Professional Elective Courses as an alternative to one of the elective courses.

## Curriculum & Scheme of Examination

## APPLIED MATHEMATICS - I

**Course Code: BTE 101** **Credit: 03**

**Course Objective:**
The knowledge of Mathematics is necessary for a better understanding of almost all the Engineering and Science subjects. Here our intention is to make the students acquainted with the concept of basic topics from Mathematics, which they need to pursue their Engineering degree in different disciplines.

**Course Contents:**

**Module I: Differential Calculus**
Successive differentiation, Leibnitz's theorem (without proof), Mean value theorem, Taylor's theorem (proof), Remainder terms, Asymptote & Curvature, Partial derivatives, Chain rule, Differentiation of Implicit functions, Exact differentials, Tangents & Normals, Maxima, Approximations, Differentiation under integral sign, Jacobians & transformations of coordinates.

**Module II: Integral Calculus**
Fundamental theorems, Reduction formulae, Properties of definite integrals, Applications to length, area, volume, surface of revolution, improper integrals, Multiple Integrals-Double integrals, Applications to areas, volumes.

**Module III: Ordinary Differential Equations**
Formation of ODEs, Definition of order, degree & solutions, ODE of first order: Method of separation of variables, homogeneous & non homogeneous equations, Exactness & integrating factors, Linear equations & Bernoulli equations, General linear ODE of $n^{th}$ order, Solution of homogeneous equations, Operator method, Method of undetermined coefficients, Solution of simple simultaneous ODE.

**Module IV: Vector Calculus**
Scalar & Vector Field, Derivative of a Vector, Gradient, Directional Derivative, Divergence and Curl and their Physical Significance, Arc Length, Tangent, Directional Derivative, Evaluation of Line Integral, Green's Theorem in Plane (without proof), Representation of Surfaces, Tangent Plane and Surface Normal, Surface Integral, Stoke's Theorem (without proof), Gauss Divergence Theorem (without proof).

**Examination Scheme:**

| **Components** | **Att** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 5 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

**Text & References:**

***Text:***
- Differential Calculus by Shanti Narain
- Integral Calculus by Shanti Narain

***References:***
- Differential Equation by A.R. Forsyth
- Higher Engineering Mathematics by H.K. Dass

# APPLIED PHYSICS - I - FIELDS AND WAVES

**Course Code:** **BTE 102** **Credit Units: 03**

## Course Objective:

Aim of this course is to introduce the students to fundamentals of graduate level physics, which form the basis of all applied science and engineering

## Course Contents:

**Module I: Oscillations & Waves**

**Oscillations:** Introduction to S.H.M. Damped Oscillations: Differential Equation and its solution, logarithmic decrement, Quality Factor, Different conditions of damping of harmonic oscillations. Forced oscillations: Amplitude and Frequency Response, Resonance, Sharpness of Resonance

**Plane Progressive Waves:** Differential Equation and Solution, Superposition of Progressive Waves stationary waves.

**Ultrasonics:** Generation and application of ultrasonicwaves.

**Module II: Wave Nature of Light**

**Interference:** Coherent Sources, Conditions of interference, Interference due to division of wavefront, Fresnels biprism Interference due to division of amplitude, Newton's rings, Interference due to thin films, .

**Diffraction:** Fresnel and Fraunhofer diffraction, Fraunhofer diffraction at a single slit, double slit, N Slits, Transmission grating, Rayleigh criterion and Resolving power of grating.

**Polarization:** Birefringence, Nicol prism, Production and analysis of plane, circularly and elliptically polarized light, Half and quarter wave plates, Optical rotation, Polarimeter.

**Module III: Electromagnetics**

Scalar and vector fields, gradient of a scalar field, physical significance of gradient, equipotential surface. Line, surface and volume integrals, Divergence and curl of vector field and mathematical analysis physical significance, Electric flux, Gauss' law, Proof and Applications, Gauss divergence and Stokes theorems.

Differential form of Gauss' Law, Amperes' Law, Displacement current, Faradays Law, Maxwell equations in free space & isotropic media (Integral form & differential form), EM wave propagation in free space, Poynting vector.

## Examination Scheme:

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Waves & oscillation, A. P. French
- Physics of waves, W. C. Elmore & M. A. Heald
- Introduction to Electrodynamics, D. J. Griffith
- Electrodynamics, Gupta, Kumar & Singh
- Optics, A. K. Ghatak
- Engineering Physics, Satya Prakash

# ELEMENT OF MECHANICAL ENGINEERING

**Course Code:** **BTE 103** **Credit Units: 02**

## Course Objective:

The objective of this course is to impart the basic knowledge of thermodynamics, stress- strain, materials & their properties and various manufacturing processes to the students of all engineering discipline.

## Course Contents:

**Module I: Fundamental Concepts**

Definition of thermodynamics, system, surrounding and universe, phase, concept of continuum, macroscopic & microscopic point of view, Thermodynamic equilibrium, property, state, path, process, cyclic process, Zeroth, first and second law of thermodynamics, Carnot Cycle, Introduction to I.C. Engines-two &four stoke S.I. and C.I. engines. Otto cycle. Diesel cycle.

**Module II: Stress And Strain Analysis**

Simple stress and strain: introduction, normal shear, and stresses-strain diagrams for ductile and brittle materials. Elastic constants, one-dimensional loadings of members of varying cross-section, Strain Energy, Properties of material-strength, elasticity, stiffness, malleability, ductility, brittleness, hardness and plasticity etc; Concept of stress and strain stress strain diagram, tensile test, impact test and hardness test.

**Module III: Casting & Forging**

Introduction of casting, pattern, mould making procedures, sand mould casting, casting defects, allowances of pattern. Forging-introduction, upsetting & drawing out, drop forging, press forging & m/c forging

**Module IV: Welding & Sheet metal working**

Introduction of welding processes, classification, gas welding, arc welding, resistance welding. Introduction to sheet metal shop, Shearing, trimming, blanking, piercing, shaving, notching, stretch forming, nibbling coining, embossing and drawing.

## Examination Scheme:

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Engineering thermodynamics, by P.K. Nag, Tata McGraw Hill.
- Thermal Engineering, by D.S. Kumar. S.K. Kataria and Sons.
- Thermal Engineering by PL Ballaney; Khanna Publishers, Delhi.
- Engineering Thermodynamics: Work and Heat Transfer, by Rogers and Mayhew, ELBS Publications
- Heine, R.W. C.R. Loper and P.C. Rosenthal, Principles of metal casting McGraw Hill
- Welding Technology by R.S. Parmar, Khanna Publishers.
- Thermodynamics and Heat Engines Volume-I, by R. Yadav: Central Publications.
- Ganesan, V. Internal Combustion Engine, Tata McGraw-Hill.
- Mathur, M.L. and Sharma, R.P. Internal Combustion Engine. Dhanpat Rai Publication

# INTRODUCTION TO COMPUTERS AND PROGRAMMING IN C

**Course Code: BTE 104 Credit Units: 03**

## Course Objective:

The objective of this course module is to acquaint the students with the basics of computers system, its components, data representation inside computer and to get them familiar with various important features of procedure oriented programming language i.e. C.

## Course Contents:

**Module I: Introduction**

Introduction to computer, history, von-Neumann architecture, memory system (hierarchy, characteristics and types), H/W concepts (I/O Devices), S/W concepts (System S/W & Application S/W, utilities). Data Representation: Number systems, character representation codes, Binary, octal, hexadecimal and their interconversions. Binary arithmetic, floating point arithmetic, signed and unsigned numbers, Memory storage unit.

**Module II: Programming in C**

History of C, Introduction of C, Basic structure of C program, Concept of variables, constants and data types in C, Operators and expressions: Introduction, arithmetic, relational, Logical, Assignment, Increment and decrement operator, Conditional, bitwise operators, Expressions, Operator precedence and associativity. Managing Input and output Operation, formatting I/O.

**Module III: Fundamental Features in C**

C Statements, conditional executing using if, else, nesting of if, switch and break Concepts of loops, example of loops in C using for, while and do-while, continue and break. Storage types (automatic, register etc.), predefined processor, Command Line Argument.

**Module IV: Arrays and Functions**

One dimensional arrays and example of iterative programs using arrays, 2-D arrays Use in matrix computations. Concept of Sub-programming, functions Example of user defined functions. Function prototype, Return values and their types, calling function, function argument, function with variable number of argument, recursion.

**Module V: Advanced features in C**

Pointers, relationship between arrays and pointers Argument passing using pointers, Array of pointers. Passing arrays as arguments.
Strings and C string library.
Structure and Union. Defining C structures, Giving values to members, Array of structure, Nested structure, passing strings as arguments.
File Handling.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***

- "ANSI C" by E Balagurusamy
- Yashwant Kanetkar, "Let us C", BPB Publications, 2nd Edition, 2001.
- Herbert Schildt, "C:The complete reference", Osbourne Mcgraw Hill, 4th Edition, 2002.
- V. Raja Raman, "Computer Programming in C", Prentice Hall of India, 1995.

***References*:**

- Kernighan & Ritchie, "C Programming Language", The (Ansi C Version), PHI, 2nd Edition.
- J. B Dixit, "Fundamentals of Computers and Programming in 'C'.
- P.K. Sinha and Priti Sinha, "Computer Fundamentals", BPB publication.

# ELECTRICAL SCIENCE

**Course Code:** **BTE 105** **Credit Units: 03**

## Course Objective:

The objective of the course is to provide a brief knowledge of Electrical Engineering to students of all disciplines. This Course includes some theorems related to electrical, some law's related to flow of current, voltages, basic knowledge of Transformer, basic knowledge of electromagnetism, basic knowledge of electrical network.

## Course Contents:

**Module I: Basic Electrical Quantities**

Basic Electrical definitions-Energy, Power, Charge, Current, Voltage, Electric Field Strength, Magnetic Flux Density, etc., Resistance, Inductance and Capacitance. Ideal Source, Independent Source and Controlled Source

**Module II: Network Analysis Techniques & Theorems**

Circuit Principles: Ohm's Law, Kirchoff's Current Law, Kirchoff's Voltage Law Network Reduction: Star–Delta Transformation, Source Transformation, Nodal Analysis, Loop analysis. Superposition theorem Thevenin's Theorem, Norton's theorem and Reciprocity theorem.

**Module III: Alternating Current Circuits**

Peak, Average and RMS values for alternating currents, Power calculation:
reactive power, active power, Complex power, power factor, impedance, reactance, conductance, susceptance Resonance: series Resonance, parallel resonance, basic definition of Q factor & Band-width.

**Module IV: Transformers**

Basic Transformer Operation principle, Construction, Voltage relations, Current relations, Linear circuit models, Open circuit test, Short circuit test, Transformer Efficiency.

## Examination Scheme:

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- R.J. Smith, R.C. Dorf: Circuits, devices and Systems
- B.L. Thareja: Electrical Technology : Part -1 & 2
- V. Deltoro: Electrical Engineering fundamentals
- Schaum's Series: Electrical Circuits

# ENVIRONMENTAL STUDIES-I

**Course Code: BTE 106 Credit Units: 02**

## Course Objective:

The term environment is used to describe, in the aggregate, all the external forces, influences and conditions, which affect the life, nature, behaviour and the growth, development and maturity of living organisms. At present a great number of environment issues, have grown in size and complexity day by day, threatening the survival of mankind on earth. A study of environmental studies is quite essential in all types of environmental sciences, environmental engineering and industrial management. The objective of environmental studies is to enlighten the masses about the importance of the protection and conservation of our environment and control of human activities which has an adverse effect on the environment.

## Course Contents:

## Module I: The multidisciplinary nature of environmental studies

Definition, scope and importance
Need for public awareness

## Module II: Natural Resources
## Renewable and non-renewable resources

Natural resources and associated problems
Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies.
Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

## Module III: Ecosystems

Concept of an ecosystem
Structure and function of an ecosystem
Producers, consumers and decomposers
Energy flow in the ecosystem
Ecological succession
Food chains, food webs and ecological pyramids
Introduction, types, characteristic features, structure and function of the following ecosystem:

a. Forest ecosystem
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, ocean estuaries)

## Module IV: Biodiversity and its conservation

Introduction – Definition: genetic, species and ecosystem
diversity Biogeographical classification of India
Value of biodiversity: consumptive use, productive use, social, ethical aesthetic and option values
Biodiversity at global, national and local levels
India as a mega-diversity nation
Hot-spots of biodiversity
Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts
Endangered and endemic species of India
Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity

## Examination Scheme:

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

**Text & References:**


- Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
- Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad 380 013, India, Email:mapin@icenet.net (R)
- Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
- Clark R.S., Marine Pollution, Clanderson Press Oxford (TB)
- Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p
- De A.K., Environmental Chemistry, Wiley Eastern Ltd.
- Down to Earth, Centre for Science and Environment (R)
- Gleick, H.P. 1993. Water in Crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford Univ. Press. 473p
- Hawkins R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R)
- Heywood, V.H & Waston, R.T. 1995. Global Biodiversity Assessment. Cambridge Univ. Press 1140p.
- Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284 p.
- Mckinney, M.L. & School, R.M. 1996. Environmental Science Systems & Solutions, Web enhanced edition. 639p.
- Mhaskar A.K., Matter Hazardous, Techno-Science Publication (TB)
- Miller T.G. Jr. Environmental Science, Wadsworth Publishing Co. (TB)
- Odum, E.P. 1971. Fundamentals of Ecology. W.B. Saunders Co. USA, 574p
- Rao M N. & Datta, A.K. 1987. Waste Water treatment. Oxford & IBH Publ. Co. Pvt. Ltd. 345p.
- Sharma B.K., 2001. Environmental Chemistry. Geol Publ. House, Meerut
- Survey of the Environment, The Hindu (M)
- Townsend C., Harper J, and Michael Begon, Essentials of Ecology, Blackwell Science
- Trivedi R.K., Handbook of Environmental Laws, Rules Guidelines, Compliances and Standards, Vol I and II, Enviro Media (R)
- Trivedi R. K. and P.K. Goel, Introduction to air pollution, Techno-Science Publication (TB)
- Wanger K.D., 1998 Environnemental Management. W.B. Saunders Co. Philadelphia, USA 499p

# APPLIED PHYSICS LAB - I

**Course Code:** **BTE 120** **Credit Units: 01**

## List of Experiments:

1. To determine the wavelength of sodium light by Newton's rings method.

2. To determine the dispersive power of the material of prism with the help of a spectrometer.

3. To determine the specific rotation of sugar by Bi-quartz or Laurent half shade polarimeter.

4. To determine the speed of ultrasonic waves in liquid by diffraction method.

5. To determine the width of a narrow slit using diffraction phenomena.

6. To determine the temperature coefficient of platinum wire, using a platinum resistance thermometer and a Callender & Griffth's bridge.

7. To determine the value of specific charge (ratio of e/m) of an electron by Thomson method.

8. To determine the internal resistance of Leclanche cell with the help of Potentiometer.

9. To determine the resistance per unit length of a Carey Foster's bridge wire and also to find out the specific resistance of a given wire.

10. To plot graph showing the variation of magnetic field with distance along the aixs of a circular coil carrying current, and hence estimate the radius of the coil.

11. To determine the value of acceleration due to gravity ('g') in the laboratory using bar pendulum.

12. To determine the moment of inertia of a flywheel about its own axis of rotation.

13. To determine the density of material of the given wire with the help of sonometer.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# ELEMENT OF MECHANICAL ENGINEERING LAB

**Course Code: BTE 121** **Credit Units: 01**

1. Welding

   (a) Arc Welding - Butt Joint
   - Lap Joint
   - T Joint

   (b) Gas Welding - Butt Joint
   - Lap Joint
   - Brazing of Broken pieces

2. Foundry - Sand mould casting by single piece pattern& Split pattern bracket with cores

3. Sheet Metal - Dust Bin
   - Mug
   - Funnel
   - Cylindrical Mug with handle-Rectangular

4. Fitting Shop - Male – Female Joint
   - Rectangular piece
   - Filing the job

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# PROGRAMMING IN C LAB

**Course Code:** **BTE 122** **Credit Units: 01**

**Software Required:** Turbo C

## Course Contents:

- C program involving problems like finding the nth value of cosine series, Fibonacci series. Etc.
- C programs including user defined function calls
- C programs involving pointers, and solving various problems with the help of those.
- File handling

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# ELECTRICAL SCIENCE LAB

**Course Code:** **BTE 123** **Credit Units: 01**

## List of Experiments:

1. To verify KVL & KCL in the given network.
2. To verify Superposition Theorem.
3. To verify Maximum Power Transfer Theorem.
4. To verify Reciprocity Theorem.
5. To determine and verify $R_{Th}$, $V_{Th}$, $R_N$, $I_N$ in a given network.
6. To perform open circuit & short circuit test on a single-phase transformer.
7. To study transient response of a given RLC Circuit.
8. To perform regulation, ratio & polarity test on a single-phase transformer.
9. To measure power & power factor in a three phase circuit by two wattmeter method.
10. To measure power & power factor in a three phase load using three ammeter & three voltmeter method.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# ENGINEERING GRAPHICS LAB

**Course Code: BTE 124 Credit Units: 01**

## Course Objective:

This course will provide students concepts on the drawings of different curves like straight line, parabola, ellipse etc. After completion of this course, students will be able to draw different figures manually and will be capable of using various instruments involved in drawings.

## Course Contents:

**Module I: General**
Importance, Significance and scope of engineering drawing, Lettering, Dimensioning, Scales, Sense of proportioning, Different types of projections, Orthographic Projection, B.I.S. Specifications.

**Module II: Projections of Point and Lines**
Introduction of planes of projection, Reference and auxiliary planes, projections of points and Lines in different quadrants, traces, inclinations, and true lengths of the lines, projections on Auxiliary planes, shortest distance, intersecting and non-intersecting lines.

**Module III: Planes other than the Reference Planes**
Introduction of other planes (perpendicular and oblique), their traces, inclinations etc., Projections of points and lines lying in the planes, conversion of oblique plane into auxiliary Plane and solution of related problems.

**Module IV: Projections of Plane Figures**
Different cases of plane figures (of different shapes) making different angles with one or both reference planes and lines lying in the plane figures making different given angles (with one of both reference planes). Obtaining true shape of the plane figure by projection.

**Module V: Projection of Solids**
Simple cases when solid is placed in different positions, Axis faces and lines lying in the faces of the solid making given angles.

**Module VI: Development of Surface**
Development of simple objects with and without sectioning. Isometric Projection

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

## Text & References:


- M.B. Shah & B.C. Rana, Engineering Drawing, Pearson Education, 2007
- PS Gill, Engineering Drawing, Kataria Publication
- ND Bhatt, Engineering Drawing, Charotar publications
- N Sidheshwar, Engineering Drawing, Tata McGraw Hill
- CL tanta, Mechanical Drawing, “Dhanpat Rai”

# ENGLISH

## Course Objective:

The course is intended to give a foundation of English Language. The literary texts are indented to help students to inculcate creative & aesthetic sensitivity and critical faculty through comprehension, appreciation and analysis of the prescribed literary texts. It will also help them to respond form different perspectives.

## Course Contents:

**Module I: Vocabulary**
Use of Dictionary
Use of Words: Diminutives, Homonyms & Homophones

**Module II: Essentials of Grammar - I**
Articles
Parts of Speech
Tenses

**Module III: Essentials of Grammar - II**
Sentence Structure
Subject -Verb agreement
Punctuation

**Module IV: Communication**
The process and importance
Principles & benefits of Effective Communication

**Module V: Spoken English Communication**
Speech Drills
Pronunciation and accent
Stress and Intonation

**Module VI: Communication Skills - I**
Developing listening skills
Developing speaking skills

**Module VII: Communication Skills - II**
Developing Reading Skills
Developing writing Skills

**Module VIII: Written English communication**
Progression of Thought/ideas
Structure of Paragraph
Structure of Essays

**Module IX: Short Stories**
Of Studies, by Francis Bacon
Dream Children, by Charles Lamb
The Necklace, by Guy de Maupassant
A Shadow, by R.K.Narayan
Glory at Twilight, Bhabani Bhattacharya

**Module X: Poems**

| | |
|---|---|
| All the Worlds a Stage | Shakespeare |
| To Autumn | Keats |
| O! Captain, My Captain. | Walt Whitman |
| Where the Mind is Without Fear | Rabindranath Tagore |
| Psalm of Life | H.W. Longfellow |

## Examination Scheme:

| Components | A | CT | HA | EE |
|---|---|---|---|---|
| Weightage (%) | 05 | 15 | 10 | 70 |

## Text & References:

- Madhulika Jha, Echoes, Orient Long Man
- Ramon & Prakash, Business Communication, Oxford.
- Sydney Greenbaum Oxford English Grammar, Oxford.
- Successful Communications, Malra Treece (Allyn and Bacon)
- Effective Technical Communication, M. Ashraf Rizvi.

## * 30 hrs Programme to be continued for Full year

# BEHAVIOURAL SCIENCE - I
# (UNDERSTANDING SELF FOR EFFECTIVENESS)

**Course Code: BTE 143 Credit Units: 01**

## Course Objective:

This course aims at imparting:

- Understanding self & process of self exploration
- Learning strategies for development of a healthy self esteem
- Importance of attitudes and its effective on personality
- Building Emotional Competence

## Course Contents:

**Module I: Self: Core Competency**
Understanding of Self
Components of Self – Self identity
Self concept
Self confidence
Self image

**Module II: Techniques of Self Awareness**
Exploration through Johari Window
Mapping the key characteristics of self
Framing a charter for self
Stages – self awareness, self acceptance and self realization

**Module III: Self Esteem & Effectiveness**
Meaning and Importance
Components of self esteem
High and low self esteem
Measuring your self esteem

**Module IV: Building Positive Attitude**
Meaning and nature of attitude
Components and Types of attitude
Importance and relevance of attitude

**Module V: Building Emotional Competence**
Emotional Intelligence – Meaning, components, Importance and Relevance
Positive and Negative emotions
Healthy and Unhealthy expression of emotions

**Module VI: End-of-Semester Appraisal**
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

## Examination Scheme:

| Components | SAP | A | Mid Term Test (CT) | VIVA | Journal for Success (JOS) |
|---|---|---|---|---|---|
| Weightage (%) | 20 | 05 | 20 | 30 | 25 |

## Text & References:


- Organizational Behaviour, Davis, K.
- Hoover, Judhith D. Effective Small Group and Team Communication, 2002,Harcourt College Publishers
- Dick, Mc Cann & Margerison, Charles: Team Management, 1992 Edition, viva books
- Bates, A. P. and Julian, J.: Sociology - Understanding Social Behaviour
- Dressler, David and Cans, Donald: The Study of Human Interaction
- Lapiere, Richard. T – Social Change
- Lindzey, G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology, Addison – Welsley, US.

- Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.
- LaFasto and Larson: When Teams Work Best, 2001, Response Books (Sage), New Delhi
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 2, Group (1996); Pfeiffer & Company
- Smither Robert D.; The Psychology of Work and Human Performance, 1994, Harper Collins College Publishers

# FRENCH - I

**Course Code:** **BTE 144** **Credit Units: 02**

## Course Objective:

To familiarize the students with the French language

- with the phonetic system
- with the syntax
- with the manners
- with the cultural aspects

## Course Contents:

**Module A: pp. 01 to 37: Unités 1, 2, Unité 3 Objectif 1, 2**
Only grammar of Unité 3: objectif 3, 4 and 5

**Contenu lexical: Unité 1 : Découvrir la langue française : (oral et écrit)**

1. se présenter, présenter quelqu'un, faire la connaissance des autres, formules de politesse, rencontres
2. dire/interroger si on comprend
3. Nommer les choses

**Unité 2: Faire connaissance**

1. donner/demander des informations sur une personne, premiers contacts, exprimer ses goûts et ses préférences
2. Parler de soi: parler du travail, de ses activités, de son pays, de sa ville.

**Unité 3: Organiser son temps**

1. dire la date et l'heure

**Contenu grammatical:**

1. organisation générale de la grammaire
2. article indéfini, défini, contracté
3. nom, adjectif, masculin, féminin, singulier et pluriel
4. négation avec « de », "moi aussi", "moi non plus"
5. interrogation : Inversion, est-ce que, qui, que, quoi, qu'est-ce que, où, quand, comment, quel(s), quelle(s)
   Interro-négatif : réponses : oui, si, non
6. pronom tonique/disjoint- pour insister après une préposition
7. futur proche

## Examination Scheme:

| **Components** | **CT1** | **CT2** | **C** | **I** | **V** | **A** |
|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- le livre à suivre : Campus: Tome 1

# GERMAN - I

**Course Code:** **BTE 145** **Credit Units: 02**

## Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany

## Course Contents:

**Module I: Introduction**
Self introduction: heissen, kommen, wohnwn, lernen, arbeiten, trinken, etc.
All personal pronouns in relation to the verbs taught so far.
Greetings: Guten Morgen!, Guten Tag!, Guten Abend!, Gute Nacht!, Danke sehr!, Danke!, Vielen Dank!, (es tut mir Leid!),
Hallo, wie geht's?: Danke gut!, sehr gut!, prima!, ausgezeichnet!,
Es geht!, nicht so gut!, so la la!, miserabel!

**Module II: Interviewspiel**
To assimilate the vocabulary learnt so far and to apply the words and phrases in short dialogues in an interview – game for self introduction.

**Module III: Phonetics**
Sound system of the language with special stress on Dipthongs

**Module IV: Countries, nationalities and their languages**
To make the students acquainted with the most widely used country names, their nationalitie and the language spoken in that country.

**Module V: Articles**
The definite and indefinite articles in masculine, feminine and neuter gender. All Vegetables, Fruits, Animals, Furniture, Eatables, modes of Transport

**Module VI: Professions**
To acquaint the students with professions in both the genders with the help of the verb "sein".

**Module VII: Pronouns**
Simple possessive pronouns, the use of my, your, etc.
The family members, family Tree with the help of the verb "to have"

**Module VIII: Colours**
All the color and color related vocabulary – colored, colorful, colorless, pale, light, dark, etc.

**Module IX: Numbers and calculations – verb "kosten"**
The counting, plural structures and simple calculation like addition, subtraction, multiplication and division to test the knowledge of numbers.
"Wie viel kostet das?"

**Module X: Revision list of Question pronouns**
W – Questions like who, what, where, when, which, how, how many, how much, etc.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- Wolfgang Hieber, Lernziel Deutsch

- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

# SPANISH – I

**Course Code:** **BTE 146** **Credit Units: 02**

## Course Objective:

To enable students acquire the relevance of the Spanish language in today's global context, how to greet each other. How to present / introduce each other using basic verbs and vocabulary

## Course Contents:

**Module I**
A brief history of Spain, Latin America, the language, the culture…and the relevance of Spanish language in today's global context.
Introduction to alphabets

**Module II**
Introduction to '*Saludos*' (How to greet each other. How to present / introduce each other).
Goodbyes (despedidas)
The verb *llamarse* and practice of it.

**Module III**
Concept of Gender and Number
Months of the years, days of the week, seasons. Introduction to numbers 1-100, Colors, Revision of numbers and introduction to ordinal numbers.

**Module IV**
Introduction to *SER* and *ESTAR* (both of which mean To Be).Revision of '*Saludos*' and '*Llamarse*'. Some adjectives, nationalities, professions, physical/geographical location, the fact that spanish adjectives have to agree with gender and number of their nouns. Exercises highlighting usage of *Ser* and *Estar*.

**Module V**
Time, demonstrative pronoun (Este/esta, Aquel/aquella etc)

**Module VI**
Introduction to some key AR /ER/IR ending regular verbs.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- Español, En Directo I A
- Español Sin Fronteras

# JAPANESE - I

**Course Code:** **BTE 147** **Credit Units: 02**

## Course Objective:

To enable the students to learn the basic rules of grammar and Japanese language to be used in daily life that will later help them to strengthen their language.

## Course Contents:

**Module I: Salutations**
Self introduction, Asking and answering to small general questions

**Module II: Cardinal Numbers**
Numerals, Expression of time and period, Days, months

**Module III: Tenses**
Present Tense, Future tense

**Module IV: Prepositions**
Particles, possession, forming questions

**Module V: Demonstratives**
Interrogatives, pronoun and adjectives

**Module VI: Description**
Common phrases, Adjectives to describe a person

**Module VII: Schedule**
Time Table, everyday routine etc.

**Module VIII: Outings**
Going to see a movie, party, friend's house etc.

**Learning Outcome**

- Students can speak the basic language describing above mentioned topics

**Methods of Private study /Self help**

- Handouts, audio-aids, and self-do assignments and role-plays will support classroom teaching

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

***Text:***

- Teach yourself Japanese

***References:***

- Shin Nihongo no kiso 1

# CHINESE – I

**Course Code: BTE 148 Credit Units: 02**

## Course Objective:

There are many dialects spoken in China, but the language which will help you through wherever you go is Mandarin, or Putonghua, as it is called in Chinese. The most widely spoken forms of Chinese are Mandarin, Cantonese, Gan, Hakka, Min, Wu and Xiang. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

## Course Contents:

**Module I**
Show pictures, dialogue and retell.
Getting to know each other.
Practicing chart with Initials and Finals. (CHART – The Chinese Phonetic Alphabet Called “Hanyu Pinyin” in Mandarin Chinese.)
Practicing of Tones as it is a tonal language.
Changes in 3$^{rd}$ tone and Neutral Tone.

**Module II**
Greetings
Let me Introduce
The modal particle “ne”.
Use of Please ‘qing” – sit, have tea ………….. etc.
A brief self introduction – Ni hao ma? Zaijian!
Use of “bu” negative.

**Module III**
Attributives showing possession
How is your Health? Thank you
Where are you from?
A few Professions like – Engineer, Businessman, Doctor, Teacher, Worker.
Are you busy with your work?
May I know your name?

**Module IV**
Use of “How many” – People in your family?
Use of “zhe” and “na”.
Use of interrogative particle “shenme”, “shui”, “ma” and “nar”.
How to make interrogative sentences ending with “ma”.
Structural particle “de”.
Use of “Nin” when and where to use and with whom. Use of guixing.
Use of verb “zuo” and how to make sentences with it.

**Module V**
Family structure and Relations.
Use of “you” – “mei you”.
Measure words
Days and Weekdays.
Numbers.
Maps, different languages and Countries.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- “Elementary Chinese Reader Part I” Lesson 1-10

# APPLIED MATHEMATICS – II

**Course Code: BTE 201 Credit Units: 03**

## Course Objective:

The knowledge of Mathematics is necessary for a better understanding of almost all the Engineering and Science subjects. Here our intention is to make the students acquainted with the concept of basic topics from Mathematics, which they need to pursue their Engineering degree in different disciplines.

## Course Contents:

**Module I: Linear Algebra**

Hermitian and Skew Hermitian Matrix, Unitary Matrix, Orthogonal Matrix, Elementary Row Transformation, Reduction of a Matrix to Row Echelon Form, Rank of a Matrix, Consistency of Linear Simultaneous Equations, Gauss Elimination Method, Gauss-Jordan Method, Eigen Values and Eigen Vectors of a Matrix, Caley-Hamilton Theorem, Diagonalization of a Matrix, Vector Space, Linear Independence and Dependence of Vectors, Linear Transformations.

**Module II: Infinite Series**

Definition of Sequence, Bounded Sequence, Limit of a Sequence, Series, Finite and Infinite Series, Convergence and Divergence of Infinite series, Cauchy's Principle of Convergence, Positive Term Infinite Series, Comparison test, D'Alembert's Ratio test. Raabe's Test, Cauchy's nth root Test. Logarithmic Test, Alternating Series, Leibnitz's Test, Absolute and conditioinal convergence, Uniform Convergence, Power Series and its Interval of Convergence.

**Module III: Complex Analysis**

De Moivre's Theorem and Roots of Complex Numbers, Logarithmic Functions, Circular, Hyperbolic Functions and their Inverses.

Functions of a Complex Variables, Limits, Continuity and Derivatives, Analytic Function, Cauchy-Riemann Equations (without proof), Harmonic Function, Harmonic Conjugates, Conformal Mapping, Bilinear Transformations, Complex Line Integral, Cauchy Integral Theorem, Cauchy Integral Formula, Derivative of Analytic Function, Power Series, Taylor Series, Laurent Series, Zeroes and Singularities, Residues, Residue Theorem, Evaluation of Real Integrals of the Form $\int_0^{2\pi} F(\cos\theta, \sin\theta)\, d\theta$ and $\int_{-\infty}^{\infty} \frac{f(x)}{F(x)}\, dx$.

**Module IV: Statistics and Probability**

Moments, Skewness, Kurtosis, Random Variables and Probability Distribution, Mean and Variance of a Probability Distribution, Binomial Distribution, Poisson Distribution and Normal Distribution.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Engineering Mathematics by Erwin Kreyszig.
- Engineering Mathematics by R.K. Jain and S.R.K. Iyengar.
- Higher Engineering Mathematics by H.K. Dass.
- Engineering Mathematics by B.S. Grewal.
- Differential Calculus by Shanti Narain.
- Integral Calculus by Shanti Narain.
- Linear Algebra- Schaum Outline Series.

# APPLIED PHYSICS - II - MODERN PHYSICS

**Course Code: BTE 202** **Credit Units: 03**

**Course Objective:**
Aim of this course is to introduce the students to fundamentals of graduate level physics which form the basis of all applied science and engineering

**Course Contents:**

**Module I: Special Theory of Relativity**
Michelson-Morley experiment, Importance of negative result, Inertial & non-inertial frames of reference, Einstein's postulates of Special theory of Relativity, Space-time coordinate system, Relativistic Space Time transformation (Lorentz transformation equation), Transformation of velocity, Addition of velocities, Length contraction and Time dilation, Mass-energy equivalence (Einstein's energy mass relation) & Derivation of Variation of mass with velocity,

**Module II: Wave Mechanics**
Wave particle duality, De-Broglie matter waves, phase and group velocity, Heisenberg uncertainty principle, wave function and its physical interpretation, Operators, expectation values. Time dependent & time independent Schrödinger wave equation for free & bound states, square well potential (rigid wall), Step potential.

**Module III** :**Laser and Fibre optics**: Lasers – Einstein coefficients, conditions for light amplification, population inversion, optical pumping, three level and four level lasers, He-Ne and Ruby laser, Properties and applications of lasers
**Fiber Optics:** Fundamental ideas about optical fibers, Manufacturing of optical fibers , Propagation of light through fiber, Numerical Aperture, Acceptance Angle and Cone, Applications of Fiber Optics

**Module IV : Semiconductor and Superconductivity**
Band Theory of Solids, Semi-conductors: Intrinsic and Extrinsic,Carreir concentration, p-n Junction Diode,Diode Equation, Breakdown in p-n Junction Diode: Avalanche and Zener, Zener Diode and its applications photoconductivity and photovoltaics.
Superconductivity, Meissner Effect, Type I and Type II Superconductors, BCS theory (qualitative)

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Concept of Modern Physics, A. Beiser
- Applied Physics II, Agarawal & Goel
- Solid State Physics, S. O. Pallai
- Physics of Atom, Wehr & Richards

# APPLIED CHEMISTRY

**Course Code:** **BTE 203** **Credit Units: 03**

## Course Objective:

Four basic sciences, Physics, Chemistry, Mathematics and Biology are the building blocks in engineering and technology. Chemistry is essential to develop analytical capabilities of students, so that they can characterize, transform and use materials in engineering and apply knowledge in their field. All engineering fields have unique bonds with chemistry whether it is Aerospace, Mechanical, Environmental and other fields the makeup of substances is always a key factor, which must be known. For electronics and computer science engineering, apart from the material, computer modeling and simulation knowledge can be inherited from the molecule designing. The upcoming field of technology like Nanotechnology and Biotechnology depends fully on the knowledge of basic chemistry. With this versatile need in view, course has been designed in such a way so that the student should get an overview of the whole subject.

## Course Contents:

**Module I: Water Technology**
Introduction and specifications of water,
Hardness and its determination (EDTA method only),
Alkalinity,
Boiler feed water, boiler problems – scale, sludge, priming & foaming: causes & prevention, Boiler problems – caustic embitterment & corrosion: causes & prevention,
Carbonate & phosphate conditioning, colloidal conditioning & calgon treatment
Water softening processes: Lime – soda process, Ion exchange method,
Water for domestic use.

**Module II: Fuels**

Classification, calorific value of fuel, (gross and net),
Determination of calorific value of fuels, bomb calorimeter,
Solid fuels - Proximate and ultimate analysis,
Octane & Cetane No. and its significance.
Numericals on combustion

**Module III: Instrumental Methods of analysis**
Introduction; Principles of spectroscopy; Laws of
absorbance IR : Principle, Instrumentation, Application UV :
Principle, Instrumentation, Application NMR : Principle,
Instrumentation, Application

**Module III: Lubricants**
Introduction; Mechanism of Lubrication;
Types of Lubricants; Chemical structure related to Lubrication;
Properties of lubricants; Viscosity and Viscosity Index; Iodine Value; Aniline Point; Emulsion number; Flash Point; Fire Point; Drop Point; Cloud Point; Pour Point.
Selection of Lubricants.

**Module VI: Corrosion**
Introduction, Mechanism of dry and wet corrosion,
Types of corrosion-Galvanic, Concentration cell, soil, pitting, intergranular, waterline. Passivity.
Factors influencing corrosion.
Corrosion control.

## Examination Scheme:

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***

- Engineering Chemistry- Jain and Jain
- Engineering Chemistry - Sunita Rattan
- Engineering Chemistry - Shashi Chawla

***References:***


- Engineering Chemistry – Dara and Dara
- Spectroscopy- Y.R Sharma
- Corrosion Engineering – Fontenna and Greene

# OBJECT ORIENTED PROGRAMMING USING C++

**Course Code: BTE 204 Credit Units: 03**

## Course Objective:

The objective of this module is to introduce object oriented programming. To explore and implement the various features of OOP such as inheritance, polymorphism, Exceptional handling using programming language C++. After completing this course student can easily identify the basic difference between the programming approaches like procedural and object oriented.

## Course Contents:

**Module I: Introduction**
Review of C, Difference between C and C++, Procedure Oriented and Object Oriented Approach. Basic Concepts: Objects, classes, Principals like Abstraction, Encapsulation, Inheritance and Polymorphism. Dynamic Binding, Message Passing. Characteristics of Object-Oriented Languages. Introduction to Object-Oriented Modeling techniques (Object, Functional and Dynamic Modeling).

**Module II: Classes and Objects**
Abstract data types, Object & classes, attributes, methods, C++ class declaration, Local Class and Global Class, State identity and behaviour of an object, Local Object and Global Object, Scope resolution operator, Friend Functions, Inline functions, Constructors and destructors, instantiation of objects, Types of Constructors, Static Class Data, Array of Objects, Constant member functions and Objects, Memory management Operators.

**Module III: Inheritance**
Inheritance, Types of Inheritance, access modes – public, private & protected, Abstract Classes, Ambiguity resolution using scope resolution operator and Virtual base class, Aggregation, composition vs classification hiérarchies, Overriding inheritance methods, Constructors in derived classes, Nesting of Classes.

**Module IV: Polymorphism**
Polymorphism, Type of Polymorphism – Compile time and runtime, Function Overloading, Operator Overloading (Unary and Binary) Polymorphism by parameter, Pointer to objects, this pointer, Virtual Functions, pure virtual functions.

**Module V: Strings, Files and Exception Handling**
Manipulating strings, Streams and files handling, formatted and Unformatted Input output. Exception handling, Generic Programming – function template, class Template Standard Template Library: Standard Template Library, Overview of Standard Template Library, Containers, Algorithms, Iterators, Other STL Elements, The Container Classes, General Theory of Operation, Vectors.

## Examination Scheme:

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***

- A.R. Venugopal, Rajkumar, T. Ravishanker "Mastering C++", TMH, 1997
- R. Lafore, "Object Oriented Programming using C++", BPB Publications, 2004.
- "Object Oriented Programming with C++" By E. Balagurusamy.
- Schildt Herbert, "C++: The Complete Reference", Wiley DreamTech, 2005.

***References:***

- Parasons, "Object Oriented Programming with C++", BPB Publication, 1999.
- Steven C. Lawlor, "The Art of Programming Computer Science with C++", Vikas Publication, 2002.
- Yashwant Kanethkar, "Object Oriented Programming using C++", BPB, 2004

# ENGINEERING MECHANICS

**Course Code:** **BTE 205** **Credit Units: 03**

## Course Objective:

Objective of this course is to provide fundamental knowledge of force system and its effect on the behaviour of the bodies that may be in dynamic or in static state. It includes the equilibrium of different structures like beams, frames, truss etc and the force transfer mechanism in the different components of a body under given loading condition.

## Course Contents:

**Module I: Force system & Structure**
Free body diagram, Equilibrium equations and applications. Plane truss, perfect and imperfect truss, assumption in the truss analysis, analysis of perfect plane trusses by the method of joints, method of section.

**Module II: Friction**
Static and Kinetic friction, laws of dry friction, co-efficient of friction, angle of friction, angle of repose, cone of friction, friction lock, efficiency of screw jack, transmission of power through belt

**Module III: Distributed Force**
Determination of center of gravity, center of mass and centroid by direct integration and by the method of composite bodies, mass moment of inertia and area moment of inertia by direct integration and composite bodies method, radius of gyration, parallel axis theorem, Pappus theorems and its application, polar moment of inertia.

**Module IV: Work -Energy**
Work energy equation, conservation of energy, Virtual work, impulse, momentum conservation, impact of bodies, co-efficient of restitution, loss of energy during impact, D'alembert principle

## Examination Scheme:

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- S.S. Bhavikatti, Engineering Mechanics, New Age International Ltd
- Timoshenko, Engineering Mechanics, McGraw Hill
- R. S. Khurmi, Engineering Mechanics, S. Chand Publication
- I. H. Shames & G. K. M. Rao, Engineering Mechanics, Pearson Education, 2006

# ENVIRONMENTAL STUDIES-II

**Course Code: BTE 206 Credit Units: 02**

**Course Objective:**

The term environment is used to describe, in the aggregate, all the external forces, influences and conditions, which affect the life, nature, behaviour and the growth, development and maturity of living organisms. At present a great number of environment issues, have grown in size and complexity day by day, threatening the survival of mankind on earth. A study of environmental studies is quite essential in all types of environmental sciences, environmental engineering and industrial management. The objective of environmental studies is to enlighten the masses about the importance of the protection and conservation of our environment and control of human activities which has an adverse effect on the environment.

**Course Contents:**

**Module I: Environmental Pollution**

Definition

Causes, effects and control measures of:

a. Air pollution
b. Water pollution
c. Soil pollution
d. Marine pollution
e. Noise pollution
f. Thermal pollution
g. Nuclear pollution

Solid waste management: Causes, effects and control measures of urban and industrial wastes.

Role of an individual in prevention of pollution.

Pollution case studies.

Disaster management: floods, earthquake, cyclone and landslides.

**Module II: Social Issues and the Environment**

From unsustainable to sustainable development

Urban problems and related to energy

Water conservation, rain water harvesting, watershed management

Resettlement and rehabilitation of people; its problems and concerns. Case studies.

Environmental ethics: Issues and possible solutions

Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.

Wasteland reclamation

Consumerism and waste products

Environmental Protection Act

Air (Prevention and Control of Pollution) Act

Water (Prevention and control of Pollution) Act

Wildlife Protection Act

Forest Conservation Act

Issues involved in enforcement of environmental legislation

Public awareness

**Module III: Human Population and the Environment**

Population growth, variation among nations Population explosion – Family Welfare Programmes

Environment and human health
Human Rights
Value Education
HIV / AIDS
Women and Child Welfare
Role of Information Technology in Environment and Human Health
Case Studies

**Module IV: Field Work**
Visit to a local area to document environmental assets-river / forest/ grassland/ hill/ mountain. Visit to a local polluted site – Urban / Rural / Industrial / Agricultural Study of common plants, insects, birds
Study of simple ecosystems-pond, river, hill slopes, etc (Field work equal to 5 lecture hours)

**Examination Scheme:**

| **Components** | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

**Text & References:**


- Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
- Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad 380 013, India, Email:mapin@icenet.net (R)
- Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
- Clark R.S., Marine Pollution, Clanderson Press Oxford (TB)
- Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p
- De A.K., Environmental Chemistry, Wiley Eastern Ltd.
- Down to Earth, Centre for Science and Environment (R)
- Gleick, H.P. 1993. Water in Crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford Univ. Press. 473p
- Hawkins R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R)
- Heywood, V.H & Waston, R.T. 1995. Global Biodiversity Assessment. Cambridge Univ. Press 1140p.
- Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284 p.
- Mckinney, M.L. & School, R.M. 1996. Environmental Science Systems & Solutions, Web enhanced edition. 639p.
- Mhaskar A.K., Matter Hazardous, Techno-Science Publication (TB)
- Miller T.G. Jr. Environmental Science, Wadsworth Publishing Co. (TB)
- Odum, E.P. 1971. Fundamentals of Ecology. W.B. Saunders Co. USA, 574p
- Rao M N. & Datta, A.K. 1987. Waste Water treatment. Oxford & IBH Publ. Co. Pvt. Ltd. 345p.
- Sharma B.K., 2001. Environmental Chemistry. Geol Publ. House, Meerut
- Survey of the Environment, The Hindu (M)
- Townsend C., Harper J, and Michael Begon, Essentials of Ecology, Blackwell Science
- Trivedi R.K., Handbook of Environmental Laws, Rules Guidelines, Compliances and Standards, Vol I and II, Enviro Media (R)
- Trivedi R. K. and P.K. Goel, Introduction to air pollution, Techno-Science Publication (TB)
- Wanger K.D., 1998 Environnemental Management. W.B. Saunders Co. Philadelphia, USA 499p

## APPLIED PHYSICS LAB – II

**Course Code:** **BTE 220** **Credit Units: 01**

### List of Experiments:

1. To determine the wavelength of prominent lines of mercury spectrum using plane transmission grating.
2. To determine the thickness of a given wire by Wedge method.
3. To determine the wavelength of He-Ne laser light using single slit.
4. To determine the frequency of an electrically maintained tunning fork by Melde's method.
5. To study the variation of magnetic field along the axis of Helmholtz coil and to find out reduction factor.
6. To draw the V – I characteristics of a forward and reverse bias PN junction diode.
7. To determine the frequency of AC mains using sonometer.
8. To determine the energy band-gap of Germanium crystal using four probes method.
9. To draw V – I characteristics of a photocell and to verify the inverse square law of radiation.
10. To determine the acceleration due to gravity ('g') using Keter's reversible pendulum.
11. To study the characteristics of photo voltaic cell (solar cell).
12. To study the diffraction pattern of LASER light through N-slit

### Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# APPLIED CHEMISTRY LAB

**Course Code: BTE 221** **Credit Units: 01**

## Course Contents:

### LIST OF EXPERIMENTS

**(Any 10 Experiments)**

1. To determine the ion exchange capacity of a given cation exchanger.

2. To determine the temporary, permanent and total hardness of a sample of water by complexometric titration method.

3. To determine the type and extent of alkalinity of given water sample.

4. To determine the number of water molecules of crystallization in Mohr's salt (ferrous ammonium sulphate) provided standard potassium dichromate solution (0.1N) using diphenylamine as internal indicator.

5. To determine the ferrous content in the supplied sample of iron ore by titrimetric analysis against standard $K_2Cr_2O_7$ solution using potassium ferricyanide $[K_3Fe (CN)_6]$ as external indicator.

6. (a) To determine the surface tension of a given liquid by drop number method.
   (b) To determine the composition of a liquid mixture A and B (acetic acid and water) by surface tension method.

7. To prepare and describe a titration curve for phosphoric acid – sodium hydroxide titration using pH-meter.

8. (a) To find the cell constant of conductivity cell.
   (b) Determine the strength of hydrochloric acid solution by titrating it against standard sodium hydroxide solution conductometrically

9. Determination of Dissolved oxygen in the given water sample.

10. To determine the total residual chlorine in water.

11. Determination of amount of oxalic acid and $H_2SO_4$ in 1 L of solution using N/10 NaOH and N/10 $KMnO_4$ solution.

12. Determination of viscosity of given oil by means of Redwood viscometer I.

13. To determine flash point and fire point of an oil by Pensky Martin's Apparatus

14. To determine the Iodine value of the oil.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# OBJECT ORIENTED PROGRAMMING USING C++ LAB

**Course Code:** **BTE 222** **Credit Units: 01**

**Software Required:** Turbo C++

## Course Contents:

- Creation of objects in programs and solving problems through them.
- Different use of private, public member variables and functions and friend functions.
- Use of constructors and destructors.
- Operator overloading
- Use of inheritance in and accessing objects of different derived classes.
- Polymorphism and virtual functions (using pointers).
- File handling.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# ENGINEERING MECHANICS LAB

**Course Code:** **BTE 223** **Credit Units: 01**

## Course Contents:

## Engineering Mechanics:

- To verify the law of Force Polygon
- To verify the law of Moments using Parallel Force apparatus. (Simply supported type)
- To determine the co-efficient of friction between wood and various surface (like
- Leather, Wood, Aluminum) on an inclined plane.
- To find the forces in the members of Jib Crane.
- To determine the mechanical advantage, Velocity ratio and efficiency of a screw jack.
- To determine the mechanical advantage, Velocity ratio and Mechanical efficiency of the
- Wheel and Axle
- To determine the MA, VR, $\eta$ of Worm Wheel (2-start)
- Verification of force transmitted by members of given truss.
- To verify the law of moments using Bell crank lever
- To find CG and moment of Inertia of an irregular body using Computation method

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# ENGLISH

**Course Code:** **BTE 240** **Credit Units: 03**

## Course Objective:
The course is intended to give a foundation of English Language. The literary texts are indented to help students to inculcate creative & aesthetic sensitivity and critical faculty through comprehension, appreciation and analysis of the prescribed literary texts. It will also help them to respond form different perspectives.

## Course Contents:

**Module I: Vocabulary**
Use of Dictionary
Use of Words: Diminutives, Homonyms & Homophones

**Module II: Essentials of Grammar - I**
Articles
Parts of Speech
Tenses

**Module III: Essentials of Grammar - II**
Sentence Structure
Subject -Verb agreement
Punctuation

**Module IV: Communication**
The process and importance
Principles & benefits of Effective Communication

**Module V: Spoken English Communication**
Speech Drills
Pronunciation and accent
Stress and Intonation

**Module VI: Communication Skills - I**
Developing listening skills
Developing speaking skills

**Module VII: Communication Skills - II**
Developing Reading Skills
Developing writing Skills

**Module VIII: Written English communication**
Progression of Thought/ideas
Structure of Paragraph
Structure of Essays

**Module IX: Short Stories**
Of Studies, by Francis Bacon
Dream Children, by Charles Lamb
The Necklace, by Guy de Maupassant
A Shadow, by R.K.Narayan
Glory at Twilight, Bhabani Bhattacharya

**Module X: Poems**

| | |
|---|---|
| All the Worlds a Stage | Shakespeare |
| To Autumn | Keats |
| O! Captain, My Captain. | Walt Whitman |
| Where the Mind is Without Fear | Rabindranath Tagore |
| Psalm of Life | H.W. Longfellow |

## Examination Scheme:

| Components | A | CT | HA | EE |
|---|---|---|---|---|
| Weightage (%) | 05 | 15 | 10 | 70 |

## Text & References:


- Madhulika Jha, Echoes, Orient Long Man
- Ramon & Prakash, Business Communication, Oxford.
- Sydney Greenbaum Oxford English Grammar, Oxford.
- Successful Communications, Malra Treece (Allyn and Bacon)
- Effective Technical Communication, M. Ashraf Rizvi.

# BEHAVIOURAL SCIENCE - II
# (PROBLEM SOLVING AND CREATIVE THINKING)

**Course Code: BTE 243** **Credit Units: 01**

## Course Objective:
To enable the students:
- Understand the process of problem solving and creative thinking.
- Facilitation and enhancement of skills required for decision-making.

## Course Contents:

**Module I: Thinking as a tool for Problem Solving**
What is thinking: The Mind/Brain/Behaviour
Critical Thinking and Learning:
Making Predictions and Reasoning
Memory and Critical Thinking
Emotions and Critical Thinking
Thinking skills

**Module II: Hindrances to Problem Solving Process**
Perception
Expression
Emotion
Intellect
Work environment

**Module III: Problem Solving**
Recognizing and Defining a problem
Analyzing the problem (potential causes)
Developing possible alternatives
Evaluating Solutions
Resolution of problem
Implementation
Barriers to problem solving:
Perception
Expression
Emotion
Intellect
Work environment

**Module IV: Plan of Action**
Construction of POA
Monitoring
Reviewing and analyzing the outcome

**Module V: Creative Thinking**
Definition and meaning of creativity
The nature of creative thinking
Convergent and Divergent thinking
Idea generation and evaluation (Brain Storming)
Image generation and evaluation
Debating
The six-phase model of Creative Thinking: ICEDIP model

**Module VI: End-of-Semester Appraisal**
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

## Examination Scheme:

| Components | SAP | A | Mid Term Test (CT) | VIVA | Journal for Success (JOS) |
|---|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 05 | 20 | 30 | 25 |

**Text & References:**


- Michael Steven: How to be a better problem solver, Kogan Page, New Delhi, 1999
- Geoff Petty: How to be better at creativity; Kogan Page, New Delhi, 1999
- Richard Y. Chang and P. Keith, Kelly: Wheeler Publishing, New Delhi, 1998.
- Phil Lowe Koge Page: Creativity and Problem Solving, New Delhi, 1996
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 3, Management (1996); Pfeiffer & Company
- Bensley, Alan D.: Critical Thinking in Psychology – A Unified Skills Approach, (1998), Brooks/Cole Publishing Company.

# FRENCH - II

**Course Code:** **BTE 244** **Credit Units: 02**

## Course Objective:

To enable the students to overcome the fear of speaking a foreign language and take position as a foreigner speaking French.

To make them learn the basic rules of French Grammar.

## Course Contents:

**Module A: pp.38 – 47: Unité 3 : Objectif 3, 4, 5. 6**

**Module B: pp. 47 to 75 Unité 4, 5**

**Contenu lexical:** **Unité 3: Organiser son temps**

1. donner/demander des informations sur un emploi du temps, un horaire SNCF – Imaginer un dialogue
2. rédiger un message/ une lettre pour …
   i) prendre un rendez-vous/ accepter et confirmer/ annuler
   ii) inviter/accepter/refuser
3. Faire un programme d'activités
   imaginer une conversation téléphonique/un dialogue
   Propositions- interroger, répondre

**Unité 4: Découvrir son environnement**

1. situer un lieu
2. s'orienter, s'informer sur un itinéraire.
3. Chercher, décrire un logement
4. connaître les rythmes de la vie

**Unité 5 : s'informer**

1. demander/donner des informations sur un emploi du temps passé.
2. donner une explication, exprimer le doute ou la certitude.
3. découvrir les relations entre les mots
4. savoir s'informer

**Contenu grammatical:**

1. Adjectifs démonstratifs
2. Adjectifs possessifs/exprimer la possession à l'aide de : i. « de » ii. A+nom/pronom disjoint
3. Conjugaison pronominale – négative, interrogative - construction à l'infinitif
4. Impératif/exprimer l'obligation/l'interdiction à l'aide de « il faut…. »/ «il ne faut pas… »
5. passé composé
6. Questions directes/indirectes

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- le livre à suivre : Campus: Tome 1

# GERMAN – II

**Course Code:** **BTE 245** **Credit Units: 02**

## Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany. Introduction to Grammar to consolidate the language base learnt in Semester I

## Course Contents:

**Module I: Everything about Time and Time periods**
Time and times of the day.
Weekdays, months, seasons.
Adverbs of time and time related prepositions

**Module II: Irregular verbs**
Introduction to irregular verbs like to be, and others, to learn the conjugations of the same, (fahren, essen, lessen, schlafen, sprechen und ähnliche).

**Module III: Separable verbs**
To comprehend the change in meaning that the verbs undergo when used as such
Treatment of such verbs with separable prefixes

**Module IV: Reading and comprehension**
Reading and deciphering railway schedules/school time table
Usage of separable verbs in the above context

**Module V: Accusative case**
Accusative case with the relevant articles
Introduction to 2 different kinds of sentences – Nominative and Accusative

**Module VI: Accusative personal pronouns**
Nominative and accusative in comparison
Emphasizing on the universal applicability of the pronouns to both persons and objects

**Module VII: Accusative prepositions**
Accusative propositions with their use
Both theoretical and figurative use

**Module VIII: Dialogues**
Dialogue reading: 'In the market place'
'At the Hotel'

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:


- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

# SPANISH – II

**Course Code: BTE 246 Credit Units: 02**

## Course Objective:
To enable students acquire more vocabulary, grammar, Verbal Phrases to understand simple texts and start describing any person or object in Simple Present Tense.

## Course Contents:

**Module I**
Revision of earlier modules.

**Module II**
Some more AR/ER/IR verbs. Introduction to root changing and irregular AR/ER/IR ending verbs

**Module III**
More verbal phrases (eg, Dios Mio, Que lastima etc), adverbs *(bueno/malo, muy, mucho, bastante, poco).*
Simple texts based on grammar and vocabulary done in earlier modules.

**Module IV**
Possessive pronouns

**Module V**
Writing/speaking essays like my friend, my house, my school/institution, myself….descriptions of people, objects etc, computer/internet related vocabulary

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- Español, En Directo I A
- Español Sin Fronteras

# JAPANESE - II

**Course Code:** **BTE 247** **Credit Units: 02**

## Course Objective:
To enable the students to converse in the language with the help of basic particles and be able to define the situations and people using different adjectives.

## Course Contents:

**Module I: Verbs**
Transitive verbs, intransitive verbs

**Module II: More prepositions**
More particles, articles and likes and dislikes.

**Module III: Terms used for instructions**
No parking, no smoking etc.

**Module IV: Adverbs**
Different adverbial expression.

**Module V: Invitations and celebrations**
Giving and receiving presents,
Inviting somebody for lunch, dinner, movie and how to accept and refuse in different ways

**Module VI: Comprehension's**
Short essay on Family, Friend etc.

**Module VII: Conversations**
Situational conversations like asking the way, At a post office, family

**Module VIII: Illness**
Going to the doctor, hospital etc.

## Learning Outcome
- Students can speak the language describing above-mentioned topics.

## Methods of Private study /Self help
- Handouts, audio-aids, and self-do assignments.
- Use of library, visiting and watching movies in Japan and culture center every Friday at 6pm.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

***Text:***
- Teach yourself Japanese

***References:***
- Shin Nihongo no kiso 1

# CHINESE – II

**Course Code: BTE 248 Credit Units: 02**

## Course Objective:

Chinese is a tonal language where each syllable in isolation has its definite tone (flat, falling, rising and rising/falling), and same syllables with different tones mean different things. When you say, "ma" with a third tone, it mean horse and "ma" with the first tone is Mother. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

## Course Contents:

**Module I**
Drills
Practice reading aloud
Observe Picture and answer the question.
Tone practice.
Practice using the language both by speaking and by taking notes.
Introduction of basic sentence patterns.
Measure words.
Glad to meet you.

**Module II**
Where do you live?
Learning different colors.
Tones of "bu"
Buying things and how muchit costs?
Dialogue on change of Money.
More sentence patterns on Days and Weekdays.
How to tell time. Saying the units of time in Chinese. Learning to say useful phrases like – 8:00, 11:25, 10:30 P.M. everyday, afternoon, evening, night, morning 3:58, one hour, to begin, to end ….. etc.
Morning, Afternoon, Evening, Night.

**Module III**
Use of words of location like-li, wais hang, xia
Furniture – table, chair, bed, bookshelf,.. etc.
Description of room, house or hostel room.. eg what is placed where and how many things are there in it? Review Lessons – Preview Lessons.
Expression 'yao", "xiang" and "yaoshi" (if).
Days of week, months in a year etc.
I am learning Chinese. Is Chinese difficult?

**Module IV**
Counting from 1-1000
Use of "chang-chang".
Making an Inquiry – What time is it now? Where is the Post Office?
Days of the week. Months in a year.
Use of Preposition – "zai", "gen".
Use of interrogative pronoun – "duoshao" and "ji".
"Whose"??? Sweater etc is it?
Different Games and going out for exercise in the morning.

**Module V**
The verb "qu"
- Going to the library issuing a book from the library
- Going to the cinema hall, buying tickets
- Going to the post office, buying stamps
- Going to the market to buy things.. etc
- Going to the buy clothes …. Etc.

Hobby. I also like swimming.
Comprehension and answer questions based on it.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- "Elementary Chinese Reader Part I" Lesson 11-20

# APPLIED MATHEMATICS - III

**Course Code: BTE 301** **Credit Units: 04**

## Course Objective:

The knowledge of Mathematics is necessary for a better understanding of almost all the Engineering and Science subjects. Here our intention is to make the students acquainted with the concept of basic topics from Mathematics, which they need to pursue their Engineering degree in different disciplines.

## Course Contents:

**Module I: Partial Differential Equations**
Formation of PDE, Equations solvable by direct integration, Linear equations of the first order, Non-linear equations of the first order, Charpit's method, Homogeneous linear equations with constant coefficients, Non homogeneous linear equations.

**Module II: Fourier Series**
Periodic Functions, Fourier Series, Functions having points of discontinuity, Even or Odd Functions, Change of Interval, Half-range series, Parseval's Formula, Complex form of Fourier series, Practical Harmonic Analysis, Fourier Transforms, Sine and Cosine Transforms.

**Module III: Laplace Transformation**
Definition, Transforms of elementary functions, Properties of Laplace transforms, Existence conditions, Transforms of derivatives, Transforms of integrals, Evaluation of integrals by Laplace transform, Inverse transforms, Other methods of finding inverse transforms, Convolution theorem, Application to differential equations, Simultaneous linear equations with constant coefficients, Unit step functions, Periodic functions.

**Module IV: Linear Programming**
Formulation of the problem, Graphical method, Canonical and Standard forms of L.P.P. Simplex Method, Artificial variable Techniques-M-method, Two phase method, Degeneracy, Dual simplex method.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***

- Differential Calculus by Shanti Narain
- Integral Calculus by Shanti Narain
- Higher Engineering Mathematics by B.S. Grewal

***References:***

- Differential Equations by A.R. Forsyth
- Higher Engineering Mathematics by H.K. Dass
- Partial Differential Equations by I.N. Snedon

# ANALOG ELECTRONICS – I

## Course Code: BTE 302 Credit Units: 04

## Course Objective:

This course builds from basic knowledge of Semiconductor Physics to an understanding of basic devices and their models. This course builds a foundation for courses on VLSI design and analog CMOS IC Design.

## Course Contents:

**Module I: Semiconductor Diode and Diode Circuits**
Different types of diodes: Zener, Schottky, LED. Zener as voltage regulator, Diffusion capacitance, Drift capacitance, the load line concept, half wave, full wave rectifiers, clipping and clamping circuits.

**Module II: Bipolar Junction Transistor**
Bipolar junction transistor: Introduction, Transistor, construction, transistor operations, BJT characteristics, load line, operating point, leakage currents, saturation and cut off mode of operations. Bias stabilization: Need for stabilization, fixed Bias, emitter bias, self bias, bias stability with respect to variations in $I_{co,}$ $V_{BE}$ & $\beta$, Stabilization factors, thermal stability.

**Module III: Small signal Analysis of transistor and Multistage Amplifier**
Hybrid model for transistors at low frequencies, Analysis of transistor amplifier using h parameters, emitter follower, Miller's theorem, THE CE amplifier with an emitter resistance, Hybrid $\pi$ model, Hybrid $\pi$ Conducatnces and Capacitances, CE short circuit current gain, CE short circuit current gain with $R_L$ Multistage amplifier: Cascading of Amplifiers, Coupling schemes(RC coupling and Transformer coupling)

**Module IV: Field Effect Transistors**
Field effect transistor (JFET, MOSFET): volt-ampere characteristics, small signal model –common drain, common source, common gate, operating point, MOSFET, enhancement and -depletion mode, Common source amplifier, Source follower

**Module V: Feedback Amplifiers**
Feedback concept, Classification of Feedback amplifiers, Properties of negative Feedback amplifiers, Impedance considerations in different Configurations, Examples of analysis of feedback Amplifiers.

**Module VI: Power amplifiers**
Power dissipation in transistors, difference with voltage amplifiers, Amplifier classification (Class A, Class B, Class C, Class AB) class AB push pull amplifier, collector efficiency of each, cross over distortion.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Robert F. Pierret: Semiconductor Device Fundamentals, Pearson Education.
- Millman and Halkias: Electronic Devices and circuits, Tata McGraw.
- Boylestad: Electronic Devices and Circuits, Pearson Education.

# CIRCUITS AND SYSTEMS

**Course Code: BTE 303 Credit Units: 04**

## Course Objective:

The course intends to make the students proficient in analyzing circuits. At the completion of the course, the student should be able to construct and interpret block diagrams and signal flow graphs of control systems and to use basic methods of determining their stability.

## Course Contents:

**Module I: Graph Theory and Network equations**

Graph of a network, Trees, Co-trees and loops, Cut set matrix, Tie set matrix, number of possible trees of a graph, duality, Loop Analysis and Node Analysis.

**Module II: Analysis of circuits using classical Method**

Time and Frequency domain analysis of RL, RC and RLC circuits, Linear constant coefficient differential equation.

**Module III: Signals and Laplace Transforms**

Unit step signal, Ramp signal, impulse signal, Laplace transformations and its properties, Gate function, Inverse Laplace transformations, Application of Laplace Transforms in circuit analysis.

**Module IV: Network Theorems**

Reciprocity theorem, Superposition theorem, Thevenin's and Norton's theorems, Millman's theorem, Maximum power transfer theorem, Compensation theorem, Tellegan's theorem.

**Module V: Two port Network & Network Functions**

Introduction, two port z-, y-, T-, h-parameters, Inter-relations among parameters, Condition for reciprocity and symmetry, Interconnections of two port networks, Driving point and transfer functions, Poles, Zeros and necessary condition for driving point and transfer function,.

**Module VI: Network Synthesis**

Hurwitz polynomial, Positive real functions, synthesis of LC, RC, RL immittance functions.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

*Text:*

- M.E. Valkenburg, "Network analysis", PHI.
- D. R. Choudhary, "Networks and Systems", New Age International.
- K.M. Soni, 2009, "Circuits and Systems", VIII Edition, S.K. Kataria & Sons Delhi.

*References:*

- Bhise, Chadda, Kulshreshtha, "Engineering network analysis and filter design", Umesh Publication.
- F.F. Kuo, "Network Analysis and Synthesis", Wiley India Pvt. Ltd.

# ELECTROMAGNETIC FIELD THEORY

**Course Code: BTE 304 Credit Units: 03**

## Course Objective:

This course provides a general introduction to the important physical concepts and mathematical methods used in treating all types of wave phenomena, but stresses electromagnetic signal propagation and issues of central importance in electrical engineering. As a core course in the Electrical Computer and Systems Engineering option of the Engineering Sciences concentration, it provides essential background and basic preparation for more advanced work in device physics, microwave and ultra-fast circuitry, antenna design, optics, optical communication and optoelectronics.

## Course Contents:

**Module I: Mathematical Basics and Electrostatics**

Coordinate Systems: Spherical and Cylindrical coordinates, Dirac delta function, Coulomb’s law, Gauss’s law, Poisson’s Equation, Laplace’s Equation, Electrostatic Boundary conditions, Work and Energy in Electrostatics, Conductors, Surface charge and force on conductors

**Module II: Magnetostatics and Magnetic Fields in matter**

Magnetic induction and Faraday’s law, Magnetic Flux density, Magnetic Field Intensity, Biot Savart Law, steady currents, Ampere’s law, Magnetostatic Boundary conditions, magnetic field inside matter, magnetic susceptibility and permeability, ferromagnetism, energy stored in a Magnetic field, Magnetic Vector Potential

**Module III: Electrodynamics**

Faraday’s laws, Maxwell’s equations, Maxwell’s modification of Ampere’s law, continuity equation and Poynting theorem.

**Module IV: Electrodynamic Waves**

Wave propagation in unbounded media, Boundary conditions, reflection and transmission, polarization, E.M. waves in vacuum, E. M. waves in matter: reflection and transmission of plane waves.

**Module V: Introduction to Transmission Lines**

Transmission Line, Line Parameters, Characteristic Impedance, Image Impedance, HVDC and HVAC Common faults in transmission lines. Skin Effect, Ferranti Effect and Corona. Standing wave ratio, input impedance and smith chart.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Griffiths: Introduction to Electrodynamics
- Fawwaz T. Ulaby: Fundamentals of Applied Electromagnetics
- Hayt, William H., Buck, John A. Hayt, William H., Buck, John A., Engineering Electromagnetics

# JAVA PROGRAMMING

**Course Code: BTE 305 Credit Units: 03**

## Course Objective:

The objective is to impart programming skills used in this object oriented language java.
The course explores all the basic concepts of core java programming. The students are expected to learn it enough so that they can develop the web solutions like creating applets etc.

## Course Contents:

**Module I**
Concepts of OOP, Features of Java, How Java is different from C++, Data types, Control Statements, identifiers, arrays, operators. Inheritance: Multilevel hierarchy, method overriding, Abstract classes, Final classes, String Class.

**Module II**
Defining, Implementing, Applying Packages and Interfaces, Importing Packages. Fundamentals, Types, Uncaught Exceptions, Multiple catch Clauses, Java's Built-in Exception.

**Module III**
Creating, Implementing and Extending thread, thread priorities, synchronization suspending, resuming and stopping Threads, Constructors, Various Types of String Operations. Exploring Various Basic Packages of Java: Java. lang, Java. util, Java.i.o

**Module IV**
Event handling Mechanism, Event Model, Event Classes, Sources of Events, Event Listener
Interfaces AWT: Working with Windows, AWT Controls, Layout Managers

**Module V**
Applet Class, Architecture, Skeleton, Display Methods.
Swings: Japplet, Icons, labels, Text Fields, Buttons, Combo Boxes.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***

- JAVA The Complete Reference by PATRICK NAUGHTON & HERBERT SCHILD, TMH
- Introduction to JAVA Programming a primar, Balaguruswamy.

***References:***

- "Introduction to JAVA Programming" Daniel/Young PHI
- Jeff Frentzen and Sobotka, "Java Script", Tata McGraw Hill,1999

# ANALOG ELECTRONICS LAB - I

**Course Code:** **BTE 320** **Credit Units: 01**

## Course Contents:

1. To study and plot the characteristics of a junction diode.
2. To study Zener diode I-V characteristics.
3. To study diode based clipping and clamping circuits.
4. To study half wave, full wave and bridge rectifier with filters.
5. To study the input and output characteristics of a transistor in its various configurations (CE and CB).
6. To study and plot the characteristics of a JFET in its various configurations.
7. To study and plot the characteristics of a MOSFET in its various configurations.
8. To study various types of Bias Stabilization for a transistor.
9. To study the gain and plot the frequency response of a single stage transistor amplifier.
10. To measure gain and plot the frequency response of double stage RC coupled amplifier.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# CIRCUITS AND SYSTEMS LAB

**Course Code:** **BTE 321** **Credit Units: 01**

## List of Experiments:

1. To verify Thevenin's theorem in a given network.
2. To verify reciprocity theorem in a given network.
3. To verify maximum power transfer theorem in a given network.
4. To verify Tellegen's theorem in a given network.
5. To determine the Z- and Y- parameters of a resistive two-port network.
6. To determine the T- (ABCD) parameters of a resistive two-port network.
7. To determine the h- parameters of a resistive two-port network.
8. To design series-series connection of 2 two-port networks and determine its Z- parameters.
9. To design parallel-parallel connection of 2 two-port networks and determine its Y- parameters.
10. To design a cascade connection of 2 two-port networks and determine its T- (ABCD) parameters.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# JAVA PROGRAMMING LAB

**Course Code:** **BTE 322** **Credit Units: 01**

**Software Required**: JDK1.3

## Assignments will be provided for the following:

- Java programs using classes & objects and various control constructs such as loops etc, and data structures such as arrays, structures and functions
- Java programs for creating Applets for display of images and texts.
- Programs related to Interfaces & Packages.
- Input/Output and random files programs in Java.
- Java programs using Event driven concept.
- Programs related to network programming.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# COMMUNICATION SKILLS - I

**Course Code:** **BTE 341** **Credit Units: 01**

## Course Objective:
To form written communication strategies necessary in the workplace

## Course Contents:

**Module I: Introduction to Writing Skills**
Effective Writing Skills
Avoiding Common Errors
Paragraph Writing
Note Taking
Writing Assignments

**Module II: Letter Writing**
Types
Formats

**Module III**
Memo
Agenda and Minutes
Notice and Circulars

**Module IV: Report Writing**
Purpose and Scope of a Report
Fundamental Principles of Report Writing
Project Report Writing
Summer Internship Reports

## Examination Scheme:

| Components | CT1 | CT2 | CAF | V | GD | GP | A |
|---|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 25 | 10 | 10 | 10 | 5 |

CAF – Communication Assessment File
GD – Group Discussion
GP – Group Presentation

## Text & References:


- Business Communication, Raman – Prakash, Oxford
- Creative English for Communication, Krishnaswamy N, Macmillan
- Textbook of Business Communication, Ramaswami S, Macmillan
- Working in English, Jones, Cambridge
- A Writer's Workbook Fourth edition, Smoke, Cambridge
- Effective Writing, Withrow, Cambridge
- Writing Skills, Coe/Rycroft/Ernest, Cambridge
- Welcome!, Jones, Cambridge

# BEHAVIOURAL SCIENCE - III
# (INTERPERSONAL COMMUNICATION)

**Course Code:** **BTE 343** **Credit Units: 01**

## Course Objective:
This course provides practical guidance on
- Enhancing personal effectiveness and performance through effective interpersonal communication
- Enhancing their conflict management and negotiation skills

## Course Contents:

**Module I: Interpersonal Communication: An Introduction**
Importance of Interpersonal Communication
Types – Self and Other Oriented
Rapport Building – NLP, Communication Mode
Steps to improve Interpersonal Communication

**Module II: Behavioural Communication**
Meaning and Nature of behavioiural communication
Persuasion, Influence, Listening and Questioning
Guidelines for developing Human Communication skills
Relevance of Behavioural Communication for personal and professional development

**Module III: Interpersonal Styles**
Transactional Analysis
Life Position/Script Analysis
Games Analysis
Interactional and Transactional Styles

**Module IV: Conflict Management**
Meaning and nature of conflicts
Styles and techniques of conflict management
Conflict management and interpersonal communication

**Module V: Negotiation Skills**
Meaning and Negotiation approaches (Traditional and Contemporary)
Process and strategies of negotiations
Negotiation and interpersonal communication

**Module VI: End-of-Semester Appraisal**
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

## Examination Scheme:

| Components | SAP | A | Mid Term Test (CT) | VIVA | Journal for Success (JOS) |
|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 05 | 20 | 30 | 25 |

## Text & References:


- Vangelist L. Anita, Mark N. Knapp, Inter Personal Communication and Human Relationships: Third Edition, Allyn and Bacon
- Julia T. Wood. Interpersonal Communication everyday encounter
- Simons, Christine, Naylor, Belinda: Effective Communication for Managers, 1997 1st Edition Cassel
- Goddard, Ken: Informative Writing, 1995 1st Edition, Cassell
- Harvard Business School, Effective Communication: United States of America
- Foster John, Effective Writing Skills: Volume-7, First Edition 2000, Institute of Public Relations (IPR)
- Beebe, Beebe and Redmond; Interpersonal Communication, 1996; Allyn and Bacon Publishers.

# FRENCH - III

**Course Code:** **BTE 344** **Credit Units: 02**

## Course Objective:

To provide the students with the know-how

- To master the current social communication skills in oral and in written.
- To enrich the formulations, the linguistic tools and vary the sentence construction without repetition.

## Course Contents:

**Module B: pp. 76 – 88 Unité 6**

**Module C: pp. 89 to103 Unité 7**

**Contenu lexical:** **Unité 6: se faire plaisir**

1. acheter : exprimer ses choix, décrire un objet (forme, dimension, poids et matières) payer
2. parler de la nourriture, deux façons d'exprimer la quantité, commander un repas au restaurant
3. parler des différentes occasions de faire la fête

**Unité 7: Cultiver ses relations**

1. maîtriser les actes de la communication sociale courante (Salutations, présentations, invitations, remerciements)
2. annoncer un événement, exprimer un souhait, remercier, s'excuser par écrit.
3. caractériser une personne (aspect physique et caractère)

**Contenu grammatical:**

1. accord des adjectifs qualificatifs
2. articles partitifs
3. Négations avec de, ne…rien/personne/plus
4. Questions avec combien, quel…
5. expressions de la quantité
6. ne…plus/toujours - encore
7. pronoms compléments directs et indirects
8. accord du participe passé (auxiliaire « avoir ») avec l'objet direct
9. Impératif avec un pronom complément direct ou indirect
10. construction avec « que » - Je crois que/ Je pense que/ Je sais que

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- le livre à suivre : Campus: Tome 1

# GERMAN - III

**Course Code:** **BTE 345** **Credit Units: 02**

## Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany

## Course Contents:

**Module I: Modal verbs**
Modal verbs with conjugations and usage
Imparting the finer nuances of the language

**Module II: Information about Germany (ongoing)**
Information about Germany in the form of presentations or "Referat"– neighbors, states and capitals, important cities and towns and characteristic features of the same, and also a few other topics related to Germany.

**Module III: Dative case**
Dative case, comparison with accusative case
Dative case with the relevant articles
Introduction to 3 different kinds of sentences – nominative, accusative and dative

**Module IV: Dative personal pronouns**
Nominative, accusative and dative pronouns in comparison

**Module V: Dative prepositions**
Dative preposition with their usage both theoretical and figurative use

**Module VI: Dialogues**
In the Restaurant,
At the Tourist Information Office,
A telephone conversation

**Module VII: Directions**
Names of the directions
Asking and telling the directions with the help of a roadmap

**Module VIII: Conjunctions**
To assimilate the knowledge of the conjunctions learnt indirectly so far

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:


- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

# SPANISH – III

**Course Code:** **BTE 346** **Credit Units: 02**

## Course Objective:
To enable students acquire knowledge of the Set/definite expressions (idiomatic expressions) in Spanish language and to handle some Spanish situations with ease.

## Course Contents:

**Module I**
Revision of earlier semester modules
Set expressions (idiomatic expressions) with the verb *Tener, Poner, Ir….*
Weather

**Module II**
Introduction to *Gustar*…and all its forms. Revision of *Gustar* and usage of it

**Module III**
Translation of Spanish-English; English-Spanish. Practice sentences.
How to ask for directions (using estar)
Introduction to IR + A + INFINITIVE FORM OF A VERB

**Module IV**
Simple conversation with help of texts and vocabulary
En el restaurante
En el instituto
En el aeropuerto

**Module V**
Reflexives

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- Español, En Directo I A
- Español Sin Fronteras -Nivel Elemental

# JAPANESE - III

**Course Code:** **BTE 347** **Credit Units: 02**

## Course Objective:

To enable the students to converse in the language with the help of basic verbs and to express themselves effectively and narrate their everyday short encounters. Students are also given projects on Japan and Japanese culture to widen their horizon further.
**Note:** The Japanese script is introduced in this semester.

## Course Contents:

**Module I: Verbs**
Different forms of verbs: present continuos verbs etc

**Module II**
More Adverbs and adverbial expressions

**Module III: Counters**
Learning to count different shaped objects,

**Module IV: Tenses**
Past tense, Past continuous tense.

**Module V: Comparison**
Comparative and Superlative degree

**Module VI: Wishes and desires**
Expressing desire to buy, hold, possess. Usage in negative sentences as well.
Comparative degree, Superlative degree.

**Module VII: Appointment**
Over phone, formal and informal etc.

## Learning Outcome

- Students can speak the language and can describe themselves and situations effectively
- They also gain great knowledge in terms of Japanese lifestyle and culture, which help them at the time of placements.

## Methods of Private study /Self help

- Handouts, audio-aids, and self-do assignments.
- Use of library, visiting and watching movies in Japan and culture center every Friday at 6pm.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

***Text:***
- Teach yourself Japanese

***References:***
- Shin Nihongo no kiso 1

# CHINESE – III

**Course Code: BTE 348 Credit Units: 02**

## Course Objective:

Foreign words are usually imported by translating the concept into Chinese, the emphasis is on the meaning rather than the sound. But the system runs into a problem because the underlying name of personal name is often obscure so they are almost always transcribed according to their pronciation alone. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

## Course Contents:

**Module I**
Drills
Dialogue practice
Observe picture and answer the question.
Introduction of written characters.
Practice reading aloud
Practice using the language both by speaking and by taking notes.
Character writing and stroke order

**Module II**
Measure words
Position words e.g. inside, outside, middle, in front, behind, top, bottom, side, left, right, straight.
Directional words – beibian, xibian, nanbian, dongbian, zhongjian.
Our school and its different building locations.
What game do you like?
Difference between “hii” and “neng”, “keyi”.

**Module III**
Changing affirmative sentences to negative ones and vice versa
Human body parts.
Not feeling well words e.g.; fever, cold, stomach ache, head ache.
Use of the modal particle “le”
Making a telephone call
Use of “jiu” and “cal” (Grammar portion)
Automobiles e.g. Bus, train, boat, car, bike etc.
Traveling, by train, by airplane, by bus, on the bike, by boat.. etc.

**Module IV**
The ordinal number “di”
“Mei” the demonstrative pronoun e.g. mei tian, mei nian etc.
use of to enter to exit
Structural particle “de” (Compliment of degree).
Going to the Park.
Description about class schedule during a week in school.
Grammar use of “li” and “cong”.
Comprehension reading followed by questions.

**Module V**
Persuasion-Please don’t smoke.
Please speak slowly
Praise – This pictorial is very beautiful
Opposites e.g. Clean-Dirty, Little-More, Old-New, Young-Old, Easy-Difficult, Boy-Girl, Black-White, Big-Small, Slow-Fast … etc.
Talking about studies and classmates
Use of “it doesn’t matter”
Enquiring about a student, description about study method.
Grammar: Negation of a sentence with a verbal predicate.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|

| | | | | | | |
|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- “Elementary Chinese Reader Part I, Part-2” Lesson 21-30

# TERM PAPER

**Course Code: BTE 330 Credit Units: 02**

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

## GUIDELINES FOR TERM PAPER

The procedure for writing a term paper may consist of the following steps:
1. Choosing a subject
2. Finding sources of materials
3. Collecting the notes
4. Outlining the paper
5. Writing the first draft
6. Editing & preparing the final paper

**1. Choosing a Subject**

The subject chosen should not be too general.

**2. Finding Sources of Materials**

a) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
b) Begin by making a list of subject-headings under which you might expect the subject to be listed.
c) The sources could be books and magazine articles, news stories, periodicals, scientific journals etc.

**3. Collecting the notes**

Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.
a) Get facts, not just opinions. Compare the facts with author's conclusion.
b) In research studies, notice the methods and procedures, results & conclusions.
c) Check cross references.

**4. Outlining the paper**

a) Review notes to find main sub-divisions of the subject.
b) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

**5. Writing the first draft**

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:
a) statement of purpose
b) main body of the paper
c) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main idea.

**6. Editing & Preparing the final Paper**

a) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.
b) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
c) Check for proper spelling, phrasing and sentence construction.
d) Check for proper form on footnotes, quotes, and punctuation.
e) Check to see that quotations serve one of the following purposes:
   (i) Show evidence of what an author has said.
   (ii) Avoid misrepresentation through restatement.
   (iii) Save unnecessary writing when ideas have been well expressed by the original author.
f) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

1) Title page
2) Table of contents
3) Introduction
4) Review
5) Discussion & Conclusion
6) References
7) Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

**Discussion**
The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

**Conclusion**
The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

a) summary of question posed
b) summary of findings
c) summary of main limitations of the study at hand
d) details of possibilities for related future research

**Reference**
From the very beginning of a research project, you should be careful to note all details of articles gathered. The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.
The key to a good bibliography is consistency. Choose a particular convention and stick to this.

**Conventions**
Monographs
Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

**Edited volumes**
Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.
[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

**Edited articles**
Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

**Journal articles**
McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

**Electronic book**
Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] from the World Wide Web, http://www.aber.ac.uk/media/Documents/S4B/.

**Electronic journal articles**
Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document]. German as a Foreign Language Journal [online] 1. Retrieved [12.09.'00] from the World Wide Web, http://www.gfl-journal.com/.

**Other websites**
Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document]. Retrieved [13.10.'01] from the World Wide Web, http://olaf.hiof.no/~sverrev/eng.html.

**Unpublished papers**
Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

**sUnpublished theses/ dissertations**

Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg.

Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

**Appendix**

The appendix should be used for data collected (e.g. questionnaires, transcripts, ...) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

## Assessment Scheme:

| | |
|---|---|
| **Continuous Evaluation:**<br>(Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.) | 40% |
| **Final Evaluation:**<br>(Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/ presented, outcomes vs. objectives, presentation/ viva etc.) | 60% |

# DIGITAL CIRCUITS AND SYSTEMS – I

**Course Code: BTE 401 Credit Units: 04**

## Course Objective:

This course is an introduction to the basic principles of digital electronics. At the conclusion of this course, the student will be able to quantitatively identify the fundamentals of computers, including number systems, logic gates, logic and arithmetic subsystems, and integrated circuits. They will gain the practical skills necessary to work with digital circuits through problem solving and hands on laboratory experience with logic gates, encoders, flip-flops, counters, shift registers, adders, etc. The student will be able to analyze and design simple logic circuits using tools such as Boolean Algebra and Karnaugh Mapping, and will be able to draw logic diagrams.

## Course Contents:

**Module I: Boolean Functions**

Analog & digital signals, AND, OR, NOT, NAND, NOR, XOR & XNOR gates, Boolean algebra, DeMorgan's theorems, Implementation of logical function using only NAND/NOR gates, 1`s complement and 2`s complement, BCD to Gray and Gray to BCD code conversion, Standard representation of logical functions ( SOP and POS forms), K-map representation and simplification of logical function up to five variables, don't care conditions, XOR & XNOR simplifications of K-maps, Tabulation method.

**Module II: Combinational Circuits**

Adders, Subtractors, Implementation of full adder using half adder, full subtractor using half subtractor, Multiplexer, de-multiplexer, decoder & encoder, code converters, 1 & 2 bit comparators, BCD to seven segment decoder/encoder, Implementation of logic functions using multiplexer/de-multiplexer and decoder, Implementation of 16×1 MUX using 4×1 MUX, 4×16 decoder using 3×8 decoder etc., logic implementations using PROM, PLA & PAL.

**Module III: Sequential Circuits**

Difference between combinational and sequential circuits, Latch, Flip-flops: SR, JK, D & T flip flops – Truth table, Excitation table, Conversion of flip-flops, set up and hold time, race around condition, Master Slave flip flop, Shift registers: SIPO, PISO, PIPO, SIPO, Bi-directional, 4-bit universal shift register; Counters: Asynchronous/ripple & synchronous counters – up/down, Ring counter, sequence detector.

**Module IV: Logic families & data converters**

Logic families: Special characteristics (Fan out, Power dissipation, propagation delay, noise margin), working of RTL, DTL, TTL, ECL and CMOS families; Data converters: Special characteristics, ADC – successive approximation, linear ramp, dual slope; DAC – Binary Weighted, R-2R ladder type.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Moris Mano : Digital Design, Pearson Education.
- R. P. Jain: Digital Electronics, Tata McGraw Hill.
- Thomas L. Floyd: Digital Fundamentals, Pearson Education.
- Malvino and Leech: Digital Principles & Applications, Tata McGraw Hill.

# COMMUNICATION SYSTEMS

**Course Code: BTE 402 Credit Units: 04**

## Course Objective:

The purpose of this course is to provide a thorough introduction to analog and digital communications with an in depth study of various modulation techniques, Random processes are discussed, and information theory is introduced.

## Course Contents:

**Module I: Introduction**
Communication Process, Source of Information, base-band and pass-band signals, Review of Fourier transforms, Random variables, different types of PDF, need of modulation process, analog versus digital communications

**Module II: Amplitude Modulation**
Amplitude modulation with full carrier, suppressed carrier systems, single side band transmission, switching modulators, synchronous detection, envelope detection, effect of frequency and phase errors in synchronous detection, comparison of various AM systems, vestigial side band transmission.

**Module III: Angle Modulation**
Narrow and wide band FM, BW calculations using Carson rule, Direct & Indirect FM generations, phase modulation, Demodulation of FM signals, noise reduction using pre & de-emphasis.

**Module IV: Pulse Modulation**
Pulse amplitude, width & position modulation, generation & detection of PAM, PWM & PPM, Comparison of frequency division and time division multiplexed systems.
Basics of Digital Communications: ASK, PSK, FSK, QPSK basics & waveform with brief mathematical introduction

**Module V: Noise**
Different types of noise, noise calculations, equivalent noise band width, noise figures, effective noise temperature, noise figure.

**Module VI: Introduction to Information Theory**
Measurement of Information, mutual, Shannon's theorem, Source coding, channel coding and channel capacity theorem, Huffman code

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- B. P. Lathi: "Modern analog & digital communication", OXFORD Publications
- Wayne Tomasi: "Electronic Communication systems", Pearson Education, 5th edition
- Simon Haykin, "Communication Systems", John Wiley & Sons, 1999, Third Edition.
- Taub and schilling, "Principles of Communication Systems" TMH

# ANALOG ELECTRONICS – II

**Course Code:** **BTE 403** **Credit Units: 04**

## Course Objective:

The purpose of this course is to introduce the student to the application of semiconductor devices in linear analog circuits. To insure the usefulness of the course material to both computer engineers and electrical engineers, the course stresses circuit designs using the operational amplifier.

## Course Contents:

**Module I: Building Blocks of Analog ICs**
Differential amplifier, Op-amp Model, op-amp DC & AC parameters, virtual ground, Current mirrors, Active loads, Level shifters and output stages.

**Module II: Operational amplifiers**
Introduction, open loop and closed loop configuration, op-amp parameters (input offset current, output offset current, i/p bias current, CMRR, PSRR, null adjustment range, etc,) Inverting and non-inverting configuration, voltage gain of inverting and non inverting configurations.

**Module III: Linear & Non Linear Wave shaping**
Adders, Voltage to current, current to voltage Converter, Integrators, Differentiators**,** Voltage follower (voltage buffer), summer, subtractor, Comparators, log/antilog circuits using Op-amps, precision rectifiers

**Module IV: Waveform Generations**
Damped and undamped oscillations, Barkhausen criterion for sustained oscillation. Tank circuit generator Astable multi Vibrators, OTA-C Oscillators, Crystal oscillator**.** Types of oscillators: LC-Hartley and Colpitts, RC-RC phase shift and Wien bridge oscillator, Basics of tuned Amplifiers, Voltage Controlled Oscillator.

**Module V: Active RC Filters & Applications of Linear Circuits**
Idealistic & Realistic response of filters (LP, BP, and HP), Butter worth & Chebyshev approximation filter functions, LP,BP,HP and All pass, Notch Filter, Operational transconductance amplifier (OTA)-C filters.

**Module VI: Applications of IC Analog Multiplier & Timer**
IC phase locked loops, 555 Timer, IC voltage regulators-(fixed, variable) 78xx, 79xx series and adjustable.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Richard C. Jaeger: Microelectronic Circuit Design
- Adel S. Sedra and K. C. Smith: Microelectronic Circuits
- Ramakant Gaekwad: Operational Amplifiers
- Rolf Schaumann and Mac E. Van Valkenburg: Design of Analog Filters
- D. Roy Choudhury and Shail B. Jain: Linear Integrated Circuits

# SIGNALS AND SYSTEMS

**Course Code: BTE 404 Credit Units: 04**

## Course Objective:

The objective of the course is to provide knowledge of Signals and Systems to students of ECE. This Course includes good insight of types of signals and types of systems, various operations performed on them through the use of Fourier series, Fourier transform, z transform.

## Course Contents:

**Module I: Signals and Systems**

Introduction of signals and systems; classification of signal, continuous time and discrete time signals, operations performed on them, even and odd signals, periodic and non periodic signals, deterministic and random signals, energy signals, power signals, elementary signals: impulse, step, ramp and exponentials, classification of systems.

**Module II: LTI system**

Response of LTI system for continuous and discrete time systems, Impulse response, Step response, properties of continuous LTI and discrete LTI systems, LTI systems described by differential and difference equation, analysis of LTI Systems, interconnection of systems.

**Module III: Fourier series**

Representation of continuous time periodic signal, properties of continuous time Fourier series, representation of discrete time periodic signals, convergence of the Fourier series, properties of discrete time Fourier series, Fourier series and LTI systems.

**Module IV: Fourier Transform**

Continuous time Fourier transform, properties of continuous time Fourier transform, discrete time Fourier transform, properties of discrete time Fourier transform; applications; Bandwidth determination of signals and systems.

**Module V: z-Transform**

Definition of z-transform, region of convergence, properties of z-transform, first order system, second order system, inverse z-transform, analysis of LTI system using z-transform.

## Examination Scheme:

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References

***Text:***

- Alan.V Oppenheim, Signals and Systems, 4$^{th}$ Edition 2007, Pearson Prentice Hall Publication.
- K.M. Soni, Signals and Systems; 3$^{rd}$ Edition, S.K. Kataria & Sons Publication.
- P.Ramesh Babu, Signal and Systems, 3$^{rd}$ Edition, Scitech Publications (INDIA) Pvt. Ltd.

***References:***

- Simon Haykin, Signals and Systems, 2$^{nd}$ Edition, Willy Publications.
- B.P.Lathi, Linear Systems & Signals, 2$^{nd}$ Edition, Oxford Publication.
- Roberts, Fundamentals of Signals and Systems, TMH Publication.

# DIGITAL CIRCUITS AND SYSTEMS LAB – I

**Course Code:** **BTE 420** **Credit Units: 01**

## List of Experiments:

1. To verify the truth tables of NOT, OR, AND, NOR, NAND, XOR, XNOR gates.
2. To obtain half adder, full adder using gates and verify their truth tables.
3. To obtain half subtractor, full subtractor using gates and verify their truth tables.
4. To implement control circuit using multiplexer.
5. To convert BCD code into excess 3 code and verify the truth table.
6. To verify the truth tables of RS, D, JK and T flip- flops.
7. To implement and verify 3-bit bi-directional shift register.
8. To design and study asynchronous/ripple counter.
9. To design and study synchronous counter.
10. To design and study a sequence detector.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# COMMUNICATION SYSTEMS LAB

**Course Code:** **BTE 421** **Credit Units: 01**

## List of Experiments:

1. To study the sampling and reconstruction of a given signal.
2. To study amplitude modulation and demodulation.
3. To study frequency modulation and demodulation.
4. To study time division multiplexing.
5. To study pulse amplitude modulation.
6. To study delta and adaptive delta modulation and demodulation.
7. To study carrier modulation techniques using amplitude shift keying and Frequency shift keying.
8. To study carrier modulation techniques using binary phase shift keying and differential shift keying.
9. To study pulse code modulation & differential pulse code modulation as well as relevant demodulations.
10. To study quadrature phase shift keying & quadrature amplitude modulation.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# ANALOG ELECTRONICS LAB – II

**Course Code:** **BTE 422** **Credit Units: 01**

## List of Experiments:

1. To study the op amp as an inverting and non inverting amplifier.
2. To use the op amp as an adder, subtractor, integrator and differentiator.
3. To design a ramp and a square wave generator.
4. To study the IC-555 timer as stable and bistable multivibrator.
5. To design low pass, high pass and band pass filters using op- amp. and plot their frequency response.
6. To design and study class a power amplifier.
7. To design and study a class B push pull amplifier.
8. To study various feedbacks such as voltage series feedback.
9. To design RC phase shift and Wein bridge oscillators using op amplifier.
10. To design and study Colpitt and Hartley oscillators.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# ELECTRONICS WORKSHOP LAB

**Course Code: BTE423** **Credit Units:02**

**List Of Exercises / Experiments:**

Familiarization/Identification of electronic components with specification :Functionality, type, size, colour coding, package, symbol, cost etc. [Active, Passive, , Electronic, Electro-mechanical, Wires, Cables, Connectors, Fuses, Switches, Relays, Crystals, Displays, Fasteners, Heat sink etc.)

1. Drawing of electronic circuit diagrams using BIS/IEEE symbols and introduction to EDA tools, Interpret data sheets of discrete components and IC's. Familiarization/Application of testing instruments and commonly used tools. [Multimeter, Function generator, Power supply, CRO etc.] [Soldering iron, De-soldering pump, Pliers, Cutters, Wire strippers, Screw drivers, Tweezers, Crimping tool, Hot air soldering and de-soldering station etc.]
2. Testing of electronic components [Resistor, Capacitor, Diode, Transistor, UJT and JFET using multimeter.]
3. Inter-connection methods and soldering practice. [Bread board, Wrapping, Crimping, Soldering - types - selection of materials and safety precautions, soldering practice in connectors and general purpose PCB, Crimping.]
4. Printed circuit boards (PCB) [Types, Single sided, Double sided, PTH, Processing methods, Design and fabrication of a single sided PCB for a simple circuit with manual etching (Ferric chloride) and drilling.]
5. Assembling of electronic circuit/system on general purpose PCB, test and show the functioning(Any two circuits)

- Fixed voltage power supply with transformer, rectifier diode, capacitor filter, zener/IC regulator.
- LED blinking circuit using a stable multi-vibrator with transistor BC 107.
- Square wave generation using IC 555 timer in IC base.
- Sine wave generation using IC 741 OP-AMP in IC base.
- RC coupled amplifier with transistor BC 107. 6. AND and NAND gates in diode transistor logic.

7.Familiarization of electronic systems :

- Setting up of a PA system with different microphones, loud speakers, mixer etc.
- Introduction to robotics- Familiarization of components (motor, sensors, battery etc.) used in robotics.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# COMMUNICATION SKILLS - II

**Course Code: BTE 441 Credit Units: 01**

## Course Objective:

To teach the participants strategies for improving academic reading and writing.
Emphasis is placed on increasing fluency, deepening vocabulary, and refining academic language proficiency.

## Course Contents:

**Module I: Social Communication Skills**
Small Talk
Conversational English
Appropriateness
Building rapport

**Module II: Context Based Speaking**
In general situations
In specific professional situations
Discussion and associated vocabulary
Simulations/Role Play

**Module III: Professional Skills**
Presentations
Negotiations
Meetings
Telephony Skills

## Examination Scheme:

| Components | CT1 | CT2 | CAF | V | GD | GP | A |
|---|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 25 | 10 | 10 | 10 | 5 |

CAF – Communication Assessment File
GD – Group Discussion
GP – Group Presentation

## Text & References:


- Essential Telephoning in English, Garside/Garside, Cambridge
- Working in English, Jones, Cambridge
- Business Communication, Raman – Prakash, Oxford
- Speaking Personally, Porter-Ladousse, Cambridge
- Speaking Effectively, Jermy Comfort, et.al, Cambridge
- Business Communication, Raman – Prakash, Oxford

# BEHAVIOURAL SCIENCE - IV
# (RELATIONSHIP MANAGEMENT)

**Course Code:** **BTE 443** **Credit Units: 01**

## Course Objective:
To understand the basis of interpersonal relationship
To understand various communication style
To learn the strategies for effective interpersonal relationship

## Course Contents:

**Module I: Understanding Relationships**
Importance of relationships
Role and relationships
Maintaining healthy relationships

**Module II: Bridging Individual Differences**
Understanding individual differences
Bridging differences in Interpersonal Relationship – TA
Communication Styles

**Module III: Interpersonal Relationship Development**
Importance of Interpersonal Relationships
Interpersonal Relationships Skills
Types of Interpersonal Relationships

**Module IV: Theories of Interpersonal Relationships**
Theories: Social Exchange, Uncertainty Reduction
Theory Factors Affecting Interpersonal Relationships
Improving Interpersonal Relationships

**Module V: Impression Management**
Meaning & Components of Impression Management
Impression Management Techniques (Influencing Skills)
Impression Management Training-Self help and Formal approaches

**Module VI: End-of-Semester Appraisal**
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

## Examination Scheme:

| Components | SAP | A | Mid Term Test (CT) | VIVA | Journal for Success (JOS) |
|---|---|---|---|---|---|
| Weightage (%) | 20 | 05 | 20 | 30 | 25 |

## Text & References:


- Vangelist L. Anita, Mark N. Knapp, Inter Personal Communication and Human Relationships: Third Edition, Allyn and Bacon
- Julia T. Wood. Interpersonal Communication everyday encounter
- Simons, Christine, Naylor, Belinda: Effective Communication for Managers, 1997 1st Edition Cassell
- Goddard, Ken: Informative Writing, 1995 1st Edition, Cassell
- Harvard Business School, Effective Communication: United States of America
- Foster John, Effective Writing Skills: Volume-7, First Edition 2000, Institute of Public Relations (IPR)
- Beebe, Beebe and Redmond; Interpersonal Communication, 1996; Allyn and Bacon Publishers.

# FRENCH - IV

**Course Code:** **BTE 444** **Credit Units: 02**

## Course Objective:
To enable students:
- To develop strategies of comprehension of texts of different origin
- To present facts, projects, plans with precision

## Course Contents:

**Module C: pp. 104 – 139: Unités 8, 9**

**Contenu lexical:** **Unité 8: Découvrir le passé**
1. parler du passé, des habitudes et des changements.
2. parler de la famille, raconter une suite d'événements/préciser leur date et leur durée.
3. connaître quelques moments de l'histoire

**Unité 9: Entreprendre**
1. faire un projet de la réalisation: (exprimer un besoin, préciser les étapes d'une réalisation)
2. parler d'une entreprise
3. parler du futur

**Contenu grammatical:**
1. Imparfait
2. Pronom « en »
3. Futur
4. Discours rapporté au présent
5. Passé récent
6. Présent progressif

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- le livre à suivre : Campus: Tome 1

# GERMAN - IV

**Course Code:** **BTE 445** **Credit Units: 02**

## Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany.
Introduction to Advanced Grammar Language and Professional Jargon

## Course Contents:

**Module I: Present perfect tense**
Present perfect tense, usage and applicability
Usage of this tense to indicate near past
Universal applicability of this tense in German

**Module II: Letter writing**
To acquaint the students with the form of writing informal letters.

**Module III: Interchanging prepositions**
Usage of prepositions with both accusative and dative cases
Usage of verbs fixed with prepositions
Emphasizing on the action and position factor

**Module IV: Past tense**
Introduction to simple past tense
Learning the verb forms in past tense
Making a list of all verbs in the past tense and the participle forms

**Module V: Reading a Fairy Tale**
Comprehension and narration

- Rotkäppchen
- Froschprinzessin
- Die Fremdsprache

**Module VI: Genitive case**
Genitive case – Explain the concept of possession in genitive
Mentioning the structure of weak nouns

**Module VII: Genitive prepositions**
Discuss the genitive propositions and their usage: (während, wegen, statt, trotz)

**Module VIII: Picture Description**
Firstly recognize the persons or things in the picture and identify the situation depicted in the picture;
Secondly answer questions of general meaning in context to the picture and also talk about the personal experiences which come to your mind upon seeing the picture.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:


- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

# SPANISH - IV

**Course Code:** **BTE 446** **Credit Units: 02**

## Course Objective:
To enable students acquire working knowledge of the language; to give them vocabulary, grammar, voice modulations/intonations to handle everyday Spanish situations with ease.

## Course Contents:

**Module I**
Revision of earlier semester modules
Introduction to Present Continuous Tense (Gerunds)

**Module II**
Translation with Present Continuous Tense
Introduction to Gustar, Parecer, Apetecer, doler

**Module III**
Imperatives (positive and negative commands of regular verbs)

**Module IV**
Commercial/business vocabulary

**Module V**
Simple conversation with help of texts and vocabulary
En la recepcion del hotel
En el restaurante
En la agencia de viajes
En la tienda/supermercado

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- Español Sin Fronteras (Nivel – Elemental)

# JAPANESE - IV

**Course Code:** **BTE 447** **Credit Units: 02**

## Course Objective:

To enable the students to comfortably interact using basic Japanese.
**Note:** Teaching is done in roman as well as Japanese script, students will be taught katankana (another form of script) in this semester i.e. to be able to write all the foreign words in Japanese.

## Course Contents:

**Module I**
Comparison using adjectives, making requests

**Module II**
Seeking permission

**Module III**
Practice of conversations on:
Visiting people, Party, Meetings, after work, at a ticket vending machine etc

**Module IV**
Essays, writing formal letters

## Learning Outcome

- ➢ Students can speak the language describing above-mentioned topics.

## Methods of Private study /Self help

- ➢ Handouts, audio-aids, and self-do assignments, role-plays.
- ➢ Students are also encouraged to attend Japanese film festival and other such fairs and workshops organized in the capital from time to time.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

***Text:***
- Teach yourself Japanese

***References:***
- Shin Nihongo no kiso 1

# CHINESE – IV

**Course Code:** **BTE 448** **Credit Units: 02**

## Course Objective:

How many characters are there? The early Qing dynasty dictionary included nearly 50,000 characters the vast majority of which were rare accumulated characters over the centuries. An educate person in China can probably recognize around 6000 characters. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

## Course Contents:

**Module I**
Dialogue Practice
Observe picture and answer the question
Pronunciation and intonation
Character writing and stroke order.
Electronic items

**Module II**
Traveling – The Scenery is very beautiful
Weather and climate
Grammar question with – "bu shi …. Ma?"
The construction "yao … le" (Used to indicate that an action is going to take place)
Time words "yiqian", "yiwai" (Before and after).
The adverb "geng".

**Module III**
Going to a friend house for a visit meeting his family and talking about their customs.
Fallen sick and going to the Doctor, the doctor examines, takes temperature and writes prescription.
Aspect particle "guo" shows that an action has happened some time in the past.
Progressive aspect of an actin "zhengzai" Also the use if "zhe" with it.
To welcome someone and to see off someone …. I cant go the airport to see you off… etc.

**Module IV**
Shipment. Is this the place to checking luggage?
Basic dialogue on – Where do u work?
Basic dialogue on – This is my address
Basic dialogue on – I understand Chinese
Basic dialogue on – What job do u do?
Basic dialogue on – What time is it now?

**Module V**
Basic dialogue on – What day (date) is it today?
Basic dialogue on – What is the weather like here.
Basic dialogue on – Do u like Chinese food?
Basic dialogue on – I am planning to go to China.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- "Elementary Chinese Reader, Part-2" Lesson 31-38

# DIGITAL CIRCUITS AND SYSTEMS - II

**Course Code:** **BTE 501** **Credit Units: 04**

## Course Objective:

This course builds on the course Digital Circuits and Systems - Hardware development language VHDL is introduced; the usage of the same to implement the systems is dealt in detail.

## Course Contents:

**Module I: Design of Sequential circuits**

SR, JK, T and D flip flops and their timing diagrams with delay, characteristic table, characteristic equation and excitation tables. Design of Finite State Machines: Mealy and Moore type using next state tables, state diagrams, state minimization, state encoding: minimum bit change and hot one encodings. Comparative cost and delays of different implementations and their optimization and timing diagrams, Asynchronous and synchronous sequential circuits Static Timing Analysis –setup, hold time, clock skew, clock period Data paths, FSMs with datapaths, ASM charts

**Module II: Basics of VHDL**

Introduction and Basic Design Units of VHDL, Writing Entities for Digital circuits like decoders, registers etc, Scalar Data types and Operations: Object types: constants, variables, signal and files. Data Types: scalar, integer, floating, physical, enumeration, type declarations, subtypes, expressions and operators for various types. Sequential statements: If, case, Null, Loop, Exit, Next statements, while loops, For loops, Assertion and report statements

Composite Arrays: arrays, Array aggregates, unconstrained array types, strings, Bit vectors, Standard Logic Arrays, array operations and records

**Module III: VHDL Programming**

Behavioral Modeling: process statements, variable and signal assignments, inertial and transport delay models, signal drivers, multiple and postponed processes

Dataflow Modeling: Concurrent signal assignment, multiple drivers, block statement

Structural Modeling: component declaration, component instantiation, resolving signal values, and configuration: basic configuration, configuration for structural modeling, mapping library entities.

Generics, generic (AND, NAND, OR, NOR, XOR and XNOR) gates, functions and subprograms, packages and libraries

**Module IV: Synthesis: mapping statements to gates**

Writing a test bench, converting real and integers to time, dumping and reading from text file

Vhdl modeling of basic gates, half and full adder AOI, IOA, OAI, multiplexes, decoders (dataflow, behavioral and structural modeling), three state driver, parity checker, D, T, JK and SR flip flops, flip flops with preset and clear, modeling for multiplexer, priority encoder, ALU etc, modeling regular structures, delays, conditional operations, synchronous logic, state machine modeling, Moore and Mealy machines, generic priority encoder, clock divider, shift registers, pulse counter etc

**Module V: Overview of the following**

PLD devices, PROM, PAL, PLA, CPLD, EPLD GAL, FPGA, DRAM etc and their applications, FPGA programming, Design exercises ASIC design using CAD tools

## Examination Scheme:

| Components | HA | V/S/Q | CT | AT | ESE |
|---|---|---|---|---|---|
| Weightage (%) | 7 | 8 | 10 | 5 | 70 |

## Text & References:


- Daniel Gajski: Principles of Digital Design
- Bhasker: A VHDL Primer 3/e
- Pedroni: Circuit Design with VHDL
- Perry: VHDL: Programming by examples K. Skahill, VHDL for programmable Logic

# MICROPROCESSOR SYSTEMS (New)

**Course Code: BTE 502 Credit Units: 04**

## Course Objective:

This course deals with the systematic study of the Architecture and programming issues of 8085-microprocessor family. The aim of this course is to give the students basic knowledge of the above microprocessor needed to develop the systems using it.

Course Contents:

**Module I: Introduction to Microcomputer Systems**
Introduction to Microprocessors and microcomputers, Study of 8 bit Microprocessor, 8085 pin configuration, Internal Architecture and operations, interrupts, Stacks and subroutines, various data transfer schemes.

Module II: ALP and timing diagrams
Introduction to 8085 instruction set, advance 8085 programming, Addressing modes, Counters and time Delays, Instruction cycle, machine cycle, T-states, timing diagram for 8085 instruction.

Module III: Memory System Design & I/O Interfacing
Memory interfacing with 8085. Interfacing with input/output devices (memory mapped, peripheral I/O), Cache memory system. Study of following peripheral devices 8255, 8253, 8257, 8259, 8251.

Module IV: Architecture of 16-Bit Microprocessor
Difference between 8085 and 8086, Block diagram and architecture of 8086 family, pin configuration of 8086, minimum mode & maximum mode Operation, Bus Interface Unit, Register Organization, Instruction Pointer, Stack & Stack pointer, merits of memory segmentation, Execution Unit, Register Organization.

**Module V: Microprocessor 8086 Programming**
Instruction set of 8086, Addressing Modes, Assembler directives , Assembly language programming, Subroutine Call and returns, Stack structure and programming, Interrupt and Interrupt service routines, Timings and Delays.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Ramesh. S. Gaonkar, “Microprocessor architecture Programming and Application with 8085” Penram International Publishing, 4$^{th}$ Edition
- B. Ram, “Fundamentals of microprocessors and microcomputer” Dhanpat Rai, 5$^{th}$ Edition. ]
- Douglas V Hall.
- M. Rafiquzzaman, “Microprocessor Theory and Application” PHI – 10$^{th}$ Indian Reprint.
- Naresh Grover, “Microprocessor comprehensive studies Architecture, Programming and Interfacing” Dhanpat Rai, 2003.
- Gosh,” 0000 to 8085” PHI.

# TELECOMMUNICATION NETWORKS

**Course Code:** **BTE 503** **Credit Units: 03**

## Course Objective:

To acquire basic knowledge of telecommunication, architecture & exchanges, Different type of switching, coding, traffic engineering, data communication in PSTN.

## Course Contents:

**Module I**

Evolution of telecommunication network, Basic switching system, simple telephone communication, crossbar switching systems, Electronic switching-Space division switching, Stored Program control-Centralized SPC, Distributed SPC, Software Architecture.

**Module II**

Speech digitization, Quantization Noise, Companding, Differential coding, delta modulation, line coding, NRZ & RZ codes, Manchester coding, AMI coding, Walsh coding, TDM.

**Module III**

Time division switching-Time division space switching, Time division time switching, Time multiplexed space switching, Time multiplexed time switching.

**Module IV**

Traffic engineering parameters, Grade of service, blocking probability, delay systems, switching hierarchy and routing, transmission plan, Signaling techniques, Common channel signaling, SS7, Data rates in PSTN

## Examination Scheme:

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- V Thyagarajan: Telecommunication, Switching systems and networks
- Forouzon: “data communication’
- Tanenbaum : Computer Network
- M. Schwartz : Telecommunication networks

# DIGITAL COMMUNICATIONS

**Course Code:** **BTE 504** **Credit Units: 03**

## Course Objective:

The purpose of this course is to provide a thorough introduction to digital communications with an in depth study of various modulation techniques, receiver design & performance analysis are discussed.

## Course Contents:

**Module I: Digital Communication System Basics**

Basic building blocks of Digital communications, analog versus digital communication, Advantages disadvantages of digital communications.

**Module II: Digital Baseband Transmission**

Pulse code modulation, Signal to quantization ratio, non-uniform quantization companding, BW calculations.

**Module III: Transmission of Analog Samples & Signal Detection in Noise**

Delta Modulation, Adaptive delta-modulation, DPCM, ADCM, ADPCM, Matched Filter Receiver, Derivation of Its Impulse Response and Peak Pulse Signal to Noise Ratio. Correlator receiver, Decision Threshold and Error Probability For, Unipolar (ON-OFF) Signaling, ISI, Nyquist Criterion For Zero ISI & Raised Cosine Spectrum

**Module IV: Digital Modulation Technique.**

Gram-Schmidt Orthogonalization Procedure, Types of Digital Modulation, Wave forms for Amplitude, Frequency and Phase Shift Keying, Method of Generation and Detection of Coherent & Non-Coherent Binary ASK, FSK & PSK Differential Phase Shift Keying, Quadrature Modulation Techniques QPSK, Probability of Error and Comparison of Various Digital Modulation Techniques.

**Module V: Digital Multiplexing**

Fundamentals of Time Division Multiplexing, Electronic Commutator, Bit, Byte Interleaving T1 Carrier System, Synchronization and Signaling of T1, TDM, PCM Hierarchy, T1 to T4 PCM TDM System (DS1 to DS4 Signals)

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Simon Haykin: "Digital Communication", John Wiley / 4th Ed.
- Bernard SKLAR: "Digital communication", Pearson education.
- Lathi, B.P / "Modern Digital & Analog Communication Systems" / Oxford University Press /.
- Prokis J.J / "Digital Communications" / McGraw Hill /
- Wayne Tomasi: "Electronic Communication systems", Pearson Education,5th edition

# MICROWAVE ENGINEERING

**Course Code:** **BTE 505** **Credit Units: 03**

## Course Objective:

This course deals with the microwaves. Microwaves are important when we are going to the high frequency regime. By studying this course students will be able to know about the microwave components and devices, microwave generators and their characteristics, microwave applications and measurement. Also they will be familier about the rectangular and circular waveguides, their equations and the modes existing in these waveguides.

## Course Contents:

**Module I: Introduction**
Microwave frequencies, standard frequency bands, behaviour of circuits at conventional and microwave frequencies, microwave application.

**Module II: Waveguide**
Overview of guided waves, TE, TM and TEM modes, rectangular and cylindrical wave guide resonators, choice of the type of waveguide, waveguide problems.

**Module III: Microwave Components and Devices**
Scattering matrix and its properties, coupling probes, coupling loops, windows, waveguide tuners, termination, E-plane Tee, H-plane Tee, Magic Tee, Phase-Shifter, attenuators, Directional Coupler, Gunn diode, Resonator and circulators, IMPATT devices, TRAPATT.

**Module IV: Microwave tubes**
Transit-time effect, limitations of conventional tubes, Two-cavity and multi-cavity Klystrons, Reflex Klystron, TWT and Magnetrons.

## Examination Scheme:

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Microwave Devices and Circuits, Liao
- Microwave Principles, Herbert J Reich
- Microwaves, K.C. Gupta
- Microwave Techniques, D C Agrawal
- Elements of Microwave Engg, Chatterjee

# DIGITAL CIRCUITS AND SYSTEMS LAB – II

**Course Code:** **BTE 520** **Credit Units: 01**

## List of Experiments

To implement VHDL code for

1. 2, 3, 4 inputs AND, OR, XOR and XNOR gates and testing their simulation with signals.
2. Half adder, full adder and full subtractor. Also trying out other simple combinatorial circuits like AOI, IOA, OAI.
3. D and T, flip-flops.
4. JK and SR flip-flops.
5. 2 to 4 and 3 to 8 decoders.
6. 2 to 1, 4 to 1 and 8 to 1 multiplexers.
7. a register.
8. 2 to 1, 4 to 2 and 8 to 3 priority encoders.
9. 8 bit tri state drivers.
10. 9 input parity checker.
11. 1 bit, 4 bit 8 bit comparators.
12. Adding and subtracting 8 bit integers of various types.
13. Clock divider
14. shift register
15. Pulse counters.
16. VHDL Design examples of Moore machine, Mealy machine, generic gate inputs and delays.
17. VHDL code examples of structural modeling showing binding.

**Experiments based Field Programmable Gate Array (FPGA) Programming** 18.

Implementation of all the above VHDL experiments using FPGA.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# MICROPROCESSOR SYSTEMS LAB

**Course Code:** **BTE 521** **Credit Units: 01**

## Proposed list of experiments:

1) Write at least three different programs for addition of two 8 bit numbers assuming carry may or may not be generated.
2) Write at least three different programs for subtraction of two 8 bit numbers assuming borrow may or may not be generated.
3) Write two different programs for 16 bit addition, one using instruction DAD and another without using instruction DAD.
4) Write assembly language program for 8 bit multiplication and division.
5) To study, understand, interface and two peripheral devices with 8085.
6) Any three programs using 8085 based on block of data.
7) Using 8086 write an ALP to add list of 10 given numbers.
8) Using 8086 write an ALP to sum the numbers from 1-100.
9) Using 8086 write an ALP to count negative numbers from a given list of 10 numbers.
10) Using 8086 write an ALP to check number of vowels in a given string.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

# TELECOMMUNICATION NETWORKS LAB

**Course Code: BTE 522 Credit Units: 01**

## List of Practicals:

1. To study slope over load and increased integration gain in delta modulation.
2. To study adaptive delta modulation and demodulation with CVSD modulation.
3. To Study TDM & PCM using a digital link.
4. To study data coding and decoding for NRZ format (NRZ L, M & S ).
5. To study data coding and decoding for phase encoding format (Bi phase L, M & S).
6. To study data coding and decoding for unipolar to bipolar and vice versa (RZ- AMI, URZ).
7. To study speech circuit using IC and its interfacing to the line (EPABX).
8. To study DTMF using IC and its interfacing to the line (EPABX).
9. To study dual tone ring generator (EPABX).
10. To study tone generator (EPABX).
11. To study dialer circuit (EPABX).

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

# MICROWAVE ENGINEERING LAB

**Course Code:** **BTE 523** **Credit Units: 01**

## List of Experiments:

1. To study the characteristics of reflex klystron.
2. To study the characteristic of Gunn diode.
3. To measure frequency and guided wavelength of a microwave signal.
4. To measure the impedance of a given load.
5. To measure the dielectric constant of the given sample.
6. To measure various parameters of a directional coupler.
7. To study the characteristic and functions of an isolator.
8. To study the characteristic and functions of a circulator.
9. To study the characteristic and functions of various tees.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# MATLAB LAB

**Course Code: BTE 524 Credit Units: 01**

## Course Contents:

Theory and pratice of .m files and simulink libraries.

1. Plot the results of certain basic arithmetic operations:
   a) addition, multiplication etc.
   b) exponential, logarithm etc.
   c) trigonometry, complex numbers.

2. Working with arrays of numbers:
   a) straight line plots.
   b) operation on vectors.
   c) matrices, circles.

3. Graph plots:
   a) sine plots
   b) decaying and growing functions.
   c) overlay plots.

4. Programs to understand creation,saving,execution of files.

5. Programs involving matrices,manupilation using linear algebra.

6. Basic 2D and 3D plots:
   a) parametric space curve.
   b) polygons with vertices.
   c) 3D contour lines.

7. Simple graphics problems.

8. The sampling and reconstruction of a given signal.

9. Amplitude modulation and demodulation.

10. Frequency modulation and demodulation.

11. Time division multiplexing

12. Pulse amplitude modulation.

13. Delta and adaptive delta modulation and demodulation.

14. Carrier modulation techniques using amplitude shift keying and frequency shift Keying.

15. Carrier modulation techniques using binary shift keying and differential shift keying.

16. Pulse code modulation and differential pulse code modulation as well as relevant Demodulation.

17. Quadrature phase shift keying and quadrature amplitude modulation.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# COMMUNICATION SKILLS - III

**Course Code: BTE 541 Credit Units: 01**

## Course Objective:
To equip the participant with linguistic skills required in the field of science and technology while guiding them to excel in their academic field.

## Course Contents:

**Module I**
Reading Comprehension
Summarising
Paraphrasing

**Module II**
Essay Writing
Dialogue Report

**Module III**
Writing Emails
Brochure
Leaflets

**Module IV: Introduction to Phonetics**
Vowels
Consonants
Accent and Rhythm
Accent Neutralization
Spoken English and Listening Practice

## Examination Scheme:

| Components | CT1 | CT2 | CAF | V | GD | GP | A |
|---|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 25 | 10 | 10 | 10 | 5 |

CAF – Communication Assessment File
GD – Group Discussion
GP – Group Presentation

## Text & References:


- Effective English for Engineering Students, B Cauveri, Macmillan India
- Creative English for Communication, Krishnaswamy N, Macmillan
- A Textbook of English Phonetics, Balasubramanian T, Macmillan

# BEHAVIOURAL SCIENCE - V
# (GROUP DYNAMICS AND TEAM BUILDING)

**Course Code: BTE 543 Credit Units: 01**

## Course Objective:
To inculcate in the students an elementary level of understanding of group/team functions To develop team spirit and to know the importance of working in teams

## Course Contents:

**Module I: Group formation**
Definition and Characteristics
Importance of groups
Classification of groups
Stages of group formation
Benefits of group formation

**Module II: Group Functions**
External Conditions affecting group functioning: Authority, Structure, Org. Resources, Organizational policies etc.
Internal conditions affecting group functioning: Roles, Norms, Conformity, Status, Cohesiveness, Size, Inter group conflict.
Group Cohesiveness and Group Conflict
Adjustment in Groups

**Module III: Teams**
Meaning and nature of teams
External and internal factors effecting team
Building Effective Teams
Consensus Building
Collaboration

**Module IV: Leadership**
Meaning, Nature and Functions
Self leadership
Leadership styles in organization
Leadership in Teams

**Module V: Power to empower: Individual and Teams**
Meaning and Nature
Types of power
Relevance in organization and Society

**Module VI: End-of-Semester Appraisal**
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

## Examination Scheme:

| Components | SAP | A | Mid Term Test (CT) | VIVA | Journal for Success (JOS) |
|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 05 | 20 | 30 | 25 |

## Text & References:


- Organizational Behaviour, Davis, K.
- Hoover, Judhith D. Effective Small Group and Team Communication, 2002,Harcourt College Publishers
- Dick, Mc Cann & Margerison, Charles: Team Management, 1992 Edition, viva books
- Bates, A. P. and Julian, J.: Sociology - Understanding Social Behaviour
- Dressers, David and Cans, Donald: The Study of Human Interaction
- Lapiere, Richard. T – Social Change
- Lindzey, G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology, Addison – Welsley, US.
- Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.
- LaFasto and Larson: When Teams Work Best, 2001, Response Books (Sage), New Delhi

- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 2, Group (1996); Pfeiffer & Company
- Smither Robert D.; The Psychology of Work and Human Performance, 1994, Harper Collins College Publishers

# FRENCH - V

**Course Code:** **BTE 544** **Credit Units: 02**

## Course Objective:

To furnish some basic knowledge of French culture and civilization for understanding an authentic document and information relating to political and administrative life

## Course Contents:

**Module D: pp. 131 – 156 Unités 10, 11**

**Contenu lexical:**

**Unité 10:** Prendre des décisions

1. Faire des comparaisons
2. décrire un lieu, le temps, les gens, l'ambiance
3. rédiger une carte postale

**Unité 11: faire face aux problèmes**

1. Exposer un problème.
2. parler de la santé, de la maladie
3. interdire/demander/donner une autorisation
4. connaître la vie politique française

**Contenu grammatical:**

1. comparatif - comparer des qualités/ quantités/actions
2. supposition : Si + présent, futur
3. adverbe - caractériser une action
4. pronom "Y"

## Examination Scheme:

| **Components** | **CT1** | **CT2** | **C** | **I** | **V** | **A** |
|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- le livre à suivre : Campus: Tome 1

# GERMAN - V

**Course Code: BTE 545 Credit Units: 02**

## Course Objective:
To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany
Introduction to Advanced Grammar and Business Language and Professional Jargon

## Course Contents:

**Module I: Genitive case**
Genitive case – Explain the concept of possession in genitive
Mentioning the structure of weak nouns

**Module II: Genitive prepositions**
Discuss the genitive propositions and their usage: (während, wegen, statt, trotz)

**Module III: Reflexive verbs**
Verbs with accusative case
Verbs with dative case
Difference in usage in the two cases

**Module IV: Verbs with fixed prepositions**
Verbs with accusative case
Verbs with dative case
Difference in the usage of the two cases

**Module V: Texts**
A poem 'Maxi'
A text Rocko

**Module VI: Picture Description**
Firstly recognize the persons or things in the picture and identify the situation depicted in the picture;
Secondly answer questions of general meaning in context to the picture and also talk about the personal experiences which come to your mind upon seeing the picture.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

# SPANISH - V

**Course Code:** **BTE 546** **Credit Units: 02**

## Course Objective:
To enable students acquire working knowledge of the language; to give them vocabulary, grammar, voice modulations/intonations to handle everyday Spanish situations with ease.

## Course Contents:

**Module I**
Revision of earlier semester modules

**Module II**
Future Tense

**Module III**
Presentations in English on
Spanish speaking countries'
Culture
Sports
Food
People
Politics
Society
Geography

**Module IV**
Situations:
En el hospital
En la comisaria
En la estacion de autobus/tren
En el banco/cambio

**Module V**
General revision of Spanish language learnt so far.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- Español Sin Fronteras, Greenfield

# JAPANESE - V

**Course Code: BTE 547 Credit Units: 02**

## Course Objective:
To enable the students to converse, read and write language comfortably and be able to converse using different patterns and forms taught through out. Students are taught and trained enough to get placed themselves in Japanese companies.
**Note:** Teaching is done in roman as well as Japanese script.

## Course Contents:

**Module I**
Dictionary form of the verbs, joining of verbs
Negative form of verbs
Potential form

**Module II**
Joining of many actions together
Usage of dictionary form of the verbs in sentences
Introducing colloquial language.

**Module III**
Direct form of the speech, quotations,
Expressing thoughts
Actions and reasoning

**Module IV**
Conclusion
Receiving and giving things, favour etc.
Different forms like 'tara' form.

**Module V**
Revision of the whole syllabus

## Learning Outcome
- Students can speak and use different patterns, ways to describe a particular situation and can converse comfortably in mentioned situations through out.
- Students can appear in the interviews for placements in Japanese companies.

## Methods of Private study /Self help
- Teaching will be supported by handouts, audio-aids, and self-do assignments and role plays.
- Use of library, visiting and watching movies in Japan and culture center every Friday at 6pm.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

***Text:***
- Teach yourself Japanese

***References:***
- Shin Nihongo no kiso 1

# CHINESE – V

**Course Code: BTE 548 Credit Units: 02**

## Course Objective:

What English words come from Chinese? Some of the more common English words with Chinese roots areginseng, silk, dim sum, fengshui, typhoon, yin and yang, T'al chi, kung-fu. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

## Course Contents:

**Module I**
Drills
Dialogue practice
Observe picture and answer the question.
Pronunciation and intonation.
Character writing and stroke order

**Module II**
Intonation
Chinese foods and tastes – tofu, chowmian, noodle, Beijing duck, rice, sweet, sour….etc. Learning to say phrases like – Chinese food, Western food, delicious, hot and spicy, sour, salty, tasteless, tender, nutritious, god for health, fish, shrimps, vegetables, cholesterol is not high, pizza, milk, vitamins, to be able to cook, to be used to, cook well, once a week, once a month, once a year, twice a week……
Repetition of the grammar and verbs taught in the previous module and making dialogues usingit.
Compliment of degree "de".

**Module III**
Grammar the complex sentence "suiran … danshi…."
Comparison – It is colder today than it was yesterday…..etc.
The Expression "chule….yiwai". (Besides)
Names of different animals.
Talking about Great Wall of China
Short stories

**Module IV**
Use of "huozhe" and "haishi"
Is he/she married?
Going for a film with a friend.
Having a meal at the restaurant and ordering a meal.

**Module V**
Shopping – Talking abut a thing you have bought, how much money you spent on it? How many kinds were there? What did you think of others?
Talking about a day in your life using compliment of degree "de". When you get up? When do you go for class? Do you sleep early or late? How is Chinese? Do you enjoy your life in the hostel?
Making up a dialogue by asking question on the year, month, day and the days of the week and answer them.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- "Elementary Chinese Reader " Part-II Lesson 39-46

# PRACTICAL TRAINING - I

**Course Code: BTE 550 Credit Units: 03**

## Methodology:

Practical training is based on the theoretical subjects studied by students. It can be arranged within the college or in any related industrial unit. The students are to learn various industrial, technical and administrative processes followed in the industry. In case of on-campus training the students will be given specific task of fabrication/assembly/testing/analysis. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation on same.

## Examination Scheme:

| | |
|---|---|
| Feedback from industry/work place | 20 |
| Training Report | 40 |
| Viva | 15 |
| Presentation | 25 |
| **Total** | **100** |

# VLSI DESIGN

**Course Code: BTE 601 Credit Units: 04**

## Course Objective:

In the recent years, IC manufacturing technology has gone through dramatic evolution and changes, continuously scaling to ever smatter dimensions. This scaling has a double impact on the design of ICs. First, the complexity of the designs that can be put on a single die has increased dramatically which led to new design methodologies. At the same time, this plunge into deep submicron space causes devices to behave differently and brings challenging issues to forefront. This course along with the course of Digital Circuits and Systems II and Analog CMOS IC design will give you many of the basic essentials to work in the area of Circuit Design. Since this course takes the latest trends in the industry into account, you will find yourself at a definite edge.

## Course Contents:

**Module I: Devices and the wire**

Diode, Dynamic and transient behavior of Diode, Diffusion capacitance, SPICE Diode model, MOSFET basic, depletion and enhancement device.

MOSFET static behavior, Threshold voltage and its dependence on $V_{SB}$ MOSFET Operation in resistive and saturation region, channel length modulation, Velocity saturation and its impact on sub micron devices, sub threshold conduction, Model for manual analysis, Equivalent resistance for MOSFET in (velocity) saturated region, comparison of equations for PMOS and NMOS.

DYNAMIC behavior, Channel capacitance in different regions of operation, junction capacitance, Level 1 SPICE models for MOS transistors.

The Wire, Interconnect parameters: resistance, capacitance and Inductance, Lumped RC model, Elmore Delay

**Module II: CMOS Inverter**

VTC of an ideal inverter, Switching Model of the CMOS inverter: NMOS /PMOS discharge and charge, VTC of CMOS inverter : PMOS and NMOS operation in various regions including velocity saturation, Switching threshold, (W/L)p/(W/L)n ratio for setting desired $V_M$ with and without velocity saturation, Noise Margins, buffer.

Ratioed logic: Pseudo NMOS inverter and PMOS to NMOS ratio for performance, tri-state inverter, Resistive load inverter.

Load Capacitance calculations: fan out capacitance, self capacitance calculations: Miller effect, wire capacitance; Improving delay calculation with input slope, Propagation delay: first order analysis, analysis from a design perspective, sizing a chain of inverters for minimum delay, choosing optimum number of stages, Power, Energy and Energy Delay: Dynamic power consumption, Static power, Glitches and power dissipation due to direct path currents, power and delay trade off, Transistor sizing for energy minimization

**Module III: Combinational circuits**

CMOS LOGIC: Good 0 and Poor 0, series and parallel N and P switches, Two and Higher input NAND and NOR gates, Functions of the type (AB+C(D+E)) and their complements, XOR and XNOR gates, 2 input Multiplexer, Full Adder; Transistor sizing in CMOS logic for optimal delay, Pseudo NMOS NAND NOR and other gates and the transistor sizing, Introduction to DSVCL logic, CPL AND/NAND, OR/NOR, XOR/XNOR gates, Logical effort, Electrical Effort, Branching effort, Examples of sizing Combinational logic chains for minimum delay, Pass-transistor logic, pass gate configurations for NMOS and PMOS, 2 input and 4 input MUX, XOR, XNOR and implementation of general functions like AB+AB*C+A*C*, Robust and Efficient PTL Design, Delay of Transmission Gate chain.

Dynamic CMOS design: Pre-charge and Evaluation, charge leakage, bootstrapping, charge sharing, Cascading Dynamic Gates, DOMINO Logic, Optimization of Domino Logic Gates, simple example circuit implementations of DOMINO logic.

**Module IV: Sequential Logic circuits**

Principle of Bistability, NAND and NOR based SR latch, and clocked SR Latch, JK latch, example of master slave flip flop, CMOS D latch, MUX based Latches, master slave edge triggered register, Static Timing Analysis –setup, hold time, clock skew, clock period, non ideal clocks, clock overlap, C2MOS register, TSPCR Register, Schmitt Trigger, Pipelining and NORA CMOS

**Module V: Layout Design Rules**

Introduction to CMOS Process technology, Latch up and its prevention Layout of CMOS inverter, CMOS NAND and NOR gates, Concept of Euler path, and stick diagrams for functions like (AB+E+CD)*,

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Jan M Rabaey: Digital Integrated Circuits
- David Hodges et al: Analysis and Design of Digital ICs
- Kang: CMOS Digital ICs
- Weste and Harris: CMOS VLSI design
- Weste and Eshragian: Principles of CMOS VLSI Design

# DIGITAL SIGNAL PROCESSING (New)

**Course Code: BTE 602** **Credit Units: 04**

## Course Objective:

The objective of the course in Digital signal processing is to provide the student with significant skills in general as well as advanced theories and methods for modification, analysis, detection and classification of analog and digital signals. Furthermore the objective is to give the student a broad knowledge of central issues regarding design, realization and test of analog and in particular digital signal processing systems consisting of hardware and/or software components. The specialization in signal processing makes it possible to study practical or theoretic fields, ranging from mathematics/signal theory over algorithmic design to development of instruments based on hardware and/or software for real time signal.

## Course Contents:

**Module I: Introduction to Discrete Time Signals & Systems**
**Sampling and Reconstruction of continuous time signals:** Periodic sampling, Reconstruction of a band limited signal from its samples, Sampling Theorem.
**Characterization and properties of discrete time signals and systems:** Discrete time signals and systems, Linear convolution, Eigen functions for linear time-invariant systems, Linear constant-coefficient difference equations.

**Module II: DFT and its Implementation**
Review of Z Transform and DTFT, The Discrete Fourier Transform (DFT) and its properties, Circular and linear convolution using the Discrete Fourier Transform.
Efficient computation of the Discrete Fourier Transform, Decimation -in-Time FFT Algorithm, Decimation-in-Frequency FFT Algorithm.

**Module III: Frequency Response & Filter Structures**
The frequency response of LTI systems, All pass and minimum-phase systems.
**Digital Filter Structure**: Filter structures for IIR and FIR filters, direct form I and II, parallel and cascade forms, frequency sampling structure for FIR filters.
**Ladder structures:** continued fraction expansion of H (z), example of continued fraction, realization of a ladder structure, example of a ladder realization.

**Module IV: FIR Digital Filter Design**
Design of FIR Digital filters by Windowing: Windowing and the Rectangular Window, Other Commonly Used Windows, Examples of Filter Designs Using Windows, The Kaiser Window.

**Module V: IIR Digital Filter Design**
Design of IIR Digital Filters from Continuous-time Filters Butterworth and Chebyshev, Impulse invariant and bilinear transformation techniques.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Prokis, Manolakis: Digital signal processing
- Oppenheim & Schaffer : Digital Signal Processing
- Fafael C. Gonzalez, Richrd E. Woods: Digital Image Processing
- A Anand Kumar, Digital Signal Processing
- S.K.Mitra: Digital Signal Processing

# CONTROL SYSTEMS

**Course Code:** **BTE 603** **Credit Units: 04**

## Course Objective:

The basic objective of this course is to provide the students the core knowledge of control systems, in which time & frequency domain analysis, concept of stability.

## Course Contents:

**Module I: Input / Output Relationship**
Introduction of open loop and closed loop control systems, mathematical modeling and representation of physical systems (Electrical Mechanical and Thermal), derivation of transfer function for different types of systems, block diagram & signal flow graph, Reduction Technique, Mason's Gain Formula.

**Module II: Time – Domain Analysis**
Time domain performance criteria, transient response of first, second & higher order systems, steady state errors and static error constants in unity feedback control systems, error criteria, generalized error constants, performance indices, response with P, PI and PID Controllers.

**Module III: Frequency Domain Analysis**
Polar and inverse polar plots, frequency domain specifications, Logarithmic plots (Bode Plots),gain and phase margins, relative stability, Correlation with time domain, constant close loop frequency responses, from open loop response, Nyquist Plot.

**Module IV: Concept of Stability**
Asymptotic stability and conditional stability, Routh – Hurwitz criterion, Root Locus plots and their applications. Compensation Techniques: Concept of compensation, Lag, Lead and Lag-Lead networks, design of closed loop systems using compensation techniques. P, PI, PID controllers.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


***Text:***

- Dr. N.K Jain, 2005,"Automatic Control System Engineering", Dhanpat Rai Publication.
- J. Nagrath & M. Gopal, 2000, "Control System Engineering", New Age International.

***References:***

- M, K. Ogata, 2002, "Modern Control Engineering, PHI.
- B. C. Kuo, 2001, "Automatic Control system, Prentice Hall of India.

# ANTENNA AND WAVE PROPOGATION

**Course Code:** **BTE 604** **Credit Units: 04**

## Course Objective:

The purpose of this course is to provide a thorough introduction to antenna systems with an in depth study of various types & performance parameters for antenna.

## Course Contents:

**Module I: Antenna**

Antenna Principles: Potential Functions & Electromagnetic Field, Current Elements, Radiation from Monopole & Half Wave Dipole, power radiated by current element, radiation resistance. Network Theorems, Directional Properties of Dipole Antenna. Antenna Gain, Effective Area, Antenna Terminal Impedance, Practical Antennas and Methods of Excitation, Antenna Temperature and Signal to Noise Ratio.

**Module II: Antenna Arrays**

Antennas Arrays: Two Element Array, Horizontal Patterns in Broadcast Arrays, Linear Arrays, Multiplication of patterns, effect of the earth on vertical patterns, Binomial array

**Module III: Wave Propagation**

Modes of Propagation, Plane Earth Reflection, Space wave and Surface Wave, Reflection and refraction waves by the Ionosphere Tropospheric Wave. Ionosphere Wave Propagation in the Ionosphere, Virtual Height, MUF Critical frequency, Skip Distance, Duct Propagation, Space wave

**Module IV: Practical Antennas**

VLF and LF transmitting antennas, effect of antenna height, Field of short dipole, electric field of small loop antenna, Directivity of circular loop antenna with uniform current, Yagi-Uda array: Square corner yagi-uda hybrid, circular polarization Rhombic Antenna: Weight and Leg length Parabolic Reflectors: Properties, Comparison with corner reflectors Horn Antenna: Length and Aperture. Introduction to Turstile Antenna Effect of ground on antenna performance.

Broadband Antenna: Frequency independent concept, RUMSEY's Principle, Frequency independent planar log spiral antenna, Frequency independent conical spiral Antenna.

**Module V: Antenna Measurements**

Radiation Pattern measurement, Distance requirement for uniform phase, uniform field amplitude requirement, Introduction to phase measurement; Gain Measurement: Comparison method, Near field method, Introduction to current distribution measurement, Measurement of antenna efficiency, measurement of Noise figure and noise temperature of an antenna polarization measurement.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***

- Jordan Edwards C. and Balmain Keith G.S "Electromagnetic Waves and Radiating Systems"/ Prentice Hall (India)
- Kraus, John D. & Mashefka, Ronald J. / "Antennas: For All Applications" / Tata McGraw Hill, 3rd Ed.

***References:***

- Prasad, K.D./ "Antennas and Wave Propagation"/ Khanna Publications
- Collin, R. / "Antennas and Radiowave Propagation" / Tata McGraw-Hill
- Hayt Jr. William H./ "Engineering Electromagnetic "/ Tata McGraw-Hill
- Das, Annaparna & Das, Sisir K. / "Microwave Engineering"/ Tata McGraw Hill.
- Roy, Sitesh Kumar & Mitra, Monojit / "Microwave Semiconductor Devices" / Prentice Hall (India).

# MEASURMENT AND MEASURING INSTRUMENTS

**Course Code: BTE 605 Credit Units: 03**

## Course Objective:

The objective of the course is to provide a brief knowledge of measurements and measuring instruments related to engineering. The basic idea of this course is to give the sufficient information of measurements in any kind of industry viz. electrical, electronics, mechanical etc.

## Course Contents:

**Module I: Basics of Measurement Systems**
Elements of Generalized Measurement System; Static & Dynamic Characteristics of Instruments; Errors in Measurements – Sources and Types of Errors; Statistical Treatment of Data – Mean, Measures of Dispersion, Rejection of data based on confidence interval

**Module II: Transducers**
Classification; Selection of Transducers; Resistive Transducers – Potentiometer, Strain gauge, Rosettes, Thermistors and RTD; Capacitive Transducers – Measurement of Liquid level by change in variation of dielectric constant; Variable Inductance Transducers – self-generating type and passive type; Piezoelectric Transducers; Photoelectric Transducers; Digital Transducer

**Module III: Measurement of Resistance, Inductance and Capacitance**
D.C. Bridges: Wheatstone's bridge, Sensitivity & Limitations; Carey Foster Bridge; Kelvin double bridge; Megaohm Bridge.
A.C. Bridges: Maxwell's Inductance Capacitance Bridge; Andersons Bridge; De Sauty's Bridge; Schering Bridge;

**Module IV: Analog and Digital Meters**
Analog meters : PMMC meters- construction, torque equation, ammeter shunts, multirange ammeter, voltmeter multiplier, sensitivity, ohmmeters, multimeters; Construction & general equation of moving iron, electrodynamometer, hot wire instruments.
Digital meters: Digital voltmeter – ramp type, integrating type, potentiometer type, Applications

**Module V: Display Devices and Recorders**
LED, LCD, Cold Cathode displays, Incandescent Displays, Fluorescent Displays, LVD, VDU
Cathode Ray Oscillioscope : Basic functioning, Measurement of Voltage, Current, Phase and Frequency.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***
- Electronic Instrumentation Technology by MMS Anand, PHI Pvt. Ltd., New Delhi Ed. 2005.
- Electronics Instrumentation by H.S. Kalsi TMH Ed. 2004.

***References:***
- Electronics Instrumentation & Measurement Techniques by W.D. Cooper & A.D. Helfrick, PHI 3rd Ed.
- Electronics Measurement & Instrumentation by Oliver & Cage Mc-Graw Hill.

# VLSI DESIGN LAB

**Course Code:** **BTE 620** **Credit Units: 01**

## Course Contents:

1. MOSFET characteristics with varying $V_{GS}$ for both pmos and nmos.
2. Effect on VTC of CMOS inverter with variation of W and L.
3. Transient analysis of CMOS inverter with varying capacitive load, W and L.
4. Rise time, Fall time power dissipation, propagation delay calculation of CMOS inverter with the variation ofcapacitive load, W and L.
5. NOR and NAND gate - Transient analysis
6. XOR/XNOR gate - Transient analysis
7. 2:1 MUX and XOR gate with P.T.L.- Transient analysis
8. D type latch and flip flop - Transient analysis
9. 3 input NAND gate implementation with DOMINO (precharge and evaluation)
10. 4 inverter chain to derive capacitive load

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# DIGITAL SIGNAL PROCESSING LAB

**Course Code:** **BTE 621** **Credit Units: 01**

## List of Experiments:

1. To generate unit step sequence, exponential sequence and sinusoidal sequence
2. To determine convolution of two given sequences.
3. To plot the frequency response of an FIR system
4. To compute DFT and IDFT of a given sequence
5. To determine the circular convolution of two given sequences
6. To design various analog filters
7. To design FIR filter using Hamming window
8. To convert Analog filter into Digital Filter using bilinear transformation
9. To determine z and inverse z transform of a given sequence
10. To verify 8 points FFT algorithm in decimation in time (DIT) & decimation in frequency (DIF).
11. To determine the filter coefficient using Ramez exchange algorithm.
12. To design an IIR digital filter and its parallel realization.

## Examination Scheme:

| **IA** | | | | **EE** | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# CONTROL SYSTEMS LAB

**Course Code: BTE 622 Credit Units: 01**

**Course Contents:**

1. Study and draw
   a) Step response of open Loop system (linear $1^{st}$ order, $2^{nd}$ order
   b) Step response of closed loop systems ($1^{st}$ order)
2. Study and draw temperature control system the open loop response and closed loop response with different values of gains
3. Study of operations and characteristics of a stepper motor
4. To Study a D.C. motor speed control system.
5. Performance evaluation and design of PID controller.
6. Study of microprocessor control of a simulated linear system.
7. To design a suitable cascade compensator for the given system and verify the resulting improvement.
8. Note: three experiments in MATLAB have to be performed in the slot of MATLAB.
   Using MATLAB obtain the unit-step response and unit impulse response of the following system:

$$\frac{C(s)}{R(s)} = \frac{16}{s^2 + 1.6s + 16}$$

9. For a $2^{nd}$ order transfer function using MATLAB
   a) Bode Plot
   b)Root locus plot
   c)Nyquist plot.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

# COMMUNICATION SKILLS - IV

**Course Code:** **BTE 641** **Credit Units: 01**

## Course Objective:
To enhance the skills needed to work in an English-speaking global business environment.

## Course Contents:

**Module I: Business/Technical Language Development**
Advanced Grammar: Syntax, Tenses, Voices
Advanced Vocabulary skills: Jargons, Terminology, Colloquialism
Individualised pronunciation practice

**Module II: Social Communication**
Building relationships through Communication
Communication, Culture and Context
Entertainment and Communication
Informal business/ Technical Communication

**Module III: Business Communication**
Reading Business/ Technical press
Listening to Business/ Technical reports (TV, radio)
Researching for Business /Technology

**Module IV: Presentations**
Planning and getting started
Design and layout of presentation
Information Packaging
Making the Presentation

## Examination Scheme:

| Components | CT1 | CT2 | CAF | V | GD | GP | A |
|---|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 25 | 10 | 10 | 10 | 5 |

CAF – Communication Assessment File
GD – Group Discussion
GP – Group Presentation

## Text & References:


- Business Vocabulary in Use: Advanced Mascull, Cambridge
- Business Communication, Raman – Prakash, Oxford
- Business Communications, Rodgers, Cambridge
- Working in English, Jones, Cambridge
- New International Business English, Jones/Alexander, Cambridge

# BEHAVIOURAL SCIENCE - VI
# (STRESS AND COPING STRATEGIES)

**Course Code: BTE 643** **Credit Units: 01**

## Course Objective:
To develop an understanding the concept of stress its causes, symptoms and consequences.
To develop an understanding the consequences of the stress on one's wellness, health, and work performance.

## Course Contents:

**Module I: Stress**
Meaning & Nature
Characteristics
Types of stress

**Module II: Stages and Models of Stress**
Stages of stress
The physiology of stress
Stimulus-oriented approach.
Response-oriented approach.
The transactional and interact ional model.
Pressure – environment fit model of stress.

**Module III: Causes and symptoms of stress**
Personal
Organizational
Environmental

**Module IV: Consequences of stress**
Effect of stress on performance
Individual and Organizational consequences with special focus on health

**Module V: Strategies for stress management**
Importance of stress management
Healthy and Unhealthy strategies
Peer group and social support
Happiness and well-being

**Module VI: End-of-Semester Appraisal**
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

## Examination Scheme:

| Components | SAP | A | Mid Term Test (CT) | VIVA | Journal for Success (JOS) |
|---|---|---|---|---|---|
| Weightage (%) | 20 | 05 | 20 | 30 | 25 |

## Text & References:


- Blonna, Richard; Coping with Stress in a Changing World: Second edition
- Pestonjee, D.M, Pareek, Udai, Agarwal Rita; Studies in Stress And its Management
- Pestonjee, D.M.; Stress and Coping: The Indian Experience
- Clegg, Brian; Instant Stress Management – Bring calm to your life now

# FRENCH - VI

**Course Code:** **BTE 644** **Credit Units: 02**

## Course Objective:

To strengthen the language of the students both in oral and written so that they can:
i) express their sentiments, emotions and opinions, reacting to information, situations;
ii) narrate incidents, events;
iii) perform certain simple communicative tasks.

## Course Contents:

**Module D: pp. 157 – 168 – Unité 12**

**Unité 12: s'évader**

1. présenter, caractériser, définir
2. parler de livres, de lectures
3. préparer et organiser un voyage
4. exprimer des sentiments et des opinions
5. téléphoner
6. faire une réservation

**Contenu grammatical:**

1. proposition relative avec pronom relatif "qui", "que", "où" - pour caractériser
2. faire + verbe

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- le livre à suivre : Campus: Tome 1

# GERMAN - VI

**Course Code:** **BTE 645** **Credit Units: 02**

## Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany
Introduction to Advanced Grammar and Business Language and Professional Jargon

## Course Contents:

**Module I: Adjective endings**
Adjective endings in all the four cases discussed so far
Definite and indefinite articles
Cases without article

**Module II: Comparative adverbs**
Comparative adverbs as and like

**Module III: Compound words**
To learn the structure of compound words and the correct article which they take
Exploring the possibility of compound words in German

**Module IV: Infinitive sentence**
Special usage of 'to' sentences called zu+ infinitive sentences

**Module V: Texts**
A Dialogue: 'Ein schwieriger Gast'
A text: 'Abgeschlossene Vergangenheit'

**Module VI: Comprehension texts**
Reading and comprehending various texts to consolidate the usage of the constructions learnt so far in this semester.

**Module VII: Picture Description**
Firstly recognize the persons or things in the picture and identify the situation depicted in the picture;
Secondly answer questions of general meaning in context to the picture and also talk about the personal experiences which come to your mind upon seeing the picture.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:


- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

# SPANISH – VI

**Course Code:** **BTE 646** **Credit Units: 02**

## Course Objective:

To enable students acquire working knowledge of the language; to give them vocabulary, grammar, voice modulations/intonations to handle everyday Spanish situations in Present as well as in Present Perfect Tense with ease.

## Course Contents:

**Module I**
Revision of the earlier modules

**Module II**
Present Perfect Tense

**Module III**
Commands of irregular verbs

**Module IV**
Expressions with **Tener que** and **Hay que**

**Module V**
En la embajada
Emergency situations like fire, illness, accident, theft

## Examination Scheme:

| **Components** | **CT1** | **CT2** | **C** | **I** | **V** | **A** |
|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- Español, En Directo I A
- Español Sin Fronteras

# JAPANESE - VI

**Course Code:** **BTE 647** **Credit Units: 02**

## Course Objective:

To enable the students to converse in the language with the help of verbs and the usage of different sentence patterns, which help them to strengthen the language.
Students are taught and trained enough to get placed in Japanese companies.
**Note:** The teaching is done in roman as well as Japanese script. 10 more kanjis are introduced in this semester.

## Course Contents:

**Module I: Polite form of verbs**
Expressing feelings with the polite forms of verb.

**Module II: Potential form**
Ability of doing or not doing something

**Module III: Conjunctions**
Joining two sentences with the help of *shi* and *mo*

**Module IV: Intransitive Verbs**
Sentence patterns of indirect speech

**Module V: Feelings and expressions**
Regret, existence etc.

## Learning Outcome

- Students can speak the language with the use of different forms of verb.

## Methods of Private study/ Self help

- Hand-outs, audio -aids, assignments and role-plays will support classroom teaching.
- Students are encouraged to watch Japanese movies at Japan Cultural and information center.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- Shin Nihon-go no Kiso Lesson No. 26 to 30.
- All vocabulary and topics taught are from the above-mentioned book.

# CHINESE – VI

**Course Code:** **BTE 648** **Credit Units: 02**

## Course Objective:

Chinese emperor Qin Shi Huang – Ti who built the great wall of China also built a network of 270 palaces, linked by tunnels, and was so afraid of assassination that he slept in a different palace each night. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

## Course Contents:

**Module I**
Drills
Dialogue practice
Observe picture and answer the question.
Pronunciation and intonation.
Character writing and stroke order.

**Module II**
Going out to see a science exhibition
Going to the theatre.
Train or Plane is behind schedule.
Indian Economy-Chinese Economy
Talking about different Seasons of the Year and Weather conditions. Learning to say phrases like-spring, summer, fall, winter, fairly hot, very cold, very humid, very stuffy, neither hot nor cold, most comfortable, pleasant …. etc.

**Module III**
Temperature – how to say – What is the temperature in May here?

- How is the weather in summer in your area?
- Around 30 degrees
- Heating, air-conditioning
- Is winter is Shanghai very cold?

Talking about birthdays and where you were born?
The verb "shuo" (speak) saying useful phrases like speak very well, do not speak very well, if speak slowly then understand if speak fast then don't understand, difficult to speak, difficult to write, speak too fast, speak too slow, listen and can understand, listen and cannot understand … etc.
Tell the following in Chinese – My name is …. I was born in … (year). My birthday is ……… Today is … (date and day of the week). I go to work (school) everyday. I usually leave home at . (O'clock). In the evening, I usually ………. (do what)? At week end, I ………. On Sundays I usually …………… It is today….. It will soon be my younger sisters birthday. She was born in ….. (year). She lives in ………. (where). She is working (or studying)…… where… She lives in …….. (where.)

## Examination Scheme:

| **Components** | **CT1** | **CT2** | **C** | **I** | **V** | **A** |
|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- Elementary Chinese Reader Part-2, 3; Lesson 47-54

# RADAR AND SATELLITE COMMUNICATIONS

**Course Code:** **BTE 701** **Credit Units: 04**

## Course Objective:

This course builds basic knowledge of different types of Radar systems and satellite communication along with link designing & application. It also covers different modulation schemes & channels used.

## Course Contents:

**Module I: Introduction to Radar**

Principle of detection and ranging, Radar frequencies and bands. Applications, Radar block diagram and operation. Radar Range Equation : Range prediction, Minimum detectable signal, Receiver noise SNR, Integration of radar pulses, Radar cross section of targets, Transmitter Power, PRF and system losses & Propagation effects.

**Module II: CW FM Radar**

Doppler effect, CW Radar, Frequency-modulated CW Radar, Multiple-frequency CW Radar. MTI and Pulse Doppler Radar: MTI delay lines, Delay line Cancellers, Coherent and Non-Coherent MTI, Pulse Doppler Radar.

**Module III: Introduction to Satellite**

Communication satellites, Orbiting satellites, Frequencies and bands, Satellite multiple access formats. Satellite Channel: Power flow, Polarization, Atmospheric losses, Receiver noise, CNR, Satellite link analysis for uplinks and downlinks. Overview of Coaxial cable system and optical Network (SONET); Overview of WLL (Wireless loop)

**Module IV: Satellite Transponder**

Transponder model, Satellite signal processing RF-RF translation, IF demodulation.

**Module V: Multiple-Access**

FDMA; amplification with multiple FDMA carriers, AM/FM Conversion with FDMA, Switched FDMA, Synchronization, SS-TDMA; CDMA; DS CDMA, Frequency- hopped, CDMA. Carrier recovery & bit timing. Satellite link budget analysis

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Introduction to Radar Systems - M.I. Skolnik
- Radar Fundamentals - G.J. Wheeler.
- Radar Engineering - D.G. Rink
- Satellite Communication - R.M. Gagliardi
- Satellite Communication - T. Pratt & C.W. Boston
- Satellite Communication System Design Principles - M. Richharia

# DATA COMMUNICATIONS AND NETWORKING

**Course Code:** **BTE 702** **Credit Units: 03**

## Course Objective:
The course provides a unified and fundamental view of the broad field of data communications networks. Furthermore, the easy to understand and extremely relevant world of Computer Net working is introduced in a top down Approach. Excellent online resources are available which are fun to use and learn and the student is highly encouraged to look at them.

## Course Contents:

**Module I: Data Transmission**
Analog and Digital transmission, transmission media, line configuration, data communications codes, error detection and correlation methods. Data encoding methods: analog to digital, digital to analog etc.

**Module II: Data Communication Methods**
Data communication interface, line control unit, UART, USRT, Serial interface, terminal types. SDLC, HDLC, Addressing Switched networks, circuit switching, packet switching, broadcast networks. IEEE 802 LAN Standards, framing, error control, flow control.

**Module III: Introduction to Computer Networking**
Internet, Circuit switching vs Packet switching, Network Access and Physical Media, ISPs, Delay and Loss in Packet Switched Networks, Five Layer concept and their PDUs

**Module IV: Application layer and Transport layer**
Application Layer Protocols: Web and HTTP, FTP, SMTP, DNS, brief overview of socket Programming with TCP and UDP
Multiplexing and Demultiplexing, UDP, Reliable Data Transfer, UDP segment structure, Reliable Data Transfer, TCP, TCP segment Structure, Basics of Congestion Control

**Module V: Network Layer**
Datagram and virtual circuit, link state routing, distance vector routing, Heirarchical Routing, IP, Ipv4 Addressing, Ipv6

**Module VI: Link Layer and Physical Layer**
Services Provided, Error Detection and Correction, Mulple Access Protocols, TDM, FDM and CDMA, ALOHA, CSMA, LANs, Ethernet, Hubs, Bridges and Switches, Introduction to PPP
The physical layer: Theoretical basis for data communication, transmission media, wireless transmission, telecom infrastructure, PSTN, communication satellites, mobile telephone system

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


***Text:***
- Computer Networking: A Top-Down Approach Featuring the Internet (3rd Edition) by James F. Kurose
- Data Communication & networking: Forouzan, B. A.

***References:***
- Computer Networks: Tanenbaum, Andrew S, Prentice Hall
- W. Tomasi, "Advanced Electronic Communication Systems", 2000
- James Martin, "Telecommunications & the Computer", 3rd Edition, PHI. 2001
- P. C. Gupta, "Data Communications, PHI, 2001.

# RADAR AND SATELLITE COMMUNICATIONS LAB

**Course Code:** **BTE 720** **Credit Units: 01**

## Course Contents:

1. To study AM transmitter and receiver.

2. To study FM transmitter and receiver.

3. To implement the following circuits.
   - AM Transmitter
   - FM Transmitter
   - AM Receiver
   - FM Receiver
   - Remote Control
   - Wireless Mic System

4. To study RF portion of satellite receiver.
   - Study of dish antenna and section N.B section
   - Study of tuner
   - Study of R.F modulator section

5. To study the base-band portion of satellite receiver
   - study of video section
   - study of sound section
   - study of signal indictor
   - study of power supply section

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# DATA COMMUNICATIONS AND NETWORKING LAB

**Course Code:** **BTE 721** **Credit Units: 01**

## Equipments Required:

Switch Network Cables, Patch Chord- Fiber optical and twisted pair cable, LAN cards, RJ-45 connectors etc.
Platforms required: Linux Server

## Course Contents:

- Introduction and Installation of Linux
- Administrating Linux
- Setting up a Local Area Network
- Connecting to the Internet
- Setting up Print Server
- Setting up File Server
- Setting up Mail Server
- Setting up FTP Server
- Setting up Web Server
- Setting up My SQL Database Server

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# ORCAD LAB

**Course Code: BTE 722 Credit Units: 01**

**Course Contents:**

1.To simulate and obtain PCB layout for a 2 bit x 2 bit combinational multiplier
 a) Using 4 to 1 line multiplexer and logic gates.
 b) Using 1:16 demultiplexer.

2.To simulate and obtain PCB layout for : BCD to EXCESS 3 codes converter using
 a) 8:1 multiplexer.
 b) 4:1 multiplexer and gates.

3.To simulate and obtain PCB layout for BCD to seven segment decoder using gates.

4.To simulate and obtain PCB layout for BCD to Gray Code using
 a) 8:1 MUX
 b) Decoder
 c) 4:1 MUX

5.To simulate and obtain PCB layout for a Gray Code to BCD converter using
 a) 4:1 MUX
 b) 1:16 DEMUX

6.To simulate and obtain PCB layout for BCD to EXCESS 3 converter using minimum number of NAND gates.

7.To simulate and obtain PCB layout for digital clock a circuit which display Hours, minutes and seconds using CPLD/FPGA.

8.To design, simulate and make a PCB layout of a circuit for traffic signal control having road at a junction using
 a) MUX
 b) Counters
 c) CPLD/FPGA

9.To design, simulate and make a PCB layout of a square wave generator using 7414 IC.

10.To design, simulate and make a PCB layout for two bit RAM using 7400, 7403 gates.

11.To design, simulate and make a PCB layout for 64 bit RAM using 7489 IC.

12.To design, simulate and make a PCB layout for voltage multiplier circuit using operational amplifier with (IC type 741CC/Fairchild 741DC/Motorola MC 1741 CL/Signetics NT 741 A/National LM741 CD, LM741 CN-14/Taxas Instruments SN 72741 N, SN 2741 J)

13.To design, simulate and make a PCB layout for D/A conversion – decade BCD.

***To design and simulate:***

14.a) 2 bit x 2 bit combinational multiplier using 1:16 demultiplexer.

15.a) BCD to seven segment decoder using gates.

16.BCD to Gray code converter using
 a)8:1 MUX
 b)Decoder

17.Gray code to BCD converter using 1:16 demultiplexer.

18.BCD to excess code converter using minimum number of gates.

19.64 bit RAM using 16x4 RAM (IC 7489).

20.Inverting and non inverting amplifier with gain more than 100 using op amp (UA 741 IC).

21.Integrator and differentiator using IC UA 741.

22.Full wave rectifier.

23.Transistor as an amplifier.

24.Diode and transistor realization of AND, OR & NOT gates.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# COMMUNICATION SKILLS - V

**Course Code:** **BTE 741** **Credit Units: 01**

## Course Objective:

To facilitate the learner with Academic Language Proficiency and make them effective users of functional language to excel in their profession.

## Course Contents:

**Module I**
Introduction to Public Speaking
Business Conversation
Effective Public Speaking
Art of Persuasion

**Module II: Speaking for Employment**
Types of Interview
Styles of Interview
Facing Interviews-Fundamentals and Practice Session
Conducting Interviews- Fundamentals and Practice Session
Question Answer on Various Dimensions

**Module III**
Resume Writing
Covering Letters
Interview Follow Up Letters

**Module IV: Basic Telephony Skills**
Guidelines for Making a Call
Guidelines for Answering a Call

**Module V: Work Place Speaking**
Negotiations
Participation in Meetings
Keynote Speeches

## Examination Scheme:

| **Components** | **CT1** | **CT2** | **CAF** | **V** | **GD** | **GP** | **A** |
|---|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 25 | 10 | 10 | 10 | 5 |

CAF – Communication Assessment File
GD – Group Discussion
GP – Group Presentation

## Text & References:


- Jermy Comfort, Speaking Effectively, et.al, Cambridge
- Krishnaswamy, N, Creative English for Communication, Macmillan
- Raman Prakash, Business Communication, Oxford.
- Taylor, Conversation in Practice,

# BEHAVIOURAL SCIENCE - VII
# (INDIVIDUAL, SOCIETY AND NATION)

**Course Code: BTE 743 Credit Units: 01**

## Course Objective:
This course aims at enabling students towards:
Understand the importance of individual differences
Better understanding of self in relation to society and nation
Facilitation for a meaningful existence and adjustment in society
Inculcating patriotism and national pride

## Course Contents:

**Module I: Individual differences & Personality**
Personality: Definition& Relevance
Importance of nature & nurture in Personality Development
Importance and Recognition of Individual differences in Personality
Accepting and Managing Individual differences (adjustment mechanisms)
Intuition, Judgment, Perception & Sensation (MBTI)
BIG5 Factors

**Module II: Managing Diversity**
Defining Diversity
Affirmation Action and Managing Diversity
Increasing Diversity in Work Force
Barriers and Challenges in Managing Diversity

**Module III: Socialization**
Nature of Socialization
Social Interaction
Interaction of Socialization Process
Contributions to Society and Nation

**Module IV: Patriotism and National Pride**
Sense of pride and patriotism
Importance of discipline and hard work
Integrity and accountability

**Module V: Human Rights, Values and Ethics**
Meaning and Importance of human rights
Human rights awareness
Values and Ethics- Learning based on project work on Scriptures like- Ramayana, Mahabharata, Gita etc.

**Module VI: End-of-Semester Appraisal**
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

## Examination Scheme:

| Components | SAP | A | Mid Term Test (CT) | VIVA | Journal for Success (JOS) |
|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 05 | 20 | 30 | 25 |

## Text & References:


- Davis, K. Organizational Behaviour,
- Bates, A. P. and Julian, J.: Sociology - Understanding Social Behaviour
- Dressler, David and Cans, Donald: The Study of Human Interaction
- Lapiere, Richard. T – Social Change
- Lindzey, G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology, Addison – Welsley, US.
- Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.

- Robbins O.B.Stephen;. Organizational Behaviour

# FRENCH - VII

**Course Code:** **BTE 744** **Credit Units: 02**

## Course Objective:
Revise the portion covered in the first volume, give proper orientation in communication and culture.

## Course Contents:

**Module A: Unités 1 – 3: pp. 06 - 46**

**Contenu lexical:**

**Unité 1:** Rédiger et présenter son curriculum vitae
Exprimer une opinion
Caractériser, mettre en valeur
Parler des rencontres, des lieux, des gens

**Unité 2:** Imaginer - Faire des projets
Proposer - conseiller
Parler des qualités et des défauts
Faire une demande écrite
Raconter une anecdote
Améliorer son image

**Unité 3:** Exprimer la volonté et l'obligation
Formuler des souhaits
Exprimer un manque/un besoin
Parler de l'environnement, des animaux, des catastrophes naturelles

**Contenu grammatical:**

1. Le passé : passé composé/imparfait
2. Pronoms compléments directs/indirects, y/en (idées/choses)
3. Propositons relatives introduites par qui, que, où
4. Comparatif et superlatif
5. Le conditionnel présent
6. Situer dans le temps
7. Féminin des adjectifs
8. La prise de paroles : expressions
9. Le subjonctif : volonté, obligation

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- le livre à suivre : Campus: Tome 2

# GERMAN - VII

**Course Code:** **BTE 745** **Credit Units: 02**

## Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany
Introduction to Advanced Grammar and Business Language and Professional Jargon

## Course Contents:

**Module I: Dass- Sätze**
Explain the use of the conjunction "-that", where verb comes at the end of the sentence

**Module II: Indirekte Fragesätze**
To explain the usage of the "Question Pronoun" as the Relative Pronoun in a Relative Sentence, where again the verb falls in the last place in that sentence.

**Module III: Wenn- Sätze**
Equivalent to the conditional "If-" sentence in English. Explain that the verb comes at the end of the sentence.

**Module IV: Weil- Sätze**
Explain the use of the conjunction "because-" and also tell that the verb falls in the last place in the sentence.

**Module V: Comprehension texts**
Reading and comprehending various texts to consolidate the usage of the constructions learnt so far in this semester.

**Module VI: Picture Description**
Firstly recognize the persons or things in the picture and identify the situation depicted in the picture;
Secondly answer questions of general meaning in context to the picture and also talk about the personal experiences which come to your mind upon seeing the picture.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:


- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant - 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

# SPANISH - VII

**Course Code:** **BTE 746** **Credit Units: 02**

## Course Objective:
To enable students acquire working knowledge of the language; to give them vocabulary, grammar, expressions used on telephonic conversation and other situations to handle everyday Spanish situations with ease.

## Course Contents:

**Module I**
Revision of earlier semester modules

**Module II**
Zodiac signs. More adjectives…to describe situations, state of minds, surroundings, people and places.

**Module III**
Various expressions used on telephonic conversation (formal and informal)

**Module IV**
Being able to read newspaper headlines and extracts (Material to be provided by teacher)

**Module V**
Negative commands (AR ending verbs)

**Module VI**
Revision of earlier sessions and introduction to negative ER ending commands, introduction to negative IR ending verbs

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- Español En Directo I A, 1B
- Español Sin Fronteras
- Material provided by the teacher from various sources

# JAPANESE - VII

**Course Code: BTE 747 Credit Units: 02**

## Course Objective:
To enable the students to converse in the language with the help of different speech, possibilities, probabilities etc.
**Note:** The teaching is done in roman as well as Japanese script. 10 more kanjis (Japanese characters) are taught in this semester.

## Course Contents:

**Module I: Thought**
Expressing one's thought and intentions on different situations.

**Module II: Advice**
Giving advice, probability, possibility and suggestions.

**Module III: Informal Speech**
Addressing friends and close people using informal ways.

**Module IV: Simultaneous Verbs**
Describing two situations simultaneously.

**Module V: Possibility**
Explaining the probability and possibility of any situation.

## Learning Outcome
- Students can interact in a formal as well as informal way on above-mentioned topics.

## Methods of Private study/ Self help
- Hand-outs, audio-aids, assignments and role-plays will support classroom teaching.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- Shin Nihon-go no Kiso Lesson No.-31 to 35.
- All vocabulary and topics taught to the students are from the above mentioned book.

# CHINESE – VII

**Course Code:** **BTE 748** **Credit Units: 02**

## Course Objective:
The story of Cinderella first appears in a Chinese book written between 850 and 860 A.D. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

## Course Contents:

**Module I**
Drills
Dialogue practice
Observe picture and answer the question.
About china part –I Lesson 1, 2.

**Module II**
Pronunciation and intonation
Character Writing and stroke order.

**Module III**
Ask someone what he/she usually does on weekends?
Visiting people, Party, Meeting, After work….etc.

**Module IV**
Conversation practice
Translation from English to Chinese and vise-versa.
Short fables.

**Module V**
A brief summary of grammar.
The optative verb “yuanyi”.
The pronoun “ziji”.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- “Kan tu shuo hua” Part-I Lesson 1-7

# INDUSTRIAL TRAINING

**Course Code:** **BTE 750** **Credit Units: 06**

## Methodology:

Practical training is based on the theoretical subjects studied by students. It can be arranged within the college or in any related industrial unit. The students are to learn various industrial, technical and administrative processes followed in the industry. In case of on-campus training the students will be given specific task of fabrication/assembly/testing/analysis. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation on same.

## Examination Scheme:

| | |
|---|---|
| Feedback from industry/work place | 20 |
| Training Report | 40 |
| Viva | 15 |
| Presentation | 25 |
| **Total** | **100** |

# ANALOG CMOS IC DESIGN

**Course Code:** **BTE 703** **Credit Units: 04**

## Course Objective:

In the VLSI design course, the student was initiated in the world of circuit design from a digital perspective. In this course, transistor modeling is emphasized from a purely analog point of view. Some of the world's highest paid jobs in Electronics based industry are in Analog Circuit Design. This course will serve as an introduction to what Analog Design is like. Since CMOS is the technology being used most of the time, only CMOS technology is being included here. A serious learner is recommended to study BJT based circuits as well.

## Course Contents:

**Module I: MOSFET Basics**
MOSFET channel length modulation, small signal model, transconductance, T model, biasing a MOSFET at DC, four resistor biasing, modeling body effect, body transconductance, short channel effects, Coupling and Bypass capacitors, AC equivalent circuit

**Module II: Single Stage Amplifiers, Differential Amplifier and Current Mirrors**
Common source, common gate, source follower: input resistance, output resistance and voltage gain, high frequency model, MOSFET Unity Gain
High and Low Frequency response of CS Amplifier, Active loads, CS source with resistive load, diode connected load, current source load, MOSFET current source, Open circuit Time constants, Miller theorem, Cascode amplifier, Results for CS, CD, CB configurations taking $r_0$ into account
Current mirror, Cascode Current mirror, Active Current Mirrors: Large and small signal Analysis
Differential Pair: Common mode and Differential input voltage**,** Large signal Operation and Small signal Operation, effect of $r_0$, CMRR, effect of $R_D$ mismatch and $g_m$ mismatch, Input Offset Voltage of MOS pair, Frequency response of resistively loaded and actively loaded MOS Differential pair

**Module III: Operational Amplifiers**
Ideal Op Amp, Compensation of Op Amp, One stage Op Amp, Two stage CMOS Op Amp, Folded Cascode Op Amp: voltage gain, Frequency response and slew rate, Noise in Op Amps, power Supply Rejection Ratio

**Module IV: Noise, Stability and Frequency Compensation**
Statistical Characteristics of Noise, Types of Noise, Noise in single stage amplifiers, Noise in Differential pair Feedback review, Loop Gain, Transfer Function of feedback amplifier, effect of feedback on Amplifier poles, Miller Compensation and Pole Splitting, multipole system, frequency compensation, compensation of two stage op amp

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Sedra and Smith: Microelectronic Circuits
- Razavi Design of Analog CMOS Integrated Circuits
- Gray, Hurst, Lewis and Meyer: Analysis and design of Analog Ics
- Allen and Holberg: CMOS Analog Design

# OPTICAL COMMUNICATIONS

**Course Code:** **BTE 704** **Credit Units: 04**

## Course Objective:

The objective of this course is to introduce the student to the fundamental basics and understanding of fiber optical communication. This includes the properties of optical fibers and how are they used to establish optical links for communication systems.

## Course Contents:

**Module I: Fundamentals of Fiber Optics**
Different generations of optical fiber communication systems, Optical fiber structure, light propagation- total internal reflection, acceptance angle and numerical aperture, signal attenuation and dispersion. Modes in an optical fiber, Optical fibers: step-index, Graded-index, Single and Multimode, other types of fibers.

**Module II: Optical Sources**
LED-spontaneous emission- material used in LED, LED efficiency, surface emitting LED, edge emitters, stimulated emission, spontaneous emission, Structure of various LED's, LASER: stimulated emission, double heterostructure LASER, LASER tuning and degradation, driver for LED and LASER.

**Module III: Photo Detectors**
Characteristics of photo detector, direct and indirect band gap semiconductors, homo junction and hetro junction photodiodes, p-i-n photodiode, avalanche photodiode, phototransistor, optocouplers.

**Module IV: Fiber Properties**
Fiber end preparation, fiber splicing, fiber connectors, connection losses, fiber couplers, fiber materials, fiber fabrication, mechanical properties of fibers, different fiber cables.

**Module V: Fiber Optic Communication System**
Basic communication components, coupling to and from the fiber, multiplexing and coding, repeaters, bandwidth and rise time budgets, noise, bit error rate and eye pattern.

**Module VI: Application of Fiber Optics**
Long haul communication, LAN, medical application, undersea communication, military application, coherent optical communication, Fiber optic sensors- Intensity modulated sensor, Phase sensor, Diffraction Grating sensors.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- J M Senior : Optical fiber Communication
- Keiser: Optical communication
- Myanbaev and Scheiner: Fiber-Optic Communications Technology

# SOFTWARE ENGINEERING

**Course Code:** **BTE 705** **Credit Units: 04**

## Course Objective:

The basic objective of Software Engineering is to develop methods and procedures for software development that can scale up for large systems and that can be used to consistently produce high-quality software at low cost and with a small cycle time. Software Engineering is the systematic approach to the development, operation, maintenance, and retirement of software.
The course provides a thorough introduction to the fundamentals principles of software engineering.
The organization broadly be based on the classical analysis-design-implementation framework.

## Course Contents:

**Module I: Introduction**
Software life cycle models: Waterfall, Prototype, Evolutionary and Spiral models, Overview of Quality Standards like ISO 9001, SEI-CMM

**Module II: Software Metrics and Project Planning**
Size Metrics like LOC, Token Count, Function Count, Design Metrics, Data Structure Metrics, Information Flow Metrics. Cost estimation, static, Single and multivariate models, COCOMO model, Putnam Resource Allocation Model, Risk management.

**Module III: Software Requirement Analysis, design and coding**
Problem Analysis, Software Requirement and Specifications, Behavioural and non-behavioural requirements, Software Prototyping Cohesion & Coupling, Classification of Cohesiveness & Coupling, Function Oriented Design, Object Oriented Design, User Interface Design Top-down and bottom-up Structured programming, Information hiding,

**Module IV: Software Reliability, Testing and Maintenance**
Failure and Faults, Reliability Models: Basic Model, Logarithmic Poisson Model, Software process, Functional testing: Boundary value analysis, Equivalence class testing, Decision table testing, Cause effect graphing, Structural testing: path testing, Data flow and mutation testing, unit testing, integration and system testing, Debugging, Testing Tools, & Standards. Management of maintenance, Maintenance Process, Maintenance Models, Reverse Engineering, Software RE-engineering

**Module V: UML**
Introduction to UML, Use Case Diagrams, Class Diagram: State Diagram in UML Activity Diagram in UML Sequence Diagram in UML Collaboration Diagram in UML

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***

- K. K. Aggarwal & Yogesh Singh, “Software Engineering”, 2nd Ed, New Age International, 2005.
- R. S. Pressman, “Software Engineering – A practitioner’s approach”, 5th Ed., McGraw Hill Int. Ed., 2001.


***References:***

- R. Fairley, “Software Engineering Concepts”, Tata McGraw Hill, 1997.
- P. Jalote, “An Integrated approach to Software Engineering”, Narosa, 1991.
- Stephen R. Schach, “Classical & Object Oriented Software Engineering”, IRWIN, 1996.
- James Peter, W. Pedrycz, “Software Engineering”, John Wiley & Sons.
- Sommerville, “Software Engineering”, Addison Wesley, 1999.


- Sommerville, “Software Engineering”, Addison Wesley, 1999.

# ANALOG CMOS IC DESIGN LAB

**Course Code:** **BTE 723** **Credit Units: 01**

## Course Contents:

1. Plot the IV characteristics of Id vs Vds for varying Vgs
2. Design and simulate single stage amplifiers
3. Repeat experiment 1 including body effect.
4. Design and simulate current mirror
5. Design and simulate voltage source and voltage sink amplifier
6. Design and simulate Differential amplifier
7. Design and simulate Darlington pair
8. Design and simulate an OP amp
9. Simulate the operation of a CMOS op-amp with SPICE and find its frequency response.
10. Simulate and plot the frequency response of a switched capacitor filter circuit using SPICE.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# OPTICAL COMMUNICATIONS LAB

**Course Code:** **BTE 724** **Credit Units: 01**

## Course Contents:

1. To measure the Numerical Aperture of a multimode fiber.
2. To measure attenuation by cut Back technique.
3. To study the model properties of a multimode fiber.
4. To couple the light into a single mode fiber & measure the far-field power distribution.
5. To measure various fiber alignment losses.
6. To estimate the power budget for a fiber optic system.
7. To set up a fiber optic analog link.
8. To set up a fiber optic digital link.
9. To study Time Division Multiplexing of signals.
10. To study Manchester Coding.
11. To study voice digitization.
12. To simulate optical fiber wave guide.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# SOFTWARE ENGINEERING LAB

**Course Code:** **BTE 725** **Credit Units: 01**

**Software Required**: Rational Rose

## Assignments will be provided for the following:

- Use of Rational Rose for visual modeling.
- Creating various UML diagrams such as use case, sequence, collaboration, activity, state diagram, and class diagrams.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# MOBILE COMMUNICATIONS

**Course Code:** **BTE 706** **Credit Units: 03**

## Course Objective:

This course introduce about global system for mobile, 2.5G, 3G technologies, how wireless communication system works and what is FDMA, TDMA. This course also introduce some facts about propagation models.

## Course Contents:

**Module I: Introduction to Wireless Communication System**

Evolution of mobile radio communication, Mobile radiotelephony in U.S., Mobile radio system around the world, second generation (2G) cellular network, evolution to 2.5G wireless network, evolution for 2.5G TDMA standards, third generation (3G) wireless network.

**Module II: The Cellular Concept**

System design fundamentals, frequency reuse channel assignment strategies, Hand off strategies, Interference and system capacity, improving coverage and capacity in cellular system.

**Module III: Propagation Model and Spread Spectrum Modulation Techniques**

Longley rice model, okumara model, hata model, pcs extension to hata model, wolfish and bertoni model, Pseudo Noise (PN) sequence, Direct sequence spread spectrum (DSSS), frequency hopped spread spectrum (FHSS).

**Module IV: Multiple Access Techniques for Wireless Communication**

Introduction to multiple access, Frequency division multiple access (FDMA), Time division Multiple access (TDMA), Spread spectrum multiple access, Packet Radio.

**Module V: Global System for Mobile**

Global system for mobile (GSM), GSM system architecture, GSM radio subsystem, GSM channel types, Example of a GSM cell, Frame structure of GSM.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***

- Wireless Communications, Theodore S. Rappaport

***References:***

- Wireless Communications & Networks by William Stallings.
- Wireless Intelligent Networking by Gerry Christensen, Robert Duncan, Paul G. Florack

# POWER ELECTRONICS

**Course Code: BTE 707 Credit Units: 03**

## Course Objective:

The course aims to introduce them to the theory of operation, analytical and circuit models and basic design concepts of Electric Power components and systems.

## Course Contents:

**Module I: Triggering Devices**

Triggering devices, Unijunction Transistor, Characteristics and applications of UJT, Programmable Unijunction Transistor, DIAC, Silicon Controlled Switch, Silicon Unilateral Switch, silicon Silicon bilateral Switch, Shockley diode.

**Module II: Thyristor Firing Circuits, Turn on systems**

Two transistor model of Thyristor, Method of Triggering a thyristor, Thyristor Types, Requirement for triggering circuits, Thyristor Firing Circuits, Fullwave control of Ac with one thryristor, Light activated SCrs (LASCR), Control Circuit, dv/dt and di/dt protection of Thyristor, Pulse Transformer triggering, Firing SCR by UJT, TRIAC firing circuit, Phase control of SCR by pedestal and Ramp.

**Module III: Controlled Rectifiers**

Types of Converters, effect of inductive load, Commutating diode or free wheeling diode, controlled rectifiers, Bi phase half wave, single phase full wave phase controlled converter using bridge principle, harmonics.

**Module IV: Inverters**

Types of Inverters, Bridge Inverters, Voltage Source Inverters, Pulse Width Modulation Inverters, Current source Inverters.

**Module V: AC Voltage Controllers**

Types of AC voltage Controllers, AC Phase Voltage controllers, single Phase Voltage Controller with RL load, harmonic analysis of single phase full wave controller with RL load.

**Module VI: DC to DC Converters**

DC choppers, Chopper classification, two quadrant chopper, Four quadrant chopper.

**Module VII: Cycloconverter**

Single phase and three phase cycloconverters.

**Module VIII: Industrial Applications**

One shot Thyristor trigger Circuit, over voltage protection, simple battery charger, battery charging regulator, AC static switches, DC static switch

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***

- J. Michael: Power Electronics: Principles and Applications
- M. H. Rashid: Power Electronics circuits

***References:***

- H. C. Rai, “Power Electronics Devices, Circuits, Systems and Application”, Galgotia, 3rd Ed.
- P. S. Bimbhara, “Electrical Machinery, Theory Performance and Applications” Khanna Publications, 7th Ed

# BIO-MEDICAL ENGINEERING

**Course Code: BTE 708 Credit Units: 03**

## Course Objective:

The course describes the physiological basis as well as engineering principles underlying the working of wide variety of medical instruments.

## Course Contents:

**Module I: Introduction**

The age of Biomedical engineering, Development of Biomedical Instrumentation, Man- Instrumentation system, Components, Physiological system of the body, Problem encountered in measuring a living system. Transducers & Electrodes for Biomedical Applications**.** Sources of Biomedical Potentials.

**Module II: Electrodes**

Electrode theory, Biopotential Electrodes- Microelectrodes Body surface electrodes, Needle Electrodes, Biochemical transducers, Reference electrodes, PH electrodes, Blood Gas electrodes.Cardiovascular Measurements: ECG amplifiers, Electrodes & leads, ECG recorders, Vector Cardiographs, Continuous ECG recording (Holter Recording), Blood pressure measurement, Heart sound measurements.

**[**

**Module III: Patient Care & Monitoring**

Elements of Intensive care monitoring, patient monitoring display, Diagnosis, Calibration & reparability of patient monitoring equipment pacemakers & Defibrillators. Measurement in Respiratory system: Physiology of respiratory system Measurement of breathing mechanics Spiro meter, Respiratory therapy equipments Inhalators ventilators & Respirators, Humidifiers, Nebulizers Aspirators**.**

**Module IV: Diagnostic Techniques**

Ultrasonic Diagnosis, Eco- Cardiograph, Eco Encephalography, Ophthalmic scans, X- Ray & radio – isotope Instrumentation, CAT scan, Emission Computerized Temenography, MRI

**Module V: Bio Telemetry**

The Components of a Biotelemetry system Implant able units, Telemetry for ECG measurements during exercise, for Emergency patient monitoring .Other Prosthetic devices like Hearing Aid, Myoelectric Arm, special aspects- safety of medical Electronics Equipments, Shock hazards from Electrical equipment and prevention against them.

## Examination Scheme:

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Khandpur R.S. / Biomedical Instrumentation / TMH
- Tompkins / Biomedical DSP: C Language Examples and Laboratory Experiments for the IBM PC/ PHI.
- Cormwell / Biomedical Instrumentation and Measurements / PHI.

# TELEVISION PRINCIPLE

**Course Code: BTE 709 Credit Units: 03**

## Course Objective:

This subject deals with the analysis and synthesis of TV pictures, composite video signal, receiver picture tubes and television camera tubes. The principles of Monochrome Television Transmitter and Receiver systems, various Color Television systems with greater emphasis on PAL system and the advanced topics in Television systems are dealt in this course.

## Course Contents:

**Module I: Fundamentals of Television**
Geometry form and Aspect Ratio, Image Continuity, Number of scanning lines, Interlaced scanning, Picture resolution, Camera tubes, Image orthicon, vidicon, plumbicon, silicon diode array vidicon, solid state image scanners, monochrome picture tubes, composite video signal, video signal dimension, horizontal sync. Composition, vertical sync. Details, functions of vertical pulse train, scanning sequence details. Picture signal transmission, positive and negative modulation, VSB transmission sound signal transmission, standard channel bandwidth.

**Module II: Monochrome Television Transmitter and Receiver**
TV transmitter, TV signal propagation, Interference, TV transmission Antennas, Monochrome TV receiver, RF tuner, UHF, VHF tuner, Digital tuning techniques, AFT – IF subsystems, AGC, Noise cancellation, Video and sound inter carrier detection, vision IF subsystem, video amplifiers requirements and configurations DC re-insertion, Video amplifier circuits, Sync separation, typical sync processing circuits, Deflection current waveform, Deflection Oscillators, Frame deflection circuits, requirements, Line Deflection circuits, EHT generation, Receiver Antennas.

**Module III: Essentials of Colour Television**
Compatibility, colour perception, Three colour theory, luminance, hue and saturation, colour television cameras, values of luminance and colour difference signals, colour television display tubes, delta, gun, precision, in-line and Trinitron colour picture tubes, purity and convergence, purity and static and dynamic convergence adjustments, pincushion correction techniques, automatic degaussing circuit, grey scale tracking, colour signal transmission, bandwidth, modulation of colour difference signals, weighting factors, Formation of chrominance signal.

**Module IV: Colour Television Systems**
NTSC colour TV system, NTSC colour receiver, limitations of NTSC system, PAL colour TV system, cancellation of phase errors, PAL-D colour system, PAL coder, PAL-Decolour receiver, chromo signal amplifier, separation of U and V signals, colour burst separation, Burst phase Discriminator, ACC amplifier, Reference Oscillator, Ident and colour killer circuits, Colour signal matrixing, merits and demerits of the PAL system.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- R.R. Gulati, “Monochrome Television Practices, Principles, Technology and servicing, Second edition, New age International Publishes, 2004 (Module 1,2,4 and 5)
- R.R. Gulati, “Monochrome and colour television”, New age International Publisher, 2003 (Module 1,3 and 4)
- A.M. Dhake, “Television and Video Engineering”, Second Edition, TMH, 2003
- S.P. Bali, “Colour Television, Theory and Practice”, TMH, 1994.

# COMPUTER ARCHITECTURE

**Course Code: BTE 710 Credit Units: 03**

## Course Objective:

This course deals with computer architecture as well as computer organization and design. Computer architecture is concerned with the structure and behaviour of the various functional modules of the computer and how they interact to provide the processing needs of the user. Computer organization is concerned with the way the hardware components are connected together to form a computer system. Computer design is concerned with the development of the hardware for the computer taking into consideration a given set of specifications.

## Course Contents:

**Module I: Register Transfer Language**

Register Transfer, Bus and Memory Transfers, Arithmetic Micro-operations, Logic Micro-operations, Shift Micro-operations, Arithmetic Logic shift Unit.

**Module II: Basic Computer Organizations and Design**

Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory-Reference Instructions, Input-Output and Interrupt, Design of Accumulator Logic. Hardwired and Microprogrammed control: Control Memory, Address Sequencing, Design of Control Unit

**Module III: Central Processing Unit**

Introduction, General Register Organization, Stack Organization, Instruction representation, Instruction Formats, Instruction type, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer RISC and CISC

Computer Arithmetic: Introduction, Multiplication Algorithms, Division Algorithms, Floating-Point Arithmetic Operations

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**Module IV: Memory and Intrasystem Communication and Input output organisation**

**Memory:** Memory types and organization Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory, Memory Management Hardware

**Intrasystem communication and I/O:** Peripheral Devices, Input-Output

Controller and I/O driver, IDE for hard disk, I/O port and Bus concept, Bus cycle, Synchronous and asynchronous transfer, Interrupt handling in PC, Parallel Port, RS – 232 interface, Serial port in PC, Serial I/O interface, Universal serial bus IEEE 1394, Bus Arbitration Techniques, Uni-bus and multi-bus architectures EISA Bus, VESA Bus.

**Module V: Pipelining, Vector Processing and Multiprocessors**

Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Vector Processing, Array Processors.

Multiprocessors: Characteristics of Multiprocessors, Interconnection Structures, Interprocessor Arbitration, Interprocessor Communication and Synchronization, Advanced computer architecture, Pentium and Pentinum – Pro, Power PC Architecture

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

*Text:*


- Morris Mano, Computer System Architecture, 3rd Edition – 1999, Prentice-Hall of India Private Limited.
- Harry & Jordan, Computer Systems Design & Architecture, Edition 2000, Addison Wesley, Delhi.


***References:***


- WIliam Stallings, Computer Organization and Architecture, 4th Edition-2000, Prentice-Hall of India Private Limited.
- Kai Hwang-McGraw-Hill, Advanced Computer Architecture.
- Kai Hwang & Faye A Briggs, McGrew Hill, inc., Computer Architecture & Parallel Processing.
- John D. Carpinelli, Computer system Organization & Architecture, Edition 2001, Addison Wesley, Delhi

- John P Hayes, McGraw-Hill Inc, Computer Architecture and Organization.
- M.Morris Mano and Charles, Logic and Computer Design Fundamentals, 2nd Edition Updated, Pearson Education, ASIA.
- Hamacher, “Computer Organization,” McGraw hill.
- Tennenbaum,” Structured Computer Organization,” PHI
- B. Ram, “Computer Fundamentals architecture and organization,” New age international Gear C. w., “Computer Organization and Programming, McGraw hill

## INFORMATION THEORY AND CODING

**Course Code: BTE 801** **Credit Units: 03**

**Module I:Information Theory**

Introduction to uncertainty, information, entropy and its properties, entropy of binary memory less source and its extension to discrete memory less source, coding theorem, data compression, prefixcoding, HUFFMAN coding, Lempel-Ziv Coding

**Module II:Channels and Capacity**

Discrete memory less channels, Binary symmetric channel, mutual information & its properties,channel capacity, channel coding theorem, and its application to BSC, Shannon's theorem on channelcapacity, capacity of channel of infinite bandwidth, Bandwidth signal to noise Trade off, Practicalcommunication system in light of shannon's theorem, Fading Channel.

**Module III:Galois Fields**

Group and field of Binary system Galois field and its construction in GF (2m) and its basic properties,vector spaces and matrices in GF(2), Linear Block Codes, Systematic codes, and its encodingcircuits, syndrome and error detection ,minimum distance, error detecting and correcting capabilitiesof block code, Decoding circuits, Probability of undetected error for linear block code in BSC,Hamming code and their applications.

**Module IV:Cyclic Codes**

Cyclic codes and its basic properties, Generator & parity check matrix of cyclic codes, encoding & decoding circuits, syndrome computation & error detection, cyclic Hamming codes.

**Module V:BCH and Convolution codes**

Introduction to BCH codes, its encoding & decoding, error location & correction. Introduction to convolution codes, its construction & viterbi algorithm for maximum likelihood decoding.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

**Text and Reference Books:**


1. Digital Communication by Haykins Simon Wiley Publ.
2. Error control Coding: Theory and Application, by Shu Lin and Cosstlello,PHI
3. Modern analog and Digital Communication system, by B.P. Lathi
4. Digital Communication by Sklar, Pearson Education
5. Principal of Communication system by Taub & Schilling, TMH
6. Error Correcting Codes by Peterson W., MIT Press
7. Digital Communication By Das , Mullick, Chatterjee,

# C BASED EMBEDDED SYSTEM DESIGN

**Course Code: BTE 802 Credit Units: 03**

## Course Objective:

The syllabus is divided into two parts, the first one deals with 8051 architecture and its interfacing with other devices. Second part of the syllabus deals with the basic embedded system and it's design. A microcontroller is an integrated circuit that is programmable. The syllabus makes student perfect in assembly language programming, addressing modes etc apart from it input-output programming is discussed in detail. In the second part Embedded systems and it's application is discussed. Real Time Operating System is also explained at length.8051 C programming is also incorporated in the syllabus.

## Course Contents:

**Module I: Introduction to an embedded systems design & RTOS**

Introduction to Embedded system, Processor in the System, Microcontroller, Memory Devices, Embedded System Project Management, ESD and Co-design issues in System development Process, Design cycle in the development phase for an embedded system, Use of target system or its emulator and In-circuit emulator, Use of software tools for development of an ES.Inter-process Communication and Synchronization of Processes, Tasks and Threads, Problem of Sharing Data by Multiple Tasks, Real Time Operating Systems: OS Services, I/O Subsystems, Interrupt Routines in RTOS Environment, RTOS Task Scheduling model, Interrupt Latency and Response times of the tasks.

**Module II: Overview of Microcontroller**

Microcontroller and Embedded Processors, Overview of 8051 Microcontroller family: Architecture, basic assembly language programming concepts, The program Counter and ROM Spaces in the 8051, Data types, 8051 Flag Bits ad PSW Register, 8051 Register Banks and Stack Instruction set, Loop and Jump Instructions, Call Instructions, Time delay generations and calculations, I/O port programming Addressing Modes, accessing memory using various addressing modes, Arithmetic instructions and programs, Logical instructions, BCD and ASCII application programs, Single-bit instruction programming, Reading input pins vs. port Latch, Programming of 8051 Timers, Counter Programming.

**Module III: Communication with 8051**

Basics of Communication, Overview of RS-232, I2C Bus, UART, USB, IEEE 488 (GPIB). Parallel input output applications. (Stepper motor Sequencer program, Strobed input/output). Interrupt driven applications (real time clock, serial input/output with interrupt). Analog-digital interfacing (Pulse width modulator, 8-bit ADC).

**Module IV: Basics of 8051 C Programming**

Introduction to 8051 C, 8051 memory constitution, Constants, variables and data types. Arrays structures and unions, pointers, Loops and decisions, Functions, Modules and programs.

**Module V: 8051 C Programming**

Data interface, Timer control, Interrupt operations, Digital operations, A/D and D/A conversions, Common control problem examples (Centronics parallel interface, Printer interace, Memory access, Key matrix scanning, Stepper motor control and digital clock. ).

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

*Text:*

- Raj Kamal, 2004, "Embedded Systems", TMH.
- James W. Stewart and Kai X. Miao, 2en Edition. "The 8051 microcontroller" Pearson Edu. Prentice Hall.
- M.A. Mazidi and J. G. Mazidi, 2004 "The 8051 Microcontroller and Embedded Systems", PHI.

*References:*

- David E. Simon,1999, "An Embedded Software Primer", Pearson Education
- K.J. Ayala, 1991, "The 8051 Microcontroller", Penram International.
- Dr. Rajiv Kapadia, "8051 Microcontroller & Embedded Systems", Jaico Press
- Dr. Prasad, 2004, "Embedded Real Time System", Wiley Dreamtech.

# INFORMATION THEORY AND CODING LAB

**Course Code: BTE820** **Credit Units: 1**

**Contents:**

Lab to be conducted using Matlab. Programs to include basics of field theory, coding theory and applications of various coding techniques.

Coding concepts to implementedin hardware using shift registers , decoders, multiplexers, othe digital ICs etc.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# C BASED EMBEDDED SYSTEM DESIGN LAB

**Course Code:** **BTE 821** **Credit Units: 01**

## Course Contents:

1. Write a program to add two 8-bit numbers using microcontroller 8051.
2. Write a program to multiply two 8-bit numbers using microcontroller 8051.
3. Write a program to divide two 8-bit numbers using microcontroller 8051.
4. Write a program to subtract two 8-bit numbers using microcontroller 8051.
5. Write a program to generate a geometric progression using microcontroller 8051.
6. Write a program to generate a square wave using microcontroller 8051.
7. Write a program to generate a delay of 5 ms using microcontroller 8051.
8. Study and implement serial communication by interfacing microcontroller with a computer.
9. Study and implement parallel data communication by interfacing microcontroller with a LCD.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# COMMUNICATION SKILLS - VI

**Course Code: BTE 841 Credit Units: 01**

## Course Objective:

The modules are designed to enhance the communicative competence of the learners to equip them with efficient interpersonal communication.

## Course Contents:

**Module I: Dynamics of Group Discussion**
Introduction,
Methodology
Role Functions
Mannerism
Guidelines

**Module II: Communication through Electronic Channels**
Introduction
Technology based Communication Tools
Video Conferencing
Web Conferencing
Selection of the Effective Tool
E-mails, Fax etc.

**Module III: Effective Public Speaking**
Types
Essentials
Success in Public Speaking
Dos and Don'ts

## Examination Scheme:

| Components | CT1 | CT2 | CAF | V | GD | GP | A |
|---|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 25 | 10 | 10 | 10 | 5 |

CAF – Communication Assessment File
GD – Group Discussion
GP – Group Presentation

## Text & References:


- Jermy Comfort, Speaking Effectively, et.al, Cambridge
- Krishnaswamy, N, Creative English for Communication, Macmillan
- Raman Prakash, Business Communication, Oxford.
- Taylor, Conversation in Practice,

# BEHAVIOURAL SCIENCE - VIII
# (PERSONAL AND PROFESSIONAL EXCELLENCE)

**Course Code: BTE 843** **Credit Units: 01**

## Course Objective:
Importance of Personal and Professional excellence
Inculcating the components of excellence

## Course Contents:

**Module I: Components of Excellence**
Personal Excellence:
Identifying long-term choices and goals
Uncovering the talent, strength & style
Analyzing choke points in your personal processes by analysis in area of placements, events, seminars, conference, extracurricular activities, projects etc.

**Module II: Managing Personal Effectiveness**
Setting goals to maintain focus
Dimensions of personal effectiveness ( self disclosure, openness to feedback and perceptiveness)
Integration of personal and organizational vision for effectiveness
A healthy balance of work and play
Managing Stress creatively and productively

**Module III: Personal Success Strategy**
Time management
Handling criticism and interruptions
Dealing with difficult people
Mapping and evaluating the situations
Identifying long-term goals

**Module IV: Positive Personal Growth**
Understanding & Developing positive emotions
Positive approach towards future
Resilience during loss and challenge

**Module V: Professional Success**
Building independence & interdependence
Reducing resistance to change
Continued reflection (Placements, events, seminars, conferences, projects extracurricular Activities etc.)

**Module VI: End-of-Semester Appraisal**
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

## Examination Scheme:

| Components | SAP | A | Mid Term Test (CT) | VIVA | Journal for Success (JOS) |
|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 05 | 20 | 30 | 25 |

# FRENCH - VIII

**Course Code:** **BTE 844** **Credit Units: 02**

## Course Objective:

Provide students with the necessary linguistic tools

- to face up to different situations of communication
- to enhance their capacity in oral/written comprehension/expression

## Course Contents:

**Module B: Unités 4, 5, 6: PP. 48 - 86**

**Contenu lexical:**

**Unité 4:**
1. Présenter une information/les circonstances d'un événement
2. Exprimer la possibilité/la probabilité
3. Exprimer une quantité indéfinie
4. Comprendre et raconter un fait div

**Unité 5:**
1. Parler d'une passion, d'une aventure
2. Choisir/créer
3. Exprimer la surpirse/des sentiments

**Unité 6:**
1. Exprimer la cause et la conséquence
2. Exprimer la crainte et rassurer
3. Faire une démonstration

**Contenu grammatical:**

1. la construction passive
2. la forme impersonnelle
3. l'interrogation
4. les adjectifs et les pronoms indéfinis
5. les pronoms interrogatifs et démonstratifs
6. la construction avec deux pronoms
7. le subjonctif dans l'expression des sentiments, de la crainte, du but
8. constructions permettant l'expression de la cause et de la conséquence
9. l'enchaînement des idées : succession et opposition

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- le livre à suivre : Campus: Tome 2

# GERMAN - VIII

**Course Code:** **BTE 845** **Credit Units: 02**

## Course Objective:
To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany
Introduction to Advanced Grammar and Business Language and Professional Jargon

## Course Contents:

**Module I: Reading and comprehension**
Reading texts and comprehending them

**Module II: Information about German History**
Acquiring information about German History through appropriate texts and stories

**Module III: Bio data/Curriculam vitae**
Writing a bio-data in the proper format with all essential components

**Module IV: Informal letters**
Reading and writing informal letters

**Module V: Business etiquette**
Business etiquette in Germany and types of companies

**Module VI: Interview skills**
To learn to face interviews
Read a text 'Interviewspiel'

**Module VII: Picture Description**
Firstly recognize the persons or things in the picture and identify the situation depicted in the picture;
Secondly answer questions of general meaning in context to the picture and also talk about the personal experiences which come to your mind upon seeing the picture.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:


- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant - 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

# SPANISH – VIII

**Course Code:** **BTE 846** **Credit Units: 02**

## Course Objective:
To enable students to deal with Spanish situations putting things in perspective, using Past Tense. Enabling them to comprehend and form slightly complex sentences. Give students vocabulary of various situations.

## Course Contents:

**Module I**
Situational exercises/Picture Description:
At the cine
At the Chemist's/Hospital

**Module II**
At a corporate client's informal/formal meeting/gathering
Looking for accommodation

**Module III**
Past Tense (Indefinido) of regular verbs
Past Tense (Indefinido) of irregular verbs
Exercises related to the above

**Module IV**
Past Tense (Imperfecto)

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- Español En Directo I A, 1B
- Español Sin Fronteras
- Material provided by the teacher from various sources

# JAPANESE - VIII

**Course Code:** **BTE 847** **Credit Units: 02**

## Course Objective:

To enable the students to converse in the language with the help of different forms as volitional forms, active and passive voice and decision making etc.
**Note:** The course and teaching in Roman as well as Japanese script. Also introducing next 10 to 20 kanjis.

## Course Contents:

**Module I: Volitional forms**
Explaining the situation when one is thinking of doing something.

**Module II: Active and Passive voice**
Direct and indirect ways of speech.

**Module III: Plain Forms**
Sentence patterns using plain forms of verb.

**Module IV: Causes and effects**
Explaining causes and effects with different forms of verb.

**Module V: Decision making**
Expressing different occupations and how to make decision.

## Learning Outcome

- Students can speak the language and will be able to express their views and opinions comfortably.

## Methods of Private study/ Self help

- Hand-outs, audio-aids, assignments and role-plays will support classroom teaching.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- Shin Nihon-go no Kiso Lesson No.-36 to 40.
- All vocabulary and topics taught to the students are from the above mentioned book.

# CHINESE – VIII

**Course Code:** **BTE 848** **Credit Units: 02**

## Course Objective:

Paper was first invented n China in 105 AD. It was a closely guarded secret and didn't reach Europe until the 8th Century. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

## Course Contents:

**Module I**
Drills
Dialogue practice
Observe picture and answer the question.
The aspect particle "le" and the modal particle "le".

**Module II**
Optative verbs
Texts based on different topics
Enriching vocabulary by dealing with various daily scenarios and situations.

**Module III**
Sentences with subject predicate construction as its predicate
Pronunciation and intonation
Character writing and stroke order

**Module IV**
About china Part I Lesson 2,3
Chinese to English and English to Chinese translations from the news paper.

**Module V**
Questions with an interrogative pronoun
Essays, writing formal letters.
Conversation practice.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- "Kan tu shuo hua" Part-I Lesson 8-13

# PROJECT

**Course Code:** **BTE 860** **Credit Units: 15**

## Methodology:

Topics of project are to be based on the latest trends, verifying engineering concepts /principals and should involve elementary research work. The projects may involve design, fabrications, testing, computer modeling, and analysis of any engineering problem. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation on same.

## Examination Scheme:

| | |
|---|---|
| Literature study/ Fabrication/ Experimentation | 40 |
| Written Report | 20 |
| Viva | 15 |
| Presentation | 25 |
| **Total** | **100** |

# INSTRUCTIONS

**Course Code:** **BTE 803** **Credit Units: 03**

## Course Objective:
The basic objective of this course is to provide the students the core knowledge of industrial instrumentation so that they learn how to implement instrumentation techniques in industry.

## Course Contents:

**Module I: Introduction to Measurement & Instrumentation**
Classification, Characteristics of measuring instruments: accuracy, precision, error, linearity, hysteresis, resolution & sensitivity, generalized instrumentation systems, primary sensing elements-definition & examples, transducers: definition & Classification; measurement of pressure- diaphragms, capsules, bourdon tubes, strain-gauge transducers, LVDT type, Temperature Measurement (RTD, Thermocouple, thermistor, optical pyrometer); Measurement of force:-load cell(column type, proving ring, shear type), Measurement of flow classification flow meters, head type flow meters-Venturi tube, flow nozzle, pitot tube

**Module II: A. C. Instruments**
A.C. Voltmeter using rectifier; True RMS responding Voltmeter; Electronics Multimeter; Digital Voltmeter; spectrum analyzer, harmonic distortion analyzer, CRO-introduction, construction of conventional CRO. Digital storage oscilloscope.

**Module III: Telemetry**
Telemetry-introduction & different types of telemetry system, data acquisitions-signal conditioning, single channel & multichannel data acquisition system.

**Module IV: Miscellaneous Instruments**
Computer controlled test systems-introduction, testing of audio amplifier, Testing of Radio Receiver; Instruments used in computer controlled instrumentation, IEEE 488 electrical interface, Fiber optic Instrumentation.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***


- A. K. Sawhney, 2005, “Measurement & Instrumentation” Dhanpat Rai Publications.
- Rangan, Sarma, Mani, “Instrumentation- devices & systems”, TMH
- Helfrick, Cooper, “Modern Electronic Instrumentation & Measurement Techniques”, PHI – 4th Reprint.


***References:***


- Johnson, “Process Control Instrumentation” PHI – 7th Edition

# ARTIFICIAL NEURAL NETWORKS

**Course Code:** **BTE 804** **Credit Units: 03**

## Course Objective:

This subject deals with the introduction of ANN and the most advanced application of ANN. ANN leads to artificial intelligence approach and different algorithms for learning, training and the generalization of ANN.

## Course Contents:

**Module I: Introduction**
Biological neurons & memory: structure & function of simple neuron; Artificial Neural Networks (ANN); Typical applications of ANN: Classification, pattern recognition, control, optimization; Basic approach of working on ANN – Training, learning and generalization.

**Module II: Supervised Learning**
Single layer networks; perception – linear separability, training algorithm, limitations; Multi-layer networks – Architecture, back propagation algorithm (BPA) and training algorithms, applications.

**Module III: Unsupervised Learning**
Hamming networks; maxnet; simple competitive learning; adaptive resonance theory.

**Module IV: Associated models**
Hopfield networks; brain-in-a-box network; Boltzman machine.

**Module V: Optimization method**
Hopfield network for – TSP, solution of simultaneous linear equations, iterated gradient descent; simulated annealing.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- K. Mehrotra, C.K. Mohan & Sanjay Ranka, “Elements of ANN”, MIT Press, 1997.
- Simon Haykin,”Neural Networks – A comprehensive foundation”, Macmillan Publishing Company, New York, 1994.
- A Cichocki and R. Unbehaven, “Neural networks for optimization and signal processing”, John Wiley & Sons, 1993.
- J.M. Zurada, “ Introduction to ANN”, Jaico Publishers, Mumbai, 1997

# RTOS PROGRAMMING

**Course Code:** **BTE 805** **Credit Units: 03**

## Course Objective:

RTOS stands for Real Time Operating System

The syllabus is divided into five modules, the first one deal with RTOS basic concepts and its features like scheduling and its interrupt routines environment. Second module include in depth detail of dynamic and the Static-priority scheduling with Practical considerations. Module 3 deals with concepts like Resource sharing, Priority and stack resource protocols. A basic Overview of operating Systems is also covered. Module 4 and 5 looks various available commercial real-time and non-real-time operating systems and there Porting on microcontroller based development system board along with of Linux, Shell and RT Linux programming.

The syllabus makes student perfect in RTOS concepts like scheduling and sharing tasks apart from it Linux programming is discussed in detail.

## Course Contents:

**Module I: Introduction and basic concept**

Introduction to real-time, Example real-time applications, Hard vs. soft real time., OS Services, I/O Subsystems, Interrupt Routines in RTOS Environment, RTOS Task Scheduling model, Interrupt Latency and Response times of the tasks. Reference model.

**Module II: Itatic and dynamic scheduling**

Classic uniprocessor scheduling, Static scheduling, dynamic scheduling, Dynamic-priority scheduling, Static-priority scheduling, Dealing with Complexities arising in real systems, Practical considerations.

**Module III: sharing, protocols and real time systems**

Resource sharing, Priority inheritance and priority ceiling protocols, stack resource protocol. systems A quick look at some real systems, Basic operating-system functions needed for real-time computing, Overview of operating Systems.

**Module IV: Operating systems and embedded systems**

A brief survey of commercial real-time and non-real-time operating systems: Embedded OS, Real Time OS, Hand held OS, Porting RTOS on a Microcontroller based development system board.

**Module V: Shell and RT LINUX programming**

Programming in Linux, Shell programming, System Programming,
Programming in RT Linux

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***

- Embedded systems, Raj Kamal, TMH
- Real-Time Systems, Jane W. S. Liu, Prentice-Hall, Inc 32
- David E. Simon, “An Embedded Software Primer”, Pearson Education, 1999.

***References:***

- Embedded system design: An Introduction to processes tools & Techniques, A.S. Berger, CMP
- Books.
- Dr. Prasad, “Embedded Real Time System”, Wiley Dreamtech, 2004.

# VERILOG PROGRAMMING

**Course Code: BTE 806 Credit Units: 03**

## Course Objective:

This course discuss fundamental Verilog concepts of today's most advanced digital design techniques. it offers broad coverage of Verilog HDL from a practical design perspective. Introduces students to gate, dataflow (RTL), behavioural, and switch level modeling, describes leading logic synthesis methodologies; explains timing and delay simulation; and introduces many other essential techniques for creating tomorrows complex digital designs

## Course Contents:

**Module I: Introduction to Verilog HDL and Basic Concepts** Emergence of HDL, typical design flow, trends in HDL, Modeling concept
Design methodologies, modules, instances, simulation, design block and stimulus block
Lexical conventions, Data Types. System Tasks and Compiler Directives, Modules and Ports

**Module II: Gate-Level Modeling and Dataflow Modeling**
Gate Types. Gate Delays, Continuous Assignments. Delays. Expressions, Operators, and Operands. Operator Types. Examples for combinational and sequential circuit using Gate level and Data-flow modeling

**Module III: Behavioural Modeling**
Structured Procedures. Procedural Assignments. Timing Controls. Conditional Statements. Multiway Branching. Loops. Sequential and Parallel Blocks. Generate Blocks. Examples

**Module IV: Tasks and Functions and Useful Modeling Techniques**
Difference between Tasks and Functions. Tasks. Functions.
Procedural Continuous Assignments. Overriding Parameters. Conditional Compilation and Execution. Time Scales. Useful System Tasks

**Module V: Advanced Verilog Topics**
Timing and Delays. Switch Level Modeling,User-Defined Primitives, Logic Synthesis with Verilog HDL, Advanced Verification Techniques

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Samir Palnitkar, “Verilog HDL”, Pearson Education (2nd edition).
- Donald Thomas, Philip moorby, “The Verilog hardware Description language” 5th Edition, Kluwer Academic publishers
- Vivek Sagdeo,” The Complete Verilog Book”
- Parag K. Lala, Self-Checking and Fault-Tolerant Digital Design, Academic Press
- J. Bhasker, Verilog HDL Synthesis: A Practical Primer,1998

# ADVANCED NETWORKING

**Course Code: BTE 807 Credit Units: 03**

## Course Objective:

The objective here is to acquaint the students with the application of networking. Detail description of the various TCP/IP protocols and the working of ATM and its performance, Network security and authentication, and various algorithms related to it has been dealt, to get a practical approach.

## Course Contents:

**Module I: TCP/IP Protocol**
Layered protocols, internet Addressing, mapping internet address to physical address, internet protocol, OSPF, RIP, RARP, BOOTP, DHCP, BGP, ARP, IP, Ipv6, ICMP Transport protocols: UDP, TCP, SNMP

**Module II: Connection oriented networks**
Frame relay, B-ISDN, ATM protocol stack, ATM switching, internetworking with ATM Networks, traffic management in ATM.

**Module III: High Speed LAN**
LAN Ethernet, fast Ethernet, gigabit Ethernet, FDDI,
DSL, ADSL

**Module IV: Wireless communication**
Wireless networks, wireless channels, channel access, network architecture, IEEE 802.11, bluetooth

**Module V**
Network Analysis And Modeling: Queuing theory, modeling network as a graph, network management system and standard

## Examination Scheme:

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***

- High performance communication networks by: J. Walrand & Pravin Varaiya, Morgan Kaufman, 1999.
- Internetworking with TCP/IP Vol.1: Principles, Protocols, and Architecture (4th Edition) by Douglas E. Comer
- ATM networks: Concepts, Protocols, Applications by: Handel, Addision Wesseley.
- Cryptography & Networks Security Stallings, William 3rd edition

***References:***

- Computer networks: Tanenbaum, Andrew S, Prentice Hall
- Data communication & networking: Forouzan, B. A.
- Computer network protocol standard and interface Uyless, Black

# DATABASE MANAGEMENT SYSTEMS

**Course Code:** **BTE 808** **Credit Units: 03**

## Course Objective:

The objective of this course is to get students familiar with Databases and their use. They can identify different types of available database model, concurrency techniques and new applications of the DBMS.

## Course Contents:

**Module I: Introduction**
Concept and goals of DBMS, Database Languages, Database Users, Database Abstraction.
Basic Concepts of ER Model, Relationship sets, Keys, Mapping, Design of ER Model

**Module II: Hierarchical model & Network Model**
Concepts, Data definition, Data manipulation and implementation.
Network Data Model, DBTG Set Constructs, and Implementation

**Module III: Relational Model**
Relational database, Relational Algebra, Relational & Tuple Calculus.

**Module IV: Relational Database Design and Query Language**
SQL, QUEL, QBE, Normalization using Functional Dependency, Multivalued dependency and Join dependency.

**Module V: Concurrency Control and New Applications**
Lock Based Protocols, Time Stamped Based Protocols, Deadlock Handling, Crash Recovery. Distributed Database, Objective Oriented Database, Multimedia Database, Data Mining, Digital Libraries.

## Examination Scheme:

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***

- Korth, Silberschatz, “Database System Concepts”, 4th Ed., TMH, 2000.
- Steve Bobrowski, “Oracle & Architecture”, TMH, 2000

***References:***

- Date C. J., “An Introduction to Database Systems”, 7th Ed., Narosa Publishing, 2004
- Elmsari and Navathe, “Fundamentals of Database Systems”, 4th Ed., A. Wesley, 2004
- Ullman J. D., “Principles of Database Systems”, 2nd Ed., Galgotia Publications, 1999.

# ADVANCED JAVA PROGRAMMING

**Course Code:** **BTE 809** **Credit Units: 03**

## Course Objective:

The objective is to equip the students with the advanced feature of contemporary java which would enable them to handle complex programs relating to managing data and processes over the network. The major objective of this course is to provide a sound foundation to the students on the concepts, precepts and practices, in a field that is of immense concern to the industry and business.

## Course Contents:

**Module I**
Introduction to Java RMI, RMI services, RMI client, Running client and server, Introduction of Swing, Swing Components, Look and Feel for Swing Components, Introduction to Multimedia Programming.

**Module II**
ODBC and JDBC Drivers, Connecting to Database with the java.sql Package, Using JDBC Terminology; Evolving Nature of Area

**Module III**
Introduction to Servlets, Servlet Life Cycle, Servlet based Applications, Servlet and HTML. JSP: Introduction to JSP, JSP implicit objects, JSP based Applications

**Module IV**
Enterprise Java Beans:-EJB roles—EJB Client-Object -container-Transaction Management—implementing a Basic EJB Object-Implementing session Beans-Implementing Entity Beans-Deploying an enterprise Java Beans Object-Changes in EJB1.1 specification.

**Module V**
The Model-View-Controller Architecture What is Struts, Struts Tags, Creating Beans, Other Bean Tags,
Bean Output, Creating HTML Forms, The ActionForm class The Action class, SimpleStruts: a simple Struts application

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***

- Java 2 Unleashed (Techmedia – SAMS), Jamie Jaworski
- Professional Java Server Programming (a Press), Allamaraju
- Developing Java Servlets (Techmedia – SAMS), James Goodwill
- Using Java 1.2 Special Edition (PHI), Webber

***References:***


- David Flanagan, Jim Parley, William Crawford & Kris Magnusson, Java Enterprise in a nutshell- A desktop Quick reference - O'REILLY, 2003
- Stephen Ausbury and Scott R. Weiner, Developing Java Enterprise Applications, Wiley-2001
- Jaison Hunder & William Crawford, Java Servlet Programming, O'REILLY, 2002
- Dietal and Deital, “JAVA 2” PEARSON Publication

# DIGITAL IMAGE PROCESSING

**Course Code:** **BTE 810** **Credit Units: 03**

## Course Objective:

The syllabus is divided into four parts, the first one deal with introduction and fundamental concepts of digital image processing and image enhancement in spatial domain. Second module of the syllabus deals with image processing operations like image enhancement in frequency domain, image restoration respectively. Third and fourth module deals with applications like Image Compression and Object recognition respectively The syllabus helps a student perfect image processing fundamentals. Apart from it image processing application are discussed in detail.

## Course Contents:

**Module I: Introduction and Digital Image Fundamentals**

The origins of Digital Image Processing, Examples of Fields that Use Digital Image Processing, Fundamentals Steps in Image Processing, Elements of Digital Image Processing Systems, Image Sampling and Quantization, Some basic relationships like Neighbors, Connectivity, Distance Measures between pixels, Linear and Non Linear Operations.

**Image Enhancement in the Spatial Domain:** Some basic Gray Level Transformations, Histogram Processing, Enhancement Using Arithmetic and Logic operations, Basics of Spatial Filters, Smoothening and Sharpening Spatial Filters, Combining Spatial Enhancement Methods.

**Module II: Image Enhancement in the Frequency Domain**

Introduction to Fourier Transform and the frequency Domain, Smoothing and Sharpening Frequency Domain Filters, Homomorphic Filtering.

**Image Restoration:** A model of The Image Degradation / Restoration Process, Noise Models, Restoration in the presence of Noise Only Spatial Filtering, Pereodic Noise Reduction by Frequency Domain Filtering, Linear Position-Invarient Dedradations, Estimation of Degradation Function, Inverse filtering, Wiener filtering, Constrained Least Square Filtering, Geometric Mean Filter, Geometric Transformations.

**Module III: Image Compression**

Coding, Interpixel and Psychovisual Redundancy, Image Compression models, Elements of Information Theory, Error free comparison, Lossy compression, Image compression standards.

*Image Segmentation:* Detection of Discontinuities, Edge linking and boundary detection, Thresholding, Region Oriented Segmentation, Motion based segmentation

**Module IV: Representation and Description**

Representation, Boundary Descriptors, Regional Descriptors, Use of Principal Components for Description, Introduction to Morphology, Some basic Morphological Algorithms.

**Object Recoginition:** Patterns and Pattern Classes, Decision-Theoretic Methods, Structural Methods.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***


- Rafael C. Conzalez & Richard E. Woods, 2002, "Digital Image Processing", 2nd edition, Pearson Education.
- A.K. Jain, 1989, "Fundamental of Digital Image Processing", PHI.


***References:***


- Bernd Jahne, 2002, "Digital Image Processing", 5th Ed., Springer.
- William K Pratt, 2001, "Digital Image Processing: Piks Inside", John Wiley & Sons.

# INSTRUMENTATION LAB

**Course Code: BTE 822 Credit Units: 01**

## Course Contents:

1. Measurement of resolution and sensitivity of thermocouple (study of various thermocouples J, K, T, etc.) (Calibration)
2. Measurement of resolution, sensitivity and non linearity of thermistor (thermistor instability)
3. Measurement of thickness of LVDT.
4. Measurement of resolution of LVDT (and displacement measurement)
5. Study of proportional control and offset Problems.
6. Study of proportional integral control.
7. Study of proportional integral derivative (PID) control.
8. Vibration measurement by stroboscope (natural frequency of a cantilever)
9. Angular frequency (speed of rotating objects) measurement by stroboscope.
10. Pressure transducer study and calibration.
11. Proving ring (force measurement)
12. Torque cell.
13. Closed loop study of an electric circuit.
14. Young's modulus of a cantilever.
15. Young's modulus and poison's ratio of tensile test piece of M.S.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# ARTIFICIAL NEURAL NETWORKS LAB

**Course Code: BTE 823 Credit Units: 01**

## Course Contents:

1. Artificial Neural Networks and their Biological Motivation
2. Basic structures and properties of ANN
3. Perceptron, its learning law and applications
4. Adaline – The adaptive linear element, its structure and learning laws
5. Feed forward multiplayer neural networks. Back propagation algorithm.
6. Applications of multiplayer neural networks
7. Advanced learning algorithms for multi layer perceptrons
8. Hopfield Networks
9. RBF networks

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# RTOS PROGRAMMING LAB

**Course Code:** **BTE 824** **Credit Units: 01**

## Course Contents:

- RTOS programs using Task Scheduling
- RTOS programs for Interrupts and Interrupt Latency, Response times of the tasks.
- Programs related to Static scheduling, Dynamic scheduling.
- Program for Resource sharing.
- RTOS programs for Resource sharing
- Introduction to LINUX Commands, Introduction to vi editor
- Programming in Linux, Shell programming
- Programming in RT Linux

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# VERILOG PROGRAMMING LAB

**Course Code: BTE 825** **Credit Units: 01**

## List of Experiments:

To implement Verilog HDL code for:

1. Basic and universal gates with 2, 3, 4 inputs and testing their simulation with signals.
2. Code for combinational circuits like Half adder, full adder and full subtractor. Also trying out other simple combinatorial circuits like AOI, IOA, OAI.
3. Code for Sequential circuit like D and T, flip-flops.
4. JK and SR flip-flops.
5. 2 to 4 and 3 to 8 decoders.
6. 2 to 1, 4 to 1 and 8 to 1 multiplexers.
7. Simple register and shift register .
8. 2 to 1, 4 to 1 and 8 to 1 priority encoders, 9 input parity checker.
9. Four 8 bit three state drivers.
10. 1 bit, 4 bit 8 bit comparators.
11. Adding and subtracting 8 bit integers of various types.
12. Clock divider
13. Binary multipliers, Pulse counters.
14. Verilog HDLL Design examples of Moore machine, Mealy machine, generic gate inputs and delays.
15. Verilog HDL code examples of structural modeling showing binding.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# ADVANCED NETWORKING LAB

**Course Code:** **BTE 826** **Credit Units: 01**

## Equipments Required:

Switch, Network Cables, Patch Chord- Fiber optical and twisted pair cable, LAN cards, RJ-45 connectors Routers, Modem, etc.

**Software Required:** C/C++, Operating System: Linux/Windows Server

## Course Contents:

- Configuring Routers
- Introduction to Socket programming
- Implementation of Socket Programming
- Troubleshoot common network failures
- Gaining Access to the Routers and Switches

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# DATABASE MANAGEMENT SYSTEMS LAB

**Course Code:** **BTE 827** **Credit Units: 01**

**Software Required**: Oracle 9i

## Topics covered in lab will include:

- Database Design
- Data Definition (SQL)
- Data Retrieval (SQL)
- Data Modification (SQL)
- Views
- Triggers and Procedures
- PL\SQL

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# ADVANCED JAVA PROGRAMMING LAB

**Course Code:** **BTE 828** **Credit Units: 01**

**Course Contents:**

**Programming Language:** Java

1. WAP to display label on a frame with the help of JFrame
2. WAP to display six buttons on a panel using JFrame.
3. WAP. To display an image and a string in a label on the JFrame.
4. WAP that implement a JApplet that display a simple label
5. WAP that implement a JApplet and display the following frame
    a. Customer name
    b. Customer number
    c. Age
    d. Address
6. WAP to access a table Product Master from MS-Access using Java code.
7. WAP that implement a simple servlet program
8. WAP for authentication, which validate the login-id and password by the servlet code.
9. WAP to connecting a database using user-id and password.
10. WAP to insert data into the database using the prepared statement.
11. WAP to read data from the database using the Resulset.
12. WAP to read data send by the client (HTML page) using servlet.
13. WAP to include a HTML page into a JSP page.
14. WAP to handle the JSPException.WAP to read data send by a client (HTML page) using JSP.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# DIGITAL IMAGE PROCESSING LAB

**Course Code:** **BTE 829** **Credit Units: 01**

## Course Contents:

**Note:** Simulate all the programs using MATLAB

1. To study about the basic image processing tools.

2. To write program for Histogram processing.

3. To write program for lossy compression.

4. To write program for lossless compression.

5. To write algorithm for different morphology operations and generate programs.

6. To write program for inverse filtering.

7. To write program for least square filtering.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# Bachelor of Technology
# (Electronics & Communication Engineering)

# ECE

# CURRICULUM

# (2018-22 Batch)

# (AICTE)

# Bachelor of Technology
# (Electronics & Communication Engineering)

## Duration – 4 Years Full Time

## Programme Structure
## &
## Curriculum & Scheme of Examination

## 2018-22
## (Based on AICTE)

# AMITY UNIVERSITY
## MADHYA PRADESH

# PREAMBLE

Amity University aims to achieve academic excellence by providing multi-faceted education to students and encourage them to reach the pinnacle of success. The University has designed a system that would provide rigorous academic programme with necessary skills to enable them to excel in their careers.

This booklet contains the Programme Structure, the Detailed Curriculum and the Scheme of Examination. The Programme Structure includes the courses (Core and Elective), arranged semester wise. The importance of each course is defined in terms of credits attached to it. The credit units attached to each course has been further defined in terms of contact hours i.e. Lecture Hours (L), Tutorial Hours (T), Practical Hours (P). Towards earning credits in terms of contact hours, 1 Lecture and 1 Tutorial per week are rated as 1 credit each and 2 Practical hours per week are rated as 1 credit. Thus, for example, an L-T-P structure of 3-0-0 will have 3 credits, 3-1-0 will have 4 credits, and 3-1-2 will have 5 credits.

The Curriculum and Scheme of Examination of each course includes the course objectives, course contents, scheme of examination and the list of text and references. The different codes used for the components of evaluation are given below:-

| **Components** | **Codes** |
|---|---|
| Case Discussion/ Presentation/ Analysis | C |
| Home Assignment | H |
| Project | P |
| Seminar | S |
| Viva | V |
| Quiz | Q |
| Class Test | CT |
| Attendance | A |
| End Semester Examination | ESE |

It is hoped that it will help the students study in a planned and a structured manner and promote effective learning. Wishing you an intellectually stimulating stay at Amity University.

April, 2019

# PROGRAM OUTCOMES

**PO1**. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

**PO2. Problem Analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

**PO3. Design/Development of Solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

**PO4. Conduct Investigations of Complex Problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

**PO5. Modern Tool Usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

**PO6. The Engineer and Society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

**PO7. Environment and Sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**PO8. Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

**PO9. Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**PO10. Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

**PO11. Life-long Learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

**PO12. Project Management and Finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

## PROGRAM SPECIFIC OUTCOMES

**PSO1. Professional Skills**: An ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.

**PSO2. Problem-solving skills**: An ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.

**PSO3. Successful career and Entrepreneurship**: An ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.

## PROGRAMME STRUCTURE

| FIRST SEMESTER | | | | | | |
|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Lecture (L) Hours Per week** | **Tutorial (T) Hours Per week** | **Practical (P) Hours Per week** | **Total Credits** | **Hours** |
| BTE 101 | Mathematics – I<br>(Calculus and Linear Algebra) | 3 | 1 | - | 4 | 40 |
| BTE 102 | Physics (Semiconductor Physics) | 3 | 1 | - | 4 | 40 |
| BTE 103 | Programming for Problem Solving | 3 | - | - | 3 | 30 |
| BTE 104 | Workshop/ Manufacturing Practices | 1 | - | - | 1 | 10 |
| BTE 120 | Physics (Semiconductor Physics) Lab | - | - | 4 | 2 | 40 |
| BTE 121 | Programming for Problem Solving Lab | - | - | 4 | 2 | 40 |
| BTE 122 | Workshop/ Manufacturing Practices Lab | - | - | 4 | 2 | 40 |
| BTE 141 | Communication Skills – I<br>(English Language Usage Essentials) | 1 | | | 1 | 10 |
| BTE 142 | Environmental Studies – I | 2 | - | - | 2 | 20 |
| BTE 143 | Behavioural Science – I | 1 | - | - | 1 | 10 |
| BTE 144 | French – I | 2 | - | - | 2 | 20 |
| **CBCS** | | 3 | - | - | 3 | 30 |
| **TOTAL CREDITS (Including CBCS)** | | | | | **27** | |
| **Total Hrs Including CBCS per week** | | | | | **33** | |
| **Total Hrs in the Semester** | | | | | **330** | |

| **SECOND SEMESTER** | | | | | | |
|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Lecture (L) Hours Per week** | **Tutorial (T) Hours Per week** | **Practical (P) Hours Per week** | **Total Credits** | **Hours** |
| BTE 201 | Mathematics – II<br>(Probability & Statistics) | 3 | 1 | - | 4 | 40 |
| BTE 202 | Chemistry – I<br>(Concepts in Chemistry for Engineering) | 3 | 1 | - | 4 | 40 |
| BTE 203 | Basic Electrical Engineering | 3 | 1 | - | 4 | 40 |
| BTE 204 | Engineering Graphics & Design | 1 | - | - | 1 | 10 |
| BTE 220 | Chemistry – I Lab | - | - | 4 | 2 | 40 |
| BTE 221 | Basic Electrical Engineering Lab | - | - | 2 | 1 | 20 |
| BTE 222 | Engineering Graphics & Design Lab | - | - | 4 | 2 | 40 |
| BTE 241 | Communication Skills – II<br>(Introduction to Communication Skill) | 1 | - | - | 1 | 10 |
| BTE 242 | Environmental Studies – II | 2 | - | - | 2 | 20 |
| BTE 243 | Behavioural Science – II | 1 | - | - | 1 | 10 |
| BTE 244 | French – II | 2 | - | - | 2 | 20 |
| **CBCS** | | 3 | - | - | 3 | 30 |
| **TOTAL CREDITS (Including CBCS)** | | | | | **27** | |
| **Total Hrs Including CBCS** | | | | | **32** | |
| **Total Hrs in the Semester** | | | | | **320** | |
| TERM PAPER DURING SUMMER BREAK | | | | | | |

| **THIRD SEMESTER** | | | | | | |
|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Lecture (L) Hours Per week** | **Tutorial (T) Hours Per week** | **Practical (P) Hours Per week** | **Total Credits** | **Hours** |
| BTE 301 | Applied Mathematics –III (Differential Calculus) | 3 | - | - | 3 | 30 |
| ECE 301 | Electronic Devices | 3 | - | - | 3 | 30 |
| ECE 302 | Digital System Design | 3 | - | - | 3 | 30 |
| ECE 303 | Network Theory | 3 | - | - | 3 | 30 |
| ECE 304 | Signals and Systems | 3 | - | - | 3 | 30 |
| ECE 321 | Electronics Devices Lab | - | - | 2 | 1 | 20 |
| ECE 322 | Digital System Design Lab | - | - | 2 | 1 | 20 |
| ECE 323 | Network Theory Lab | - | - | 2 | 1 | 20 |
| ECE 325 | MATLAB and SIMULINK Lab | - | - | 4 | 2 | 40 |
| BCU 341 | Communication Skills – III | 1 | - | - | 1 | 10 |
| BSU 343 | Behavioural Science – III | 1 | - | - | 1 | 10 |
| FLU 344 | French – III | 2 | - | - | 2 | 20 |
| NTP 330 | **Term Paper (Evaluation)** | **-** | **-** | **-** | 2 | - |
| **CBCS** | | 3 | - | - | 3 | 30 |
| **TOTAL CREDITS (Including CBCS)** | | | | | **29** | |
| **Total Hrs Including CBCS per week** | | | | | **32** | |
| **Total Hrs in the Semester** | | | | | **320** | |

| FOURTH SEMESTER | | | | | | |
|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Lecture (L) Hours Per week** | **Tutorial (T) Hours Per week** | **Practical (P) Hours Per week** | **Total Credits** | **Hours** |
| ECE 401 | Analog and Digital Communication | 3 | - | - | 3 | 30 |
| ECE 402 | Analog Circuits | 3 | - | - | 3 | 30 |
| ECE 403 | Microcontrollers | 3 | - | - | 3 | 30 |
| CSE 403 | Java Programming | 2 | 1 | - | 3 | 30 |
| ECE 421 | Analog and Digital Communication Lab | - | - | 2 | 1 | 20 |
| ECE 422 | Analog Circuits Lab | - | - | 2 | 1 | 20 |
| ECE 423 | Microcontrollers Lab | - | - | 2 | 1 | 20 |
| CSE 423 | Java Programming Lab | - | - | 4 | 2 | 40 |
| ECE 425 | Electronics Workshop Lab | - | - | 4 | 2 | 40 |
| BCU 441 | Communication Skills – IV | 1 | - | - | 1 | 10 |
| BSU 443 | Behavioural Science – IV | 1 | - | - | 1 | 10 |
| FLU 444 | French – IV | 2 | - | - | 2 | 20 |
| **CBCS** | | 3 | 1 | - | 4 | 40 |
| **TOTAL CREDITS (Including CBCS)** | | | | | **27** | |
| **Total Hrs Including CBCS per week** | | | | | **34** | |
| **Total Hrs in the Semester** | | | | | **340** | |
| INDUSTRIAL PRACTICAL TRAINING – I : 6-8 WEEKS | | | | | | |

| **FIFTH SEMESTER** | | | | | | |
|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Lecture (L) Hours Per week** | **Tutorial (T) Hours Per week** | **Practical (P) Hours Per week** | **Total Credits** | **Hours** |
| ECE 501 | Electromagnetic Waves | 3 | - | - | 3 | 30 |
| ECE 502 | Digital Signal Processing | 3 | - | - | 3 | 30 |
| ECE 503 | Antennas and Propagation | 3 | - | - | 3 | 30 |
| ECE 504 | Control Systems | 3 | - | - | 3 | 30 |
| BTE 501 | Data Structures | 3 | - | - | 3 | 30 |
| ECE 521 | Electromagnetic Waves Lab | - | - | 2 | 1 | 20 |
| ECE 522 | Digital Signal Processing Lab | - | - | 2 | 1 | 20 |
| ECE 523 | Antennas and Propagation Lab | - | - | 2 | 1 | 20 |
| ECE 524 | Control Systems Lab | - | - | 2 | 1 | 20 |
| BTE 521 | Data Structures Lab | - | - | 2 | 1 | 20 |
| BCU 541 | Communication Skills – V | 1 | - | - | 1 | 10 |
| BSU 543 | Behavioural Science – V | 1 | - | - | 1 | 10 |
| FLU 544 | French – V | 2 | - | - | 2 | 20 |
| NPT 550 | **Industrial Practical Training – I (Evaluation)** | **-** | **-** | **-** | 3 | - |
| **CBCS** | | 3 | 1 | - | 4 | 40 |
| **TOTAL CREDITS (Including CBCS)** | | | | | **31** | |
| **Total Hrs Including CBCS per week** | | | | | **33** | |
| **Total Hrs in the Semester** | | | | | **330** | |

| SIXTH SEMESTER | | | | | | |
|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Lecture (L) Hours Per week** | **Tutorial (T) Hours Per week** | **Practical (P) Hours Per week** | **Total Credits** | **Hours** |
| ECE 601 | Computer Architecture | 3 | - | - | 3 | 30 |
| ECE 602 | Probability Theory and Stochastic Processes | 3 | - | - | 3 | 30 |
| ECE 603 | Quantitative Aptitude and Reasoning | 3 | - | - | 3 | 30 |
| CSE 603 | Internet of Things (IOT) | 2 | - | - | 2 | 20 |
| CSE 604 | Problem Solving Techniques – I | 3 | - | - | 3 | 30 |
| CSE 623 | Internet of Things (IOT) Lab | - | - | 4 | 2 | 40 |
| CSE 624 | Problem Solving Techniques – I Lab | - | - | 4 | 2 | 40 |
| **ELECTIVES (Any one from following with Practical)** | | | | | **4** | **50** |
| ECE 605 | Microwave Theory and Techniques | 3 | - | - | - | - |
| ECE 606 | Instrumentation | 3 | - | - | - | - |
| CSE 304 | Database Management Systems | 3 | - | - | - | - |
| CSE 504 | Advanced Java Programming | 3 | - | - | - | - |
| ECE 625 | Microwave Theory and Techniques Lab | - | - | 2 | - | - |
| ECE 626 | Instrumentation Lab | - | - | 2 | - | - |
| CSE 324 | Database Management Systems Lab | - | - | 2 | - | - |
| CSE 524 | Advanced Java Programming Lab | - | - | 2 | - | - |
| | | | | | | |
| BCU 641 | Communication Skills – VI | 1 | - | - | 1 | 10 |
| BSU 643 | Behavioural Science – VI | 1 | - | - | 1 | 10 |
| FLU 644 | French – VI | 2 | - | - | 2 | 20 |
| NMP 660 | **Minor Project** | - | - | - | 2 | - |
| CBCS (Project) | | - | - | - | 1 | - |
| **TOTAL CREDITS (Including CBCS)** | | | | | **29** | |
| **Total Hrs per Week** | | | | | **31** | |
| **Total Hrs in the Semester** | | | | | **310** | |
| INDUSTRIAL PRACTICAL TRAINING – II : 6-8 WEEKS | | | | | | |

| SEVENTH SEMESTER | | | | | | |
|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Lecture (L) Hours Per week** | **Tutorial (T) Hours Per week** | **Practical (P) Hours Per week** | **Total Credits** | **Hours** |
| ECE 701 | Fiber Optic Communication | 3 | - | - | 3 | 30 |
| ECE 702 | Computer Network | 3 | - | - | 3 | 30 |
| ECE 721 | Fiber Optic Communication Lab | - | - | 2 | 1 | 20 |
| ECE 722 | Computer Network Lab | - | - | 2 | 1 | 20 |
| **ELECTIVES (Any one from each category) A (With Practical)** | | | | | **4** | **50** |
| ECE 704 | CMOS Design | 3 | - | - | - | - |
| ECE 705 | Artificial Neural Networks | 3 | - | - | - | - |
| ECE 706 | Analog CMOS IC Design | 3 | - | - | - | - |
| CSE 605 | Software Engineering | 3 | - | - | - | - |
| ECE 724 | CMOS Design Lab | - | - | 2 | - | - |
| ECE 725 | Artificial Neural Networks Lab | - | - | 2 | - | - |
| ECE 726 | Analog CMOS IC Design Lab | - | - | 2 | - | - |
| CSE 625 | Software Engineering Lab | - | - | 2 | - | - |
| **ELECTIVES (Any one from each category) B (Without Practical)** | | | | | **3** | **30** |
| ECE 707 | Mobile Communications | 3 | - | - | - | - |
| ECE 708 | Power Electronics | 3 | - | - | - | - |
| ECE 709 | Bio-Medical Engineering | 3 | - | - | - | - |
| ECE 710 | Wireless Sensor Networks | 3 | - | - | - | - |
| | | | | | | |
| BCU 741 | Communication Skills – VII | 1 | - | - | 1 | 10 |
| BSU 743 | Behavioural Science – VII | 1 | - | - | 1 | 10 |
| FLU 744 | French – VII | 2 | - | - | 2 | 20 |
| NPT 750 | **Industrial Practical Training – II (Evaluation)** | - | - | - | 5 | - |
| NMP 760 | **Major Project – I** | - | - | - | 6 | - |
| **TOTAL CREDITS** | | | | | **30** | |
| **Total Hrs per week** | | | | | **22** | |
| **Total Hrs in the Semester** | | | | | **220** | |

| EIGHT SEMESTER | | | | | | |
|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Lecture (L) Hours Per week** | **Tutorial (T) Hours Per week** | **Practical (P) Hours Per week** | **Total Credits** | **Hours** |
| ECE 801 | Information Theory and Coding | 3 | - | - | 3 | 30 |
| ECE 802 | Radar & Satellite Communications | 3 | - | - | 3 | 30 |
| ECE 803 | Embedded Systems | 3 | - | - | 3 | 30 |
| ECE 821 | Information Theory and Coding Lab | - | - | 2 | 1 | 20 |
| ECE 822 | Radar & Satellite Communications Lab | - | - | 2 | 1 | 20 |
| ECE 823 | Embedded Systems Lab | - | - | 2 | 1 | 20 |
| **ELECTIVES (Any one from following with Practical)** | | | | | **4** | **50** |
| ECE 804 | VHDL Programming | 3 | - | - | - | - |
| ECE 805 | Verilog Programming | 3 | - | - | - | - |
| ECE 806 | Advanced Networking | 3 | - | - | - | - |
| ECE 807 | Speech and Audio Processing | 3 | - | - | - | - |
| CSE 801 | Digital Image Processing | 3 | - | - | - | - |
| ECE 824 | VHDL Programming Lab | - | - | 2 | - | - |
| ECE 825 | Verilog Programming Lab | - | - | 2 | - | - |
| ECE 826 | Advanced Networking Lab | - | - | 2 | - | - |
| ECE 827 | Speech and Audio Processing Lab | - | - | 2 | - | - |
| CSE 821 | Digital Image Processing Lab | - | - | 2 | - | - |
| | | | | | | |
| BCU 841 | Communication Skills – VIII | 1 | - | - | 1 | 10 |
| BSU 843 | Behavioural Science – VIII | 1 | - | - | 1 | 10 |
| FLU 844 | French – VIII | 2 | - | - | 2 | 20 |
| NMP 860 | **Major Project – II** | **-** | **-** | **-** | 9 | - |
| **TOTAL CREDITS** | | | | | **29** | |
| **Total Hrs per week** | | | | | **24** | |
| **Total Hrs in the Semester** | | | | | **240** | |

# Bachelor of Technology
# (Electronics & Communication Engineering))

# Duration – 4 Years Full Time

## OVERALL CREDITS

| Sr. No. | Semester | No. of Credits | No. of Hours |
|---|---|---|---|
| 1 | I | 27 | 33 |
| 2 | II | 27 | 32 |
| 3 | III | 29 | 32 |
| 4 | IV | 27 | 34 |
| 5 | V | 31 | 33 |
| 6 | VI | 29 | 31 |
| 7 | VII | 30 | 22 |
| 8 | VIII | 29 | 24 |
| **Total Credits** | | **229** | **239** |

# MATHEMATICS-I
# (CALCULUS AND LINEAR ALGEBRA)

**Course Code: BTE 101** **Credit Units: 04**
**Total Hours: 40**

**Course Objective:**
The objective of this course is to familiarize the prospective engineers with techniques in basic calculus and linear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

**Module 1: Calculus (6 Hours)**
Evolutes and involutes; Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions.

**Module 2: Calculus (6 Hours)**
Rolle's theorem, Mean value theorems, Taylor's and Maclaurin theorems with remainders; Indeterminate forms and L'Hospital's rule; Maxima and minima.

**Module 3: Matrices (8 Hours)**
Matrices, vectors: addition and scalar multiplication, matrix multiplication; Linear systems of equations, linear Independence, rank of a matrix, determinants, Cramer's Rule, inverse of a matrix, Gauss elimination and Gauss-Jordan elimination.

**Module 4: Vector spaces (10 Hours)**
Vector Space, linear dependence of vectors, basis, dimension; Linear transformations (maps), range and kernel of a linear map, rank and nullity, Inverse of a linear transformation, rank- nullity theorem, composition of linear maps, Matrix associated with a linear map.

**Module 5: Vector spaces (10 Hours)**
Eigen values, eigenvectors, symmetric, skew-symmetric, and orthogonal Matrices, eigen base. Diagonalization; Inner product spaces, Gram-Schmidt ortho gonalization. Examination Scheme:

## Course Outcomes:
The objective of this course is to familiarize the prospective engineers with techniques in basic calculus and linear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.
The students will learn:
- To apply differential and integral calculus to notions of curvature and to improper integrals. Apart from various applications, they will have a basic understanding of Beta and Gamma functions.
- The essential tools of matrices and linear algebra including linear transformations, eigen values, diagonalization and orthogonalization.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Suggested Text/Reference Books


- G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint,2002.
- Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
- D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole,2005.
- Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
- Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint,2010.
- N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint,2010.
- B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
- V. Krishnamurthy, V.P. Mainra and J.L. Arora, An introduction to Linear Algebra,
- Affiliated East–West press, Reprint2005.

# PHYSICS (SEMICONDUCTOR PHYSICS)

**Course Code: BTE 102** **Credit Units: 04**
**Total Hours: 40**

**Course Objective:**
Aim of this course is to introduce the students to fundamentals of semi conductor Physics, which form the basis of Applied Science and Engineering

**Module I:** Electronic materials **(10 Hours)**
Free electron theory, Density of states and energy band diagrams, Kronig-Penny model (to introduce origin of band gap), Energy bands in solids, E-k diagram, Direct and indirect band-gaps, Types of electronic materials: metals, semiconductors, and insulators, Density of states, Occupation probability, Fermi level, Effective mass, Phonons.

**Module II:** Semiconductors **(10 Hours)**
Intrinsic and extrinsic semiconductors, Dependence of Fermi level on carrier-concentration and temperature (equilibrium carrier statistics), Carrier generation and recombination, Carrier transport: diffusion and drift, p-n junction, Metal-semiconductor junction (Ohmic and Schottky), Semiconductor materials of interest for optoelectronic devices.

**Module III:** Light-semiconductor interaction **(6 Hours)**
Optical transitions in bulk semiconductors: absorption, spontaneous emission, and stimulated emission; Joint density of states, Density of states for photons, Transition rates (Fermi's golden rule), Optical loss and gain; Photovoltaic effect, Exciton, Drude model.

**Module IV:** Measurements **(6 Hours)**
Four-point probe and van der Pauw measurements for carrier density, resistivity, and hall mobility; Hot-point probe measurement, capacitance-voltage measurements, parameter extraction from diode I-V characteristics, DLTS, band gap by UV-Vis spectroscopy, absorption/transmission.

**Module V:** Engineered semiconductor materials **(8 Hours)**
Density of states in 2D, 1d and 0D (qualitatively). Practical examples of low-dimensional systems such as quantum wells, wires, and dots: design, fabrication, and characterization techniques. Heterojunctions and associated band-diagrams

## Course Outcomes:
After successful completion of the course students will have the knowledge and skill to
- Relate semiconductor material properties to physical concepts.
- Analyse Charge carrier dynamics in semiconductors by implementing the equations of state.
- Relate the working of semiconductor device building blocks (diodes and transistors) to the charge carrier action.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

A: Attendance, CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination

## Text & References:

- J. Singh, Semiconductor Optoelectronics: Physics and Technology, McGraw-Hill Inc. (1995).
- B. E. A. Saleh and M. C. Teich, Fundamentals of Photonics, John Wiley & Sons, Inc., (2007).
- S. M. Sze, Semiconductor Devices: Physics and Technology, Wiley (2008).
- A. Yariv and P. Yeh, Photonics: Optical Electronics in Modern Communications, Oxford University Press, New York (2007).
- P. Bhattacharya, Semiconductor Optoelectronic Devices, Prentice Hall of India (1997).
- Online course: “ Semiconductor Optoelectronics” by M R Shenoy on NPTEL
- Online course: "Optoelectronic Materials and Devices" by Monica Katiyar and Deepak Gupta on NPTEL

# PROGRAMMING FOR PROBLEM SOLVING

**Course Code: BTE 103** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The objective of this course module is to acquaint the students with the basics of computers system, its components, data representation inside computer and to get them familiar with various important features of procedure oriented programming language i.e. C.

**Module I: Introduction to Programming (3 hours)**
Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.) Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/ Pseudocode with examples. From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code.

**Module II: Programming Essential (8 hours)**
Arithmetic expressions and precedence, Conditional Branching and Loop, Writing and evaluation of conditionals and consequent branching , Iteration and loops.

**Module III: Arrays (4 hours)**
Arrays (1-D, 2-D), Character arrays and Strings.

**Module IV: Basic Algorithms (3 hours)**
Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required)

**Module V: Function (3 hours)**
Functions (including using built in libraries), Parameter passing in functions, call by value, Passing arrays to functions: idea of call by reference

**Module VI: Recursion (3 hours)**
Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort.

**Module VII: Structure (2 hours)**
Structures, Defining structures and Array of Structures.

**Module VIII: Pointers (2 hours)**
Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation)

**Module IX: File handling(2 hours)**
Basics of file Handling.

## Course Outcomes:
The student will learn
- To formulate simple algorithms for arithmetic and logical problems.
- To translate the algorithms to programs (in C language).
- To test and execute the programs and correct syntax and logical error
- To implement conditional branching, iteration and recursion.
- To decompose a problem into functions and synthesize a complete program using divide and conquer approach.
- To use arrays, pointers and structures to formulate algorithms and programs.
- To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.
- To apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:


- Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
- E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill
- Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India

# WORKSHOP/MANUFACTURING PRACTICES

**Course Code: BTE 104** **Credit Units: 01**

**Total Hours: 10**

**Course Objective:**

The objective of this course is to impart the basic knowledge of Manufacturing methods, CNC machines, materials & their properties and various manufacturing processes to the students of all engineering discipline.

**Module I:** Manufacturing Methods- casting, forming, machining, joining, advanced manufacturing methods **(3 hours)**

**Module II:** CNC machining, Additive manufacturing, Fitting operations & power tools **(2 hours)**

**Module III:** Electrical &Electronics, Carpentry, Plastic moulding, glass cutting **(3 hours)**

**Module IV:** Metal casting, Welding (arc welding & gas welding), brazing **(2 hours)**

## Course Outcomes:

- To gain knowledge of the different manufacturing processes which are commonly employed in the industry
- To fabricate components using different materials

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:


- Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., “ Elements of Workshop Technology” , Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.
- Kalpakjian S. And Steven S. Schmid, “ Manufacturing Engineering and Technology” , 4th edition, Pearson Education India Edition, 2002.
- Gowri P. Hariharan and A. Suresh Babu,” Manufacturing Technology – I” Pearson Education, 2008.
- Roy A. Lindberg, “ Processes and Materials of Manufacture”, 4th edition, Prentice Hall India, 1998.
- Rao P.N., “ Manufacturing Technology” , Vol. I and Vol. II, Tata McGrawHill House, 2017.

# PHYSICS (SEMICONDUCTOR PHYSICS) LAB

**Course Code: BTE 120** **Credit Units: 02**
**Total Hours: 40**

**Course Objective**
To provide detailed introduction to the principal class of semiconductor and. electronics components

**List of Experiments**
Time allocated -
(i) For experiment No.1-8 is **24 hours**
(ii) and for experiment No.9-16 is **16 hours**

1. To determine the forbidden band gap energy of a semiconductor.
2. To study the common base characteristics of a *PNP* junction transistor, by drawing
   (i) input characteristic curves and
   (ii) output characteristic curves.
3. To study the common emitter characteristics of a *NPN* junction transistor, by drawing input characteristic curves and output characteristic curves.
4. To observe the action of *p-n* junction diode as :
   (i) half wave rectifier and
   (ii) full wave rectifier.
5. To study a series /parallel resonant LCR circuit, its resonate frequency and quality factor
6. To measure the frequency of a signal by comparing the frequencies of oscillations using Lissajous figures.
7. To study the voltage regulation characteristics of a zener diode.
8. To study the characteristics of a solar cell.
9. To determine the value of e/m of an electron by Thomson's method.
10. To draw the characteristic curves of a photocell and to find the maximum velocity of the emitted electrons.
11. To study charging and discharging of a capacitor.
12. To study V-I characteristics of *p-n* junction diode in forward and reverse bias conditions.
13. To study the phenomena of magnetic hysteresis and calculate the retentivity, coercivity and saturation magnetization of a material
14. To determine the Hall co-efficient, Hall Voltage, carrier concentration of a material.
15. To study various crystal structures.
16. To plot the characteristics of thermistor and hence find the temperature coefficient of resistance.

## Course Outcomes:

The course will provide the students with skills to use Physics
- To understand the working of semiconductor devices and Electronic Circuits.
- To quantitatively analyze the working of defined electronic system component.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

A: Attendance, CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;

# PROGRAMMING FOR PROBLEM SOLVING LAB

**Course Code: BTE 121** **Credit Units: 02**
**Total Hours: 40**

**List of experiments/demonstrations:**
**Tutorial 1**: Problem solving using computers: **(2 hours)**
**Lab1**: Familiarization with programming environment

**Tutorial 2**: Variable types and type conversions: **(2 hours)**
**Lab 2**: Simple computational problems using arithmetic expressions
**Tutorial 3:** Branching and logical expressions: **(4 hours)**
**Lab 3:** Problems involving if-then-else structures
**Tutorial 4**: Loops, while and for loops: **(4 hours)**
**Lab 4:** Iterative problems e.g., sum of series
**Tutorial 5**: 1D Arrays: searching, sorting**: (4 hours)**
**Lab 5**: 1D Array manipulation
**Tutorial 6**: 2D arrays and Strings**: (4 hours)**
**Lab 6**: Matrix problems, String operations
**Tutorial 7**: Functions, call by value: **(4 hours)**
**Lab 7**: Simple functions
**Tutorial 8 &9**: Numerical methods (Root finding, numerical differentiation, numerical integration): **(4 hours)**
**Lab 8 and 9:** Programming for solving Numerical methods problems
**Tutorial 10**: Recursion, structure of recursive calls: **(4 hours)**
**Lab 10:** Recursive functions
**Tutorial 11**: Pointers, structures and dynamic memory allocation: **(4 hours)**
**Lab 11**: Pointers and structures
**Tutorial 12**: File handling: **(4 hours)**
**Lab 12**: File operations

## Laboratory Outcomes:

- To formulate the algorithms for simple problems
- To translate given algorithms to a working and correct program
- To be able to correct syntax errors as reported by the compilers
- To be able to identify and correct logical errors encountered at run time
- To be able to write iterative as well as recursive programs
- To be able to represent data in arrays, strings and structures and manipulate them through a program
- To be able to declare pointers of different types and use them in defining self- referential structures.
- To be able to create, read and write to and from simple text files.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

# WORKSHOP/MANUFACTURING PRACTICES – LAB

**Course Code: BTE 122** **Credit Units: 02**
**Total Hours: 40**

**List of experiments/demonstrations:**

1. Machine shop **(4 hours)**
2. Fitting shop **(4 hours)**
3. Carpentry **(4 hours)**
4. Electrical & Electronics**(6 hours)**
5. Welding shop **( 8 hours) (Arc welding 4 hrs + gas welding 4 hrs)**
6. Casting **(4 hours)**
7. Smithy **(4 hours)**
8. Plastic moulding & Glass Cutting (**6 hours**)

Examinations could involve the actual fabrication of simple components, utilizing one or more of the techniques covered above.

## Laboratory Outcomes:

- Upon completion of this laboratory course, students will be able to fabricate components with their own hands.
- They will also get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.
- By assembling different components, they will be able to produce small devices of their interest.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

# COMMUNICATION SKILLS – I
# (ENGLISH LANGUAGE USAGE ESSENTIALS)

**Course Code: BTE 141** **Credit Units: 01**

**Total Hours: 10**

**Course Objective** The course is intended to familiarize students with the basics of English language and help them to learn to identify language structures for correct English usage.

**Module I: Essentials of English Grammar (4 Hours)**
- Common Errors, Parts of Speech, Collocations, Relative Pronoun, Subject-Verb Agreement, Articles , Punctuation, Sentence Structure- ‘Wh’ Questions

**Module II: Written English Communication (2 Hours)**
- Paragraph Writing, Essay Writing

**Module III: Spoken English Communication (2 Hours)**
- Introduction to Phonetics, Syllable-Consonant and Vowel Sounds, Stress and Intonation

**Module IV: Prose (2 Hours)**
- “Friends, Romans, countrymen, lend me your ears” Speech by Marc Anthony in Julius Caesar

## Learning Outcomes:
- The students should be able to :
- Identify Common Errors and Rectify Them
- Develop and Expand Writing Skills Through Controlled and Guided Activities
- To Develop Coherence, Cohesion and Competence in Oral Discourse through Intelligible Pronunciation

| **Examination Scheme:** | | | | |
|---|---|---|---|---|
| **Components (Drop down)** | CIE | Mid Sem | Attendance | ESE |
| **Weightage (%)** | 30% | 15% | 5% | 50% |

**CIE: Continuous Internal Evaluation, Mid Sem, Attendance, ESE: End Semester Examination**

## Text & References:

## Text:
- Rosenblum, M. How to Build Better Vocabulary, London: Bloomsbury Publication
- Verma, Shalini. Word Power made Handy, S. Chand Publications
- High School English Grammar & Composition by Wren & Martin

## References:
- K.K.Sinha , Business Communication, Galgotia Publishing Company
- Additional Reading: Newspapers and Journals

# ENVIRONMENTAL STUDIES-I

**Course Code: BTE 142** **Credit Units: 02**
**Total Hours: 20**

**Course Objective**
The objective of environmental studies is to enlighten the masses about the importance of the protection and conservation of our environment and control of human activities which has an adverse effect on the environment.

**Module I: The multidisciplinary nature of environmental studies (2 Hours)**
Environmental Education, Environmental Organizations & Environmentalists, Environment & its Segments, Case Studies, Role of Teachers and Students in Environmental Protection

**Module II: Natural Resources Renewable and non-renewable resources: (6 Hours)**
Natural resources and associated problems, Introduction and Forest Resources, Water Resources, Land Resources, Mineral Resources, Energy Resources, Food Resources, Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

**Module III: Ecosystems (6 Hours)**
Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids, Introduction, types, characteristic features, structure and function of the following ecosystem: Forest ecosystem, Grassland ecosystem , Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, ocean estuaries)

**Module IV: Biodiversity and its conservation (6 Hours)**
Introduction – Definition: genetic, species and ecosystem diversity Biogeographical classification of India, Value of biodiversity: consumptive use, productive use, social, ethical aesthetic and option values Biodiversity at global, national and local levels, India as a mega-diversity nation, Hot-spots of biodiversity, Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts, Endangered and endemic species of India, Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity

## Learning Outcomes – Upon course completion, students will be able to understand:
The multidisciplinary nature of environmental studies, Our natural resources The ecosystem its structure and function, ecological succession, Biodiversity and its conservation and Biological classification of India.

**Examination Scheme:**

| Components | CT | HA | S/V/Q | A | ESE |
|---|---|---|---|---|---|
| Weightage (%) | 15 | 10 | 20 | 5 | 50 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:

- Chauhan B. S. 2009: Environmental Studies,University Science Press New Delhi.
- Dhameja S.K., 2010; Environmental Studies, Katson Publisher, New Delhi.
- Smriti Srivastava, 2011: Energy Environment Ecology and Society, Katson Publisher, New Delhi.
- Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumabai, 1196p
- De A.K., Environmental Chemistry, Wiley Eastern Ltd. Down to Earth, Centre for Science and Environment (R)
- Gleick, H.P. 1993. Water in Crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford Univ. Press. 473p

# BEHAVIOURAL SCIENCE-I

**Course Code: BTE 143** **Credit Units: 01**
**Total Hours: 10**

**Course Objective**:
This course aims at imparting an understanding of:
- Understanding self & process of self exploration
- Learning strategies for development of a healthy self esteem
- Importance of attitudes and its effective on personality
- Building Emotional Competency

**Module I: Self: Core Competency (2 Hours)**
- Understanding of Self
- Components of Self – Self identity
- Self concept
- Self confidence
- Self image

**Module II: Techniques of Self Awareness (2 Hours)**
- Exploration through Johari Window
- Mapping the key characteristics of self
- Framing a charter for self
- Stages – self awareness, self acceptance and self realization

**Module III: Self Esteem & Effectiveness (2 Hours)**
- Meaning
- Importance
- Components of self esteem
- High and low self esteem
- Measuring your self esteem

**Module IV: Building Positive Attitude (2 Hours)**
- Meaning and nature of attitude
- Components and Types of attitude
- Importance and relevance of attitude

**Module V: Building Emotional Competence (2 Hours)**
- Emotional Intelligence – Meaning, components, Importance and Relevance
- Positive and negative emotions
- Healthy and Unhealthy expression of emotions

**Module VI: End-of-Semester Appraisal**
- Viva - Voce based on personal journal
- Assessment of Behavioral change as a result of training
- Exit Level Rating by Self and Observer

## Course Outcomes:
Through this course,
- The knowledge of self will be utilized by students to resolve their personal, interpersonal and life problems
- Rather than extrinsic locus of control, students will acquire an intrinsic approach towards life
- The heightened awareness of self, attitudes and emotions will help students to work towards removal of obstacles created by self-limitations and enhance their full potential in their education and career.

**Examination Scheme:**

| Components | SAP | A | Mid Term Test (CT) | VIVA | Journal for Success (JOS) |
|---|---|---|---|---|---|
| Weightage (%) | 20 | 05 | 20 | 30 | 25 |

## Suggested Readings:


- Organizational Behaviour, Davis, K.
- Hoover, Judhith D. Effective Small Group and Team Communication, 2002,Harcourt College Publishers
- Dick, Mc Cann & Margerison, Charles: Team Management, 1992 Edition, viva books
- Bates, A. P. and Julian, J.: Sociology - Understanding Social Behaviour
- Dressler, David and Cans, Donald: The Study of Human Interaction
- Lapiere, Richard. T – Social Change
- Lindzey, G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology, Addison – Welsley, US.
- Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.
- LaFasto and Larson: When Teams Work Best, 2001, Response Books (Sage), New Delhi
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 2, Group (1996); Pfeiffer & Company
- Smither Robert D.; The Psychology of Work and Human Performance, 1994, Harper Collins College Publishers

# FRENCH – I

**Course Code: BTE 144** **Credit Units: 02**
**Total Hours: 20**

## Course Objective:

To enable the students to take position as a foreigner speaking French and establish contacts and speak about self.
To provide an understanding of the basics of French lexicology, grammar and phonetics
To familiarize the students

- with the manners and socio-cultural aspects
- with the transparent words in science and specialties
- with formal and informal language

**Course Contents:** pp. 1 to 28: Unité 1
This course is structured based on the text book Tech French: French for Science and Technology and prepares the Students for A1 / A2 of DELF.

**Unité 1: Premiers pas en France**
**Actes de Communication : (12 Hours)**
Saluer - accueillir, identifier, nommer quelqu'un
Se présenter, présenter quelqu'un - nom, âge, nationalité, profession, spécialisation, ville, pays
Aborder une personne - prise de contact, politesse, famille
Présenter des renseignements personnels - remplir un formulaire, adresse, numéro de téléphone
Demander des nouvelles - comprendre et poser des questions
Parler de soi - de ses activités, de ses loisirs, exprimer ses goûts

**Grammaire : (8 Hours)**
Articles indéfinis et définis
Accord - masculin et féminin
Pronoms personnels sujets, toniques, on, c'est/il est + profession
Verbes au présent : du 1$^{er}$ groupe -er (habiter), être, avoir, faire, savoir, aller
Formes : négation, interrogation
Prépositions de lieu
Adjectifs possessifs - un seul possesseur et plusieurs possesseurs
Partitif – faire/ jouer + à/ de…

## Course Outcomes:

- To understand basic French. Able to read, write basic French
- To express basic day to day activities in French

**Examination Scheme:**

<table>
<tr><th></th><th colspan="4">Internal exam</th><th rowspan="2">End semester</th><th>Grand total</th></tr>
<tr><th>Components</th><td>Mid-Sem</td><td>Viva-Voce</td><td>Attendance</td><th>TOTAL</th><td rowspan="2">100</td></tr>
<tr><th>Weightage (%)</th><td>15</td><td>30</td><td>5</td><td>50</td><td>50</td></tr>
</table>

## Text & References:

**Text:**

- **Le livre à suivre:** Le Gargasson, Ingrid, Shariva Naik et Claire Chaize. Tech French: French for Science and Technology. Delhi: Goyal Publishers & Distributors Pvt. Ltd., 2011.

**References:**


- Girardeau, Bruno et Nelly Mous. Réussir le DELF A1. Paris: Didier, 2010.

# MATHEMATICS – II
# (PROBABILITY AND STATISTICS)

**Course Code: BTE 201** **Credit Units: 04**
**Total Hours: 40**

**Course Objective:**
The objective of this course is to familiarize the students with statistical techniques. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling various problems in the discipline.

**Module I: Basic Probability: (12 Hours)**
Probability spaces, conditional probability, independence; Discrete random variables, Independent random variables, the multinomial distribution, Poisson approximation to the binomial distribution, infinite sequences of Bernoulli trials, sums of independent random variables; Expectation of Discrete Random Variables, Moments, Variance of a sum, Correlation coefficient, Chebyshev's Inequality.

**Module II: Continuous Probability Distributions: (4 Hours)**
Continuous random varibales and their properties, distribution functions and densities, normal, exponential and gamma densities.

**Module III: Bivariate Distributions: (4 Hours)**
Bivariate distributions and their properties, distribution of sums and quotients, conditional densities, Bayes' rule.

**Module IV: Basic Statistics: (8 Hours)**
Measures of Central tendency: Moments, skewness and Kurtosis - Probability distributions: Binomial, Poisson and Normal - evaluation of statistical parameters for these three distributions, Correlation and regression – Rank correlation.

**Module V: Applied Statistics: (8 Hours)**
Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves. Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations.

**Module VI: Small samples: (4 Hours)**
Test for single mean, difference of means and correlation coefficients, test for ratio of variances - Chi-square test for goodness of fit and independence of attributes.

## Course Outcomes:

- The objective of this course is to familiarize the students with statistical techniques. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling various problems in the discipline.
- The students will learn: The ideas of probability and random variables and various discrete and continuous probability distributions and their properties.
- The basic ideas of statistics including measures of central tendency, correlation and regression.
- The statistical methods of studying data samples.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Suggested Text/Reference Books


- Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
- P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003(Reprint).
- S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.
- W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Ed.,Wiley, 1968.
- N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
- B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
- Veerarajan T., Engineering Mathematics (for semester III), Tata McGraw-Hill, New Delhi, 2010.

# CHEMISTRY – I
# (CONCEPTS IN CHEMISTRY FOR ENGINEERING)

**Course Code: BTE 202** **Credit Units: 04**
**Total Hours: 40**

**Course Objective:**
Technology is being increasingly based on the electronic, atomic and molecular level modifications. The course will have a strong emphasis on the concepts that will aid in quantification of several concepts in chemistry that have been introduced at the 10+2 levels in schools. Quantum theory is more than 100 years old and to understand phenomena at nanometer levels, one has to base the description of all chemical processes at molecular levels. The course will emphasize on learning microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces. Principles of different spectroscopic techniques will be introduced and some applications will be considered. Bulk properties and processes will be analysed using thermodynamic considerations. There will also be outlines of periodic properties, stereochemistry, chemical reactions and synthesis. The chemistry laboratory course will consist of experiments illustrating the principles of chemistry that have been learnt so far, as well as others relevant to the study of science and engineering.

**Module I: Atomic and molecular structure (12 hours)**
Schrodinger equation. Particle in a box solutions and their applications for conjugated molecules and nanoparticles. Forms of the hydrogen atom wave functions and the plots of these functions to explore their spatial variations. Molecular orbitals of diatomic molecules and plots of the multicentre orbitals. Equations for atomic and molecular orbitals. Energy level diagrams of diatomics. Pi-molecular orbitals of butadiene and benzene and aromaticity. Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties. Band structure of solids and the role of doping on band structures.

**Module II: Spectroscopic techniques and applications (8 hours)**
Principles of spectroscopy and selection rules. Electronic spectroscopy. Fluorescence and its applications in medicine. Vibrational and rotational spectroscopy of diatomic molecules. Applications. Nuclear magnetic resonance and magnetic resonance imaging, surface characterisation techniques. Diffraction and scattering.

**Module III: Intermolecular forces and potential energy surfaces (4 hours)**
Ionic, dipolar and van Der Waals interactions. Equations of state of real gases and critical phenomena. Potential energy surfaces of $H_3$, $H_2F$ and HCN and trajectories on these surfaces.

**Module IV: Use of free energy in chemical equilibria (6 hours)**
Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies. Free energy and emf. Cell potentials, the Nernst equation and applications. Acid base, oxidation reduction and solubility equilibria. Water chemistry. Corrosion. Use of free energy considerations in metallurgy through Ellingham diagrams.

**Module V: Periodic properties (4 hours)**
Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states, coordination numbers and geometries, hard soft acids and bases, molecular geometries.

**Module VI: Stereochemistry (4 hours)**
Representations of 3 dimensional structures, structural isomers and stereoisomers, configurations and symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis. Isomerism in transitional metal compounds.

**Module VII: Organic reactions and synthesis of a drug molecule (2 hours)**
Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings. Synthesis of a commonly used drug molecule.

## Course Outcomes:

The concepts developed in this course will aid in quantification of several concepts in chemistry that have been introduced at the 10+2 levels in schools. Technology is being increasingly based on the electronic, atomic and molecular level modifications. Quantum theory is more than 100 years old and to understand phenomena at nanometer levels, one has to base the description of all chemical processes at molecular levels. The course will enable the student to:

- Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
- Rationalise bulk properties and processes using thermodynamic considerations.
- Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques
- Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.
- List major chemical reactions that are used in the synthesis of molecules.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **ESE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

A: Attendance, CT: Class Test, S/V/Q/HA - Seminar/Viva/Quiz/Home Assignment, ESE - End Semester Examination.

## Text & References:


- University chemistry, by B. H. Mahan
- Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane
- Fundamentals of Molecular Spectroscopy, by C. N. Banwell
- Engineering Chemistry (Web-book), B. L. Tembe, Kamaluddin and M. S. Krishnan
- Physical Chemistry, by P. W. Atkins
- Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore.

# BASIC ELECTRICAL ENGINEERING

**Course Code: BTE 203** **Credit Units: 04**
**Total Hours: 40**

**Course Objective:**
The objective of the course is to provide a brief knowledge of Electrical Engineering to students of all disciplines. This Course includes some theorems related to electrical, some law's related to flow of current, voltages, basic knowledge of Transformer, basic knowledge of electromagnetism, basic knowledge of electrical network.

**Module I: DC Circuits (8 Hours)**
Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff's current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin's and Norton's Theorems. Time-domain analysis of first-order RL and RC circuits.

**Module II: AC Circuits (8 Hours)**
Representation of sinusoidal waveforms, peak and R.M.S. values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance. Three- phase balanced circuits, voltage and current relations in star and delta connections.

**Module III: Transformers (6 Hours)**
Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.

**Module IV: Electrical Machines (8 Hours)**
Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor. Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited dc motor. Construction and working of synchronous generators.

**Module V: Power Converters (5 Hours)**
DC-DC buck and boost converters, duty ratio control. Single-phase and three-phase voltage source inverters; sinusoidal modulation.

**Module VI: Electrical Installations (5 Hours)**
Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

## Course Outcomes:
- To understand and analyze basic electric and magnetic circuits.
- To study the working principles of electrical machines and power converters.
- To introduce the components of low voltage electrical installations.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:

- D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering" , Tata McGraw Hill, 2010.
- D. C. Kulshreshtha, " Basic Electrical Engineering", McGraw Hill, 2009.
- L. S. Bobrow, " Fundamentals of Electrical Engineering", Oxford University Press, 2011.
- E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
- V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

# ENGINEERING GRAPHICS & DESIGN

**Course Code: BTE 204** **Credit Units: 01**
**Total Hours: 10**

***Except the basic essential concepts, most of the teaching part can happen concurrently in the laboratory itself***

**Course Objective:**
This course will provide students concepts on the drawings of different curves like straight line, parabola, ellipse etc. After completion of this course, students will be able to draw different figures manually and will be capable of using various instruments involved in drawings.

**Module I:** Introduction to Engineering Drawing, Orthographic Projections, Projections of Regular Solids, Sections and Sectional Views of Right Angular Solids. **(3 Hours)**

**Module II:** Sections and Sectional Views of Right Angular Solids, Isometric Projections, Overview of Computer Graphics. **(3 Hours)**

**Module III:** Customization & CAD Drawing, Annotations, layering & other functions, Demonstration of a simple team design project. **(4 Hours)**

## Course Outcomes:

- To prepare students to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- To prepare students to use the techniques, skills, and modern engineering tools necessary for engineering practice
- To prepare for actual work situations through practical training in a new state-of-the-art computer designed CAD laboratory using engineering software.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:


- M.B. Shah & B.C. Rana, Engineering Drawing, Pearson Education, 2007
- PS Gill, Engineering Drawing, Kataria Publication
- ND Bhatt, Engineering Drawing, Charotar publications
- N Sidheshwar, Engineering Drawing, Tata McGraw Hill
- CL Tanta, Mechanical Drawing, “Dhanpat Rai”
- Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication
- Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers
- (Corresponding set of) CAD Software Theory and User Manuals

# CHEMISTRY – I LAB

**Course Code: BTE 220** **Credit Units: 02**
**Total Hours: 40**

## List of experiments/ demonstrations:

1. Determination of surface tension of a given liquid. **(2 Hours)**
2. Determination of viscosity of a given liquid. **(2 Hours)**
3. Thin layer chromatography. **(2 Hour)**
4. Ion exchange column for removal of hardness of water. **(2 Hours)**
5. Determination of chloride content of water. **(2 Hour)**
6. Colligative properties using freezing point depression. **(2 Hours)**
7. Determination of the rate constant of a reaction. **(2 Hours)**
8. Determination of cell constant and conductance of solutions. **(2 Hours)**
9. Potentiometry - determination of redox potentials and emfs. **(2 Hours)**
10. Synthesis of a polymer/drug. **(2 Hour)**
11. Saponification/acid value of an oil. **(2 Hours)**
12. Chemical analysis of a salt. **(2 Hour)**
13. Lattice structures and packing of spheres **(2 Hour)**
14. Models of potential energy surfaces. **(2 Hour)**
15. Chemical oscillations- Iodine clock reaction. **(2 Hour)**
16. Determination of the partition coefficient of a substance between two immiscible liquids. **(4 Hours)**
17. Adsorption of acetic acid by charcoal. **(2 Hours)**
18. Use of the capillary viscos meters to demonstrate the isoelectric point as the pH of minimum viscosity for gelatin sols and/or coagulation of the white part of the egg. **(4 Hours)**

## Laboratory Outcomes:

- The chemistry laboratory course will consist of experiments illustrating the principles of chemistry relevant to the study of science and engineering. The students will learn to:
- Estimate rate constants of reactions from concentration of reactants/products as a
- function of time
- Measure molecular/system properties such as surface tension, viscosity,
- conductance of solutions, redox potentials, chloride content of water, etc
- Synthesize a small drug molecule and analyse a salt sample

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

# BASIC ELECTRICAL ENGINEERING LAB

**Course Code: BTE 221** **Credit Units: 01**
**Total Hours: 20**

**List of experiments/demonstrations:**

1. Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors. **(2 Hours)**
2. Measuring the steady-state and transient time-response of R-L, R-C, and R-L-C circuits to a step change in voltage (transient may be observed on a storage oscilloscope). **(2 Hours)**
3. Sinusoidal steady state response of R-L, and R-C circuits – impedance calculation and verification. Observation of phase differences between current and voltage. Resonance in R-L-C circuits. **(2 Hours)**
4. Transformers: Observation of the no-load current waveform on an oscilloscope (non- sinusoidal wave-shape due to B-H curve nonlinearity should be shown along with a discussion about harmonics). Loading of a transformer: measurement of primary and secondary voltages and currents, and power. **(2 Hours)**
5. Three-phase transformers: Star and Delta connections. Voltage and Current relationships (line-line voltage, phase-to-neutral voltage, line and phase currents). Phase-shifts between the primary and secondary side. Cumulative three-phase power in balanced three-phase circuits. **(2 Hours)**
6. Demonstration of cut-out sections of machines: dc machine (commutator-brush arrangement), induction machine (squirrel cage rotor), synchronous machine (field winging - slip ring arrangement) and single-phase induction machine. **(2 Hours)**
7. Torque Speed Characteristic of separately excited dc motor. **(2 Hours)**
8. Synchronous speed of two and four-pole, three-phase induction motors. Direction reversal by change of phase-sequence of connections. Torque-Slip Characteristic of an induction motor. Generator operation of an induction machine driven at super- synchronous speed. **(2 Hours)**
9. Synchronous Machine operating as a generator: stand-alone operation with a load. Control of voltage through field excitation. **(2 Hours)**
10. Demonstration of (a) dc-dc converters (b) dc-ac converters – PWM waveform (c) the use of dc-ac converter for speed control of an induction motor and (d) Components of LT switchgear. **(2 Hours)**

## Laboratory Outcomes:

- Get an exposure to common electrical components and their ratings.
- Make electrical connections by wires of appropriate ratings.
- Understand the usage of common electrical measuring instruments.
- Understand the basic characteristics of transformers and electrical machines.
- Get an exposure to the working of power electronic converters.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

# ENGINEERING GRAPHICS & DESIGN LAB

**Course Code: BTE 222** **Credit Units: 02**
**Total Hours: 40**

**List of experiments/demonstrations:**

**Module I: Introduction to Engineering Drawing (4 Hours)**
Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales – Plain, Diagonal and Vernier Scales

**Module II: Orthographic Projections (4 Hours)**
Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes; Projections of planes inclined Planes - Auxiliary Planes

**Module III: Projections of Regular Solids (4 Hours)**
Those inclined to both the Planes- Auxiliary Views; Draw simple annotation, dimensioning and scale. Floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc.

**Module IV: Sections and Sectional Views of Right Angular Solids (4 Hours)**
Prism, Cylinder, Pyramid, Cone – Auxiliary Views; Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry and dwellings (foundation to slab only)

**Module V: Isometric Projections (4 Hours)**
Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions

**Module VI: Overview of Computer Graphics (4 Hours)**
Listing the computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.; Isometric Views of lines, Planes, Simple and compound Solids

**Module VII: Customization & CAD Drawing (4 Hours)**
consisting of set up of the drawing page and the printer, including scale settings, Setting up of units and drawing limits; ISO and ANSI standards for coordinate dimensioning and tolerancing; Orthographic constraints, Snap to objects manually and automatically; Producing drawings by using various coordinate input entry methods to draw straight lines, Applying various ways of drawing circles

**Module VIII: Annotations, layering & other functions (6 Hours)**
Applying dimensions to objects, applying annotations to drawings; Setting up and use of Layers, layers to create drawings, Create, edit and use customized layers; Changing line lengths through modifying existing lines (extend/lengthen); Printing documents to paper using the print command; orthographic projection techniques; Drawing sectional views of composite right regular geometric solids and project the true shape of the sectioned surface; Drawing annotation, Computer-aided design (CAD) software modeling of parts and assemblies. Parametric and non-parametric solid, surface, and wireframe models. Part editing and two-dimensional documentation of models. Planar projection theory, including sketching of perspective, isometric, multiview, auxiliary, and section views. Spatial visualization exercises. Dimensioning guidelines, tolerancing techniques; dimensioning and scale multi views of dwelling

**Module IX: Demonstration of a simple team design project (6 hours)**
Geometry and topology of engineered components: creation of engineering models and their presentation in standard 2D blueprint form and as 3D wire-frame and shaded solids; meshed topologies for engineering analysis and tool-path generation for component manufacture; geometric dimensioning and tolerancing; Use of solid-modeling software for creating associative models at the component and assembly levels; floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc. Applying colour coding according to building drawing practice; Drawing sectional elevation showing foundation to ceiling; Introduction to Building Information Modelling (BIM)

## Laboratory Outcomes

- Introduction to engineering design and its place in society

- Exposure to the visual aspects of engineering design
- Exposure to engineering graphics standards
- Exposure to solid modelling
- Exposure to computer-aided geometric design
- Exposure to creating working drawings
- Exposure to engineering communication

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

# MATHEMATICS – III (DIFFERENTIAL CALCULUS)

**Course Code: BTE 301** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The objective of this course is to familiarize the prospective engineers with techniques in calculus, multivariate analysis and vector calculus. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

**Course Contents:**

**Module I: Integral Calculus: (10 Hours)**
Multiple Integration: Double integrals (Cartesian), change of order of integration in double integrals, Change of variables (Cartesian to polar), Applications: areas and volumes, Center of mass and Gravity (constant and variable densities); Triple integrals (Cartesian), orthogonal curvilinear coordinates, Simple applications involving cubes, sphere and rectangular parallelepipeds; Scalar line integrals, Applications of definite integrals to evaluate surface areas and volumes of revolutions.

**Module II: Multivariable Calculus (Differentiation): (10 Hours)**
Partial derivatives, directional derivatives, total derivative; Maxima, minima and saddle points; Method of Lagrange multipliers;

**Module III: Vector Calculus (Integration): (10 Hours)**
Gradient, curl and divergence, vector line integrals, scalar surface integrals, vector surface integrals, Theorems of Green, Gauss and Stokes

## Course Outcomes

The objective of this course is to familiarize the prospective engineers with techniques in multivariate integration, ordinary and partial differential equations and complex variables. It aims to equip the students to deal with advanced level of mathematics and applications that would be essential for their disciplines.
The students will learn:

- The mathematical tools needed in evaluating multiple integrals and their usage.
- The effective mathematical tools for the solutions of differential equations that model physical processes.
- The tools of differentiation and integration of functions of a complex variable that are used in various techniques dealing engineering problems

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Suggested Text/Reference Books


- G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
- Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
- Veerarajan T., Engineering Mathematics for first year, Tata McGraw- Hill, New Delhi, 2008.
- Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint,2010.
- N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint,2008
- B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

# ELECTRONIC DEVICES

**Course Code: ECE 301** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The objective of the course is to provide a brief knowledge of Electronic devices to all the students. This course builds from basic knowledge of Semiconductor Physics to an understanding of basic devices and their models. This course builds a foundation for courses on VLSI design and analog CMOS IC Design.

**Course Contents:**

**Module 1: Introduction to Semiconductor Physics: (6 Hours)**
Review of Quantum Mechanics, Electrons in periodic Lattices, E-k diagrams. Energy bands in intrinsic and extrinsic silicon; Carrier transport: diffusion current, drift current, mobility and resistivity; sheet resistance, design of resistors

**Module 2: Generation and recombination of carriers: (6 Hours)**
Poisson and continuity equation P-N junction characteristics, I-V characteristics, and small signal switching models; Avalanche breakdown, Zener diode, Schottky diode

**Module 3: Applications of diode: (6 Hours)**
Half wave, full wave rectifiers, Bridge rectifier, clipping and clamping circuits

**Module 4: Bipolar Junction Transistor: (6 Hours)**
Bipolar Junction Transistor, I-V characteristics, Ebers-Moll Model, MOS capacitor, C-V characteristics, MOSFET, I-V characteristics, and small signal models of MOS transistor, LED, photodiode and solar cell

**Module 5: Integrated circuit Fabrication Process: (6 Hours)**
Oxidation, diffusion, ion implantation, photolithography, etching, chemical vapor deposition, sputtering, twin-tub CMOS process

## Course Outcomes:

At the end of this course students will demonstrate the ability to

- Understand the principles of semiconductor Physics
- Understand and utilize the mathematical models of semiconductor junctions and MOS transistors for circuits and systems.
- To understand and analyze basic electronic device circuits.
- To study the applications of electrical devices and practical aspects.
- To introduce the fabrication process of IC's.

**Examination Scheme:**

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Robert F. Pierret: Semiconductor Device Fundamentals, Pearson Education.
- Millman and Halkias: Electronic Devices and circuits, Tata McGraw.
- Boylestad: Electronic Devices and Circuits, Pearson Education.
- G. Streetman, and S. K. Banerjee, "Solid State Electronic Devices," 7th edition, Pearson,2014.
- D. Neamen , D. Biswas "Semiconductor Physics and Devices," McGraw-Hill Education
- S. M. Sze and K. N. Kwok, " Physics of Semiconductor Devices," 3rd edition, John Wiley &Sons, 2006.
- C.T. Sah, "Fundamentals of solid state electronics," World Scientific Publishing Co. Inc, 1991.
- Y. Tsividis and M. Colin, "Operation and Modeling of the MOS Transistor," Oxford Univ.Press, 2011.

# DIGITAL SYSTEM DESIGN

**Course Code: ECE 302** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
This course is an introduction to the basic principles of digital electronics. At the conclusion of this course, the student will be able to quantitatively identify the fundamentals of computers, including number systems, logic gates, logic and arithmetic subsystems, and integrated circuits. They will gain the practical skills necessary to work with digital circuits through problem solving and hands on laboratory experience with logic gates, encoders, flip-flops, counters, shift registers, adders, etc. The student will be able to analyze and design simple logic circuits using tools such as Boolean Algebra and Karnaugh Mapping, and will be able to draw logic diagrams.

**Course Contents:**

**Module 1: Boolean Functions & Logic Simplification (6 Hours)**
Analog & digital signals, AND, OR, NOT, NAND, NOR, XOR & XNOR gates, Review of Boolean Algebra and De Morgan's Theorem, SOP & POS forms, Canonical forms, Karnaugh maps up to 6 variables,. 1`s complement and 2`s complement, don't care conditions, Tabulation method, Number Systems

**Module 2: Combinational Logic Design (6 Hours)**
MSI devices like Comparators, Multiplexers, Encoder, Decoder, DEMUX, Driver & Multiplexed Display, Half and Full Adders, Subtractors, Serial and Parallel Adders, BCD Adder, Barrel shifter and ALU, Binary codes, Code Conversion

**Module 3: Sequential Logic Design (6 Hours)**
Building blocks like S-R, JK and Master-Slave JK FF, Edge triggered FF, Ripple and Synchronous counters, Shift registers, Conversion of flip-flops, set up and hold time, race around condition, Master Slave flip flop.

**Module 4: Design of Sequential circuits (6 Hours)**
Finite state machines, Design of synchronous FSM, Algorithmic State Machines charts. Designing synchronous circuits like Pulse train generator, Pseudo Random Binary Sequence generator, Clock generation, Mealy and Moore type using next state tables, state diagrams, state minimization, state encoding: minimum bit change and hot one encodings.

**Module 5: Logic Families and PLD (6 Hours)**
TTL NAND gate, Specifications, Noise margin, Propagation delay, fan-in, fan-out, Tristate TTL, ECL, CMOS families and their interfacing, Concept of Programmable logic devices like PLA,ROM, FPGA. Logic implementation using Programmable Devices.

**Module 6: Industrial Visit**
One day visit to local industry in the field of Electronics Engineering.

## Course Outcomes:
At the end of this course students will demonstrate the ability to
- Design and analyze combinational logic circuits
- Design & analyze modular combinational circuits with MUX/DEMUX, Decoder, Encoder
- Design & analyze synchronous sequential logic circuits

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Suggested Text/Reference Books

- W.H. Gothmann, “Digital Electronics- An introduction to theory and practice”, PHI, 2nd edition, 2006.
- R.P. Jain, “Modern digital Electronics”, Tata McGraw Hill, 4th edition, 2009.
- D.V. Hall, “Digital Circuits and Systems”, Tata McGraw Hill, 1989
- . Charles Roth, “Digital System Design using VHDL”, Tata McGraw Hill 2nd edition 2012.
- Moris Mano : Digital Design, Pearson Education.
- Thomas L. Floyd: Digital Fundamentals, Pearson Education.
- Malvino and Leech: Digital Principles & Applications, Tata McGraw Hill.

# NETWORK THEORY

**Course Code: ECE 303** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The course intends to make the students proficient in analyzing circuits and prepare the students to have a basic knowledge in the analysis of Electric Networks to solve the given circuit with various theorems and methods to distinguish between tie set and cut set methods for solving various circuits, to design various types of filters and relate various two port parameters and transform them.

**Course Contents:**

**Module 1: Basics of Network Theory (5 Hours)**
Node and Mesh Analysis, matrix approach of network containing voltage and current sources, and reactance, source transformation and duality, Trigonometric and exponential Fourier series: Discrete spectra and symmetry of waveform, steady state response of a network to non-sinusoidal periodic inputs, power factor, effective values, Fourier transform and continuous spectra, three phase unbalanced circuit and power calculation.

**Module II: Network theorems (5 Hours)**
Superposition, reciprocity, Thevenin's, Norton's, Maximum power Transfer, compensation and Tallegen's theorem as applied to AC. circuits

**Module III: Laplace Transforms and its Application to Network Analysis (5 Hours)**
Laplace transforms and properties: Partial fractions, singularity functions, waveform synthesis, analysis of RC, RL, and RLC networks with and without initial conditions with Laplace transforms evaluation of initial conditions.

**Module IV: Transient Analysis (5 Hours)**
Transient behavior, concept of complex frequency, Driving points and transfer functions poles and zeros of immittance function, their properties, sinusoidal response from pole-zero locations, convolution theorem

**Module V: Two Port Network & Filters (5 Hours)**
Introduction, two port z-, y-, T-, h-parameters, Inter-relations among parameters, Condition for reciprocity and symmetry, Interconnections of two port networks, Behaviors of series and parallel resonant circuits, Introduction to band pass, low pass, high pass and band reject filters.

**Module VI: Graph Theory and Network equations (5 Hours)**
Graph of a network, Trees, Co-trees and loops, Cut set matrix, Tie set matrix, number of possible trees of a graph, duality, Loop Analysis and Node Analysis.

## Course Outcomes:
At the end of this course students will demonstrate the ability to
- Understand basics electrical circuits with nodal and mesh analysis.
- Appreciate electrical network theorems.
- Apply Laplace Transform for steady state and transient analysis.
- Determine different network functions.
- Appreciate the frequency domain techniques.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Suggested Text/Reference Books


- Van, Valkenburg.; "Network analysis" ; Prentice hall of India, 2000
- Sudhakar, A., Shyammohan, S. P.; "Circuits and Network"; Tata McGraw-Hill New Delhi, 1994
- A William Hayt, "Engineering Circuit Analysis" 8th Edition, McGraw-Hill Education

# SIGNALS AND SYSTEMS

**Course Code: ECE 304** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The objective of the course is to provide knowledge of Signals and Systems to students of ECE. This Course includes good insight of types of signals and types of systems, various operations performed on them through the use of Fourier series, Fourier transform, z transform.

**Course Contents:**

**Module 1: Signals and Systems : (6 Hours)**
Signals and systems as seen in everyday life and in various branches of engineering and science, Energy, power signals, continuous and discrete time signals, continuous and discrete amplitude signals. System properties: linearity: additive and homogeneity, shift-invariance, causality, stability, reliability. Operations performed on them, even and odd signals, periodic and non periodic signals, deterministic and random signals, energy signals, power signals, elementary signals: impulse, step, ramp and exponentials, classification of systems.

**Module 2: LTI system : (6 Hours)**
Linear shift-invariant (LSI) systems, impulse response and step response, convolution, input- output behavior with aperiodic convergent inputs, Characterization of causality and stability of linear shift-invariant systems, System representation through differential equations and difference equations.

**Module 3: Fourier series and Fourier Transform : (6 Hours)**
Periodic and semi-periodic inputs to an LSI system, the notion of a frequency response and its relation to the impulse response, Fourier series representation, the Fourier Transform, convolution/ multiplication and their effect in the frequency domain, magnitude and phase response, Fourier domain duality. The Discrete-Time Fourier Transform (DTFT) and the Discrete Fourier Transform (DFT) Parseval's Theorem. The idea of signal space and orthogonal base

**Module 4: Laplace Transform and Introduction to State Space Analysis : (6 Hours)**
The Laplace Transform, notion of eigen functions of LSI systems, a basis of eigen functions, region of convergence, poles and zeros of system, Laplace domain analysis, solution to differential equations and system behavior.
State-space analysis, multi-input and multi-output representation, The state-transition matrix and its role
.
**Module 5: Z- Transform and The Sampling Theorem and its implications: (6 Hours)**
The z-Transform for discrete time signals and systems- Eigen functions, region of convergence, z-domain analysis, Inverse Z Transform The Sampling Theorem and its implications- Spectra of sampled signals, Reconstruction: ideal interpolator, zero-order hold, first-order hold, and so on, Aliasing and its effects. Relation between continuous and discrete time systems

## Course outcomes:
At the end of this course students will demonstrate the ability to
- Analyze different types of signals
- Represent continuous and discrete systems in time and frequency domain using different transforms

Investigate whether the system is stable Sampling and reconstruction of a signal

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References

***Text:***

- Alan.V Oppenheim, Signals and Systems, 4th Edition 2007, Pearson Prentice Hall Publication.
- K.M. Soni, Signals and Systems; 3rd Edition, S.K. Kataria & Sons Publication.
- P.Ramesh Babu, Signal and Systems, 3rd Edition, Scitech Publications (INDIA) Pvt. Ltd.

***References:***

- Simon Haykin, Signals and Systems, 2nd Edition, Willy Publications.
- B.P.Lathi, Linear Systems & Signals, 2nd Edition, Oxford Publication.
- Roberts, Fundamentals of Signals and Systems, TMH Publication.

# ELECTRONIC DEVICES LAB

**Course Code: ECE 321** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
The objective of this laboratory course is to provide a brief knowledge of Electronic devices to all the students. This course builds from basic knowledge of Semiconductor Physics to an understanding of basic devices and their models. This course builds a foundation for courses on VLSI design and analog CMOS IC Design.

**List of experiments/demonstrations:**

1. To study and plot the characteristics of a junction diode. **(2 Hours)**
2. To study Zener diode I-V characteristics. **(2 Hours)**
3. To study diode based clipping circuits. **(2 Hours)**
4. To study diode based clamping circuits. **(2 Hours)**
5. To study half wave, full wave rectifier with filters. **(2 Hours)**
6. To study full wave and bridge rectifier with filters. **(2 Hours)**
7. To study the input and output characteristics of a transistor in its various configurations (CE and CB). **(2 Hours)**
8. To study and plot the characteristics of a JFET in its various configurations. **(2 Hours)**
9. To study and plot the characteristics of a MOSFET in its various configurations. **(2 Hours)**
10. To measure gain and plot the frequency response of double stage RC coupled amplifier. (**2 Hours)**

## Laboratory Outcomes:

At the end of the course the students can able to

- Measure voltage, frequency and phase of any waveform using CRO.
- Generate sine, square and triangular waveforms with required frequency and amplitude using function generator.

Analyze the characteristics of different electronic devices such as diodes, transistors etc., and simple circuits like rectifiers, amplifiers etc.

**Examination Scheme:**

| | IA | | | | EE | |
|---|---|---|---|---|---|---|
| **Components** | **A** | **PR** | **LR** | **V** | **PR** | **V** |
| **Weightage (%)** | 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# DIGITAL SYSTEM DESIGN LAB

**Course Code: ECE 322** **Credit Units: 01**

**Total Hours: 20**

**Course Objective:**

This course is an introduction to the basic principles of digital electronics. At the conclusion of this course, the student will be able to quantitatively identify the fundamentals of computers, including number systems, logic gates, logic and arithmetic subsystems, and integrated circuits. They will gain the practical skills necessary to work with digital circuits through problem solving and hands on laboratory experience with logic gates, encoders, flip-flops, counters, shift registers, adders, etc. The student will be able to analyze and design simple logic circuits using tools such as Boolean Algebra and Karnaugh Mapping, and will be able to draw logic diagrams.

**List of experiments/demonstrations:**

1. To verify the truth tables of NOT, OR, AND, NOR, NAND, XOR, XNOR gates. **(2 Hours)**
2. To obtain half adder, full adder using gates and verify their truth tables. **(2 Hours)**
3. To obtain half subtractor, full subtractor using gates and verify their truth tables. **(2 Hours)**
4. To implement control circuit using multiplexer. **(2 Hours)**
5. To convert BCD code into excess 3 code and verify the truth table. **(2 Hours)**
6. To verify the truth tables of RS, D, JK and T flip- flops. **(2 Hours)**
7. To implement and verify 3-bit bi-directional shift register. **(2 Hours)**
8. To design and study asynchronous/ripple counter. **(2 Hours)**
9. To design and study synchronous counter. **(2 Hours)**
10. To design and study a sequence detector. **(2 Hours)**

## Laboratory Outcomes:

At the end of the course the students can able to

- Ability to formulate and solve problems in Digital Systems design and implementation.
- Consolidation of the design methodologies for combinational and sequential digital systems
- Interpret the specifications of programmable reconfigurable device and select the appropriate for the application in hand

**Examination Scheme:**

| | IA | | | | EE | |
|---|---|---|---|---|---|---|
| **Components** | **A** | **PR** | **LR** | **V** | **PR** | **V** |
| **Weightage (%)** | 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# NETWORK THEORY LAB

**Course Code: ECE 323** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
The purpose of this laboratory course is to make the students proficient in analyzing circuits and prepare the students to have a basic knowledge in the analysis of Electric Networks to solve the given circuit with various theorems and methods to distinguish between tie set and cut set methods for solving various circuits, to design various types of filters and relate various two port parameters and transform them.

**List of experiments/demonstrations:**

1. To verify Thevenin's theorem in a given network. **(2 Hours)**
2. To verify reciprocity theorem in a given network. **(2 Hours)**
3. To verify maximum power transfer theorem in a given network. **(2 Hours)**
4. To verify Tellegen's theorem in a given network. **(2 Hours)**
5. To determine the Z- and Y- parameters of a resistive two-port network. **(2 Hours)**
6. To determine the T- (ABCD) parameters of a resistive two-port network. **(2 Hours)**
7. To determine the h- parameters of a resistive two-port network. **(2 Hours)**
8. To design series-series connection of 2 two-port networks and determine its Z- parameters. **(2 Hours)**
9. To design parallel-parallel connection of 2 two-port networks and determine its Y- parameters. **(2 Hours)**
10. To design a cascade connection of 2 two-port networks and determine its T- (ABCD) parameters. **(2 Hours)**

## Course Outcomes:
At the end of this laboratory course students will demonstrate the ability to

- Understand basics electrical circuits with nodal and mesh analysis.
- Appreciate and apply electrical network theorems.
- Apply Laplace Transform for steady state and transient analysis.
- Determine different network functions.
- Appreciate the frequency domain techniques.

**Examination Scheme:**

| | IA | | | | EE | |
|---|---|---|---|---|---|---|
| **Components** | **A** | **PR** | **LR** | **V** | **PR** | **V** |
| **Weightage (%)** | 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# MATLAB AND SIMULINK LAB

**Course Code: ECE 325** **Credit Units: 02**
**Total Hours: 40**

**Course Objective:**
This course introduces students to MATLAB programming and Simulink, and demonstrate it's use for scientific computations. The objective of this course is to introduce undergraduate students to computational methods using MATLAB and Simulink, become familiar with the main features of the MATLAB integrated design environment and its user interfaces, and understand the basic principles of programming and of implementing engineering concepts in MATLAB and Simulink.

**List of experiments/demonstrations:**
Theory and practice of .m files and Simulink libraries.

1. Plot the results of certain basic arithmetic operations: **(2 Hours)**
   (a) Addition, multiplication etc.
   (b) Exponential, logarithm etc.
   (c) Trigonometry, complex numbers

2. Working with arrays of numbers: **(2 Hours)**
   (a) straight line plots
   (b) operation on vectors
   (c) matrices, circles

3. Graph plots: **(2 Hours)**
   (a) sine plots
   (b) decaying and growing functions
   (c) overlay plots

4. Programs to understand creation, saving, execution of files. **(2 Hours)**

5. Programs involving matrices, manipulation using linear algebra. **(2 Hours)**

6. Basic 2D and 3D plots: **(2 Hours)**
   (a) parametric space curve
   (b) polygons with vertices
   (c) 3D contour lines
   (d) surface plots

7. Import data as a MATLAB table. Work with data stored as a table. **(2 Hours)**
   (a) storing data as a table
   (b) operating on tables
   (c) extracting data from tables
   (d) modifying tables

8. Introduction to Toolboxes. **(2 Hours)**

9. To study and verify the transient behavior of DC network with RL load using MATLAB. **(2 Hours)**

10. To study and verify the transient behavior of DC network with RC load using MATLAB. **(2 Hours)**

11. To study and verify the transient behavior of DC network with RLC load using MATLAB. **(2 Hours)**

12. Calculating transforms using MATLAB. **(2 Hours)**
    (a) Calculate and plot Fourier Transform of a given signal
    (b) Calculate and plot Z-transform of a given signal

## Simulink

1. Introduction to Simulink. **(2 Hours)**
2. Create a simple Simulink model, simulate it, and analyze the results. **(2 Hours)**
3. Model and simulate basic programming constructs in Simulink. **(2 Hours)**
4. Model and simulate discrete systems in Simulink. **(2 Hours)**
5. Model and simulate continuous systems in Simulink. **(2 Hours)**
6. Use subsystems to combine smaller systems into larger systems. **(2 Hours)**
7. Create subsystems that are executed based on a control signal input. **(2 Hours)**
8. Use model referencing to combine models. **(2 Hours)**

## Course Outcome

At the end of this course, a student would:

- Learn basics of MATLAB programming.
- Get introduced to numerical methods for engineering problems and will be able to use MATLAB and Simulink to solve computational problems.
- Translate mathematical methods to MATLAB code.
- Break a complex task up into smaller, simpler tasks using MATLAB and Simulink.
- Represent mathematical objects as data structures.
- Tabulate results and represent data visually.
- Use MATLAB development tools to find and correct problems with code.

**Examination Scheme:**

| | IA | | | | EE | |
|---|---|---|---|---|---|---|
| **Components** | **A** | **PR** | **LR** | **V** | **PR** | **V** |
| **Weightage (%)** | 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# TERM PAPER

**Course Code: NTP 330** **Credit Units: 02**

**Course Objective:** A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject. The objective of this course to make a student to carry out intense study on a specific topic related to current development in their field of specialization and Develop skills of presentation and report writing.

**METHODOLOGY:** The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

**GUIDELINES FOR TERM PAPER**

The procedure for writing a term paper may consist of the following steps:

1. Choosing a subject
2. Finding sources of materials
3. Collecting the notes
4. Outlining the paper
5. Writing the first draft
6. Editing & preparing the final paper

**1. Choosing a Subject**

The subject chosen should not be too general.

**2. Finding Sources of Materials**

a) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
b) Begin by making a list of subject-headings under which you might expect the subject to be listed.
c) The sources could be books and magazine articles, news stories, periodicals, scientific journals etc.

**3. Collecting the notes**

Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

a) Get facts, not just opinions. Compare the facts with author's conclusion.
b) In research studies, notice the methods and procedures, results & conclusions.
c) Check cross references.

**4. Outlining the paper**

a) Review notes to find main sub-divisions of the subject.
b) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

**5. Writing the first draft**

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

a) statement of purpose
b) main body of the paper
c) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main idea.

**6. Editing & Preparing the final Paper**

a) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.
b) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
c) Check for proper spelling, phrasing and sentence construction.
d) Check for proper form on footnotes, quotes, and punctuation.
e) Check to see that quotations serve one of the following purposes:
   (i) Show evidence of what an author has said.
   (ii) Avoid misrepresentation through restatement.
   (iii) Save unnecessary writing when ideas have been well expressed by the original author.

f) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

1) Title page
2) Table of contents
3) Introduction
4) Review
5) Discussion & Conclusion
6) References
7) Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

**Discussion**
The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

**Conclusion**
The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

a) summary of question posed
b) summary of findings
c) summary of main limitations of the study at hand
d) details of possibilities for related future research

**Reference**
From the very beginning of a research project, you should be careful to note all details of articles gathered. The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.
The key to a good bibliography is consistency. Choose a particular convention and stick to this.

**Conventions**
Monographs
Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

**Edited volumes**
Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.
[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hoursg.) for Herausgeber].

**Edited articles**
Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

**Journal articles**
McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

**Electronic book**
Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] from the World Wide Web, http://www.aber.ac.uk/media/Documents/S4B/.

**Electronic journal articles**
Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document]. German as a Foreign Language Journal [online] 1. Retrieved [12.09.'00] from the World Wide Web, http://www.gfl-journal.com/.

**Other websites**
Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document]. Retrieved [13.10.'01] from the World Wide Web, http://olaf.hiof.no/~sverrev/eng.html.

**Unpublished papers**

Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

**Unpublished theses/ dissertations**

Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg.

Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

**Appendix**

The appendix should be used for data collected (e.g. questionnaires, transcripts, ...) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

**Assessment Scheme:**

**Continuous Evaluation:** **40%**
(Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)

**Final Evaluation:** **60%**

(Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/ presented, outcomes vs. objectives, presentation/ viva etc.)

**Course Outcomes:**
After successful completion of this course, students will be able to

1. Carry out intense study on a specific topic related to current development in their field of specialization
2. Collect, interpret and analyze the information
3. Compare and evaluate the existing solutions for a specific cases study
4. Develop skills of presentation and report writing.

# ANALOG AND DIGITAL COMMUNICATION

**Course Code: ECE 401** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The purpose of this course is to provide a thorough introduction to analog and digital communications with an in depth study of various modulation techniques, Random processes are discussed, and information theory is introduced.

**Course Contents:**

**Module I: Analog Modulation Techniques: (06 Hours)**
Review of signals and systems, Frequency domain representation of signals, Principles of Amplitude Modulation Systems- DSB, SSB and VSB modulations. Angle Modulation, Representation of FM and PM signals, Spectral characteristics of angle modulated signals.

**Module II: Noise in Communication System: (08 Hours)**
Review of probability and random process. Gaussian and white noise characteristics, Noise in amplitude modulation systems, Noise in Frequency modulation systems. Different types of noise, noise calculations, equivalent noise band width, noise figures, effective noise temperature, noise figure. Pre-emphasis and De-emphasis, Threshold effect in angle modulation.

**Module III: Digital Modulation Techniques: (08 Hours)**
Pulse modulation, Sampling process, Pulse Amplitude and Pulse code modulation (PCM), Differential pulse code modulation, Delta modulation, Noise considerations in PCM, Time Division multiplexing, Digital Multiplexers, Digital Modulation schemes- Phase Shift Keying, Frequency Shift Keying, Quadrature Amplitude Modulation, Continuous Phase Modulation and Minimum Shift Keying, Digital Modulation tradeoffs

**Module IV: Optimum Detection of Signal: (08 Hours)**
Elements of Detection Theory, Optimum detection of signals in noise,Coherent communication with waveforms- Probability of Error evaluations. Baseband Pulse Transmission- Inter symbol Interference and Nyquist criterion, Pass band Optimum demodulation of digital signals over band-limited channels- Maximum likelihood sequence detection (Viterbi receiver),Equalization Techniques, Synchronization and Carrier Recovery for Digital modulation

## Course Outcomes:

- At the end of this course students will demonstrate the ability to
- Analyze and compare different analog modulation schemes for their efficiency and bandwidth
- Analyze the behavior of a communication system in presence of noise
- Investigate pulsed modulation system and analyze their system performance
- Analyze different digital modulation schemes and can compute the bit error performance

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Suggested Text/Reference Books


- Haykin S., "Communications Systems", John Wiley and Sons, 2001.
- Proakis J. G. and Salehi M., "Communication Systems Engineering", Pearson Education, 2002.
- Taub H. and Schilling D.L., "Principles of Communication Systems”, Tata McGraw Hill, 2001.
- Wozencraft J. M. and Jacobs I. M., ``Principles of Communication Engineering",John Wiley, 1965.
- Barry J. R., Lee E. A. and Messerschmitt D. G., ``Digital Communication'', Kluwer Academic Publishers, 2004.
- Proakis J.G., ``Digital Communications", 4th Edition, McGraw Hill, 2000

# ANALOG CIRCUITS

**Course Code: ECE 402** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The purpose of this course is to introduce the student to the application of semiconductor devices in linear analog circuits. To insure the usefulness of the course material to both computer engineers and electrical engineers, the course stresses circuit designs using the operational amplifier.

**Course Contents:**

**Module 1: Diode and Transistor Circuits: (6 Hours)**
Diode Circuits, Amplifier models: Voltage amplifier, current amplifier, trans-conductance amplifier and trans-resistance amplifier. Biasing schemes for BJT and FET amplifiers, bias stability, various configurations (such as CE/CS, CB/CG, CC/CD) and their features, small signal analysis, low frequency transistor models, estimation of voltage gain, input resistance, output resistance etc., design procedure for particular specifications, low frequency analysis of multistage amplifiers.

**Module II: Small Signal Analysis of Transistors and Multistage Amplifiers: (6 Hours)**
High frequency transistor models, frequency response of single stage and multistage amplifiers, cascode amplifier. Various classes of operation (Class A, B, AB, C etc.) their power efficiency and linearity issues. Feedback topologies: Voltage series, current series, voltage shunt, current shunt, effect of feedback on gain, bandwidth etc., calculation with practical circuits, concept of stability, gain margin and phase margin.

**Module III: Oscillators and Filters: (6 Hours)**
Oscillators: Review of the basic concept, Barkhausen criterion, RC oscillators (phase shift, Wien bridge etc.), LC oscillators (Hartley, Colpitt, Clapp etc.), non-sinusoidal oscillators, Active filters: Low pass, high pass, band pass and band stop, design guidelines.

**Module IV: Differential Amplifier and Operational amplifier: (6 Hours)**
Differential amplifier: Basic structure and principle of operation, calculation of differential gain, common mode gain, CMRR and ICMR. OP-AMP design: design of differential amplifier for a given specification, design of gain stages and output stages, compensation,OP-AMP applications: review of inverting and non-inverting amplifiers, integrator and differentiator, summing amplifier, precision rectifier, Schmitt trigger and its applications, Current mirror: Basic topology and its variants, V-I characteristics, output resistance and minimum sustainable voltage (VON), maximum usable load.

**Module V: Applications of Diode and Transistor Circuits: (6 Hours)**
Digital-to-analog converters (DAC): Weighted resistor, R-2R ladder, resistor string etc. Analog-to-digital converters (ADC): Single slope, dual slope, successive approximation, flash etc. Switched capacitor circuits: Basic concept, practical configurations, application in amplifier, integrator, ADC etc., 555 Timer

## Course Outcomes:
At the end of this course students will demonstrate the ability to
- Understand the characteristics of diodes and transistors
- Design and analyze various rectifier and amplifier circuits
- Design sinusoidal and non-sinusoidal oscillators
- Understand the functioning of OP-AMP and design OP-AMP based circuits
- Design ADC and DAC

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Suggested Text/Reference Books


- J.V. Wait, L.P. Huelsman and GA Korn, Introduction to Operational Amplifier theory and applications, McGraw Hill, 1992.
- J. Millman and A. Grabel, Microelectronics, 2nd edition, McGraw Hill, 1988.
- P. Horowitz and W. Hill, The Art of Electronics, 2nd edition, Cambridge University Press, 1989.
- A.S. Sedra and K.C. Smith, Microelectronic Circuits, Saunder's College11Publishing, Edition IV
- Paul R. Gray and Robert G.Meyer, Analysis and Design of Analog Integrated Circuits, John Wiley, 3rd Edition

# MICROCONTROLLERS

**Course Code: ECE 403** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
This course deals with the systematic study of the Architecture and programming issues of 8085-microprocessor and 8051 microcontroller family. The aim of this course is to give the students basic knowledge of the above microprocessor needed to develop the systems using it.

**Course Contents:**

**Module 1: Overview of Microprocessor Systems: (08 Hours)**
Overview of microcomputer systems and their building blocks, memory interfacing, concepts of interrupts and Direct Memory Access, instruction sets of microprocessors (with examples of 8085 and 8086);Interfacing with peripherals - timer, serial I/O, parallel I/O, A/D and D/ A converters; Arithmetic Coprocessors; System level interfacing design;

**Module II: Advanced Microprocessor and Memory Systems: (06 Hours)**
Concepts of virtual memory, Cache memory, Advanced coprocessor Architectures- 286, 486, Pentium; Introduction to RISC processors;

**Module III: 8051 Microcontroller: (08 Hours)**
Features, architecture, Pin Diagram, Interrupts, Interrupt structure and priorities, Port structure and operation, memory organization, external memory interfacing, instruction syntax, data types, subroutines, addressing Modes, instruction set, ALP of 8051

**Module IV: 8051 Microcontroller Interfacing and Applications: (08 Hours)**
Programming 8051 Timers and Serial port programming, 8051 interfacing to ADC and DAC, stepper motor and Sensors. Serial Communication,Modes and Programming, ARM microcontrollers interface designs.

## Course Outcomes:
At the end of this course students will demonstrate the ability to
- Do assembly language programming
- Do interfacing design of peripherals like, I/O, A/D, D/A, timer etc.
- Develop systems using different microcontrollers
- Understand RISC processors and design ARM microcontroller based systems

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Suggested Text/Reference Books

- R. S. Gaonkar, Microprocessor Architecture: Programming and Applications with the 8085/8080A, Penram International Publishing, 1996
- D A Patterson and J H Hennessy, "Computer Organization and Design The hardware and software interface. Morgan Kaufman Publishers.
- Douglas Hall, Microprocessors Interfacing, Tata McGraw Hill, 1991.
- Kenneth J. Ayala, the 8051 Microcontroller, Penram International Publishing, 1996.

# JAVA PROGRAMMING

**Course Code: CSE 403** **Credit Units: 03**
**Total Hours: 30**

## Course Objective:

The objective is to impart programming skills used in this object oriented language java. The course explores all the basic concepts of core java programming. The students are expected to learn it enough so that they can develop the web solutions like creating applets etc.

**Course Contents :**

**Module 1: (7 Hours)**
Object Oriented Programming: Concept and features of object-oriented programming, create classes and objects and add methods to a class, Real World Comparison. Evolution of JAVA: History of Java, Requirements and Environment (JDK), Comparison with other languages, Basic Features & Java Architecture-Java Virtual Machine (JVM), Installing Java Development Kit, Program Structure- Data types, Variables and Operators. Arrays.

**Module II : (7 Hours)**
Classes and Objects in Java: Understanding Constructors, Dealing with Garbage Collection. Working with Inheritance in Java: Understanding Abstract Classes and Interfaces. Packages: Introduction to packages, How to implement a package, CLASSPATH Setting for Packages, Types and understanding packages.

**Module III : (6 Hours)**
Multithreaded Programming: Basic concepts and needs of multi-threading, Life Cycle of a Thread, How to create a thread, Handling Thread Priorities, Enforcing Thread Synchronization, Maintaining Inter-thread Communication. Exception Handling: The Idea behind Exception, Exceptions & Errors, Types of Exception, Control Flow in Exceptions, Use of try, catch, finally, throw, throws in Exception Handling.

**Module IV : (7 Hours)**
GUI Programming -Introduction to AWT, Window Fundamentals, Working with Graphics, Using AWT Controls and Menus, Understanding Layout Managers. JFC and Swing - A Higher Level of User Interaction, Features of the Java Foundation Classes, Overview of Swing, Components and Containers, Swing Packages, Exploring Swing components, Generating Swing Application.

**Module V : (3 Hours)**
Event Handling -The Delegation Event Model, Event Classes, Event Listener Interfaces Handling Various Events.

## Course Outcomes:

The student will learn

- Students can perform object oriented programming solution and develop solutions to problems demonstrating usage of control structure, modularity, classes, I/O and the scope of the class members
- Students can demonstrate adeptness of object oriented programming in developing solution to problems demonstrating usage of data abstraction, encapsulation and inheritance
- Students can demonstrate ability to implement one or more patterns involving dynamic binding and utilization of polymorphism in the solution of problems
- Students can demonstrate ability to implement multithreading in the programming.
- To learn syntax and features of exception handling
- Students can demonstrate the ability to implement solution to various I/O manipulation operations and the ability to create two-dimensional graphic components using Swings.
- To demonstrate the ability to handle Events in the Programming

**Examination Scheme:**

| Components | A | CT | S/V/Q | HA | ESE |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

**Text & References:**

***Text:***

- JAVA The Complete Reference by Patrick Naughton & Herbert Schild, TMH
- Introduction to JAVA Programming a primar, Balaguruswamy.

***References:***

- "Introduction to JAVA Programming" Daniel/Young PHI
- Jeff Frentzen and Sobotka, "Java Script" , Tata McGraw Hill,1999

# ANALOG AND DIGITAL COMMUNICATION LAB

**Course Code: ECE 421** **Credit Units: 01**
**Total Hours: 20**

**Course Objective**
The purpose of this laboratory course is to provide a thorough introduction to analog and digital communications with an in depth study of various modulation techniques experimentally.

**List of Experiments**

- To study the sampling and reconstruction of a given signal. **(2 Hours)**
- To study amplitude modulation and demodulation. **(2 Hours)**
- To study frequency modulation and demodulation. **(2 Hours)**
- To study time division multiplexing. **(2 Hours)**
- To study pulse amplitude modulation. **(2 Hours)**
- To study delta and adaptive delta modulation and demodulation. **(2 Hours)**
- To study carrier modulation techniques using amplitude shift keying and Frequency shift keying. **(2 Hours)**
- To study carrier modulation techniques using binary phase shift keying and differential shift keying. **(2 Hours)**
- To study pulse code modulation & differential pulse code modulation as well as relevant demodulations. **(2 Hours)**
- To study quadrature phase shift keying & quadrature amplitude modulation. **(2 Hours)**

## Laboratory Outcomes:
Upon completion of this laboratory course students will demonstrate the ability to
- Analyze and compare different analog modulation schemes for their efficiency and bandwidth
- Analyze the behavior of a communication system in presence of noise
- Investigate pulsed modulation system and analyze their system performance
- Analyze different digital modulation schemes and can compute the bit error performance

**Examination Scheme:**

| | IA | | | | EE | |
|---|---|---|---|---|---|---|
| **Components** | **A** | **PR** | **LR** | **V** | **PR** | **V** |
| **Weightage (%)** | 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# ANALOG CIRCUITS LAB

**Course Code: ECE 422** **Credit Units: 01**
**Total Hours: 20**

**Course Objective**

The purpose of this laboratory course is to introduce the student to the practical application of semiconductor devices in linear analog circuits. To insure the usefulness of the course material to both computer engineers and electrical engineers, the course stresses practical circuit designs using the operational amplifier.

**List of Experiments**

1. To study the op amp as an inverting and non inverting amplifier. **(2 Hours)**
2. To use the op amp as an adder, subtractor, integrator and differentiator. **(2 Hours)**
3. To design a ramp and a square wave generator. **(2 Hours)**
4. To study the IC-555 timer as stable and bistable multivibrator. **(2 Hours)**
5. To design low pass, high pass and band pass filters using op- amp. and plot their frequency response. **(2 Hours)**
6. To design and study class a power amplifier. **(2 Hours)**
7. To design and study a class B push pull amplifier. **(2 Hours)**
8. To study various feedbacks such as voltage series feedback. **(2 Hours)**
9. To design RC phase shift and Wein bridge oscillators using op amplifier.**(2 Hours)**
10. To design and study Colpitt and Hartley oscillators. **(2 Hours)**

## Laboratory Outcomes:

Upon completion of this laboratory course students will demonstrate the ability to

- Understand the functioning of OP-AMP and design OP-AMP based circuits such as filters
- Design and analyze various rectifier, multivibrator and amplifier circuits
- Design sinusoidal and non-sinusoidal oscillators

**Examination Scheme:**

| | IA | | | | EE | |
|---|---|---|---|---|---|---|
| **Components** | **A** | **PR** | **LR** | **V** | **PR** | **V** |
| **Weightage (%)** | 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# MICROCONTROLLERS LAB

**Course Code: ECE 423** **Credit Units: 01**

**Total Hours: 20**

**Course Objective**

This course deals with the systematic study of the Architecture and programming issues of 8085-microprocessor and 8051microcontroller family. The aim of this course is to give the students basic knowledge of the above microprocessor needed to develop the systems using it.

**List of Experiments**

Time allocated **-**

(iii) For experiment No.1-8 is **10 Hours**

(iv) and for experiment No.9-16 is **10 Hours**

1. Write at least three different programs for addition of two 8 bit numbers assuming carry may or may not be generated.
2. Write at least three different programs for subtraction of two 8 bit numbers assuming borrow may or may not be generated.
3. Write two different programs for 16 bit addition, one using instruction DAD and another without using instruction DAD.
4. Write assembly language program for 8 bit multiplication and division.
5. To study, understand, interface and two peripheral devices with 8085.
6. Any three programs using 8085 based on block of data.
7. Using 8086 write an ALP to add list of 10 given numbers.
8. Using 8086 write an ALP to sum the numbers from 1-100.
9. Using 8086 write an ALP to count negative numbers from a given list of 10 numbers.
10. Using 8086 write an ALP to check number of vowels in a given string.
11. Program and verify Timer/Counter in 8051.
12. Program and verify Interrupt handling in 8051.
13. UART Operation in 8051.
14. Communication between 8051 kit and PC.
15. Interfacing LCD to 8051.
16. Interfacing Matrix/Keyboard to 8051.

## Laboratory Outcomes:

Upon completion of this laboratory course students will demonstrate the ability to

- Do assembly language programming
- Do interfacing design of peripherals like, I/O, UART, LCD, Keyboard, timer etc. to 8051
- Develop systems using different microcontrollers

**Examination Scheme:**

| | IA | | | | EE | |
|---|---|---|---|---|---|---|
| **Components** | **A** | **PR** | **LR** | **V** | **PR** | **V** |
| **Weightage (%)** | 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# JAVA PROGRAMMING LAB

**Course Code: CSE 423** **Credit Units: 02**
**Total Hours: 40**

## Course Objective:

programming in the Java programming language, knowledge of object-oriented paradigm in the Java programming language, the use of Java in a variety of technologies and on different platforms.

**1. Lab assignment will be based on the following: (40 Hours)**

1. Use Eclipse or NetBeans platform and acquaint with the various menus. Create a test project, add a test class and run it. See how you can use auto suggestions, auto fill. Try code formatter and code refactoring like renaming variables, methods and classes. Try debug step by step with a small program of about 10 to 15 lines which contains at least one if else condition and a for loop. : **(2 Hours)**
2. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -, *, % operations. Add a text field to display the result. Handle any possible exceptions like divided by zero. : **(2 Hours)**
3. Develop an applet in Java that displays a simple message. : **(1 Hour)**
4. Develop an applet in Java that receives an integer in one text field, and computes its factorial Value and returns it in another text field, when the button named "Compute" is clicked. : **(1 Hour)**
5. Write a Java program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 andNum2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a Number Format Exception. If Num2 were Zero, the program would throw an Arithmetic Exception. Display the exception in a message dialog box. : **(2 Hours)**
6. Write a Java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number. : **(2 Hours)**
7. Write a Java program that connects to a database using JDBC and does add, delete, modify and retrieve operations. : **(1 Hour)**
8. Write a Java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green with radio buttons. On selecting a button, an appropriate message with "Stop" or "Ready" or "Go" should appear above the buttons in selected color. Initially there is no message shown. : **(1 Hour)**
9. Write a Java program to create an abstract class named Shape that contains two integers and an empty method named printArea(). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method printArea() that prints the area of the given shape. : **(1 Hour)**
10. Suppose that a table named Table.txt is stored in a text file. The first line in the file is the header, and the remaining lines correspond to rows in the table. The elements are separated by commas. Write a java program to display the table using Labels in Grid Layout. : **(2 Hours)**
11. Write a Java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired (Use Adapter classes). : **(1 Hour)**
12. Write a Java program that loads names and phone numbers from a text file where the data is organized as one line per record and each field in a record are separated by a tab. It takes a name or phone number as input and prints the corresponding other value from the hash table (hint: use hash tables). : **(1 Hour)**
13. Implement the above program with database instead of a text file. : **(1 Hour)**
14. Write a Java program that takes tab separated data (one record per line) from a text file and inserts them into a database. : **(1 Hour)**
15. Write a java program that prints the meta-data of a given table. : **(1 Hour)**

**2 Students are required to develop an JAVA based application or model as project.**

## Laboratory Outcomes:

- knowledge of the structure and model of the Java programming language, (knowledge)
- use the Java programming language for various programming technologies (understanding)
- develop software in the Java programming language, (application)
- evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements (analysis) propose the use of certain technologies by implementing them in the Java programming language to solve the given problem (synthesis)

**Examination Scheme:**

| | IA | | | | EE | |
|---|---|---|---|---|---|---|
| **Components** | **A** | **PR** | **LR** | **V** | **PR** | **V** |
| **Weightage (%)** | 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

## Text & References:

***Text:***

- Java Fundamentals - A comprehensive Introduction, Herbet Schidt and Dale Srien, TMH.

***References:***

- Java for Programmers, P.J. Deitel and H.M. Deitel, Pearson education (OR) Java: How to Program P.J. Deitel and H.M. Deitel, PHI.
- Object Orientd Programming through Java, P. Radha Krishna, Universities Press.
- Thinking in Java, Bruce Eckel, Pearson Education
- Programming in Java, Bruce Eckel, Pearson Education
- Programming in Java, S. Malhotra and S. Choudhary, Oxford Univ. Press.

# ELECTRONICS WORKSHOP LAB

**Course Code: ECE 425** **Credit Units: 02**
**Total Hours: 40**

**Course Objective**

The purpose of this laboratory course is to introduce the student to the practical application and Familiarization/Identification of electronic components with specification: Functionality, type, size, colour coding, package, symbol, cost etc. (Active, Passive, Electronic, Electro-mechanical, Wires, Cables, Connectors, Fuses, Switches, Relays, Crystals, Displays, Fasteners, Heat sink etc.)

**List of Exercises / Experiments:**

Time allocated -

(i) For experiment No.1-4 is **(30 Hours)**

(ii) and for experiment No.5-6 is (**10 Hours)**

1. Drawing of electronic circuit diagrams using BIS/IEEE symbols and introduction to EDA tools, Interpret data sheets of discrete components and IC's. Familiarization/Application of testing instruments and commonly used tools. [Multimeter, Function generator, Power supply, CRO etc.] [Soldering iron, De-soldering pump, Pliers, Cutters, Wire strippers, Screw drivers, Tweezers, Crimping tool, Hot air soldering and de- soldering station etc.]
2. Testing of electronic components [Resistor, Capacitor, Diode, Transistor, UJT and JFET using multimeter.
3. Inter-connection methods and soldering practice. [Bread board, Wrapping, Crimping, Soldering - types - selection of materials and safety precautions, soldering practice in connectors and general purpose PCB, Crimping.]
4. Printed circuit boards (PCB) [Types, Single sided, Double sided, PTH, Processing methods, Design and fabrication of a single sided PCB for a simple circuit with manual etching (Ferric chloride) and drilling.]
5. Assembling of electronic circuit/system on general purpose PCB, test and show the functioning (Any two circuits)
   - Fixed voltage power supply with transformer, rectifier diode, capacitor filter, zener/IC regulator.
   - LED blinking circuit using a stable multi-vibrator with transistor BC 107.
   - Square wave generation using IC 555 timer in IC base.
   - Sine wave generation using IC 741 OP-AMP in IC base.
   - RC coupled amplifier with transistor BC 107. 6. AND and NAND gates in diode transistor logic.
6. Familiarization of electronic systems:
   - Setting up of a PA system with different microphones, loud speakers, mixer etc.
   - Introduction to robotics- Familiarization of components (motor, sensors, battery etc.) used in robotics.
7. **To make Working Electronics Hardware project compulsorily by each student.**

## Laboratory Outcomes:

Upon completion of this laboratory course students will demonstrate the ability to

- Perform the Testing of electronic components with the help of Multimeter, Function generator, Power supply and CRO etc.
- Do assembling of electronic circuit/system on general purpose PCB.
- Develop different electroinic projects like Square wave generator, LED blinking circuit etc. using different electronic components.

**Examination Scheme:**

| | IA | | | | EE | |
|---|---|---|---|---|---|---|
| **Components** | **A** | **PR** | **LR** | **V** | **PR** | **V** |
| **Weightage (%)** | 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# ELECTROMAGNETIC WAVES

**Course Code: ECE 501** **Credit Units: 03**

**Total Hours: 30**

**Course Objective:**

This course provides a general introduction to the important physical concepts and mathematical methods used in treating all types of wave phenomena, but stresses electromagnetic signal propagation and issues of central importance in electrical engineering. As a core course in the Electrical Computer and Systems Engineering option of the Engineering Sciences concentration, it provides essential background and basic preparation for more advanced work in device physics, microwave and ultra-fast circuitry, antenna design, optics, optical communication and optoelectronics.

**Module I: Transmission Lines: (6 Hours)**

Equations of Voltage and Current on TX line, Propagation constant and characteristic impedance, and reflection coefficient and VSWR, Impedance Transformation on Loss-less and Low loss Transmission line, Power transfer on TX line, Smith Chart, Admittance Smith Chart, Applications of transmission lines: Impedance Matching, use transmission line sections as circuit elements.

**Module II: Maxwell's Equations: (6 Hours)**

Basics of Vectors, Vector calculus, Basic laws of Electromagnetics, Maxwell's Equations, Boundary conditions at Media Interface.

**Module III: Uniform Plane Wave: (6 Hours)**

Uniform plane wave, Propagation of wave, Wave polarization, Poincare's Sphere, Wave propagation in conducting medium, phase and group velocity, Power flow and Poynting vector, Surface current and power loss in a conductor

**Module IV: Plane Waves at a Media Interface: (6 Hours)**

Plane wave in arbitrary direction, Reflection and refraction at dielectric interface, Total internal reflection, wave polarization at media interface, Reflection from a conducting boundary.

Wave propagation in parallel plane waveguide, Analysis of waveguide general approach, Rectangular waveguide, Modal propagation in rectangular waveguide, Surface currents on the waveguide walls, Field visualization, Attenuation in waveguide.

**Module V: Radiation: (6 Hours)**

Solution for potential function, Radiation from the Hertz dipole, Power radiated by hertz dipole, Radiation Parameters of antenna, receiving antenna, Monopole and Dipole antenna,
HVDC and HVAC Common faults in transmission lines. Skin Effect, Ferranti Effect and Corona

## Course Outcomes:

At the end of this course students will demonstrate the ability to:

- Understand characteristics and wave propagation on high frequency transmission lines
- Carryout impedance transformation on TL
- Use sections of transmission line sections for realizing circuit elements
- Characterize uniform plane wave
- Calculate reflection and transmission of waves at media interface
- Analyze wave propagation on metallic waveguides in modal form
- Understand principle of radiation and radiation characteristics of an antenna

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

**Text/Reference Books:**

- R.K. Shevgaonkar, Electromagnetic Waves, Tata McGraw Hill India, 2005
- E.C. Jordan & K.G. Balmain, Electromagnetic waves & Radiating  Systems, Prentice Hall, India
- Narayana Rao, N: Engineering Electromagnetics, 3rd ed., Prentice Hall, 1997.
- David Cheng, Electromagnetics, Prentice Hall

# DIGITAL SIGNAL PROCESSING

**Course Code: ECE 502** **Credit Units: 03**

**Total Hours: 30**

## Course Objective:

The objective of the course in Digital signal processing is to provide the student with significant skills in general as well as advanced theories and methods for modification, analysis, detection and classification of analog and digital signals. Furthermore the objective is to give the student a broad knowledge of central issues regarding design, realization and test of analog and in particular digital signal processing systems consisting of hardware and/or software components. The specialization in signal processing makes it possible to study practical or theoretic fields, ranging from mathematics/signal theory over algorithmic design to development of instruments based on hardware and/or software for real time signal.

## Course Contents:

**Module I: Introduction to Discrete Time Signals & Systems: (6 Hours)**
Sampling and Reconstruction of continuous time signals: Periodic sampling, Reconstruction of a band limited signal from its samples, Sampling Theorem.
Characterization and properties of discrete time signals and systems: Discrete time signals and systems, Linear convolution, Eigen functions for linear time-invariant systems, Linear constant-coefficient difference equations.

**Module II: DFT and its Implementation: (7 Hours)**
Review of Z Transform and DTFT, The Discrete Fourier Transform (DFT) and its properties, Circular and linear convolution using the Discrete Fourier Transform.
Efficient computation of the Discrete Fourier Transform, Decimation -in-Time FFT Algorithm, Decimation-in-Frequency FFT Algorithm.

**Module III: Frequency Response & Filter Structures: (6 Hours)**
The frequency response of LTI systems, All pass and minimum-phase systems.
Digital Filter Structure: Filter structures for IIR and FIR filters, direct form I and II, parallel and cascade forms, frequency sampling structure for FIR filters.
Ladder structures: continued fraction expansion of H (z), example of continued fraction, realization of a ladder structure, example of a ladder realization.

**Module IV: FIR Digital Filter Design: (4 Hours)**
Design of FIR Digital filters by Windowing: Windowing and the Rectangular Window, Other Commonly Used Windows, Examples of Filter Designs Using Windows, The Kaiser Window.

**Module V: IIR Digital Filter Design: (5 Hours)**
Design of IIR Digital Filters from Continuous-time Filters Butterworth and Chebyshev, Impulse invariant and bilinear transformation techniques.

**Module VI: Multirate Signal Processing: (2 Hours)**
Introduction to Multirate Signal Processing, Applications of DSP

## Course Outcomes:

- At the end of this course students will demonstrate the ability to
- Represent signals mathematically in continuous and discrete time and frequency domain
- Get the response of an LSI system to different signals
- Design of different types of digital filters for various applications

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text/Reference Books:


- S.K.Mitra, Digital Signal Processing: A computer based approach.TMH
- A.V. Oppenheim and Schafer, Discrete Time Signal Processing, Prentice Hall, 1989.
- John G. Proakis and D.G. Manolakis, Digital Signal Processing: Principles, Algorithms and Applications, Prentice Hall, 1997.
- L.R. Rabiner and B. Gold, Theory and Application of Digital Signal Processing, Prentice Hall, 1992.
- J.R. Johnson, Introduction to Digital Signal Processing, Prentice Hall, 1992.
- D.J.DeFatta, J. G. Lucas andW.S.Hodgkiss, Digital Signal Processing, John Wiley& Sons, 1988.

# ANTENNA AND PROPOGATION

**Course Code: ECE 503** **Credit Units: 03**
**Total Hours: 30**

## Course Objective:

The purpose of this course is to provide a thorough introduction to antenna systems with an in depth study of various types & performance parameters for antenna.

**Module I: Fundamental Concepts: (7 Hours)**
Physical concept of radiation, Radiation pattern, near-and far-field regions, reciprocity, directivity and gain, effective aperture, polarization, input impedance, efficiency, Friis transmission equation, radiation integrals and auxiliary potential functions.

Radiation from Wires and Loops- Infinitesimal dipole, finite-length dipole, linear elements near conductors, dipoles for mobile communication, small circular loop.

**Module II: Aperture and Reflector Antennas: (8 Hours)**
Huygens' principle, radiation from rectangular rand circular apertures, design considerations, Babinet's principle, Radiation from sectoral and pyramidal horns, design concepts, prime-focus parabolic reflector and Cassegrain antennas.
Broadband Antennas- Log-periodic and Yagi-Uda antennas, frequency independent antennas, broadcast antennas.
Micro strip Antennas- Basic characteristics of micro strip antennas, feeding methods, methods of analysis, design of rectangular and circular patch antennas.

**Module III: Antenna Arrays: (5 Hours)**
Analysis of uniformly spaced arrays with uniform and non-uniform excitation amplitudes, extension to planar arrays, synthesis of antenna arrays.

**Module IV: Basic Concepts of Smart Antennas: (4 Hours)**
Concept and benefits of smart antennas, fixed weight beam forming basics, Adaptive beam forming.

**Module V: Wave Propagation: (6 Hours)**
Modes of Propagation, Plane Earth Reflection, Space wave and Surface Wave, Reflection and refraction waves by the Ionosphere Tropospheric Wave. Ionosphere Wave Propagation in the Ionosphere, Virtual Height, MUF Critical frequency, Skip Distance, Duct Propagation, Space wave

## Course Outcomes:

At the end of the course, students will demonstrate the ability to:

- Understand the properties and various types of antennas.
- Analyze the properties of different types of antennas and their design.
- Operate antenna design software tools and come up with the design of the antenna of required specifications.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:

***Text:***

- Jordan Edwards C. and Balmain Keith G.S “Electromagnetic Waves and Radiating Systems”/ Prentice Hall (India)
- Kraus, John D. & Mashefka, Ronald J. / “Antennas: For All Applications” / Tata McGraw Hill, 3rd Ed.

***References:***

- Prasad, K.D./ “Antennas and Wave Propagation”/ Khanna Publications
- Collin, R. / “Antennas and Radiowave Propagation” / Tata McGraw-Hill
- Hayt Jr. William H./ “Engineering Electromagnetic “/ Tata McGraw-Hill
- Das, Annaparna & Das, Sisir K. / “Microwave Engineering”/ Tata McGraw Hill.
- Roy, Sitesh Kumar & Mitra, Monojit / “Microwave Semiconductor Devices” / Prentice Hall (India).

# CONTROL SYSTEMS

**Course Code: ECE 504** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The basic objective of this course is to provide the students the core knowledge of control systems, in which time & frequency domain analysis, concept of stability and state variable analysis .

**Module I: Introduction to control problem: (8 Hours)**
Introduction of open loop and closed loop control systems, mathematical modeling and representation of physical systems (Electrical Mechanical and Thermal), derivation of transfer function for different types of systems, block diagram & signal flow graph, Reduction Technique, Mason's Gain Formula.

**Module II: Time – Domain Analysis: (6 Hours)**
Time domain performance criteria, transient response of first, second & higher order systems, steady state errors and static error constants in unity feedback control systems, error criteria, generalized error constants, performance indices, response with P, PI and PID Controllers.

**Module III: Frequency Domain Analysis: (6 Hours)**
Polar and inverse polar plots, frequency domain specifications, Logarithmic plots (Bode Plots),gain and phase margins, relative stability, Correlation with time domain, constant close loop frequency responses, from open loop response, Nyquist Plot.

**Module IV: Concept of Stability: (5 Hours)**
Asymptotic stability and conditional stability, Routh – Hurwitz criterion, Root Locus plots and their applications. Compensation Techniques: Concept of compensation, Lag, Lead and Lag-Lead networks, design of closed loop systems using compensation techniques.

**Module V: State variable Analysis: (5 Hours)**
Concepts of state, state variable, state model, state models for linear continuous time functions, diagonalization of transfer function, solution of state equations, concept of controllability & observability. Introduction to Optimal control & Nonlinear control, Optimal Control problem, Regulator problem, Output regulator, treking problem. Nonlinear system – Basic concept & analysis.

## Course Outcomes:
At the end of this course students will demonstrate the ability to:
- Characterize a system and find its steady state behavior
- Investigate stability of a system using different tests
- Design various controllers
- Solve liner, non-liner and optimal control problems

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:

***Text:***
- Dr. N.K Jain, 2005,"Automatic Control System Engineering", Dhanpat Rai Publication.
- J. Nagrath & M. Gopal, 2000, "Control System Engineering", New Age International.
- Gopal. M., " Control Systems: Principles and Design", Tata McGraw-Hill, 1997.
- U A Bakshi "Control systems", Technical Publications
- S Hasan Saeed " Automatic Control Systems" S.K. Kataria & Sons

***References:***
- M, K. Ogata, 2002, "Modern Control Engineering, PHI.
- B. C. Kuo, 2001, "Automatic Control system, Prentice Hall of India.

# DATA STRUCTURE

**Course Code: BTE 501** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**

Data structure deals with organizing large amount of data in order to reduce space complexity and time requirement. This course gives knowledge of algorithms, different types of data structures and the estimation space and time complexity.

**Course Contents:**

**Module I: Introduction to Data structures: (? Hours)**
**Data structures:** Definition, Types. Algorithm design, Complexity, Time-Space Trade offs. Use of pointers in data structures.
Array Definition and Analysis, Representation of Linear Arrays in Memory, Traversing of Linear Arrays, Insertion And Deletion, Single Dimensional Arrays, Two Dimensional Arrays, Multidimensional Arrays, Function Associated with Arrays, Character String in C, Character String Operations, Arrays as parameters, Implementing One Dimensional Array, Sparse matrix.

**Module II: Introduction to Stacks and queue: (? Hours)**
**Stack:** Definition, Array representation of stacks, Operations Associated with Stacks- Push & Pop, Polish expressions, Conversion of infix to postfix, infix to prefix (and vice versa),Application of stacks recursion, polish expression and their compilation, conversion of infix expression to prefix and postfix expression, Tower of Hanoi problem.
**Queue:** Definition, Representation of Queues, Operations of queues- QInsert, QDelete, Priority Queues, Circular Queue, Deque.

**Module III: Dynamic Data Structure: (? Hours)**
**Linked list:** Introduction to Singly linked lists: Representation of linked lists in memory, Traversing, Searching, Insertion into linked list, Deletion from linked list, doubly linked list, circular linked list, generalized list. Applications of Linked List-Polynomial representation using linked list and basic operation. Stack and queue implementation using linked list.

**Module IV: Trees and Graphs: (? Hours)**
**Trees:** Basic Terminology, Binary Trees and their representation, expression evaluation, Complete Binary trees, extended binary trees, Traversing binary trees, Searching, Insertion and Deletion in binary search trees, General trees, AVL trees, Threaded trees, B trees.
**Graphs:** Terminology and Representations, Graphs & Multigraphs, Directed Graphs, Sequential representation of graphs, Adjacency matrices, Transversal Connected Component and Spanning trees.

**Module V: Sorting and Searching and file structures: (? Hours)**
**Sorting:** Insertion Sort, Bubble sort, Selection sort, Quick sort, two-way Merge sort, Heap sort, Partition exchange sort, Shell sort, Sorting on different keys, External sorting.
**Searching:** Linear search, Binary search
**File structures:** Physical storage media, File Organization, Linked organization of file, Inverted file, Organization records into blocks, Sequential blocks, Hash function, Indexing & Hashing, Multilevel indexing, Tree Index, Random file, Primary Indices, Secondary Indices, B tree index files.

**Examination Scheme:**

| Components | Att | CT | S/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/Q: Seminar/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***

- Horowitz and Sahani, “Fundamentals of Data structures”, Galgotia publications
- Tannenbaum, “Data Structures”, PHI
- R.L. Kruse, B.P. Leary, C.L. Tondo, “Data structure and program design in C”  PHI
- “Data structures and algorithms” – Schaum Series.
- File Structures An object-Oriented Approach with C++ by Michael J. Folk, Bill Zoellick, Breg Riccardi, Published by Addison Wesley (1st ISE Reprint,1999).

***References:***

- J. P. Tremblay and P. G. Sorenson, Introduction to Data Structures with Applications, McGraw – Hill Computer Science Series, Mc-Graw – Hill New York, 1984
- Algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Published by Prentice-Hall India (1999).
- Data Structures Using C and C++ second edition by Yeddidyah Langsam, Moshe J.Augenstein, Aaron M. Tenen Baum, Published by Prentice-Hall India
- Data Structures and Algorithm analysis in C++ by Mark Allen Weiss, Published by Addison Wesley (3rd Indian Reprint 2000).
- “Data Structures” – R. S. Salaria

# ELECTROMAGNETIC WAVES LAB

**Course Code: ECE 521** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
This course helps students to understand practically the concept of Electromagnetic waves and Transmission lines used in various applications of Communication systems
Hands-on experiments related to the course contents ECE501

**List of experiments:**

1. To Study the Wave propagation in parallel plane waveguide. **(2 Hours)**
2. To Study the Maxwell Equation and Boundary Condition in EM Wave. **(2 Hours)**
3. To Study the Waves generated at resonant locations. **(2 Hours)**
4. To measure the Propagation constant and characteristic impedance of EM waves in Parallel Wire. **(2 Hours)**
5. Verify the relationship between wavelength of an EM wave in air and inside a rectangular waveguide. **(2 Hours)**
6. Measurement of unknown load impedence and VSWR Based on transmission lines. **(2 Hours)**
7. Wireless Power Transfer Measure the variation in voltage w.r.t. distance between coils, angular orientation of coils, receiver capacitance, metal sheet location and input frequency (ac circuit). Check the DC-AC conversion circuit properly. Make sure to maintain input voltage of 4-5 V DC. Do not touch the MOSFETs during the experiment. **(2 Hours)**
8. Antenna (2 turns) Make a printed antenna using $FeCl_3$ and tape on a substrate and then test it using a Network Analyzer. Ref: Antenna Theory by C. Balanis (3Ed, pg : 816-831) **(2 Hours)**
9. Computational Electromagnetic (5 turns) : Photonic Crystals and Wave scattering Simulation software : MPB and MEEP [works best with Ubuntu] **(4 Hours)**

## Course Outcomes:

- At the end of this course students will demonstrate the ability to
- Understand characteristics and wave propagation on high frequency transmission lines
- Carryout impedance transformation on TL
- Use sections of transmission line sections for realizing circuit elements
- Calculate reflection and transmission of waves at media interface
- Analyze wave propagation on metallic waveguides in modal form
- Understand principle of radiation and radiation characteristics of an antenna

**Examination Scheme:**

| | IA | | | | EE | |
|---|---|---|---|---|---|---|
| **Components** | **A** | **PR** | **LR** | **V** | **PR** | **V** |
| **Weightage (%)** | 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# DIGITAL SIGNAL PROCESSING LAB

**Course Code: ECE 522** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
This course helps students to understand practically the concept of digital signal processing for various applications .

## List of Experiments:

1. To generate unit step sequence, exponential sequence and sinusoidal sequence. **(2 Hours)**
2. To determine convolution of two given sequences. **(2 Hours)**
3. To plot the frequency response of an FIR system. **(2 Hours)**
4. To compute DFT and IDFT of a given sequence. **(2 Hours)**
5. To determine the circular convolution of two given sequences. **(2 Hours)**
6. To design various analog filters. **(2 Hours)**
7. To design FIR filter using Hamming window. **(2 Hours)**
8. To convert Analog filter into Digital Filter using bilinear transformation. **(2 Hours)**
9. To determine z and inverse z transform of a given sequence. **(1 Hour)**
10. To verify 8 points FFT algorithm in decimation in time (DIT) & decimation in frequency (DIF). **(1 Hour)**
11. To determine the filter coefficient using Ramez exchange algorithm. **(1 Hour)**
12. To design an IIR digital filter and its parallel realization. **(1 Hour)**

## Course Outcomes:

1. At the end of this course students will demonstrate the ability to
2. Visualize signals in continuous and discrete time and frequency domain
3. Get the response of an LSI system to different signals
4. Design of different types of digital filters for various application

**Examination Scheme:**

| | IA | | | | EE | |
|---|---|---|---|---|---|---|
| **Components** | **A** | **PR** | **LR** | **V** | **PR** | **V** |
| **Weightage (%)** | 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# ANTENNA AND PROPOGATION LAB

**Course Code: ECE 523** | **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
This course helps students to understand practically the concept of designing of various Antennas. In the course the students will learn Simulation software, HFSS , design different types of antenna, verify their parameters and fabricate one of these.

## List of Experiments:

1. Introduction to HFSS. **(2 Hours)**
2. To study the parameters of Microstrip antenna. **(2 Hours)**
3. To Design and implement Microstrip Square patch antenna on HFSS. **(2 Hours)**
4. To Design and implement Microstrip circular antenna on HFSS. **(2 Hours)**
5. To Design and implement Microstrip Rectangular antenna on HFSS. **(2 Hours)**
6. To Design and implement Microstrip Ring antenna on HFSS. **(2 Hours)**
7. To Design and implement Microstrip patch Array antenna on HFSS. **(2 Hours)**
8. Study of fabrication process of patch antenna. **(2 Hours)**
9. Fabrication of patch antenna. **(2 Hours)**
10. Testing of patch antenna. **(2 Hours)**

## Course Outcomes:
At the end of the course, students will demonstrate the ability to:

- Design different Antennas using simulation software.
- Analyze the properties of different types of antennas and their design.
- Operate antenna design software tools and come up with the design of the antenna of required specifications.

**Examination Scheme:**

| | IA | | | | EE | |
|---|---|---|---|---|---|---|
| **Components** | **A** | **PR** | **LR** | **V** | **PR** | **V** |
| **Weightage (%)** | 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# CONTROL SYSTEMS LAB

**Course Code: ECE 524** **Credit Units: 01**

**Total Hours: 20**

**Course Objective:**

This course helps students to understand practically the concept of Time response , stability and PID controllers.

**Course Contents:**

1. Study and draw: **(2 Hours)**
   a) Step response of open Loop system (linear 1st order, 2nd order
   b) Step response of closed loop systems (1st order)
2. Study and draw temperature control system the open loop response and closed loop response with different values of gains. **(2 Hours)**
3. Study of operations and characteristics of a stepper motor. **(2 Hours)**
4. To Study a D.C. motor speed control system. **(2 Hours)**
5. Performance evaluation and design of PID controller. **(2 Hours)**
6. Study of microprocessor control of a simulated linear system. **(2 Hours)**
7. To design a suitable cascade compensator for the given system and verify the resulting improvement. **(2 Hours)**
8. Note: three experiments in MATLAB have to be performed in the slot of MATLAB. **(3 Hours)**
   Using MATLAB obtain the unit-step response and unit impulse response of the following system:

$$\frac{C(s)}{R(s)} = \frac{16}{s^2 + 1.6s + 16}$$

9. For a 2nd order transfer function using MATLAB : **(3 Hours)**
   a) Bode Plot
   b) Root locus plot
   c) Nyquist plot.

## Course Outcomes:

- At the end of this course students will demonstrate the ability to Characterize a system and find its steady state behaviour Investigate stability of a system using different tests Design various controllers

**Examination Scheme:**

| | IA | | | | EE | |
|---|---|---|---|---|---|---|
| **Components** | **A** | **PR** | **LR** | **V** | **PR** | **V** |
| **Weightage (%)** | 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# DATA STRUCTURES LAB

**Course Code: BTE 521** **Credit Units: 01**
**Total Hours: 20**

**Software Required:** Turbo C++

**Assignment will be provided for following:**

1. C Program to Implement a Stack using array. **(1 Hour)**
2. C Program to Reverse a Stack use array. **(1 Hour)**
3. C Program to Implement two Stacks using a Single Array & Check for Overflow & Underflow. **(1 Hour)**
4. C Program to Implement a Stack using Linked List. **(1 Hour)**
5. C Program to Search for an Element in the Linked List. **(1 Hour)**
6. C Program to Implement a Queue using an Array. **(1 Hour)**
7. C Program to Implement Queue Data Structure using Linked List. **(1 Hour)**
8. C Program to Implement Priority Queue to Add and Delete Elements. **(1 Hour)**
9. C Program to Check String is Palindrome using Stack. **(1 Hour)**
10. C Program to Implement various Queue Functions using Dynamic Memory Allocation. **(1 Hour)**
11. C Program to Implement Queue Functions Using Arrays and link list. **(1 Hour)**
12. Write a C program for sequential search. **(1 Hour)**
13. Write a C program for binary search. **(1 Hour)**
14. Write a C program to sort a list of elements using the selection sort algorithm. **(1 Hour)**
15. Write a C program to sort a list of elements using the bubble sort algorithm. **(1 Hour)**
16. Write a C program to sort a list of elements using the insertion sort algorithm. **(1 Hour)**
17. Write a C program to sort a list of elements using the merge sort algorithm. **(1 Hour)**
18. Write a C program to sort a list of elements using the quick sort algorithm. **(1 Hour)**
19. Write a C program to sort numbers using heap algorithm (MAX heap). **(1 Hour)**
20. Application based on tree, graph and files. **(1 Hour)**

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# INDUSTRIAL PRACTICAL TRAINING – I

**Course Code: NPT 550** **Credit Units: 03**

**Course Objectives:** This course will enable the students to explore the preferred field of specialization and develop analytical / hardware / software / experimental / observation skills. It will help them to manage the technical content and work. It will also help them to prepare and present technical report.

**Methodology:**

Practical training is based on the theoretical subjects studied by students. It can be arranged within the college or in any related industrial unit. The students are to learn various industrial, technical and administrative processes followed in the industry. In case of on-campus training the students will be given specific task of fabrication/assembly/testing/analysis. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation on same.

**Course Outcome:**

After successful completion of the course, the students will be able to

- Explore the preferred field of specialization and develop analytical / hardware / software / experimental / observation skills.
- Manage the technical content and work.
- Learn the various administrative process followed in industry.
- Prepare and present technical report.

**Examination Scheme:**

| | |
|---|---|
| Feedback from industry/work place | 20 |
| Training Report | 40 |
| Viva | 15 |
| Presentation | 25 |
| **Total** | **100** |

**Course Outcome:**

After successful completion of the course, the students will be able to

- Explore the preferred field of specialization and develop analytical / hardware / software / experimental / observation skills.
- Manage the technical content and work.
- Learn the various administrative process followed in industry.
- Prepare and present technical report.

# COMPUTER ARCHITECTURE

**Course Code: ECE 601** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
This course aims to provide a strong foundation for students to understand modern computer system architecture and to apply these insights and principles to future computer designs. The course is structured around the three primary building blocks of general-purpose computing systems: processors, memories, and networks.

**Course Contents:**

**Module 1: Introduction to basic structure of computers: (7 Hours)**
Basic Structure of Computers, Functional units, software, performance issues software, machine instructions and programs, Types of instructions, Instruction sets: Instruction formats, Assembly language, Stacks, Ques, Subroutines.

**Module II: Processor Organization: (5 Hours)**
Processor organization, Information representation, number formats. Multiplication & division, ALU design, Floating Point arithmetic, IEEE 754 floating point formats

**Module III: Control Design: (5 Hours)**
Control Design, Instruction sequencing, Interpretation, Hard wired control - Design methods, and CPU control unit. Microprogrammed Control - Basic concepts, minimizing microinstruction size, multiplier control unit. Microprogrammed computers - CPU control unit

**Module IV: Memory Classification: (7 Hours)**
Memory organization, device characteristics, RAM, ROM, Memory management, Concept of Cache & associative memories, Virtual memory.

**Module V: Basics of parallel processing: (6 Hours)**
System organization, Input - Output systems, Interrupt, DMA, Standard I/O interfaces Concept of parallel processing, Pipelining, Forms of parallel processing, interconnect network

## Course Outcomes:
At the end of this course students will demonstrate
- The ability to learn how computers work know basic principles of computer's working.
- Analyze the performance of computers.
- know how computers are designed and built.
- Understand issues affecting modern processors (caches, pipelines etc.).

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:

- V.Carl Hammacher, "Computer Organisation", Fifth Edition.
- A.S.Tanenbum, "Structured Computer Organisation", PHI, Third edition
- Y.Chu, "Computer Organization and Microprogramming" , II, Englewood Chiffs, N.J., Prentice Hall Edition
- M.M.Mano, "Computer System Architecture", Edition
- C.W.Gear, " Computer Organization and Programming", McGraw Hill, N.V. Edition Hayes J.P, " Computer Architecture and Organization", PHI, Second edition.

# PROBABILITY THEORY AND STOCHASTIC PROCESSES

**Course Code: ECE 602** **Credit Units: 03**

**Total Hours: 30**

**Course Objective:**

The objective of this course is to provide the fundamentals and advanced concepts of probability theory and random process to support graduate coursework and research in electrical, electronic and computer engineering. The required mathematical foundations will be studied at a fairly rigorous level and the applications of the probability theory and random processes to engineering problems will be emphasized.

**Course Contents:**

**Module I: Introduction to basic concepts of probability: (6 Hours)**

Sets and set operations; Probability space; Conditional probability and Bayes theorem; Combinatorial probability and sampling models.

**Module II: Random variables and functions: (6 Hours)**

Discrete random variables, probability mass function, probability distribution function, example random variables and distributions; Continuous random variables, probability density function, probability distribution function, example distributions;

**Module III: Distribution and functions: (6 Hours)**

Joint distributions, functions of one and two random variables, moments of random variables; Conditional distribution, densities and moments; Characteristic functions of a random variable; Markov, Chebyshev and Chernoff bounds;

**Module 4: Random sequence and theorem: (6 Hours)**

Random sequences and modes of convergence (everywhere, almost everywhere, probability, distribution and mean square); Limit theorems; Strong and weak laws of large numbers, central limit theorem.

**Module 5: Basics of transmission process: (6 Hours)**

Random process. Stationary processes. Mean and covariance functions. Ergodicity. Transmission of random process through LTI. Power spectral density.

## Course Outcomes:

At the end of this course students will demonstrate the ability to

- Understand representation of random signals
- Investigate characteristics of random processes
- Make use of theorems related to random signals
- To understand propagation of random signals in LTI systems.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:


- H. Stark and J. Woods, ``Probability and Random Processes with Applications to Signal Processing," Third Edition, Pearson Education
- A.Papoulis and S. Unnikrishnan Pillai, ``Probability, Random Variables and Stochastic Processes," Fourth Edition, McGraw Hill.
- K. L. Chung, Introduction to Probability Theory with Stochastic Processes, Springer International
- P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability, UBS Publishers,
- P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Stochastic Processes, UBS Publishers
- S. Ross, Introduction to Stochastic Models, Harcourt Asia, Academic Press.

# QUANTITATIVE APTITUDE AND REASONING

**Course Code: ECE 603** **Credit Units: 03**
**Total Hours: 30**

## Course Objective:
To enhance the problem-solving skills, to improve the basic mathematical skills and to help those students who are preparing for any type of competitive examinations like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc. It can also help students to prepare for their placements.

**Course Contents:**

**Module I: Basic Mathematics: (6 Hours)**
Numbers System, LCM and HCF, Time & Work, Pipes and Cisterns, Time Speed Distance, Problems on Trains, Boats and Streams, Simplification and Approximation.

**Module II: Applied Mathematics: (6 Hours)**
Percentages, Ratio Proportion and Partnership, Mixtures and Alligation, Problems on Ages, Profit and Loss, Banker's Discount, Simple Interest, Compound Interest, Clocks, Calendars.

**Module III: Engineering Mathematics: (6 Hours)**
Mensuration 2D, Mensuration 3D, Trigonometry, Height and Distances, Progressions, Logarithms, Permutation and Combination, Probability, Race.

**Module IV: Data Interpretation: (4 Hours)**
Table Charts, Bar Graph, Pie Charts, Line Charts.

**Module V: Aptitude and Reasoning: (8 Hours)**
Arithmetic Series: Missing Numbers, Odd One Out, Coding Decoding, Directions and Distances, Blood Relations, Data Sufficiency, Assumptions and Conclusions, Courses of Action, Puzzles, Sitting Arrangements, Syllogism, Cubes & Dice, Counting Figures,

## Course Outcomes:
The student will be able:
- Understand the basic concepts of QUANTITATIVE ABILITY
- Understand the basic concepts of LOGICAL REASONING Skills
- Acquire satisfactory competency in use of VERBAL REASONING
- Solve campus placements aptitude papers covering Quantitative Ability, Logical Reasoning and Verbal Ability.
- Compete in various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | ESE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

A: Attendance, CT: Class Test,:, S/V/Q/HA: Seminar/Viva/Quiz/ Home Assignment, EE: End Semester Examination;

**Text & References:**
**Texts:**
- R. S Aggarwal, "Quantitative Aptitude for competitive Exams", S. Chand publication.
- Arun Sharma, "How to Prepare for Quantitative Aptitude",

**References:**
- R. S Aggarwal, "A Modern Approach to Verbal & Non-Verbal Reasoning", S. Chand publication.
- M. Tyra, "Magical Book on Quicker Mathematics", BSC publication.
- https://www.indiabix.com/aptitude/questions-and-answers/

# INTERNET OF THINGS

**Course Code: CSE 603** **Credit Units: 02**
**Total Hours: 20**

**Course Objectives:**
The objective of the course is to:Vision and Introduction to IOT, Understand IOT Market perspective, Data and Knowledge Management and use of Devices in IOT Technology, Understand State of the Art – IOT Architecture, Real World IOT Design Constraints, Industrial Automation and Commercial Building Automation in IOT.

**Course Contents:**

**Module I: Introduction to the Internet of Things: (07 Hours)**
Key Features, advantages, disadvantages, Wearable electronics, The Basics of Sensors & Actuators, Introduction to Cloud Computing, IOT Software.

**Module II: IoT-An Architectural Overview: (06 Hours)**
Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations. IoT Technology Fundamentals- Devices and gateways, Local and wide area networking, Data management, Business processes in IoT, Everything as a Service(XaaS), M2M and IoT Analytics, Knowledge Management.

**Module III: The Arduino Platform:(06 Hours)**
What is Arduino, Why Arduino, Driver installation, programming &Burning ,Coding in wiring language, Compiling in Arduino, The Arduino Open-Microcontroller Platform, Arduino Basics, Arduino Board Layout & Architecture Reading from Sensors.

**Module IV: Arduino Programming & Interface of Sensors: (05 Hours)**
LED display, PUSH button to array of LED, Communicating to and from computer, GSM, GPS and Zigbee interfacing ,Interface sensor with arduino, Programming arduino, Reading from sensor, Connecting Arduino with Mobile Device. The Android Mobile OS, Using the Bluetooth Module.

**Module V: Projects: (06 Hours)**
1. Creating own Android App using MIT App Inventor & controlling Arduino connected devices. 2. Use Arduino to Upload free data from Environmental Sensors to Cloud Server. 3. Receive Automatic Call Notification on Mobile Phone for Burglar Alarm using IoT Platform4.Control Electronic Devices from anywhere across the world using Internet & Mobile App.

## Course Outcome:.

- Ability to develop IOT application.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | ESE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

A: Attendance, CT: Class Test,:, S/V/Q/HA: Seminar/Viva/Quiz/ Home Assignment, ESE: End Semester Examination;

## *Text & References:*

**Text:**


- Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, David Boyle, **"From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence",** 1st Edition, Academic Press, 2014.


**Reference Books:**


- Vijay Madisetti and ArshdeepBahga, **"Internet of Things (A Hands-on-Approach)",** 1stEdition, VPT, 2014.
- Francis daCosta, **"Rethinking the Internet of Things: A Scalable Approach to Connecting Everything",** 1st Edition, Apress Publications, 2013

# PROBLEM SOLVING TECHNIQUES – I

**Course Code: CSE 604** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
To improve problem solving skills using the concept of C,C++ and data structures and develop knowledge of basic data structures for storage and retrieval of ordered or unordered data. Data structures include: arrays, linked lists, binary trees, heaps, and hash tables etc.

**Course Contents:**

**Module I– Programming in C –I: (04 Hours)**
**Introduction :** Basic structure of C program, Concept of variables, constants and data types in C, Operators and expressions: Introduction, arithmetic, relational, Logical, Assignment, Increment and decrement operator, Conditional, bitwise operators, Expressions, Operator precedence and associativity. Managing Input and output Operation, formatting I/O.

**Control Structures and Looping:** C Statements, conditional executing using if, else, nesting of if, switch and break Concepts of loops, example of loops in C using for, while and do-while, continue and break. Storage types (automatic, register etc.), predefined processor, Command Line Argument.

**Module II- Programming in C – II: (06 Hours)**
**Arrays and Functions:** One dimensional arrays and example of iterative programs using arrays, 2-D arrays Use in matrix computations. Concept of Sub-programming, functions Example of user defined functions. Function prototype, Return values and their types, calling function, function argument, function with variable number of argument, recursion.
**Pointers :** Pointers, relationship between arrays and pointers Argument passing using pointers, Array of pointers. Passing arrays as arguments.
**String:** Strings and C string library.
**Structure:** Structure and Union, Defining C structures, Giving values to members, Array of structure, Nested structure, passing strings as arguments.
**File Handling:** Basics of file Handling.

**Module III- Object Oriented Programming in C++: (05 Hours)**
Difference between C and C++, Procedure Oriented and Object Oriented Approach, Characteristics of Object-Oriented Languages

**Classes and Objects:** Abstract data types, Object & classes, attributes, methods, C++ class declaration, Local Class and Global Class, State identity and behaviour of an object, Local Object and Global Object, Scope resolution operator, Friend Functions, Inline functions, Constructors and destructors, instantiation of objects, Types of Constructors, Static Class Data, Array of Objects, Constant member functions and Objects, Memory management Operators.
**Inheritance:** Inheritance, Types of Inheritance, access modes – public, private & protected, Abstract Classes, Ambiguity resolution using scope resolution operator and Virtual base class, Aggregation, composition vs classification hiérarchies, Overriding inheritance methods, Constructors in derived classes, Nesting of Classes.
**Polymorphism:** Polymorphism, Type of Polymorphism – Compile time and runtime, Function Overloading, Operator Overloading (Unary and Binary) Polymorphism by parameter, Pointer to objects, this pointer, Virtual Functions, pure virtual functions.

**Module IV – Data Structure –I: (07 Hours)**
Classification of Data structures, Abstract Data Types, Implementation aspects: Memory representation. Data structures operations and its cost estimation.
**Linked List:** Representation of linked list in memory, different implementation of linked list. Circular linked list, doubly linked list, etc. Application of linked list: polynomial manipulation using linked list, etc.

**Stacks:** Stacks as ADT, Different implementation of stack, multiple stacks. Application of Stack: Conversion of infix to postfix notation using stack, evaluation of postfix expression, Recursion.
**Queues:** Queues as ADT, Different implementation of queue, Circular queue, Concept of Dqueue and Priority Queue, Application of queues.

**Module V – Data Structure-II: (08 Hours)**
**Tree:** Definitions - Height, depth, order, degree etc. Binary Search Tree - Operations, Traversal, Search. AVL Tree, Heap, Applications and comparison of various types of tree; Introduction to forest, multi-way Tree, B tree, B+ tree, B* tree and red-black tree.
**Graphs:** Introduction, Classification of graph: Directed and Undirected graphs, etc, Representation, Graph Traversal: Depth First Search (DFS), Breadth First Search (BFS), Graph algorithm: Minimum Spanning Tree (MST)- Kruskal, Prim's algorithms. Dijkstra's shortest path algorithm; Comparison between different graph algorithms. Application of graphs.
**Sorting:** Introduction, Sort methods like: Bubble Sort, Quick sort. Selection sort, Heap sort, Insertion sort, Shell sort, Merge sort and Radix sort; comparison of various sorting techniques. Basic Search Techniques: Sequential search, Binary search, Comparison of search methods, Hashing & Indexing.

## Course outcome:

- Able to understand the concepts of data structure, data type and array data structure.
- Able to implement linked list data structure to solve various problems.
- Able to understand and apply various data structure such as stacks, queues, trees and graphs to solve various computing problems using C/C++ -programming language.
- To apply concepts and techniques for implementation.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **ESE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

A: Attendance, CT: Class Test,:, S/V/Q/HA: Seminar/Viva/Quiz/ Home Assignment, ESE: End Semester Examination;

## Text & References:

***Text:***

- Yashwant Kanetkar, "Let us C", BPB Publications, 2nd Edition, 2001.
- Herbert Schildt, "C: The complete reference", Osbourne Mcgraw Hill, 4th Edition, 2002.
- A.R. Venugopal, Rajkumar, T. Ravishanker "Mastering C++", TMH, 1997
- R. Lafore, "Object Oriented Programming using C++", BPB Publications, 2004.
- A. M. Tenenbaum, "Data Structures using C & C++", Prentice-Hall of India Pvt. Ltd., New Delhi.

***Refrence:***

- Kernighan & Ritchie, "C Programming Language", The (Ansi C Version), PHI, 2nd Edition.
- "Object Oriented Programming with C++" By E. Balagurusamy.
- Bruno R Preiss, "Data Structures and Algorithms with Object Oriented Design Pattern in C++",
- Jhon Wiley & Sons, Inc.
- Gilberg Forozan , "Data Structure – A pseudo code approach with C++", Cengage Learning, New Delhi.

# INTERNET OF THINGS LAB

**Course Code: CSE 623** **Credit Units: 02**
**Total Hours: 40**

**Course Objectives:**
The objective of the course is to:Vision and Introduction to IOT, Understand IOT Market perspective, Data and Knowledge Management and use of Devices in IOT Technology, Understand State of the Art – IOT Architecture, Real World IOT Design Constraints, Industrial Automation and Commercial Building Automation in IOT.

**SOFTWARE REQUIREMENTS:** Arduino IDE
**List of experiments/demonstrations:**
1. Study and Install Python in Eclipse and WAP for data types in python. **(03 Hours)**
2. Write a Program for arithmetic operation in Python. **(03 Hours)**
3. Write a Program for looping statement in Python. **(03 Hours)**
4. Study and Install IDE of Arduino and different types of Arduino. **(03 Hours)**
5. Write program using Arduino IDE for Blink LED. **(03 Hours)**
6. Write Program for RGB LED using Arduino. **(03 Hours)**
7. Study the Temperature sensor and Write Program foe monitor temperature using Arduino **(03 Hours)**
8. Study and Implement RFID, NFC using Arduino. **(03 Hours)**
9. Study and implement MQTT protocol using Arduino. **(04 Hours)**
10. Study and Configure Raspberry Pi. **(04 Hours)**
11. WAP for LED blink using Raspberry Pi. **(04 Hours)**
12. Study and Implement Zigbee Protocol using Arduino / Raspberry Pi.**(04 Hours)**

## Course Outcomes:
- Ability to develop IOT application

**Examination Scheme:**

| IA | | | EE | | | |
|---|---|---|---|---|---|---|
| **A** | **PR** | **Practical Based Test** | **Major Experiment** | **Minor Experiment** | **LR** | **Viva** |
| 5 | 10 | 15 | 35 | 15 | 10 | 10 |

Note: IA –InternalAssessment, EE- External Exam, A- Attendance PR- Performance, LR – Lab Record, V – Viva.

## Text & References:

Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, David Boyle, **"From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence",** 1st Edition, Academic Press, 2014.

# PROBLEM SOLVING TECHNIQUES LAB – I

**Course Code: CSE 624** **Credit Units: 02**
**Total Hours: 40**

**Course Objective:**
To write the programs for solving problems using the concept of C,C++ and data structures and develop knowledge of basic data structures for storage and retrieval of ordered or unordered data.

**Software Requirements:** Turbo C++ compiler

**List of experiments/demonstrations:**

**(A) Programming in C : (10 Hours)**

1. Write a simple program based on operators (pre, post increment , bitwise and , or , etc.).
2. Write a simple program based on conversions (from int to float & float to int)
3. Write a program for find the max and min from the three numbers.
4. Write the program for the simple, compound interest.
5. Write program for students marks grading.
6. C program to check whether a given number is odd or even.
7. C program to Add digits of input number.
8. C program to Factorial of a given number.
9. C program to swap two numbers without using third variable.
10. C program to check whether a given year is leap year or not.
11. C program to check whether a given number Palindrome Number or not.
12. C programs to print different patterns.
13. Program for the following using switch statement:

    **Menu:-**

    (a) Sum of two numbers

    (b) Negative or Positive Number

    (c) Simple Interest

    (d) Area of Circle

    (e) Exit
14. C program to check whether a given number Prime Number or not.
15. C program to check whether a given number Armstrong Number or not.
16. C program to print Fibonacci series up to given term.
17. C program to find out sum of 10 numbers by using array.
18. C program to reverses of one array elements into another.
19. C program to find out maximum and minimum number in an array.
20. Write a C program that uses functions to perform the following:

    (a) Addition of Two Matrices

    (b) Multiplication of Two Matrices

    (c) Transpose of a matrix
21. C program to Factorial of a given number by using user define function.
22. Write a program for display values reverse order from array using pointer.
23. Write a program through pointer variable to sum of n elements from array .
24. Write a C program which copies one file to another.

**(B) Object Oriented Programming in C++ : (10 Hours)**

1. Write a program that show the concept of class and object and having function for addition,subtraction,multiplication and division of two number.
2. Program that show the concept of inline function.
3. Program that show the concept of friend function.
4. Program that show the concept of all types of constructor and destructor.
5. Program that show the concept of local class and global class.
6. Program that show the concept of local object and global object.
7. Program that show the concept of static class data and static member function.
8. Program that show the concept of constant member data and function .
9. Program that show the concept of dynamic memory allocation.
10. Program that show the concept of multiple inheritance.
11. Program that show the concept of multilevel inheritance.
12. Program that show the concept of function overloading.
13. Program that show the concept of function overriding.
14. Program that illustrates the order of execution of constructors and destructors when new class is derived from more than one base class.
15. Program that show the concept of operator overloading(overload ++ operator) .
16. Program that overload +,- for addition and subtraction of two complex number.
17. Program that show the concept of this pointer.
18. Program that illustrates how run time polymorphism is achieved using virtual functions.
19. Program that illustrates the role of virtual base class in building class hierarchy.
20. Program that illustrates the role of abstract class in building class hierarchy.

**(C) Data Structure : (20 Hours)**

1. Write a C/C++ program that uses functions to perform the following: i) Create a singly linked list of integers. ii) Delete a given integer from the above linked list. iii) Display the contents of the above list after deletion.
2. Write a C/C++ program that uses functions to perform the following: i) Create a doubly linked list of integers. ii) Delete a given integer from the above doubly linked list. iii) Display the contents of the above list after deletion.
3. Write a C/C++ program that implement the concept of Stack using array/link list.
4. Write a C/C++ program that implement the concept of Queue using array/link list..
5. Write a C/C++ program that implement the concept of Circular Queue.
6. Write a C/C++ program that implement the solution of Tower of Hanoi problem.
7. Write a C/C++ program that uses stack operations to convert a given infix expression into its postfix Equivalent.
8. Write a C/C++ program that uses functions to perform the following: i) Create a binary search tree of characters. ii) Traverse the above Binary search tree recursively in postorder.
9. Write a C/C++ program that uses functions to perform the following: i) Create a binary search tree of integers. ii) Traverse the above Binary search tree non recursively in order.
10. Write C/C++ programs for implementing the following sorting methods to arrange a list of integers in ascending order: i) Insertion sort ii) Bubble Sort iii) Insertion Sort iv) Quick Sort v) Merge sort vi) Counting Sort etc.

11. Write C/C++ programs for implementing the following graph traversal algorithms:

    (i)Depth first traversal (ii)Breadth first traversal

## Course outcome:

Able to write the program using different data structures.

- Able to implement linked list data structure to solve various problems.
- Able to apply various data structure such as stacks, queues, trees and graphs to solve various computing problems using C/C++ -programming language.
- To apply concepts and techniques for implementation.

**Examination Scheme:**

| IA | | | EE | | | |
|---|---|---|---|---|---|---|
| **A** | **PR** | **Practical Based Test** | **Major Experiment** | **Minor Experiment** | **LR** | **Viva** |
| 5 | 10 | 15 | 35 | 15 | 10 | 10 |

- Note: IA –Internal Assessment, EE- External Exam, A- Attendance PR- Performance, LR – Lab Record, V – Viva.

## Text & References:

***Text:***

- Yashwant Kanetkar, "Let us C", BPB Publications, 2nd Edition, 2001.
- Herbert Schildt, "C: The complete reference", Osbourne Mcgraw Hill, 4th Edition, 2002.
- A.R. Venugopal, Rajkumar, T. Ravishanker "Mastering C++", TMH, 1997
- R. Lafore, "Object Oriented Programming using C++", BPB Publications, 2004.
- A. M. Tenenbaum, "Data Structures using C & C++", Prentice-Hall of India Pvt. Ltd., New Delhi.

***Refrence:***

- Kernighan & Ritchie, "C Programming Language", The (Ansi C Version), PHI, 2nd Edition.
- "Object Oriented Programming with C++" By E. Balagurusamy.
- Bruno R Preiss, "Data Structures and Algorithms with Object Oriented Design Pattern in C++", Jhon Wiley & Sons, Inc.
- Gilberg Forozan , "Data Structure – A pseudo code approach with C++", Cengage Learning, New Delhi.

# MICROWAVE THEORY AND TECHNIQUES

**Course Code: ECE 605** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
This course deals with the microwaves. Microwaves are important when we are going to the high frequency regime. By studying this course students will be able to know about the microwave components and devices, microwave generators and their characteristics, microwave applications and measurement. Also they will be familiar about the rectangular and circular waveguides, their equations and the modes existing in these waveguides.

**Course Contents:**

**Module 1: Introduction to Microwaves: (4 Hours)**
History of Microwaves, Microwave Frequency bands; Applications of Microwaves: Civil and Military, Medical, EMI/ EMC.

**Mathematical Model of Microwave Transmission:** Concept of Mode, Features of TEM, TE and TM Modes, Losses associated with microwave transmission, Concept of Impedance in Microwave transmission.

**Module II: Analysis of RF and Microwave Transmission Lines**: **(4 Hours)**
Coaxial line, Rectangular waveguide, Circular waveguide, Strip line, Micro strip line.
**Microwave Network Analysis**: Equivalent voltages and currents for non-TEM lines, Network parameters for microwave circuits, Scattering Parameters.

**Module III: Passive and Active Microwave Devices: (6 Hours)**
Microwave passive components: Directional Coupler, Power Divider, Magic Tee, Attenuator, Resonator. Microwave active components: Diodes, Transistors, Oscillators, Mixers. Microwave Semiconductor Devices: Gunn Diodes, IMPATT diodes, Schottky Barrier diodes, PIN diodes. Microwave Tubes: Klystron, TWT, Magnetron.

**Module IV: Microwave Design Principles: (5 Hours)**
Impedance transformation, Impedance Matching, Microwave Filter Design, RF and Microwave Amplifier Design, Microwave Power Amplifier Design, Low Noise Amplifier Design, Microwave Mixer Design, Microwave Oscillator Design. Microwave Antennas- Antenna parameters, Antenna for ground based systems, Antennas for airborne and satellite borne systems, Planar Antennas.

**Module V: Microwave Measurements: (5 Hours)**
Power, Frequency and impedance measurement atmicrowave frequency, Network Analyzer and measurement of scattering parameters, Spectrum Analyzer and measurement of spectrum of a microwave signal, Noise at microwave frequency and measurement of noise figure. Measurement of Microwave antenna parameters.

**Module VI: Microwave Systems: (6 Hours)**
Radar, Terrestrial and Satellite Communication, Radio Aidsto Navigation, RFID, GPS. Modern Trends in Microwaves Engineering- Effect of Microwaves on human body, Medical and Civil applications of microwaves, Electromagnetic interference and Electromagnetic Compatibility (EMI & EMC), Monolithic Microwave ICs, RFMEMS for microwave components, Microwave Imaging.

## Course Outcomes
At the end of the course, students will demonstrate the ability to:
- Understand various microwave system components their properties.
- Appreciate that during analysis/ synthesis of microwave systems, the different mathematical treatment is required compared to general circuit analysis.
- Design microwave systems for different practical application.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Suggested Text/Reference Books

- R.E. Collins, Microwave Circuits, McGraw Hill
- K.C. Gupta and I.J. Bahl, Microwave Circuits, Artech house
- Microwave Devices and Circuits, Liao
- Microwave Principles, Herbert J Reich
- Microwaves, K.C. Gupta
- Microwave Techniques, D C Agrawal
- Elements of Microwave Engg, Chatterjee

# INSTRUMENTATION

**Course Code: ECE 606** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The basic objective of this course is to provide the students the core knowledge of industrial instrumentation so that they learn how to implement instrumentation techniques in industry.

**Course Contents:**

**Module I: Introduction to Measurement & Instrumentation: (8 Hours)**
Classification, Characteristics of measuring instruments: accuracy, precision, error, linearity, hysteresis, resolution & sensitivity, generalized instrumentation systems, primary sensing elements-definition & examples, transducers: definition & Classification; measurement of pressure- diaphragms, capsules, bourdon tubes, strain-gauge transducers, LVDT type, Temperature Measurement (RTD, Thermocouple, thermistor, optical pyrometer); Measurement of force:-load cell(column type, proving ring, shear type), Measurement of flow classification flow meters, head type flow meters-Venturi tube, flow nozzle, pitot tube

**Module II: A. C. Instruments: (8 Hours)**
A.C. Voltmeter using rectifier; True RMS responding Voltmeter; Electronics Multimeter; Digital Voltmeter; spectrum analyzer, harmonic distortion analyzer, CRO-introduction, construction of conventional CRO. Digital storage oscilloscope.

**Module III: Telemetry: (7 Hours)**
Telemetry-introduction & different types of telemetry system, data acquisitions-signal conditioning, single channel & multichannel data acquisition system.

**Module IV: Miscellaneous Instruments: (7 Hours)**
Computer controlled test systems-introduction, testing of audio amplifier, Testing of Radio Receiver; Instruments used in computer controlled instrumentation, IEEE 488 electrical interface, Fiber optic Instrumentation.

## Course Outcomes
At the end of the course, students will demonstrate the ability to:
- Recognize the evolution and history of units and standardsin Measurements.
- Identify the various parameters that are measurable in electronic instrumentation.
- Employ appropriate instruments to measure given sets of parameters.
- Practice the construction of testing and measuring set up for electronic systems.
- To have a deep understanding about instrumentation concepts which can be applied to Control systems.
- Relate the usage of various instrumentation standards.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:

***Text:***

- A. K. Sawhney, 2005, “Measurement & Instrumentation” Dhanpat Rai Publications.
- Rangan, Sarma, Mani, “Instrumentation- devices & systems”, TMH
- Helfrick, Cooper, “Modern Electronic Instrumentation & Measurement Techniques”, PHI – 4th Reprint.


***References:***

- Johnson, “Process Control Instrumentation” PHI – 7th Edition

# DATA BASE MANAGEMENT SYSTEMS

**Course Code: CSE 304** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The objective of this course is to get students familiar with Databases and their use. They can identify different types of available database model, concurrency techniques and new applications of the DBMS.

**Course Contents:**

**Module I: Introduction: (06 Hours)**
Concept and goals of DBMS, Database Languages, Database Users, Database Abstraction.
Basic Concepts of ER Model, Relationship sets, Keys, Mapping, Design of ER Model, Concept of Generalization, Aggregation and Specialization. transforming ER diagram into the tables. Various other data models object oriented data Model, Network data model, and Relational data model.

**Module II: Relational Data models: (06 Hours)**
Domains, Tuples, Attributes, Relations, Characteristics of relations, Keys, Key attributes of relation, Relational database, Schemas, Integrity constraints. Referential integrity, Intension and Extension, Relational Query languages: SQL-DDL, DML, integrity constraints, Complex queries, various joins, indexing, triggers ,Relational algebra and relational calculus, Relational algebra operations like select, Project, Join, Division, outer union. Tuple relational calculus.

**Module III: Data Base Design: (06 Hours)**
Data Base Design: Introduction to normalization, Normal forms, Functional dependency, Decomposition, Dependency preservation and lossless join, problems with null valued and dangling tuples, multivalued dependencies.

**Module IV: Transaction Processing Concepts: (06 Hours)**
Transaction System, Testing of Serilizability, Serializability of schedules, conflict & view serializable schedule, recoverability, Recovery from transaction failures. Log based recovery. Checkpoints deadlock handling. Concurrency Control Techniques: – Concurrency Control, locking Techniques for concurrency control, time stamping protocols for concurrency control, validation-based protocol, multiple granularity. Multi version schemes, Recovery with concurrent transaction.

**Module V: Relational Database Management Systems: (06 Hours)**
Study of Relational Database Management Systems through Oracle/Postgres SQL/MySQL: Architecture, physical files, memory structures, background process. Concept of table spaces, segments, extents and block. Dedicated server, multi-threaded server, distributed database. Introduction of ANSI SQL. Usage of like, any, all, exists, views and other commands, Special operators. Hierarchical queries, inline queries, flashback queries

## Course Outcomes:
The student will learn
- Describe DBMS architecture, physical and logical database designs, database modeling, relational, hierarchical and network models.
- Identify basic database storage structures and access techniques such as file organizations, indexing methods including B-tree, and hashing.
- Learn and apply Structured query language (SQL) for database definition and database manipulation.
- Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database.
- Understand various transaction processing, concurrency control mechanisms and database protection mechanisms.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | ESE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

A: Attendance, CT: Class Test,:, S/V/Q/HA: Seminar/Viva/Quiz/ Home Assignment, ESE: End Semester Examination;

## Text & References:

***Text:***

- Korth, Silberschatz, "Database System Concepts", 4th Ed., TMH, 2000.
- Steve Bobrowski, "Oracle & Architecture", TMH, 2000

***References:***


- Date C. J., "An Introduction to Database Systems", 7th Ed., Narosa Publishing, 2004
- Elmsari and Navathe, "Fundamentals of Database Systems", 4th Ed., A. Wesley, 2004
- Ullman J. D., "Principles of Database Systems", 2nd Ed., Galgotia Publications, 1999.

# ADVANCED JAVA PROGRAMMING

**Course Code: CSE 504** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The objective is to equip the students with the advanced feature of contemporary java which would enable them to handle complex programs relating to managing data and processes over the Enterprise network. The major objective of this course is to provide a sound foundation to the students on the concepts, precepts and practices, in a field that is of immense concern to the industry and business.

**Course Contents:**

**Module I: (05 Hours)**
Introduction to Java RMI, RMI services, RMI client, Running client and server, Introduction of swing, swing components, Introduction to Multimedia Programming

**Module II: (05 Hours)**
Database Connectivity using JDBC- Understanding JDBC, Define the layers in JDBC architecture, various types of JDBC drivers, manipulating various SQL Queries, Manage transactions and perform batch updates in JDBC, Creating Database Connectivity Applications, Connection to Database with the java.sql Package.

**Module III: (08 Hours)**
Introduction to sever side programming, Introduction to Servlets, Web Container, Servlet Life Cycle, Servlet based Applications, Servlet and HTML. Web.xml file. Session tracking

**Module IV: (06 Hours)**
JSP: Introduction to JSP, JSP architecture, JSP syntax Basics, JSP implicit objects, JSP based Applications. The Model-View-Controller Architecture. Session management.

**Module V: (06 Hours)**
Enterprise Java Beans:-EJB roles—EJB Client-Object -container-Transaction Management—implementing a Basic EJB Object-Implementing session Beans-Implementing Entity Beans-Deploying an enterprise Java Beans Object-Changes in EJB1.1 specification.

## Course Outcomes:
The student will learn
- Can develop Java Applets, Beans programming.
- Can Understand Advanced Java Networking concepts and develop server side application.
- Can learn Server Side Programming Concepts and create Dynamic web Application.
- Know about the JDBC Principles and can interact with back end database with java programming.
- Understand the application server and also understand the enterprise level applications.

**Examination Scheme:**

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## *Text & References:*
***Text:***

- Java 2 Unleashed (Techmedia – SAMS) By Jamie Jaworski
- Professional Java Server Programming ( a Press ) By Allamaraju
- Developing Java Servlets (Techmedia – SAMS) By James Goodwill
- Using Java 1.2 Special Edition ( PHI ) By Webber

***References:***


- David Flanagan,Jim Parley, William Crawford & Kris Magnusson, Java Enterprise in a nutshell- A desktop Quick reference -O'REILLY, 2003
- Stephen Ausbury and Scott R. Weiner, Developing Java Enterprise Applications, Wiley-2001
- Jaison Hunder & William Crawford, Java Servlet Programming, O'REILLY, 2002
- Dietal and Deital, “JAVA 2” PEARSON publication

# MICROWAVE THEORY AND TECHNIQUES LAB

**Course Code: ECE 625** **Credit Units: 01**

**Total Hours: 20**

**Course Objective:**

To understand and Analysis of Waveguides and gain complete knowledge about Microwave Components.

**List of Experiments:**

1. To study the characteristics of reflex klystron. **(2 Hours)**
2. To study the characteristic of Gunn diode. **(2 Hours)**
3. To measure frequency and guided wavelength of a microwave signal. **(2 Hours)**
4. To measure the impedance of a given load. **(2 Hours)**
5. To measure the dielectric constant of the given sample. **(2 Hours)**
6. To measure various parameters of a directional coupler. **(2 Hours)**
7. To study the characteristic and functions of an isolator. **(2 Hours)**
8. To study the characteristic and functions of a circulator. **(3 Hours)**
9. To study the characteristic and functions of various tees. **(3 Hours)**

## Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Demonstrate the characteristics of Microwave sources
2. Demonstrate the characteristics of directional Couplers
3. To test the characteristics of microwave components
4. To analyze the radiation pattern of antenna
5. To measure antenna gain CO6 Practice microwave measurement procedures

**Examination Scheme:**

| | IA | | | | EE | |
|---|---|---|---|---|---|---|
| **Components** | **A** | **PR** | **LR** | **V** | **PR** | **V** |
| **Weightage (%)** | 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# INSTRUMENTATION LAB

**Course Code: ECE 626** **Credit Units: 01**

**Total Hours: 20**

**Course Objective:**

1. To learn how to visualize and work on laboratory and multidisciplinary tasks.
2. To demonstrate various Bridges &sensors using simulation and hardware set ups.
3. To Measure Voltage, Current, Power factor, Power, Energy.

**List of Experiments:**

1. Measurement of resolution and sensitivity of thermocouple (study of various thermocouples J, K, T, etc.) (Calibration). **(2 Hours)**
2. Measurement of resolution, sensitivity and non linearity of thermistor (thermistor instability). **(2 Hours)**
3. Measurement of thickness of LVDT. **(2 Hours)**
4. Measurement of resolution of LVDT (and displacement measurement). **(2 Hours)**
5. Study of proportional control and offset Problems. **(2 Hours)**
6. Study of proportional integral control. **(1 Hour)**
7. Study of proportional integral derivative (PID) control. **(1 Hour)**
8. Vibration measurement by stroboscope (natural frequency of a cantilever). **(1 Hour)**
9. Angular frequency (speed of rotating objects) measurement by stroboscope. **(1 Hour)**
10. Pressure transducer study and calibration. **(1 Hour)**
11. Proving ring (force measurement). **(1 Hour)**
12. Torque cell. **(1 Hour)**
13. Closed loop study of an electric circuit. **(1 Hour)**
14. Young's modulus of a cantilever. **(1 Hour)**
15. Young's modulus and poison's ratio of tensile test piece of M.S. **(1 Hour)**

## Course Outcomes:

At the end of the course, students will demonstrate the ability to:

- Have knowledge, to demonstrate the designing and conducting experiments, to analyze and interpret data.
- Provides the ability to visualize and work on laboratory and multidisciplinary tasks.
- Measurement of R,L,C ,Voltage, Current, Power factor , Power, Energy
- Measurement of Magnetic Circuits.
- Measurement uses PMMC and Moving Iron type Instruments
- Measurement of power using LPF and UPF methods.
- Ability to balance AC Bridges to find unknown values

**Examination Scheme:**

| | IA | | | | EE | |
|---|---|---|---|---|---|---|
| **Components** | **A** | **PR** | **LR** | **V** | **PR** | **V** |
| **Weightage (%)** | 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# DATA BASE MANAGEMENT SYSTEMS LAB

**Course Code: CSE 324** **Credit Units: 01**
**Total Hours: 20**

**Software Required:** Oracle 9i

**Topics covered in lab will include the following Programs: (02 Hours)**

1. Using create command design three specific table and the table structure is given below.
Table name- Book

| ISBN | TITLE | PUB_YEAR | UNIT_PRICE | AUTHOR_NAME | PUB_NAME |
|---|---|---|---|---|---|
| 1001 | Oracle | 2004 | 399 | Arora | phi |
| 1002 | Dbms | 2004 | 400 | Basu | technical |
| 2001 | Dos | 2003 | 250 | Sinha | nirali |
| 2002 | Adbms | 2004 | 450 | Basu | technical |
| 2003 | Unix | 2000 | 300 | Kapoor | scitech |

Table name- Author

| AUTHOR_NAME | COUNTRY |
|---|---|
| Arora | U.S.A |
| Kapoor | Canada |
| Basu | India |
| Sinha | India |

Table name- Publisher

| PUB_NAME | PUB_ADD1 |
|---|---|
| Phi | Delhi |
| Technical | Pune mainmarket |
| Nirali | Mumbai |
| Scitech | Chennai |

2. Write the SQL query to find the name of all publisher from Book relation. **(02 Hours)**
3. Write the SQL query to display the name of all publisher using distinct clause.**(02 Hours)**
4. Write the SQL query to find the names of author from the author table where the first two characters of names are 'ba'.**(02 Hours)**
5. Write the SQL query to display title of books published in year 2004.**(02 Hours)**
6. Write the SQL query to display title of books having price between 300 to 400.**(01 Hour)**
7. Write the SQL query to display title of books having price between 300 to 400 using operators.**(01 Hour)**
8. Write the SQL query to display title of books with author_name and country published in year 2004.**(01 Hour)**
9. Write the SQL query to display all title and (unit_price*10) as an attribute from book table using arithmetic expression.**(01 Hour)**
10. Write the SQL query to add the new column in all three tables.**(01 Hour)**
11. Study the concept of Views and their utility in DBMS ,write the SQL query to design a view.**(01 Hour)**
12. Write the SQL query to make the attribute ISBN as a primary key in Book relation.**(01 Hour)**
13. Write the SQL query to display the all the titles of Books with price and year in descending order.**(01 Hour)**
14. Write the SQL query to study the use of Delete and Drop command in DBMS. **(01 Hour)**
15. Study the concept of Triggers, cursors and Stored procedures in DBMS. **(01 Hour)**

## Course Outcome:

- At the end of lab session students would be able to design the Database application for the real life projects.
- Students would be able to perform insertion, deletion and updation operation on Databases.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# ADVANCED JAVA PROGRAMMING LAB

**Course Code: CSE 524** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**

The objective is to equip the students with the advanced feature of contemporary java which would enable them to handle complex programs relating to managing data and processes over the Enterprise network. The major objective of this course is to provide a sound foundation to the students on the concepts, precepts and practices, in a field that is of immense concern to the industry and business.

**Course Contents:**

**Programming Language:** Java

1. Implement two services that should be run on a given network host. You should use Java RMI. Develop a basic arithmetic calculator with the help of java RMI.**(02 Hours)**
2. Write a Java program that can create an employee form for inserting the detail of employee in an organization by using Applets create a JFrame which have labels, text box, Radio button, Check Box, button etc. **(02 Hours)**
3. For the above form write a programme to handle the events for checking the data input by user. **(02 Hours)**
4. WAP that implement a JApplet and display the following frame. **(02 Hours)**
   b. Customer name
   c. Customer number
   d. Age
   e. Address
5. Write a Java program to access a table Employees for Oracle Sample database in HR Schema using Java code.**(01 Hour)**
6. Write a Java program to manipulate a table Employees for Oracle Sample database in HR Schema using Java code.**(01 Hour)**
7. Write a Java program that implement a simple servlet program.**(02 Hours)**
8. Write a Java program for authentication,
   a). Create the Web Page for User-Name and Password
   b). Validate the login-id and password by the servlet code.
   c). Connecting a database using user-id and password.
9. Write a Java program to product selling web site. **(02 Hours)**
   a) Read data send by the client (HTML page)
   b) Insert data into the database using the prepared statement.
   c) Display the output to client for item purchased or not.
10. Write a Java program to include a HTML page into a JSP page to product purchasing.**(02 Hours)**
    a) Read data send by the client (HTML page)
    b) Insert data into the database using the prepared statement.
    c) Display the output to client for item purchased or not.
11. Write a Java program using Enterprise Java Beans for creating an application. **(02 Hours)**
    a) Adding a Session EJB component to handle the business logic of the J2EE Application.
    b) Integrating the DAO into the Session EJB.
    c) Adding an Entity EJB
    d) Integrating the Entity EJB into the Session EJB.
    e) Interfacing the Web Tier with the Session EJB.

## Course Outcomes:

- Ability to design and develop Java Applets, Beans programming.
- Ability to design and structure the Server Side Programming Concepts.
- Ability to Create and design Dynamic web Application.
- Write the structured code for JDBC (back end database).
- Ability to develop and design the enterprise level applications.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

## Text & References:

***Text:***

- Java 2 Unleashed (Techmedia – SAMS) By Jamie Jaworski
- Professional Java Server Programming ( a Press ) By Allamaraju
- Developing Java Servlets (Techmedia – SAMS) By James Goodwill
- Using Java 1.2 Special Edition ( PHI ) By Webber

***References:***


- David Flanagan,Jim Parley, William Crawford & Kris Magnusson, Java Enterprise in a nutshell- A desktop Quick reference -O'REILLY, 2003
- Stephen Ausbury and Scott R. Weiner, Developing Java Enterprise Applications, Wiley-2001
- Jaison Hunder & William Crawford, Java Servlet Programming, O'REILLY, 2002
- Dietal and Deital, “JAVA 2” PEARSON publication

# MINOR PROJECT

**Course Code: NMP 660** **Credit Units: 02**

**Course objectives:** The objective of Minor project is to enable the student to take up investigative study in the broad field of Engineering, either fully theoretical/practical or involving both theoretical and practical work to be assigned by the Department on an individual basis or two/three students in a group, under the guidance of a Supervisor.

**Methodology:**

Topics of project are to be based on the latest trends, verifying engineering concepts /principals and should involve elementary research work. The projects may involve design, fabrications, testing, computer modeling, and analysis of any engineering problem. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation on same.

**Examination Scheme:**

| | |
|---|---|
| Literature study/ Fabrication/ Experimentation | 40 |
| Written Report | 20 |
| Viva | 15 |
| Presentation | 25 |
| **Total** | **100** |

**Course Outcomes:**
At the end of the course, students will demonstrate the ability to:
1. Conceive a problem statement either from rigorous literature survey or from the requirements raised from need analysis.
2. Design, implement and test the prototype/algorithm in order to solve the conceived problem.
3. Write comprehensive report on mini project work.

# FIBER OPTIC COMMUNICATION

**Course Code: ECE 701** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**

To provide in-depth knowledge of modern optical communication systems, Optical Sources, Different types of fibers, optical switching and the losses which occur during transmission of the signals.

**Module1: Introduction to optical Fiber: (6 Hours)**
Introduction to vector nature of light, propagation of light, propagation of light ina cylindrical dielectric rod, Ray model, wave model.

Different types of optical fibers, Modal analysis of a step index fiber. Signal degradation on optical fiber due to dispersion and attenuation. Fabrication of fibers and measurement techniques like OTDR.

**Module II: Optical Sources: (7 Hours)**
Optical sources - LEDs and Lasers, Photo-detectors - pin-diodes, APDs, detectorresponsivity, noise, optical receivers. Optical link design - BER calculation, quantum limit, power penalties.

**Module III: Different Types of optical Switches: (6 Hours)**
Optical switches - coupled mode analysis of directional couplers, electro-optic switches. Optical amplifiers - EDFA, Raman amplifier. WDM and DWDM systems. Principles of WDM networks.

Nonlinear effects in fiber optic links. Concept of self-phase modulation, group velocity dispersion and solition based communication.

**Module IV: Mechanical properties of Fiber: (6 Hours)**
Fiber end preparation, fiber splicing, fiber connectors, connection losses, fiber couplers, fiber materials, fiber fabrication, mechanical properties of fibers, different fiber cables.

**Module V: Communication Components of Fiber: (5 Hours)**
Basic communication components, coupling to and from the fiber, multiplexing and coding, repeaters, bandwidth and rise time budgets, noise, bit error rate and eye pattern.

## Course Outcomes:
At the end of the course, students will demonstrate the ability to:
- Understand the principles fiber-optic communication, the components and the bandwidth advantages.
- Understand the properties of the optical fibers and optical components.
- Understand operation of lasers, LEDs, and detectors
- Analyze system performance of optical communication systems
- Design optical networks and understand non-linear effects in optical fibers

## Examination Scheme:

| Components | Att | CT | S/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/Q: Seminar/Quiz, EE: End Semester Examination; Att: Attendance

## Text/Reference Books

- J. Keiser, Fibre Optic communication, McGraw-Hill, 5th Ed. 2013 (Indian Edition).
- T. Tamir, Integrated optics, (Topics in Applied Physics Vol.7), Springer-Verlag, 1975.
- J. Gowar, Optical communication systems, Prentice Hall India, 1987.
- S.E. Miller and A.G. Chynoweth, eds., Optical fibres telecommunications, Academic Press, 1979.
- G. Agrawal, Nonlinear fibre optics, Academic Press, 2nd Ed. 1994.
- G. Agrawal, Fiber optic Communication Systems, John Wiley and sons, New York, 1997
- F.C. Allard, Fiber Optics Handbook for engineers and scientists, McGraw Hill, New York (1990).

# COMPUTER NETWORK

**Course Code: ECE 702** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
This course is designed to provide a detailed treatment of Networking principles and control of switching systems, traffic engineering, Transport Layer and Network Layer and Link Layer protocols for telecommunication networks.

**Module I: Introduction of Application Layer: (6 Hours)**
Introduction to computer networks and the Internet: Application layer: Principles of network applications, The Web and Hyper Text Transfer Protocol, File transfer, Electronic mail, Domain name system, Peer-to-Peer file sharing, Socket programming, Layering concepts.

**Module II: Switching in computer Network: (6 Hours)**
Switching in networks: Classification and requirements of switches, a generic switch, Circuit Switching, Time-division switching, Space-division switching, Crossbar switch and evaluation of blocking probability, 2-stage, 3-stage and n-stage networks, Packet switching, Blocking in packet switches, Three generations of packet switches, switch fabric, Buffering, Multicasting, Statistical Multiplexing.

**Module III: Applications of Transport Layer: (6 Hours)**
Transport layer: Connectionless transport - User Datagram Protocol, Connection-oriented transport – Transmission Control Protocol, Remote Procedure Call.

Congestion Control and Resource Allocation: Issues in Resource Allocation,Queuing Disciplines, TCP congestion Control, Congestion Avoidance Mechanisms and Quality of Service.

**Module IV: Applications Network Layer: (6 Hours)**
Network layer: Virtual circuit and Datagram networks, Router, Internet Protocol, Routing algorithms, Broadcast and Multicast routing.

**Module V: ALOHA & IEEE 802 Standards: (6 Hours)**
Link layer: ALOHA, Multiple access protocols, IEEE 802 standards, Local Area Networks, addressing, Ethernet, Hubs, Switches.

## Course Outcomes:
At the end of this course students will demonstrate the ability to:
- Understand the concepts of networking thoroughly.
- Design a network for a particular application.
- Analyze the performance of the network.
- To see the function of Transport and Network layer

**Examination Scheme:**

| Components | Att | CT | S/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/Q: Seminar/Quiz, EE: End Semester Examination; Att: Attendance

## Text Reference books:

- J.F. Kurose and K. W. Ross, “ Computer Networking – A top down approach featuring the Internet”, Pearson Education, 5th Edition
- L. Peterson and B. Davie, “Computer Networks – A Systems Approach” Elsevier Morgan Kaufmann Publisher, 5th Edition.
- T. Viswanathan, “Telecommunication Switching System and Networks”, Prentice Hall
- S. Keshav, “ An Engineering Approach to Computer Networking” , Pearson Education
- B. A. Forouzan, “ Data Communications and Networking”, Tata McGraw Hill, 4th Edition
- Andrew Tanenbaum, “ Computer networks”, Prentice Hall
- D. Comer, “ Computer Networks and Internet/TCP-IP”, Prentice Hall
- William Stallings, “Data and computer communications”, Prentice Hall

# FIBER OPTIC COMMUNICATION LAB

**Course Code: ECE 721** | **Credit Units: 01**
**Total Hours: 20**

**Course Objective**:

To provide the concepts of optical fibres, sources and detectors used in optical communication systems. Wave propagation in cylindrical fibres, step and graded index fibres, single-mode fibres and measure the losses in optical fibers.

## Course Contents:

1. To measure the Numerical Aperture of a multimode fiber. **(2 Hours)**
2. To measure attenuation by cut Back technique. **(2 Hours)**
3. To study the model properties of a multimode fiber. **(2 Hours)**
4. To couple the light into a single mode fiber & measure the far-field power distribution. **(2 Hours)**
5. To measure various fiber alignment losses. **(2 Hours)**
6. To estimate the power budget for a fiber optic system. **(2 Hours)**
7. To set up a fiber optic analog link. **(2 Hours)**
8. To set up a fiber optic digital link. **(2 Hours)**
9. To study Time Division Multiplexing of signals. **(1 Hour)**
10. To study Manchester Coding. **(1 Hour)**
11. To study voice digitization. **(1 Hour)**
12. To simulate optical fiber wave guide. **(1 Hour)**

## Course Outcomes:

At the end of the course, students will demonstrate the ability to:

- Calculate the Numerical Aperture of a multimode Fiber
- Measure the coupling losses of the Fiber.
- Set up the analog and digital link of optical fiber.
- Study Time division Multiplexing.
- Study Manchester Coding.
- Simulate optical fiber wave guide.

**Examination Scheme:**

| | IA | | | | EE | |
|---|---|---|---|---|---|---|
| **Components** | **A** | **PR** | **LR** | **V** | **PR** | **V** |
| **Weightage (%)** | 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# COMPUTER NETWORK LAB

**Course Code: ECE 722** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**

To familiarize students with the layered design and protocols of computer networks, including the Internet.

**Course Contents:**

1. Study of Network Topologies. **(2 Hours)**
2. Implementation and study of Stop & Wait protocol. **(2 Hours)**
3. Implementation and study of Go Back N Protocol. **(2 Hours)**
4. Implementation and study of selective repeat protocol. **(2 Hours)**
5. Implementation and study of CSMA-CA Protocol. **(2 Hours)**
6. Implementation and study of CSMA-CD Protocol. **(2 Hours)**
7. Implementation and study of Pure Aloha Protocol. **(2 Hours)**
8. Implementation and study of Slotted Aloha Protocol. **(2 Hours)**
9. Implementation and study of Token Bus Protocol. **(2 Hours)**
10. Implementation and study of Token Ring Protocol. **(1 Hour)**
11. Study of Data encryption and Decryption. **(1 Hour)**

## Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. To Study Different types of Network Topology
2. Demonstrate the Stop and Wait Protocal
3. Study the CSMA-CA Protocal
4. Study of Aloha Protocol
5. To analyze Data encryption and Decryption.

**Examination Scheme:**

| | IA | | | | EE | |
|---|---|---|---|---|---|---|
| **Components** | **A** | **PR** | **LR** | **V** | **PR** | **V** |
| **Weightage (%)** | 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# CMOS DESIGN

**Course Code: ECE 704** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
In the recent years, IC manufacturing technology has gone through dramatic evolution and changes, continuously scaling to ever smatter dimensions. This scaling has a double impact on the design of ICs. First, the complexity of the designs that can be put on a single die has increased dramatically which led to new design methodologies. At the same time, this plunge into deep submicron space causes devices to behave differently and brings challenging issues to forefront. This course along with the course of Digital Circuits and Systems II and Analog CMOS IC design will give you many of the basic essentials to work in the area of Circuit Design. Since this course takes the latest trends in the industry into account, you will find yourself at a definite edge.

**Course Contents:**

**Module I: Introduction to VLSI design: (8 Hours)**
VLSI Design Concepts, Moor's Law, Scale of Integration (SSI, MSI, LSI, VLSI, ULSI – basic idea only), Types of VLSI Chips (Analog & Digital VLSI chips, General purpose, ASIC, PLA, FPGA), Design principles (Digital VLSI –Concept of Regularity, Granularity etc), Design Domains (Behavioral, Structu1) ,Design hierarchy, VLSI Design style: Full custom, Gate array, standard-cell, Macro cell based design, Field programmable devices.

**Module II: Basics of MOSFET: (8 Hours)**
MOS transistor theory: MOS Capacitor(Accumulation, Depletion, Inversion) ,Fundamentals of Enhancement Mode MOSFETs, Depletion Mode MOSFETs, Weak & strong Inversion Conditions , Ideal Current-Voltage (IV) Characteristics of a MOSFET, non ideal I-V effects(Channel Length Modulation, Body effect, Sub threshold conduction, velocity saturation), Threshold Voltage Concept in MOSFETs and its physical significance ,Trends & Projections in VLSI Design & Technology, Scaling in MOS devices.MOS capacitances. Comparison of equations for PMOS and NMOS.

**Module III: CMOS for Digital VLSI Circuits: (6 Hours)**
General CMOS logic structure, VTC of an ideal inverter, noise margin, Different types of inverter (resistive load, and CMOS), DC transfer Characteristics of CMOS, Switching characteristic (propagation delay like High to low & low to high), Different types of Power dissipation in CMOS, power and delay trade-off, tri state inverter.

**Module IV: Combinational circuit & sequential Circuit design: (4 Hours)**
Series and parallel N and P switches, : Good 0 and Poor 0 transmission by Pass transistor logic, Implementation of NAND & NOR using CMOS, Design of complex logics by using CMOS, TGL, Pseudo NMOS logic design, Dynamic logic(Pre-charge & Evaluation),concept of charge sharing , Domino Logic, concept of Bi CMOS. Principle of Bi-stability, NAND and NOR based SR latch, and clocked SR Latch, JK latch

**Module V: Integrated Circuit Layout: (4 Hours)**
Introduction to CMOS Process technology, Latch up and its prevention, Stick Diagrams, Physical Design Rules, stick diagrams of CMOS NAND and NOR gates and stick diagrams for functions like (AB+E+CD)*.
Design Rules, Parasitics. Delay: RC Delay model, linear delay model, logical path efforts. Power, interconnect and Robustness in CMOS circuit layout

## Course Outcomes:
At the end of the course, students will demonstrate the ability to:
- Design different CMOS circuits using various logic families along with their circuit layout.
- Use of tools for VLSI IC design.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:

- Jan M Rabaey: Digital Integrated Circuits
- David Hodges et al: Analysis and Design of Digital ICs
- Kang: CMOS Digital ICs
- Weste and Harris: CMOS VLSI design
- Weste and Eshragian: Principles of CMOS VLSI Design

# ARTIFICIAL NEURAL NETWORKS

**Course Code: ECE 705** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
This subject deals with the introduction of ANN and the most advanced application of ANN. ANN leads to artificial intelligence approach and different algorithms for learning, training and the generalization of ANN.

**Course Contents:**

**Module I: Introduction: (7 Hours)**
Biological neurons & memory: structure & function of simple neuron; Artificial Neural Networks (ANN); Typical applications of ANN: Classification, pattern recognition, control, optimization; Basic approach of working on ANN – Training, learning and generalization.

**Module II: Supervised Learning: (7 Hours)**
Single layer networks; perception – linear separability, training algorithm, limitations; Multi-layer networks – Architecture, back propagation algorithm (BPA) and training algorithms, applications.

**Module III: Unsupervised Learning: (6 Hours)**
Hamming networks; maxnet; simple competitive learning; adaptive resonance theory.

**Module IV: Associated models: (5 Hours)**
Hopfield networks; brain-in-a-box network; Boltzman machine.

**Module V: Optimization method: (5 Hours)**
Hopfield network for – TSP, solution of simultaneous linear equations, iterated gradient descent; simulated annealing.

## Course Outcomes:
At the end of the course, students will demonstrate the ability to:

- Knowledge about different neural networks, their architecture and training algorithm
- Concept of Fuzzy logic, Fuzzy Sets, fuzzy rules and fuzzy reasoning
- Exposure to the applicability of neural networks and fuzzy logic

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

**Text & References:**

- K. Mehrotra, C.K. Mohan & Sanjay Ranka, "Elements of ANN", MIT Press, 1997.
- Simon Haykin,"Neural Networks – A comprehensive foundation", Macmillan Publishing Company, New York, 1994.
- A Cichocki and R. Unbehaven, "Neural networks for optimization and signal processing", John Wiley & Sons, 1993.
- J.M. Zurada, " Introduction to ANN", Jaico Publishers, Mumbai, 1997

# ANALOG CMOS IC DESIGN

**Course Code: ECE 706** **Credit Units: 03**
**Total Hours: 30**

### Course Objective:

In the VLSI design course, the student was initiated in the world of circuit design from a digital perspective. In this course, transistor modeling is emphasized from a purely analog point of view. Some of the world's highest paid jobs in Electronics based industry are in Analog Circuit Design. This course will serve as an introduction to what Analog Design is like. Since CMOS is the technology being used most of the time, only CMOS technology is being included here. A serious learner is recommended to study BJT based circuits as well.

### Course Contents:

**Module I: MOSFET Basics: (8 Hours)**
MOSFET channel length modulation, small signal model, transconductance, T model, biasing a MOSFET at DC, four resistor biasing, modeling body effect, body transconductance, short channel effects, Coupling and Bypass capacitors, AC equivalent circuit

**Module II: Single Stage Amplifiers, Differential Amplifier and Current Mirrors: (9 Hours)**
Common source, common gate, source follower: input resistance, output resistance and voltage gain, high frequency model, MOSFET Unity Gain
High and Low Frequency response of CS Amplifier, Active loads, CS source with resistive load, diode connected load, current source load, MOSFET current source, Open circuit Time constants, Miller theorem, Cascode amplifier, Results for CS, CD, CB configurations taking $r_0$ into account
Current mirror, Cascode Current mirror, Active Current Mirrors: Large and small signal Analysis
Differential Pair: Common mode and Differential input voltage**,** Large signal Operation and Small signal Operation, effect of $r_0$, CMRR, effect of $R_D$ mismatch and $g_m$ mismatch, Input Offset Voltage of MOS pair, Frequency response of resistively loaded and actively loaded MOS Differential pair

**Module III: Operational Amplifiers: (7 Hours)**
Ideal Op Amp, Compensation of Op Amp, One stage Op Amp, Two stage CMOS Op Amp, Folded Cascode Op Amp: voltage gain, Frequency response and slew rate, Noise in Op Amps, power Supply Rejection Ratio

**Module IV: Noise, Stability and Frequency Compensation: (6 Hours)**
Statistical Characteristics of Noise, Types of Noise, Noise in single stage amplifiers, Noise in Differential pair
Feedback review, Loop Gain, Transfer Function of feedback amplifier, effect of feedback on Amplifier poles, Miller Compensation and Pole Splitting, multipole system, frequency compensation, compensation of two stage op amp

## Course Outcomes:

At the end of the course, students will demonstrate the ability to:

- Differentiate between Analog, Digital and Mixed Signal CMOS Integrated Circuits
- Analyze and design current sources and voltage references for given specifications.
- Analyze and design single stage MOS Amplifiers.
- Analyze and design Operational Amplifiers.
- Analyze and design data converter circuits.

### Examination Scheme:

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:


- Sedra and Smith: Microelectronic Circuits
- Razavi Design of Analog CMOS Integrated Circuits
- Gray, Hurst, Lewis and Meyer: Analysis and design of Analog Ics
- Allen and Holberg: CMOS Analog Design

# SOFTWARE ENGINEERING

**Course Code: CSE 605** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The basic objective of Software Engineering is to develop methods and procedures for software development that can scale up for large systems and that can be used to consistently produce high-quality software at low cost and with a small cycle time. Software Engineering is the systematic approach to the development, operation, maintenance, and retirement of software.
The course provides a thorough introduction to the fundamentals principles of software engineering. The organization broadly is based on the classical analysis-design-implementation framework.

**Course Contents:**

**Module I: Introduction: (06 Hours)**
Software life cycle models: Waterfall, Prototype, Evolutionary and Spiral models, Overview of Quality Standards like ISO 9001, SEI-CMM.

**Module II: Software Metrics and Project Planning: (06 Hours)**
Size Metrics like LOC, Token Count, Function Count, Design Metrics, Data Structure Metrics, Information Flow Metrics. Cost estimation, static, Single and multivariate models, COCOMO model, Putnam Resource Allocation Model, Risk management.

**Module III: Software Requirement Analysis, design and coding: (07 Hours)**
Problem Analysis, Software Requirement and Specifications, Behavioural and non-behavioural requirements, Software Prototyping Cohesion & Coupling, Classification of Cohesiveness & Coupling, Function Oriented Design, Object Oriented Design, User Interface Design Top-down and bottom-up Structured programming, Information hiding.

**Module IV: Software Reliability, Testing and Maintenance: (08 Hours)**
Failure and Faults, Reliability Models: Basic Model, Logarithmic Poisson Model, Software process, Functional testing: Boundary value analysis, Equivalence class testing, Decision table testing, Cause effect graphing, Structural testing: path testing, Data flow and mutation testing, unit testing, integration and system testing, Debugging, Testing Tools, & Standards.Management of maintenance, Maintenance Process, Maintenance Models, Reverse Engineering, Software RE-engineering.

**Module V: UML: (03 Hours)**
Introduction to UML,Use Case Diagrams, Class Diagram: State Diagram in UMLActivity Diagram in UMLSequence Diagram in UMLCollaboration Diagram in UML.

## Course Outcomes:
- Ability to use the modeling approaches for the designing of software.
- Ability to use the testing tools and designing of test cases for testing.
- Ability to use the Unified modeling language (UML) for the designing of software product.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | ESE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

A: Attendance, CT: Class Test,:, S/V/Q/HA: Seminar/Viva/Quiz/ Home Assignment, ESE: End Semester Examination;

## Text & References:
***Text:***

- K. K. Aggarwal & Yogesh Singh, "Software Engineering", 2nd Ed, New Age International, 2005.
- R. S. Pressman, "Software Engineering – A practitioner's approach", 5th Ed., McGraw Hill Int. Ed., 2001.


***References:***

- R. Fairley, "Software Engineering Concepts", Tata McGraw Hill, 1997.
- P. Jalote, "An Integrated approach to Software Engineering", Narosa, 1991.
- Stephen R. Schach, "Classical & Object Oriented Software Engineering", IRWIN, 1996.
- James Peter, W. Pedrycz, "Software Engineering", John Wiley & Sons.
- Sommerville, "Software Engineering", Addison Wesley, 1999.

# CMOS DESIGN LAB

**Course Code: ECE 724** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
This course gives the opportunity to the students to learn about the configuration and simulation of Very Large Scale Integrated Circuits & Systems. The main purpose of this lab course is to explore various design style of simple and complex Integrated Circuits(IC) near to students. In this laboratory students are able to understand about models and model parameters of MOSFET amplifier CMOS Inverter etc. which are suited for IC Technology.

## Course Contents:

1. MOSFET characteristics with varying $V_{GS}$ for both pmos and nmos. **(2 Hours)**

2. Effect on VTC of CMOS inverter with variation of W and L. **(2 Hours)**

3. Transient analysis of CMOS inverter with varying capacitive load, W and L. **(2 Hours)**

4. Rise time, Fall time power dissipation, propagation delay calculation of CMOS inverter with the variation ofcapacitive load, W and L. **(2 Hours)**

5. NOR and NAND gate - Transient analysis. **(2 Hours)**

6. XOR/XNOR gate - Transient analysis. **(2 Hours)**

7. 2:1 MUX and XOR gate with P.T.L.- Transient analysis. **(2 Hours)**

8. D type latch and flip flop - Transient analysis. **(2 Hours)**

9. 3 input NAND gate implementation with DOMINO (precharge and evaluation). **(2 Hours)**

10. 4 inverter chain to derive capacitive load. **(2 Hours)**

## Course Outcomes:
At the end of the course, students will demonstrate the ability to:
- Understand the concepts of digital system design methods through practical domain.
- Design of combinational and sequential circuits using CAD
- To analyse and layout design of CMOS circuits in micron and submicron level using any platform.

**Examination Scheme:**

| | IA | | | | EE | |
|---|---|---|---|---|---|---|
| **Components** | **A** | **PR** | **LR** | **V** | **PR** | **V** |
| **Weightage (%)** | 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# ARTIFICIAL NEURAL NETWORKS LAB

**Course Code: ECE 725** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**

The main objective of this course is to provide the student with the basic understanding of neural networks and fuzzy logic fundamentals, Program the related algorithms and Design the required and related systems.

## Course Contents:

1. Artificial Neural Networks and their Biological Motivation. **(2 Hours)**
2. Basic structures and properties of ANN. **(2 Hours)**
3. Perceptron, its learning law and applications. **(2 Hours)**
4. Adaline – The adaptive linear element, its structure and learning laws. **(2 Hours)**
5. Feed forward multiplayer neural networks. Back propagation algorithm. **(2 Hours)**
6. Applications of multiplayer neural networks. **(2 Hours)**
7. Advanced learning algorithms for multi layer perceptrons. **(2 Hours)**
8. Hopfield Networks. **(3 Hours)**
9. RBF networks. **(3 Hours)**

## Course Outcomes:

At the end of the course, students will demonstrate the ability to:

- Knowledge and understanding: Understanding principles of neural networks and fuzzy logic fundamentals;
- Designing of the required and related systems.

**Examination Scheme:**

| | IA | | | | EE | |
|---|---|---|---|---|---|---|
| **Components** | **A** | **PR** | **LR** | **V** | **PR** | **V** |
| **Weightage (%)** | 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# ANALOG CMOS IC DESIGN LAB

**Course Code: ECE 726** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
This course gives the opportunity to the students to learn about the configuration and simulation of Analog system throough CMOS. The main purpose of this lab course is to explore various design style of simple and complex analog Integrated Circuits(IC) near to students. In this laboratory students are able to understand about models and model parameters of MOSFET amplifier CMOS Inverter etc. which are suited for IC Technology.

## Course Contents:

1. Plot the IV characteristics of Id vs Vds for varying Vgs. **(2 Hours)**
2. Design and simulate single stage amplifiers. **(2 Hours)**
3. Repeat experiment 1 including body effect. **(2 Hours)**
4. Design and simulate current mirror. **(2 Hours)**
5. Design and simulate voltage source and voltage sink amplifier. **(2 Hours)**
6. Design and simulate Differential amplifier. **(2 Hours)**
7. Design and simulate Darlington pair. **(2 Hours)**
8. Design and simulate an OP amp. **(2 Hours)**
9. Simulate the operation of a CMOS op-amp with SPICE and find its frequency response. **(2 Hours)**
10. Simulate and plot the frequency response of a switched capacitor filter circuit using SPICE. **(2 Hours)**

## Course Outcomes:
At the end of the course, students will demonstrate the ability to:
- Understand the concepts of analog system design methods through practical domain.
- Design of OPAMP, Differential Amplifier using CAD
- To analyze and layout design of CMOS circuits in micron and submicron level using any platform.

**Examination Scheme:**

| | IA | | | | EE | |
|---|---|---|---|---|---|---|
| **Components** | **A** | **PR** | **LR** | **V** | **PR** | **V** |
| **Weightage (%)** | 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# SOFTWARE ENGINEERING LAB

**Course Code: CSE 625** **Credit Units: 01**
**Total Hours: 20**

**Course Objectives:**
The course provides a practical implementation of the fundamentals principles of software engineering. The organization broadly is based on the classical analysis-design-implementation framework.

**SOFTWARE REQUIREMENTS:** Rational Rose

**List of experiments/demonstrations:**

1. Learning the concepts of Feasibility Study. **(02 Hours)**
2. Understanding the concepts of Software Documentation.**(02 Hours)**
3. Learning Project Management activities and techniques for designing of software.**(02 Hours)**
4. Getting familiarized with the Unified Modelling Language (UML) Environment.**(02 Hours)**
5. Working with the Use-case View of UML. **(02 Hours)**
6. Working with the Class Diagrams of UML. **(02 Hours)**
7. Working with the State Diagrams of UML.**(02 Hours)**
8. Working with the Activity Diagrams of UML. **(02 Hours)**
9. Working with the Collaboration Diagrams of UML. **(02 Hours)**
10. Study of cost estimation modelling approaches in Software Engineering.**(02 Hours)**

## Course Outcomes:

- Ability to design the proper documentation of software product.
- Ability to implement the cost estimation modelling approaches.
- Ability to use the unified modelling language as a tool.

**Examination Scheme:**

| IA | | | EE | | | |
|---|---|---|---|---|---|---|
| **A** | **PR** | **Practical Based Test** | **Major Experiment** | **Minor Experiment** | **LR** | **Viva** |
| 5 | 10 | 15 | 35 | 15 | 10 | 10 |

- Note: IA –Internal Assessment, EE- External Exam, A- Attendance PR- Performance, LR – Lab Record, V – Viva.

## Text & References:


- K.K.Agrawal& Yogesh singh “Software Engineering”, 2nd Ed, New Age International, 2005.
- R.S. Pressmen Software Engineering – A practitioner’s approach”, 5th Ed., McGraw Hill Int. Ed., 2001.
- P. Jalote, “An Integrated approach to Software Engineering”, Narosa, 1991.

# MOBILE COMMUNICATIONS

**Course Code: ECE 707**

**Credit Units: 03**
**Total Hours: 30**

### Course Objective:

This course introduce about global system for mobile, 2.5G, 3G technologies, how wireless communication system works and what is FDMA, TDMA. This course also introduce some facts about propagation models.

### Course Contents:

**Module I: Introduction to Wireless Communication System: (6 Hours)**
Evolution of mobile radio communication, Mobile radiotelephony in U.S., Mobile radio system around the world, second generation (2G) cellular network, evolution to 2.5G wireless network, evolution for 2.5G TDMA standards, third generation (3G) wireless network.

**Module II: The Cellular Concept: (6 Hours)**
System design fundamentals, frequency reuse channel assignment strategies, Hand off strategies, Interference and system capacity, improving coverage and capacity in cellular system.

**Module III: Propagation Model and Spread Spectrum Modulation Techniques: (6 Hours)**
Longley rice model, okumara model, hata model, pcs extension to hata model, wolfish and bertoni model, Pseudo Noise (PN) sequence, Direct sequence spread spectrum (DSSS), frequency hopped spread spectrum (FHSS).

**Module IV: Multiple Access Techniques for Wireless Communication: (6 Hours)**
Introduction to multiple access, Frequency division multiple access (FDMA), Time division Multiple access (TDMA), Spread spectrum multiple access, Packet Radio.

**Module V: Global System for Mobile: (6 Hours)**
Global system for mobile (GSM), GSM system architecture, GSM radio subsystem, GSM channel types, Example of a GSM cell, Frame structure of GSM.

### Course Outcomes:

At the end of the course, students will demonstrate the ability to:

- Explain the basic physical and technical settings functioning of mobile communications systems,
- Describe the basic principles of mobile communication system,.
- Describe the development and implementation of mobile communication systems,

### Examination Scheme:

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

### Text & References:

***Text:***

- Wireless Communications, Theodore S. Rappaport

***References:***

- Wireless Communications & Networks by William Stallings.
- Wireless Intelligent Networking by Gerry Christensen, Robert Duncan, Paul G. Florack

# POWER ELECTRONICS

**Course Code: ECE 708** **Credit Units: 03**
**Total Hours: 30**

## Course Objective:

1. The course aims to introduce the theory of operation, analytical and circuit models and basic design concepts of Electric Power components and systems to the students.
2. To introduce students to the basic theory of power semiconductor devices and passive components, their practical applications in power electronics
3. To familiarize students to the principle of operation, design and synthesis of different power conversion circuits and their applications.
4. To provide strong foundation for further study of power electronic circuits and systems.

## Course Contents:

**Module I: Triggering Devices: (5 Hours)**
Triggering devices, Unijunction Transistor, Characteristics and applications of UJT, Programmable Unijunction Transistor, DIAC, Silicon Controlled Switch, Silicon Unilateral Switch, silicon Silicon bilateral Switch, Shockley diode.

**Module II: Thyristor Firing Circuits, Turn on systems: (5 Hours)**
Two transistor model of Thyristor, Method of Triggering a thyristor, Thyristor Types, Requirement for triggering circuits, Thyristor Firing Circuits, Fullwave control of Ac with one thryristor, Light activated SCrs (LASCR), Control Circuit, dv/dt and di/dt protection of Thyristor, Pulse Transformer triggering, Firing SCR by UJT, TRIAC firing circuit, Phase control of SCR by pedestal and Ramp.

**Module III: Controlled Rectifiers: ( 4 Hours)**
Types of Converters, effect of inductive load, Commutating diode or free wheeling diode, controlled rectifiers, Bi phase half wave, single phase full wave phase controlled converter using bridge principle, harmonics.

**Module IV: Inverters: (4 Hours)**
Types of Inverters, Bridge Inverters, Voltage Source Inverters, Pulse Width Modulation Inverters, Current source Inverters.

**Module V: AC Voltage Controllers: (3 Hours)**
Types of AC voltage Controllers, AC Phase Voltage controllers, single Phase Voltage Controller with RL load, harmonic analysis of single phase full wave controller with RL load.

**Module VI: DC to DC Converters: (3 Hours)**
DC choppers, Chopper classification, two quadrant chopper, Four quadrant chopper.

**Module VII: Cycloconverter: (3 Hours)**
Single phase and three phase cycloconverters.

**Module VIII: Industrial Applications: (3 Hours)**
One shot Thyristor trigger Circuit, over voltage protection, simple battery charger, battery charging regulator, AC static switches, DC static switch

## Course Outcomes:

At the end of the course, students will demonstrate the ability to:

- Articulate the basics of power electronic devices
- Express the design and control of rectifiers, inverters.
- Design of power electronic converters in power control applications
- Ability to express characteristics of SCR, BJT, MOSFET and IGBT.
- Ability to express communication methods.
- Ability design AC voltage controller and Cyclo Converter.
- Ability to design Chopper circuits.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:

***Text:***

- J. Michael: Power Electronics: Principles and Applications
- M. H. Rashid: Power Electronics circuits

***References:***

- H. C. Rai, “Power Electronics Devices, Circuits, Systems and Application”, Galgotia, 3rd Ed.
- P. S. Bimbhara, “Electrical Machinery, Theory Performance and Applications” Khanna Publications, 7th Ed

# BIO-MEDICAL ENGINEERING

**Course Code: ECE 709** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The course describes the physiological basis as well as engineering principles underlying the working of wide variety of medical instruments.

**Course Contents:**

**Module I: Introduction: (6 Hours)**
The age of Biomedical engineering, Development of Biomedical Instrumentation, Man- Instrumentation system, Components, Physiological system of the body, Problem encountered in measuring a living system. Transducers & Electrodes for Biomedical Applications**.** Sources of Biomedical Potentials.

**Module II: Electrodes: (6 Hours)**
Electrode theory, Biopotential Electrodes- Microelectrodes Body surface electrodes, Needle Electrodes, Biochemical transducers, Reference electrodes, PH electrodes, Blood Gas electrodes.Cardiovascular Measurements: ECG amplifiers, Electrodes & leads, ECG recorders, Vector Cardiographs, Continuous ECG recording (Holter Recording), Blood pressure measurement, Heart sound measurements.

**Module III: Patient Care & Monitoring: (6 Hours)**
Elements of Intensive care monitoring, patient monitoring display, Diagnosis, Calibration & reparability of patient monitoring equipment pacemakers & Defibrillators. Measurement in Respiratory system: Physiology of respiratory system Measurement of breathing mechanics Spiro meter, Respiratory therapy equipments Inhalators ventilators & Respirators, Humidifiers, Nebulizers Aspirators**.**

**Module IV: Diagnostic Techniques: (6 Hours)**
Ultrasonic Diagnosis, Eco- Cardiograph, Eco Encephalography, Ophthalmic scans, X- Ray & radio – isotope Instrumentation, CAT scan, Emission Computerized Temenography, MRI

**Module V: Bio Telemetry: (6 Hours)**
The Components of a Biotelemetry system Implant able units, Telemetry for ECG measurements during exercise, for Emergency patient monitoring .Other Prosthetic devices like Hearing Aid, Myoelectric Arm, special aspects- safety of medical Electronics Equipments, Shock hazards from Electrical equipment and prevention against them.

## Course Outcomes:
At the end of the course, students will demonstrate the ability to:
- Have an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
- Have an ability to function on multidisciplinary teams.
- Have an ability to identify, formulate, and solve engineering problems.

## Examination Scheme:

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:


- Khandpur R.S. / Biomedical Instrumentation / TMH
- Tompkins / Biomedical DSP: C Language Examples and Laboratory Experiments for the IBM PC/ PHI.
- Cormwell / Biomedical Instrumentation and Measurements / PHI.

# WIRELESS SENSOR NETWORKS

**Course Code: ECE 710** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**

**Students will be able to**
- Understand the fundamentals of wireless networks.
- Learn and analyze the different wireless technologies.
- Evaluate Ad-hoc networks and wireless sensor networks.
- Understand and evaluate emerging wireless technologies and standards
- Understand design considerations for wireless networks
- Learn and analyze and evaluate the security threats and related security standards

**Course Contents:**

**Module I: Introduction: (7 Hours)**
Introduction to Sensor Networks, unique constraints and challenges, Advantage of Sensor Networks, Applications of Sensor Networks, Types of wireless sensor networks

**Module II: MANETs: (6 Hours)**
Mobile Ad-hocNetworks (MANETs) and Wireless Sensor Networks, Enabling technologies for Wireless Sensor Networks. Issues and challenges in wireless sensor networks

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**Module III: Protocols: (7 Hours)**
Routing protocols, MAC protocols: Classification of MAC Protocols, S-MAC Protocol, B-MAC protocol, IEEE 802.15.4 standard and ZigBee, Dissemination protocol for large sensor network. Data dissemination, data gathering, and data fusion; Quality of a sensor network; Real-time traffic support and security protocols.

**Module IV: Design Principles: (5 Hours)**
Design Principles for WSNs, Gateway Concepts Need for gateway, WSN to Internet Communication, and Internet to WSN Communication.

**Module V: Architecture & OS: (5 Hours)**
Single-node architecture, Hardware components & design constraints, Operating systems and execution environments, introduction to TinyOS and nesC.

## Course Outcomes:
At the end of the course, students will demonstrate the ability to:
- Design wireless sensor networks for a given application
- Understand emerging research areas in the field of sensor networks
- Understand MAC protocols used for different communication standards used in WSN
- Explore new protocols for WSN

### Examination Scheme:

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:

- Waltenegus Dargie , Christian Poellabauer, “Fundamentals Of Wireless Sensor Networks Theory And Practice”, By John Wiley & Sons Publications ,2011
- Sabrie Soloman, “Sensors Handbook" by McGraw Hill publication. 2009
- Feng Zhao, Leonidas Guibas, “Wireless Sensor Networks”, Elsevier Publications,2004
- Kazem Sohrby, Daniel Minoli, “Wireless Sensor Networks”: Technology, Protocols and
- Applications, Wiley-Inter science
- Philip Levis, And David Gay "TinyOS Programming” by Cambridge University Press 2009

# INDUSTRIAL PRACTICAL TRAINING – II

**Course Code: NPT 750** **Credit Units: 05**

**Course objectives:**

1. To expose students to the 'real' working environment and get acquainted with the organization structure, business operations and administrative functions.
2. To have hands-on experience in the students' related field so that they can relate and reinforce what has been taught at the university.
3. To promote cooperation and to develop synergetic collaboration between industry and the university in promoting a knowledgeable society.
4. To set the stage for future recruitment by potential employers.

**Methodology:**

Practical training is based on the theoretical subjects studied by students. It can be arranged within the college or in any related industrial unit. The students are to learn various industrial, technical and administrative processes followed in the industry. In case of on-campus training the students will be given specific task of fabrication/assembly/testing/analysis. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation on same.

**Examination Scheme:**

| | |
|---|---|
| Feedback from industry/work place | 20 |
| Training Report | 40 |
| Viva | 15 |
| Presentation | 25 |
| **Total** | **100** |

**Course Objectives:**
After successful completion of the course, the students will be able to

1. Explore the preferred field of specialization and develop analytical / hardware / software / experimental / observation skills.
2. Manage the technical content and work.
3. Learn the various administrative process followed in industry.
4. Prepare and present technical report.

# MAJOR PROJECT- I

**Course Code: NMP 760** **Credit Units: 06**

**Course Objectives:**
The object of Major Project I is to enable the student to extend further the investigative study taken up under NMP 660, either fully theoretical/ practical or involving both theoretical and practical work, under the guidance of a Supervisor from the Department alone or jointly with a Supervisor drawn from R&D laboratory/Industry. This is expected to provide a good training for the student(s) in R&D work and technical leadership. The aim is to provide students an opportunity to exercise their creative and innovative qualities in a group project environment and to excite the imagination of aspiring engineers, innovators and technopreneurs.

**Methodology:**

Topics of project are to be based on the latest trends, verifying engineering concepts /principals and should involve elementary research work. The projects may involve design, fabrications, testing, computer modeling, and analysis of any engineering problem. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation on same.

## Course Outcomes:
On successful completion of the course students will be able to:
- Demonstrate a sound technical knowledge of their selected project topic.
- Undertake problem identification, formulation and solution.
- Design engineering solutions to complex problems utilising a systems approach.
- Conduct an engineering project
- Communicate with engineers and the community at large in written an oral forms.
- Demonstrate the knowledge, skills and attitudes of a professional engineer.
- Write comprehensive report on project work.

**Examination Scheme:**

| | |
|---|---|
| Literature study/ Fabrication/ Experimentation | 40 |
| Written Report | 20 |
| Viva | 15 |
| Presentation | 25 |
| **Total** | **100** |

# INFORMATION THEORY AND CODING

**Course Code : ECE 801** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
This course introduces how various coding takes place in communication and what type of different codes are used in communication system. It also introduces different entropies, channel capacity and purpose of encoding.

**Module 1: Information Theory: (06 Hours)**
Introduction to uncertainty, information, entropy and its properties, entropy of binary memory less source and its extension to discrete memory less source, coding theorem, data compression, prefix coding, HUFFMAN coding, Lempel-Ziv Coding.

**Module II: Channels and Capacity: (06 Hours)**
Discrete memory less channels, Binary symmetric channel, mutual information & its properties, channel capacity, channel coding theorem, and its application to BSC, Shannon's theorem on channel capacity, capacity of channel of infinite bandwidth, Bandwidth signal to noise Trade off, Practical communication system in light of shannon's theorem, Fading Channel.

**Module III: Galois Fields: (06 Hours)**
Group and field of Binary system Galois field and its construction in GF (2m) and its basic properties,vector spaces and matrices in GF(2), Linear Block Codes, Systematic codes, and its encoding circuits, syndrome and error detection ,minimum distance, error detecting and correcting capabilities of block code, Decoding circuits, Probability of undetected error for linear block code in BSC, Hamming code and their applications.

**ModuleIV:Cyclic-Codes: (06Hours)**
Cyclic codes and its basic properties, Generator & parity check matrix of cyclic codes, encoding & decoding circuits, syndrome computation & error detection, cyclic Hamming codes.

**Module V: BCH and Convolution codes: (06 Hours)**
Introduction to BCH codes, its encoding & decoding, error location & correction.
Introduction to convolution codes, its construction & viterbi algorithm for maximum likelihood decoding.

## Course Outcomes
At the end of the course, students will demonstrate the ability to:
- Understand the concept of information and entropy
- Understand Shannon's theorem for coding
- Calculation of channel capacity
- Apply coding techniques

### Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Suggested Text/Reference Books
- Digital Communication by Haykins Simon Wiley Publ.
- Error control Coding: Theory and Application, by Shu Lin and Cosstlello,PHI
- Modern analog and Digital Communication system, by B.P. Lathi
- Digital Communication by Sklar, Pearson Education
- Principal of Communication system by Taub & Schilling, TMH
- Error Correcting Codes by Peterson W., MIT Press
- Digital Communication By Das , Mullick, Chatterjee,.

# RADAR AND SATELLITE COMMUNICATIONS

**Course Code: ECE 802** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
This course builds basic knowledge of different types of Radar systems and satellite communication along with link designing & application. It also covers different modulation schemes & channels used.

**Module 1: Introduction to Radar: (06 Hours)**
Principle of detection and ranging, Radar frequencies and bands. Applications, Radar block diagram and operation. Radar Range Equation : Range prediction, Minimum detectable signal, Receiver noise SNR, Integration of radar pulses, Radar cross section of targets, Transmitter Power, PRF and system losses & Propagation effects.

**Module II: CW FM Radar: (06 Hours)**
Doppler effect, CW Radar, Frequency-modulated CW Radar, Multiple-frequency CW Radar. MTI and Pulse Doppler Radar: MTI delay lines, Delay line Cancellers, Coherent and Non-Coherent MTI, Pulse Doppler Radar.

**Module III: Introduction to Satellite: (06 Hours)**
Communication satellites, Orbiting satellites, Frequencies and bands, Satellite multiple access formats. Satellite Channel: Power flow, Polarization, Atmospheric losses, Receiver noise, CNR, Satellite link analysis for uplinks and downlinks. Overview of Coaxial cable system and optical Network (SONET); Overview of WLL (Wireless loop)

**Module IV: Satellite Transponder: (06 Hours)**
Transponder model, Satellite signal processing RF-RF translation, IF demodulation.

**Module V: Multiple-Access: (06 Hours)**
FDMA; amplification with multiple FDMA carriers, AM/FM Conversion with FDMA, Switched FDMA, Synchronization, SS-TDMA; CDMA; DS CDMA, Frequency- hopped, CDMA. Carrier recovery & bit timing. Satellite link budget analysis

## Course Outcomes:

At the end of this course students will demonstrate the ability to

- Visualize the architecture of different types of Radar systems and satellite systems as a means of high speed, high range communication system.
- State various aspects related to satellite systems such as orbital equations, sub-systems in a satellite, link budget, modulation and multiple access schemes.
- Solve numerical problems related to orbital motion and design of link budget for the given parameters and conditions.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Introduction to Radar Systems - M.I. Skolnik
- Radar Fundamentals - G.J. Wheeler.
- Radar Engineering - D.G. Rink
- Satellite Communication - R.M. Gagliardi
- Satellite Communication - T. Pratt & C.W. Boston
- Satellite Communication System Design Principles - M. Richharia

# EMBEDDED SYSTEMS

**Course Code: ECE 803** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The syllabus is divided into two parts, the first one deals with 8051 architecture and its interfacing with other devices. Second part of the syllabus deals with the basic embedded system and it's design. A microcontroller is an integrated circuit that is programmable. The syllabus makes student perfect in assembly language programming, addressing modes etc apart from it input-output programming is discussed in detail. In the second part Embedded systems and it's application is discussed. Real Time Operating System is also explained at length.8051 C programming is also incorporated in the syllabus.

**Module 1: Introduction to an embedded systems design & RTOS: (06 Hours)**
Introduction to Embedded system, Processor in the System, Microcontroller, Memory Devices, Embedded System Project Management, ESD and Co-design issues in System development Process, Design cycle in the development phase for an embedded system, Use of target system or its emulator and In-circuit emulator, Use of software tools for development of an ES.Inter-process Communication and Synchronization of Processes, Tasks and Threads, Problem of Sharing Data by Multiple Tasks, Real Time Operating Systems: OS Services, I/O Subsystems, Interrupt Routines in RTOS Environment, RTOS Task Scheduling model, Interrupt Latency and Response times of the tasks.

**Module II: Overview of Microcontroller: (06 Hours)**
Microcontroller and Embedded Processors, Overview of 8051 Microcontroller family: Architecture, basic assembly language programming concepts, The program Counter and ROM Spaces in the 8051, Data types, 8051 Flag Bits ad PSW Register, 8051 Register Banks and Stack Instruction set, Loop and Jump Instructions, Call Instructions, Time delay generations and calculations, I/O port programming Addressing Modes, accessing memory using various addressing modes, Arithmetic instructions and programs, Logical instructions, BCD and ASCII application programs, Single-bit instruction programming, Reading input pins vs. port Latch, Programming of 8051 Timers, Counter Programming.

**Module III: Communication with 8051: (06 Hours)**
Basics of Communication, Overview of RS-232, I2C Bus, UART, USB, IEEE 488 (GPIB). Parallel input output applications. (Stepper motor Sequencer program, Strobed input/output). Interrupt driven applications (real time clock, serial input/output with interrupt). Analog-digital interfacing (Pulse width modulator, 8-bit ADC).

**Module IV: Basics of 8051 C Programming: (06 Hours)**
Introduction to 8051 C, 8051 memory constitution, Constants, variables and data types. Arrays structures and unions, pointers, Loops and decisions, Functions, Modules and programs.

**Module V: 8051 C Programming: (06 Hours)**
Data interface, Timer control, Interrupt operations, Digital operations, A/D and D/A conversions, Common control problem examples (Centronics parallel interface, Printer interace, Memory access, Key matrix scanning, Stepper motor control and digital clock)

## Course Outcomes:
At the end of this course students will demonstrate the ability to

- Suggest design approach using advanced controllers to real-life situations.
- Design interfacing of the systems with other data handling / processing systems.
- Appreciate engineering constraints like energy dissipation, data exchange speeds etc.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Suggested Text/Reference Books


- Raj Kamal, 2004, "Embedded Systems", TMH.
- James W. Stewart and Kai X. Miao, 2en Edition. "The 8051 microcontroller" Pearson Edu. Prentice Hall.
- M.A. Mazidi and J. G. Mazidi, 2004 "The 8051 Microcontroller and Embedded Systems", PHI.
- David E. Simon,1999, "An Embedded Software Primer", Pearson Education
- K.J. Ayala, 1991, "The 8051 Microcontroller", Penram International.
- Dr. Rajiv Kapadia, "8051 Microcontroller & Embedded Systems", Jaico Press
- Dr. Prasad, 2004, "Embedded Real Time System", Wiley Dreamtech.

# INFORMATION THEORY AND CODING LAB

**Course Code: ECE 821** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
The objective of this laboratory course is to provide a brief knowledge of information theory to students of ECE. Lab to be conducted using Matlab. Programs to include basics of field theory, coding theory and applications of various coding techniques. Coding concepts to implemented in hardware using shift registers, decoders, multiplexers, other digital ICs etc.

**List of experiments/demonstrations:**

1. Write a program for encoding messages for a forward error correction system with a given Linear Block Code and verifying through simulation. (**2 Hours)**

2. Write a program for decoding encoded words for a forward error correction system with a given Linear Block Code and verifying through simulation. (**2 Hours)**

3. Write a program for encoding the message for a system with a given cyclic polynomial code and verifying through simulation. (**2 Hours)**

4. Write a program to decode the messages for a system with a given cyclic polynomial code and verifying through simulation. (**2 Hours)**

5. Write a program for Understanding the concept of loss-less data compression technique using Huffman coding. (**2 Hours)**

6. Write a program for encoding the data bits using a Binary Cyclic block encoder in Simulink. (**2 Hours)**

7. Write a program for decoding the code words using a Binary Cyclic block decoder in Simulink. (**2 Hours)**

8. Write a program for Encoding the data bits using a Binary Linear block encoder in Simulink. (**2 Hours)**

9. Write a program for decoding the code words using a Binary Linear block decoder in Simulink. (**2 Hours)**

10. Write a program to design a convolution encoder. (**2 Hours)**

## Laboratory Outcomes:
At the end of the course the students can able to
- Understand the concept of information and entropy
- Understand Shannon's theorem for coding
- Calculation of channel capacity
- Apply coding techniques

**Examination Scheme:**

| | IA | | | | EE | |
|---|---|---|---|---|---|---|
| **Components** | **A** | **PR** | **LR** | **V** | **PR** | **V** |
| **Weightage (%)** | 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# RADAR AND SATELLITE COMMUNICATIONS LAB

**Course Code: ECE 822** | **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
The course intends builds basic knowledge of different types of Radar systems and satellite communication along with link designing & application. It also covers different modulation schemes & channels used.

**List of experiments/demonstrations:**

1. To study AM transmitter and receiver. (**2 Hours)**
2. To study FM transmitter and receiver. (**2 Hours)**
3. To implement the following circuits. (**6 Hours)**
   - AM Transmitter
   - FM Transmitter
   - AM Receiver
   - FM Receiver
   - Remote Control
   - Wireless Mic System
4. To study RF portion of satellite receiver. (**4 Hours)**
   - Study of dish antenna and section N.B section
   - Study of tuner
   - Study of R.F modulator section
5. To study the base-band portion of satellite receiver. (**6 Hours)**
   - study of video section
   - study of sound section
   - study of signal indictor
   - study of power supply section

## Laboratory Outcomes:

At the end of the course the students can able to
- implement the AM Transmitter, FM Transmitter, AM Receiver, FM Receiver, Remote Control etc.
- Implement Wireless Mic System and RF portion of satellite receiver.

**Examination Scheme:**

| | IA | | | | EE | |
|---|---|---|---|---|---|---|
| **Components** | **A** | **PR** | **LR** | **V** | **PR** | **V** |
| **Weightage (%)** | 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# EMBEDDED SYSTEMS LAB

**Course Code: ECE 823** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
The objective of this laboratory course is to provide a brief knowledge of microcontrollers to all the students. The syllabus makes student perfect in assembly language programming, addressing modes etc apart from it input-output programming is discussed in detail. In the second part Embedded systems and it's application is discussed. Real Time Operating System is also explained at length.

**List of experiments/demonstrations:**

1. Write a program to add two 8-bit numbers using microcontroller 8051. (**2 Hours)**
2. Write a program to multiply two 8-bit numbers using microcontroller 8051. (**2 Hours)**
3. Write a program to divide two 8-bit numbers using microcontroller 8051. (**2 Hours)**
4. Write a program to subtract two 8-bit numbers using microcontroller 8051. (**2 Hours)**
5. Write a program to generate a geometric progression using microcontroller 8051. (**2 Hours)**
6. Write a program to generate a square wave using microcontroller 8051. (**2 Hours)**
7. Write a program to generate a delay of 5 ms using microcontroller 8051. (**2 Hours)**
8. Study and implement serial communication by interfacing microcontroller with a computer. (**2 Hours)**
9. Study and implement parallel data communication by interfacing microcontroller with an LCD. (**4 Hours)**

## Laboratory Outcomes:

At the end of the course the students can able to

- Write assembly language programming.
- Implement serial communication by interfacing microcontroller with a computer.
- Implement parallel data communication by interfacing microcontroller with an LCD.

**Examination Scheme:**

| | IA | | | | EE | |
|---|---|---|---|---|---|---|
| **Components** | **A** | **PR** | **LR** | **V** | **PR** | **V** |
| **Weightage (%)** | 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# VHDL PROGRAMMING

**Course Code: ECE 804** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
- This course builds on the course Digital Circuits and Systems - Hardware development language VHDL is introduced; the usage of the same to implement the systems is dealt in detail.
- To provide the concept of modeling of Combinational and sequential circuits using VHDL.
- To provide basic knowledge of how digital building blocks are described in VHDL

**Course Contents:**

**Module I: Basics of VHDL: (6 Hours)**
Introduction and Basic Design Units of VHDL, Writing Entities for Digital circuits like decoders, registers etc, Scalar Data types and Operations: Object types: constants, variables, signal and files. Data Types: scalar, integer, floating, physical, enumeration, type declarations, subtypes, expressions and operators for various types.

**Module II: Sequential Statements: (6 Hours)**
Sequential statements: If, case, Null, Loop, Exit, Next statements, while loops, For loops, Assertion and report statements.
Composite Arrays: arrays, Array aggregates, unconstrained array types, strings, Bit vectors, Standard Logic Arrays, array operations and records.

**Module III: VHDL Programming (Data Flow Modeling): (6 Hours)**
Dataflow Modeling: Concurrent signal assignment, multiple drivers, block statement, Vhdl modeling of basic gates, half and full adder AOI, IOA, OAI, multiplexes, decoders, ), three state driver, parity checker, modeling for multiplexer, priority encoder, ALU etc. Generics, generic (AND, NAND, OR, NOR, XOR and XNOR) gates, functions and subprograms, packages and libraries.

**Module IV: VHDL Programming (Structural Modeling): (6 Hours)**
Structural Modeling: component declaration, component instantiation, resolving signal values, and configuration: basic configuration, configuration for structural modeling, mapping library entities. Vhdl modeling of basic gates, half and full adder AOI, IOA, OAI, multiplexes, decoders, ), three state driver, parity checker, modeling for multiplexer, priority encoder, ALU etc.

**Module V: VHDL Programming (Behavioral Modeling): (6 Hours)**
Behavioral Modeling: process statements, variable and signal assignments, inertial and transport delay models, signal drivers, multiple and postponed processes.
Modeling of D, T, JK and SR flip flops with preset and clear, state machine modeling, Moore and Mealy machines clock divider, shift registers, pulse counter etc, Writing a test bench.

## Course Outcomes:
At the end of the course, students will demonstrate the ability to:
- Design synchronous and asynchronous sequential circuits
- Translate real world problems into digital logic formulations.
- Construct test and debug digital networks using VHDL.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:

- Daniel Gajski: Principles of Digital Design
- Bhasker: A VHDL Primer 3/e
- Pedroni: Circuit Design with VHDL
- Perry: VHDL: Programming by examples K. Skahill, VHDL for programmable Logic

# VERILOG PROGRAMMING

**Course Code: ECE 805** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
This course discuss fundamental Verilog concepts of today's most advanced digital design techniques. it offers broad coverage of Verilog HDL from a practical design perspective. Introduces students to gate, dataflow (RTL), behavioural, and switch level modeling, describes leading logic synthesis methodologies; explains timing and delay simulation; and introduces many other essential techniques for creating tomorrows complex digital designs

**Course Contents:**

**Module I: Introduction to Verilog HDL and Basic Concepts: (8 Hours)**
Emergence of HDL, typical design flow, trends in HDL, Modeling concept Design methodologies, modules, instances, simulation, design block and stimulus block Lexical conventions, Data Types. System Tasks and Compiler Directives, Modules and Ports

**Module II: Gate-Level Modeling and Dataflow Modeling: (8 Hours)**
Gate Types. Gate Delays, Continuous Assignments. Delays. Expressions, Operators, and Operands. Operator Types. Examples for combinational and sequential circuit using Gate level and Data-flow modeling

**Module III: Behavioural Modeling: (6 Hours)**
Structured Procedures. Procedural Assignments. Timing Controls. Conditional Statements. Multiway Branching. Loops. Sequential and Parallel Blocks. Generate Blocks. Examples

**Module IV: Tasks and Functions and Useful Modeling Techniques: (3 Hours)**
Difference between Tasks and Functions. Tasks. Functions. Procedural Continuous Assignments. Overriding Parameters. Conditional Compilation and Execution. Time Scales. Useful System Tasks

**Module V: Advanced Verilog Topics** : **(5 Hours)**
Timing and Delays. Switch Level Modeling,User-Defined Primitives, Logic Synthesis with Verilog HDL, Advanced Verification Techniques

## Course Outcomes:
At the end of the course, students will demonstrate the ability to:
- Design synchronous and asynchronous sequential circuits using Verilog HDL.
- Translate real world problems into digital logic formulations.
- Construct test and debug digital networks using Verilog..

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:


- Samir Palnitkar, “Verilog HDL”, Pearson Education (2nd edition).
- Donald Thomas, Philip moorby, “The Verilog hardware Description language” 5th Edition, Kluwer Academic publishers
- Vivek Sagdeo,” The Complete Verilog Book”
- Parag K. Lala, Self-Checking and Fault-Tolerant Digital Design, Academic Press
- J. Bhasker, Verilog HDL Synthesis: A Practical Primer,1998

# ADVANCED NETWORKING

**Course Code: ECE 806** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The objective here is to acquaint the students with the application of networking. Detail description of the various TCP/IP protocols and the working of ATM and its performance, Network security and authentication, and various algorithms related to it has been dealt, to get a practical approach.

**Course Contents:**

**Module I: TCP/IP Protocol: (6 Hours)**
Layered protocols, internet Addressing, mapping internet address to physical address, internet protocol, OSPF, RIP, RARP, BOOTP, DHCP, BGP, ARP, IP, Ipv6, ICMP
Transport protocols: UDP, TCP, SNMP

**Module II: Connection oriented networks: (6 Hours)**
Frame relay, B-ISDN, ATM protocol stack, ATM switching, internetworking with ATM Networks, traffic management in ATM.

**Module III: High Speed LAN: (6 Hours)**
LAN Ethernet, fast Ethernet, gigabit Ethernet, FDDI,
DSL, ADSL

**Module IV: Wireless communication: (6 Hours)**
Wireless networks, wireless channels, channel access, network architecture, IEEE 802.11, bluetooth

**Module V: Network Analysis And Modeling: (6 Hours)**
Queuing theory, modeling network as a graph, network management system and standard

## Course Outcomes:
At the end of the course, students will demonstrate the ability to:
- Independently understand basic computer network technology.
- Understand and explain Data Communications System and its components.
- Identify the different types of network topologies and protocols.
- Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
- Identify the different types of network devices and their functions within a network
- Understand and building the skills of subnetting and routing mechanisms.
- Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:
*Text:*
- High performance communication networks by: J. Walrand & Pravin Varaiya, Morgan Kaufman, 1999.
- Internetworking with TCP/IP Vol.1: Principles, Protocols, and Architecture (4th Edition) by Douglas E. Comer
- ATM networks: Concepts, Protocols, Applications by: Handel, Addision Wesseley.
- Cryptography & Networks Security Stallings, William 3rd edition

*References:*
- Computer networks: Tanenbaum, Andrew S, Prentice Hall
- Data communication & networking: Forouzan, B. A.
- Computer network protocol standard and interface Uyless, Black

# SPEECH AND AUDIO PROCESSING

**Course Code: ECE 807** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
- To provide students with the knowledge of basic characteristics of speech signal in relation to production and hearing of speech by humans.
- To describe basic algorithms of speech analysis common to many applications.
- To give an overview of applications (recognition, synthesis, coding) and to inform about practical aspects of speech algorithms implementation.

**Course Contents:**

**Module I: Introduction: (7 Hours)**
Speech production and modeling - Human Auditory System;General structure of speech coders; Classification of speech coding techniques – parametric, waveform and hybrid ; Requirements of speech codecs –quality, coding delays, robustness

**Module II: Speech Signal Processing: (7 Hours)**
Pitch-period estimation, all-pole and all-zero filters, convolution; Power spectral density, periodogram, autoregressive model, autocorrelation estimation. Linear Prediction of Speech- Basic concepts of linear prediction; Linear Prediction Analysis of non-stationary signals –prediction gain, examples; Levinson-Durbin algorithm; Long term and short-term linear prediction models; Moving average prediction

**Module III: Speech Quantization-: (7 Hours)**
Scalar quantization–uniform quantizer, optimum quantizer,logarithmic quantizer, adaptive quantizer, differential quantizers; Vector quantization – distortion measures, codebook design, codebook types. Scalar Quantization of LPC- Spectral distortion measures, Quantization based on reflection coefficient and log area ratio, bit allocation; Line spectral frequency – LPC to LSF conversions, quantization based on LSF.

**Module IV: Linear Prediction Coding: (6 Hours)**
LPC model of speech production; Structures of LPC encoders and decoders; Voicing detection; Limitations of the LPC model. Code Excited Linear Prediction-CELP speech production model; Analysis-by-synthesis; Generic CELP encoders and decoders; Excitation codebook search – state-save method, zero-input zerostate method; CELP based on adaptive codebook, Adaptive Codebook search; Low Delay CELP and algebraic CELP

**Module V: Speech Coding Standards: (3 Hours)**
An overview of ITU-T G.726, G.728 and G.729standards

## Course Outcomes:
At the end of the course, students will demonstrate the ability to:
- Mathematically model the speech signal
- Analyze the quality and properties of speech signal.
- Modify and enhance the speech and audio signals.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:

- “Digital Speech” by A.M.Kondoz, Second Edition (Wiley Students_ Edition), 2004.
- “Speech Coding Algorithms: Foundation and Evolution of Standardized Coders”, W.C. Chu, WileyInter science, 2003.

# DIGITAL IMAGE PROCESSING

**Course Code: CSE 801** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
Processing color and grayscale images or other two-dimensional signals has become an important tool for research and investigation in many areas of science and engineering. Digital Image Processing is designed to give professionals and students a powerful collection of fundamental and advanced image processing tools on the desktop. Digital Image Processing takes full advantage of the computational technology of Mathematics.

**Course Contents:**

**Module I: Introduction and Digital Image Fundamentals: (06 Hours)**
The origins of Digital Image Processing, Examples of Fields that Use Digital Image Processing, Fundamentals Steps in Image Processing, Elements of Digital Image Processing Systems, Image Sampling and Quantization, Some basic relationships like Neighbours, Connectivity, Distance Measures between pixels, Linear and Non Linear Operations.

**Module II: Image Enhancement in the Spatial Domain: (06 Hours)**
Some basic Gray Level Transformations, Histogram Processing, Enhancement Using Arithmetic and Logic operations, Basics of Spatial Filters, Smoothening and Sharpening Spatial Filters, Combining Spatial Enhancement Methods.

**Module III: Image Enhancement in the Frequency Domain: (07 Hours)**
Introduction to Fourier Transform and the frequency Domain, Smoothing and Sharpening Frequency Domain Filters, Homomorphic Filtering.
**Image Restoration**
A model of The Image Degradation / Restoration Process, Noise Models, Restoration in the presence of Noise Only Spatial Filtering, Pereodic Noise Reduction by Frequency Domain Filtering, Linear Position-Invarient Dedradations, Estimation of Degradation Function, Inverse filtering, Wiener filtering, Constrained Least Square Filtering, Geometric Mean Filter, Geometric Transformations.

**Module IV: Image Compression: (06 Hours)**
Coding, Interpixel and Psychovisual Redundancy, Image Compression models, Elements of Information Theory, Error free comparison, Lossy compression, Image compression standards.
**Image Segmentation**
Detection of Discontinuities, Edge linking and boundary detection, Threshold, Region Oriented Segmentation, Motion based segmentation.

**Module V: Representation and Description (05 Hours)**
Representation, Boundary Descriptors, Regional Descriptors, Use of Principal Components for Description, Introduction to Morphology, Some basic Morphological Algorithms.
**Object Recognition**
Patterns and Pattern Classes, Decision-Theoretic Methods, Structural Methods.

## Course Outcomes:

- Ability to examine various types of images, intensity transformations and spatial filtering.
- Ability to evaluate the methodologies for image segmentation, restoration etc.
- Ability to apply image processing algorithms in practical applications.
- Ability to develop Fourier transform for image processing in frequency domain.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | ESE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

A: Attendance, CT: Class Test,:, S/V/Q/HA: Seminar/Viva/Quiz/ Home Assignment, ESE: End Semester Examination;

**Text & References:**
***Text:***

- Rafael C. Conzalez & Richard E. Woods, "Digital Image Processing", 2nd edition, Pearson Education.
- A. K. Jain, "Fundamental of Digital Image Processing", PHI.

***References:***

- Rosefield Kak, "Digital Picture Processing".
- W.K. Pratt, "Digital Image Processing".

# VHDL PROGRAMMING LAB

**Course Code: ECE 824** **Credit Units: 01**
**Total Hours: 20**

**Course objective:**

- To provide the concept of modeling of Combinational and sequential circuits using VHDL and writing a code.
- To provide basic knowledge of how digital building blocks are described in VHDL.

**List of Experiments**

1. To implement VHDL code for inputs AND, OR, XOR and XNOR gates and testing their simulation with signals. **(2 Hours)**
2. Half adder, full adder and full subtractor. Also trying out other simple combinatorial circuits like AOI, IOA, OAI. **(2 Hours)**
3. D and T, flip-flops. **(2 Hours)**
4. JK and SR flip-flops. **(2 Hours)**
5. 2 to 4 and 3 to 8 decoders. **(2 Hours)**
6. 2 to 1, 4 to 1 and 8 to 1 multiplexers. **(1 Hour)**
7. A register. **(1 Hour)**
8. 2 to 1, 4 to 2 and 8 to 3 priority encoders. **(1 Hour)**
9. 8 bit tri state drivers. **(1 Hour)**
10. 9 input parity checker. **(1 Hour)**
11. 1 bit, 4 bit 8 bit comparators. **(1 Hour)**
12. Adding and subtracting 8 bit integers of various types. **(1 Hour)**
13. Clock divider. **(1 Hour)**
14. Shift register. **(1 Hour)**
15. Pulse counters. **(1 Hour)**
16. VHDL Design examples of Moore machine, Mealy machine, generic gate inputs and delays. **(1 Hour)**
17. VHDL code examples of structural modeling showing binding. **(1 Hour)**

**Experiments based Field Programmable Gate Array (FPGA) Programming**

18. Implementation of all the above VHDL experiments using FPGA.

## Course Outcomes:

At the end of the course, students will demonstrate the ability to:

- Write a VHDL code for various combinational and sequential circuits.
- Testing of Various digital designs using test bench in VHDL.

.

**Examination Scheme:**

| | IA | | | | EE | |
|---|---|---|---|---|---|---|
| **Components** | **A** | **PR** | **LR** | **V** | **PR** | **V** |
| **Weightage (%)** | 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# VERILOG PROGRAMMING LAB

**Course Code: ECE 825** **Credit Units: 01**
**Total Hours: 20**

**Course Objectives:**

- To provide the concept of modeling of Combinational and sequential circuits using VHDL and writing a code.
- To provide basic knowledge of how digital building blocks are described in VHDL.

**List of Experiments:**

To implement Verilog HDL code for:

1. Basic and universal gates with 2, 3, 4 inputs and testing their simulation with signals. **(2 Hours)**
2. Code for combinational circuits like Half adder, full adder and full subtractor. Also trying out other simple combinatorial circuits like AOI, IOA, OAI. **(2 Hours)**
3. Code for Sequential circuit like D and T, flip-flops. **(2 Hours)**
4. JK and SR flip-flops. **(2 Hours)**
5. 2 to 4 and 3 to 8 decoders. **(2 Hours)**
6. 2 to 1, 4 to 1 and 8 to 1 multiplexers. **(1 Hour)**
7. Simple register and shift register. **(1 Hour)**
8. 2 to 1, 4 to 1 and 8 to 1 priority encoders, 9 input parity checker. **(1 Hour)**
9. Four 8 bit three state drivers. **(1 Hour)**
10. 1 bit, 4 bit 8 bit comparators. **(1 Hour)**
11. Adding and subtracting 8 bit integers of various types. **(1 Hour)**
12. Clock divider. **(1 Hour)**
13. Binary multipliers, Pulse counters. **(1 Hour)**
14. Verilog HDLL Design examples of Moore machine, Mealy machine, generic gate inputs and delays. **(1 Hour)**
15. Verilog HDL code examples of structural modeling showing binding. **(1 Hour)**

## Course Outcomes:

At the end of the course, students will demonstrate the ability to:

- Write a Verilog code for various combinational and sequential circuits.
- Testing of Various digital designs using test bench in Verilog.

.

**Examination Scheme:**

| | IA | | | | EE | |
|---|---|---|---|---|---|---|
| **Components** | **A** | **PR** | **LR** | **V** | **PR** | **V** |
| **Weightage (%)** | 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# ADVANCED NETWORKING LAB

**Course Code: ECE 826**

**Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
To familiarize students with the layered design and protocols of computer networks, including the Internet.

**List of Experiments:**

1. Study of Router Configuration in interface mode using packet tracer. **(2 Hours)**
2. Implementation and study of Pure Aloha Protocol. **(2 Hours)**
3. Implementation and study of Slotted Aloha Protocol. **(2 Hours)**
4. Implementation and study of Token Bus Protocol. **(2 Hours)**
5. Implementation and study of Token Ring Protocol. **(2 Hours)**
6. To interconnect different network through routers. **(2 Hours)**
7. To study and verify RIP Protocol. **(2 Hours)**
8. To study and verify EIGRP protocol. **(2 Hours)**
9. Socket Programming with JAVA. **(2 Hours)**
10. Network Programming by using JAVA Program. **(2 Hours)**

## Course Outcomes:
At the end of the course, students will demonstrate the ability to:

- To Study Different types of Network Topology
- Study of Pure Aloha Protocol
- Study the CSMA-CA Protocal
- To analyze Data encryption and Decryption.

**Examination Scheme:**

| | IA | | | | EE | |
|---|---|---|---|---|---|---|
| **Components** | **A** | **PR** | **LR** | **V** | **PR** | **V** |
| **Weightage (%)** | 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# SPEECH AND AUDIO PROCESSING LAB

**Course Code: ECE 827** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
The objective of this lab course is to give students a hands on experience in audio processing. To give an overall picture about various applications of speech processing

**List of Experiments:**
1. Write a MATLAB program to load, display, and play back Audio files. **(2 Hours)**
2. Handling Audio files in MATLAB. **(2 Hours)**
    a. Read an audio file, its sampling rate and bits per sample.
    b. Write an audio file, at different sampling rates, at different bits per sample.
    c. Play an audio file at different sampling rates.
    d. Use of whos command to view the variables in the workspace.
3. Up-sampling and down-sampling of audio file and its effect in perceptual properties. **(2 Hours)**
4. Fourier Transform and inverse Fourier Transform of Audio signals, plot of the spectrum of audio signals. Audio synthesis from a select number (subset) of FFT components. **(2 Hours)**
5. For an audio signal, include a framing module in a program and set the frame size to 256 samples. Every frame should be read in a 256 × 1 real vector called. Compute the fast Fourier transform of this vector. Compute the magnitude of the complex vector $S_{freq}$ and plot its magnitude in dB up to the fold-over frequency. This computation should be part of the frame-by-frame audio processing program. **(2 Hours)**
6. Analysis of audio signals using Short-term Fourier Transform (STFT) in the Time-frequency domain. **(2 Hours)**
7. Analysis of multi-resolution, wavelet decomposition and reconstruction of audio signals at different levels using different filters. **(2 Hours)**
8. Write a program to plot the absolute threshold of hearing in quiet. Give a plot in terms of a linear Hz scale. **(2 Hours)**
9. Power spectral density of different types of audio signals. **(2 Hours)**
10. Insert and recover data from an audio signal using LSB coding method. **(2 Hours)**

## Course Outcomes:
- The students will be able to understand basic concepts of speech production, speech analysis, speech coding and parametric representation of speech and apply it in practical applications
- Develop systems for various applications of speech processing
- Learn Signal processing models of sound perception and application of perception models in audio signal processing.

**Examination Scheme:**

| | IA | | | | EE | |
|---|---|---|---|---|---|---|
| **Components** | **A** | **PR** | **LR** | **V** | **PR** | **V** |
| **Weightage (%)** | 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# DIGITAL IMAGE PROCESSING LAB

**Course Code: CSE 821** **Credit Units: 01**
**Total Hours: 20**

**Course Objectives:**
The course Digital Image Processing is designed to give professionals and students a powerful collection of fundamental and advanced image processing tools and the implementation of image processing algorithms.

**SOFTWARE REQUIREMENTS**: Java or Matlab.

**List of experiments/demonstrations:**
1. Study of various functions in Matlab. **(02 Hours)**
2. Convert RGB image or colour map to greyscale and B&W.**(02 Hours)**
3. Implementation of converting RGB Image to separately three images in single colored image.**(02 Hours)**
4. Implementation of different geometric transformations like Scaling, Rotation, Translation.**(02 Hours)**
5. Perform the 'Haar Transform' of an RGB Image. **(02 Hours)**
6. Plotting of Histogram for Low contrast, High Contrast, Blurred Images, Black & white images and Gray Images.**(02 Hours)**
7. Implementation of Edge detection in different images. **(02 Hours)**
8. Smoothening and Sharpening of Images using spatial filters and un-sharp masking.**(02 Hours)**
9. Perform Image enhancement techniques over an image to enhance the brightness.**(02 Hours)**
10. Perform Image enhancement techniques over an image to suppress the brightness.**(02 Hours)**

**Course Outcomes:**
- Ability to implement the image processing techniques using colour models.
- Ability to implement the image compression algorithm.
- Ability to implement the various image enhancement techniques.

**Examination Scheme:**

| IA | | | EE | | | |
|---|---|---|---|---|---|---|
| **A** | **PR** | **Practical Based Test** | **Major Experiment** | **Minor Experiment** | **LR** | **Viva** |
| 5 | 10 | 15 | 35 | 15 | 10 | 10 |

Note: IA –Internal Assessment, EE- External Exam, A- Attendance PR- Performance, LR – Lab Record, V – Viva.

## Text & References:

- Rafael C. Conzalez & Richard E. Woods, "Digital Image Processing", 2nd edition, Pearson Education..
- A.K. "Fundamental of Digital Image Processing", PHI.
- W.K. Pratt, "Digital Image Processing".

# MAJOR PROJECT – II

**Course Code: NMP 860** **Credit Units: 09**

**Course Objectives:**
The objective of Major project is to enable the student to take up investigative study in the broad field of Engineering, either fully theoretical/practical or involving both theoretical and practical work to be assigned by the Department on an individual basis or two/three students in a group, under the guidance of a Supervisor. The aim is to provide students an opportunity to exercise their creative and innovative qualities in a group project environment and to excite the imagination of aspiring engineers, innovators and technopreneurs.

**Methodology:**

Topics of project are to be based on the latest trends, verifying engineering concepts /principals and should involve elementary research work. The projects may involve design, fabrications, testing, computer modeling, and analysis of any engineering problem. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation on same.

## Course Outcomes:
On successful completion of the course students will be able to:
- Apply critical and creative thinking in the design of engineering projects
- Plan and manage time effectively as a team.
- Consider the business context and commercial positioning of designed devices or systems.
- Apply knowledge of the ‘real world’ situations that a professional engineer can encounter.
- Use fundamental knowledge and skills in engineering and apply it effectively on a project.
- Design and develop a functional product prototype while working in a team.
- Use various tools and techniques to study existing systems.
- Achieve precision in uses of the tools related to their experiments/fabrication.
- Timely reflect on peers’ technical and non-technical learning.
- Orally present and demonstrate your product to peers, academics, general and industry community.
- Write comprehensive report on project work.

**Examination Scheme:**

| | |
|---|---|
| Literature study/ Fabrication/ Experimentation | 40 |
| Written Report | 20 |
| Viva | 15 |
| Presentation | 25 |
| **Total** | **100** |

# Master of Technology
# (Electronics & Communication Engineering)

## Programme code: ECM

## Duration – 2 years full Time

## Programme Structure
## and
## Curriculum & Scheme of Examination

## 2019-21

# AMITY UNIVERSITY
## MADHYA PRADESH

# PREAMBLE

Amity University aims to achieve academic excellence by providing multi-faceted education to students and encourage them to reach the pinnacle of success. The University has designed a system that would provide rigorous academic programme with necessary skills to enable them to excel in their careers.

This booklet contains the Programme Structure, the Detailed Curriculum and the Scheme of Examination. The Programme Structure includes the courses (Core and Elective), arranged semester wise. The importance of each course is defined in terms of credits attached to it. The credit units attached to each course has been further defined in terms of contact hours i.e. Lecture Hours (L), Tutorial Hours (T), Practical Hours (P). Towards earning credits in terms of contact hours, 1 Lecture and 1 Tutorial per week are rated as 1 credit each and 2 Practical hours per week are rated as 1 credit. Thus, for example, an L-T-P structure of 3-0-0 will have 3 credits, 3-1-0 will have 4 credits, and 3-1-2 will have 5 credits.

The Curriculum and Scheme of Examination of each course includes the course objectives, course contents, scheme of examination and the list of text and references. The scheme of examination defines the various components of evaluation and the weightage attached to each component. The different codes used for the components of evaluation and the weightage attached to them are:

| Components | Codes | Weightage (%) |
|---|---|---|
| Case Discussion/ Presentation/ Analysis | C | 05 - 10 |
| Home Assignment | H | 05 - 10 |
| Project | P | 05 - 10 |
| Seminar | S | 05 - 10 |
| Viva | V | 05 - 10 |
| Quiz | Q | 05 - 10 |
| Class Test | CT | 10 - 15 |
| Attendance | A | 05 |
| End Semester Examination | EE | 70 |

It is hoped that it will help the students study in a planned and a structured manner and promote effective learning. Wishing you an intellectually stimulating stay at Amity University.

March, 2019

# PROGRAMME STRUCTURE-M.TECH (ECE)

## FIRST SEMESTER

| Course Code | Course Title | Lecture (L) Hours Per Week | Tutorial (T) Hours Per Week | Practical (P) Hours Per Week | Total Credits |
|---|---|---|---|---|---|
| ECM 101 | Advanced Digital Communication | 3 | 1 | - | 4 |
| ECM 102 | Audio Signal Processing | 3 | 1 | - | 4 |
| ECM 103 | Stochastic Methods | 3 | 1 | - | 4 |
| ECM 121 | Advanced Digital Communication Lab | - | - | 4 | 2 |
| ECM 122 | Audio Signal Processing Lab | - | - | 4 | 2 |
| ECM 124 | Lab Using Labview Software /MATLAB | - | - | 4 | 2 |
| | **Elective-I (Select any one)** | 3 | 1 | - | 4 |
| ECM 105 | Low Power VLSI Design | | | | |
| ECM 106 | Advanced Instrumentation & System Design | | | | |
| ECM 107 | Wireless Communication | | | | |
| BCP 141 | Advanced Communication-I | 1 | - | - | 1 |
| BSP 143 | Behavioural Science – I | 1 | - | - | 1 |
| FLP 144 | Foreign Language – I French | 2 | - | - | 2 |
| MTP 130 | Term Paper (Review Paper) | - | - | - | 3 |
| | **TOTAL** | | | | **29** |

## SECOND SEMESTER

| | | | | | |
|---|---|---|---|---|---|
| ECM 201 | Computer Communication & Networks | 3 | 1 | - | 4 |
| ECM 202 | Advanced Microwave Engineering | 3 | 1 | - | 4 |
| ECM 203 | Advanced Information Theory & Coding | 3 | 1 | - | 4 |
| ECM 221 | Computer Communication & Networks Lab | - | - | 4 | 2 |
| ECM 222 | Advanced Microwave Engineering Lab | - | - | 4 | 2 |
| ECM 224 | CDMA Lab using Qualnet | - | - | 4 | 2 |
| | **Elective - I (Without lab)** | 3 | 1 | - | 4 |
| ECM 205 | Advanced Optical Communication | | | | |
| ECM 206 | Satellite Communication | | | | |
| ECM 207 | MEMS & IC Integration | | | | |
| BCP 241 | Advanced Communication-II | 1 | - | - | 1 |
| BSP 243 | Behavioural Science – II | 1 | - | - | 1 |
| FLP 244 | Foreign Language – II French | 2 | - | - | 2 |
| MMP 260 | Minor Project I | - | - | - | 4 |
| | **TOTAL** | | | | **30** |

**SUMMER PROJECT: 08 WEEKS**

**THIRD SEMESTER**

| | | | | | |
|---|---|---|---|---|---|
| ECM 301 | Antenna Theory & Design | 3 | 1 | - | 4 |
| ECM 302 | Image Processing & Pattern Recognition | 3 | 1 | - | 4 |
| ECM 303 | Research Methodology | 3 | 1 | - | 4 |
| ECM 321 | Antenna Technology Lab | - | - | 4 | 2 |
| ECM 322 | Advanced Image Processing Lab | - | - | 4 | 2 |
| ECM 324 | Semiconductor Device Physics & Modeling Lab (using SILVACO) | - | - | 4 | 2 |
| | | | | | |
| <br>MAM 309<br>ECM 305<br>ECM 306<br>CSM 311 | **Elective – III (Select any one)**<br>Optimization Techniques<br>Project Management<br>Reliability Engineering<br>Cluster & Grid Computing | 3 | 1 | - | 4 |
| BCP 341 | Advanced Communication-III | 1 | - | - | 1 |
| BSP 343 | Behavioural Science – III | 1 | - | - | 1 |
| FLP 344 | Foreign Language – III<br>French | 2 | - | - | 2 |
| MSP 350 | Summer Internship programme (Evaluation) | - | - | - | 6 |
| MMP 360 | Minor Project II | - | - | - | 4 |
| | **TOTAL** | | | | **36** |

**FOURTH SEMESTER**

| | | | | | |
|---|---|---|---|---|---|
| MMP 460 | Dissertation | - | - | - | 30 |
| | **TOTAL** | | | | **30** |

# Curriculum & Scheme of Examination

# ADVANCED DIGITAL COMMUNICATION

**Course Code: ECM 101 Credit Units: 04**

## Course Objective:

The purpose of this course is to provide a thorough knowledge of advanced digital communications systems with in depth study of various digital modulation techniques, spread spectrum techniques, and information theory.

## Course Contents:

**Module I: Introduction**

Geometric representation of modulation signals, Liner modulation technique, $\pi/4$ QPSK, Offset QPSK Constant envelop modulation technique, MSK, GMSK, Linear & constant envelop modulation techniques, M-ary PSK, M-ary QAM**.** Characterization of communication signals & system.

**Module II: Spread spectrum analysis**

Spread spectrum system like DS-Spread spectrum, Pseudo noise sequences, Performance of DS-SS, Frequency Hopping system, Modulation Error Performance for Binary signal in AWGN, Detection of M-ary orthogonal signals, and M-ary orthogonaling with non-coherent detection.

**Module III: Signal design for band limited channel and Equalization**

Design of band limited signals for no ISI and with controlled ISI, data detection for controlled ISI, Adaptive equalization, Linear Equalization, Nonlinear Equalization, decision feedback equalization, RAKE receiver, Maximum likelihood sequence estimation (MLSE) equalization.

**Module IV: Digital communications through fading multi path channels**

Characterization of fading multipath channels, effect of signal characteristics and the choice of channel model, frequency non selective and slowly fading channel, diversity techniques for fading multipath channels, digital signaling over a frequency selective and slowly fading channels, coded waveforms for fading channels, multiple antenna system.

**Module V: Channel Capacity & Quantization**

Channel model & channel capacity with orthogonal signals, random selection of codes based on M-ary binary coded signals & also on M-ary multi amplitude signal. Comparison of R0 with capacity of AWGN channel. Vector Quantization, Adaptive Quantization.

**Module VI: Optimum receivers for the additive white Gaussian noise channel**

Optimum receiver for signals corrupted by AWGN, Performance of the optimum receiver for memory less modulation, optimum receiver for CPM signal and for signals with random phase in AWGN channel, performance analysis for wire line and radio communication system.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- John G.Proakis: Digital Communications.
- Bernard Sklar: Digital Communications.
- Simon Haykin: Communication System, Wiley eastern Ltd. Ed. 1998.
- J.Dassm S K Mullick & P K Chatterjee: Principle of Digital Communication, Wiley Eastern Ltd.
- Martin S. Roden: Digital and Data Communication System P.H.I London. Ed. 1998.
- Viterbi, A.I and J.K.Qmura: Principles of Digital Communication, McGraw Hill Company, New York.

# AUDIO SIGNAL PROCESSING

**Course Code: ECM 102 Credit Units: 04**

## Course Objective:

This course covers the concepts of audio signal processing and coding. It covers Psychoacoustic Principles, Time Frequency Analysis and Coding.

## Course Contents:

**Module I: Audio Signal Processing Essentials**

Introduction, Spectra of Analog Signals, Review of Convolution and Filtering, Uniform Sampling, Discrete-Time Signal Processing, Transforms for Discrete-Time Signals, The Discrete and the Fast Fourier Transform, The Discrete Cosine Transform, The Short-Time Fourier Transform, Difference Equations and Digital Filters, The Transfer and the Frequency Response Functions, Poles, Zeros, and Frequency Response, Digital Filters for Audio Applications, Review of MultiMate Signal Processing, Down-sampling by an Integer, Up-sampling by an Integer, Sampling Rate Changes by Non-integer Factors,

**Module II: Linear Prediction in Narrowband and Wideband Coding**

LP-Based Source-System Modeling for Speech, Short-Term Linear Prediction, Long-Term Prediction, ADPCM Using Linear Prediction, Open-Loop Analysis-Synthesis Linear Prediction, Analysis-by-Synthesis Linear Prediction, Code-Excited Linear Prediction Algorithms, Linear Prediction in Wideband Coding, Wideband Speech Coding, Wideband Audio Coding,

**Module III: Psychoacoustic Principles**

Absolute Threshold of Hearing, Critical Bands, Simultaneous Masking, Masking Asymmetry, and the Spread of Masking, Noise-Masking-Tone, Tone-Masking-Noise, Noise-Masking-Noise, Asymmetry of Masking, Perceptual Entropy Example Codec Perceptual Model: ISO/IEC(MPEG - 1), Psychoacoustic Model, Spectral Analysis and SPL Normalization, Identification of Tonal and Noise Maskers, Decimation and Reorganization of Maskers, Calculation of Individual Masking Thresholds, Calculation of Global Masking Thresholds, Perceptual Bit Allocation.

**Module IV: Time-Frequency Analysis: Filter Banks and Transforms**

Analysis-Synthesis Framework for M-band Filter Banks, Filter Banks for Audio Coding: Design Considerations, The Role of Time-Frequency Resolution in Masking Power Estimation, The Role of Frequency Resolution in Perceptual Bit Allocation, The Role of Time Resolution in Perceptual Bit Allocation, Quadrature Mirror and Conjugate Quadrature Filters, Cosine Modulated Perfect Reconstruction (PR) M-band Banks and the Modified Discrete Cosine Transform (MDCT), Discrete Fourier and Discrete Cosine Transform, Pre-echo Distortion, Pre-echo Control Strategies.

**Module V: Lossless Audio Coding**

Lossless Audio Coding ($L^2AC$), $L^2AC$ Principles, $L^2AC$ Algorithms, DVD-Audio, Meridian Lossless Packing (MLP), Super-Audio CD (SACD), SACD Storage Format, Sigma-Delta Modulators (SDM), Direct Stream Digital (DSD) Encoding, Digital Audio Watermarking, Background, A Generic Architecture for DAW, DAW Schemes – Attributes, Commercial Applications.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

## Text & References:

Andreas Spanias, Ted Painter, Venkatraman Atti, Audio Signal Processing and Coding, John Wiley & Sons.

- Udo Zölzer, Digital Audio Signal Processing, John Wiley and Sons

# STOCHASTIC METHODS

**Course Code: ECM 103 Credit Units: 04**

## Course Objective:

This course deals with the comprehensive knowledge of Probability theory, probability distributions, transition probabilities, Markov Chains, birth and death processes, Network of queues, correlation and regression analysis and Analysis of variance.

## Course Contents:

**Module I: Random Variables**

Probability Bay's rule, Distribution function, discrete random vectors, different distributions, jointly distributed random variables. Order statistics, Distribution of sums, expectations, moments, transform methods mean time to failure, Inequalities and limit theorems, Mixture distribution, Conditional expectations, Imperfect fault coverage & reliability, Random sums.

**Module II: Stochastic Processes**

Classification Bernoulli process, Poisson process, Renewal processes, available analysis, Random incidence, renewal model of program behavior.

**Module III: Markov Chains**

n-step transition probabilities, limiting distribution, distribution of times between state changes, irreducible finite chains with a periodic states, the m/g/I, queuing system discrete parameter, Birth Data Processes, Markov chains with absorbing states, Birth and death Processes, Non – Birth Death Processes.

**Module IV: Network of Queues**

Open and close queuing networks, Non exponential service item distributions and multiple job type, non product form networks. Correlation & Regression: Introduction, least squares curve fitting, Coefficient of determination, Confidence of intervals in linear regression, concatenation analysis, non linear regression, Analysis of variance.

## Examination Scheme:

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:


- Papoulis, A., Probability, Random Variables and Stochastic Processes, Third Edition, McGraw-Hill
- K.S.Trivedi: Probability and Statistics, PHI, 3$^{rd}$ Ed.
- S.P.Gupta, Statistical Methods, Sultan Chand Sons
- V.K. Kapoor and S. C. Gupta Fundamentals of Statistics, Sultan Chand and Sons.

# ADVANCED DIGITAL COMMUNICATION LAB

**Course Code: ECM 121** **Credit Units: 02**

## Tailor Made Experiments:

- To study carrier modulation techniques using Amplitude shift keying.
- To study carrier modulation techniques using frequency shift keying.
- To study carrier modulation techniques using binary phase shift keying.
- To study data coding and decoding for NRZ format (NRZ L, M&S)
- To study data coding and decoding for phase encoding format (Biphase L, M&S).
- To study data coding and decoding for unipolar to bipolar and vice versa (RZ, AMI, URZ)
- To study delta modulation and demodulation.

## Open Ended Experiments:

- To study slope overload and increased gain in Delta modulation.
- To study Quadrature phase shift keying.
- To study Quadrature Amplitude Modulation.
- To study voice modulation and demodulation
- To study Compander and Expander.
- To study Adaptive delta modulation and demodulation with CVSD.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# AUDIO SIGNAL PROCESSING LAB

**Course Code: ECM 122 Credit Units: 02**

## List of experiments:

1. Write a MATLAB program to load, display, and play back Audio files.
2. Handling Audio files in MATLAB.
   a. Read an audio file, its sampling rate and bits per sample.
   b. Write an audio file, at different sampling rates, at different bits per sample.
   c. Play an audio file at different sampling rates.
   d. Use of whos command to view the variables in the workspace.
3. Up-sampling and down-sampling of audio file and its effect in perceptual properties.
4. Fourier Transform and inverse Fourier Transform of Audio signals, plot of the spectrum of audio signals. Audio synthesis from a select number (subset) of FFT components.
5. For an audio signal, include a framing module in a program and set the frame size to 256 samples. Every frame should be read in a 256 × 1 real vector called. Compute the fast Fourier transform of this vector. Compute the magnitude of the complex vector $S_{freq}$ and plot its magnitude in dB up to the fold-over frequency. This computation should be part of the frame-by-frame audio processing program.
6. Analysis of audio signals using Short-term Fourier Transform (STFT) in the Time-frequency domain.
7. Analysis of multi-resolution, wavelet decomposition and reconstruction of audio signals at different levels using different filters.
8. Write a program to plot the absolute threshold of hearing in quiet. Give a plot in terms of a linear Hz scale.
9. Power spectral density of different types of audio signals.
10. Insert and recover data from an audio signal using LSB coding method

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# LAB USING LABVIEW SOFTWARE/MATLAB

**Course Code:** **ECM 124** **Credit Units: 02**

**List of Experiments:**

1. Hands – on lab view software
2. DSP based algorithm and system design.
3. Analysis of sound and vibration.
4. Signal generation and analysis of digital modulation formats.
5. Experiments on spectral analysis
6. Designing and analyzing filter based applications
7. Experiments on audio measurements (THD/IMD/gain/phase).
8. Experiments on frequency response measurement and transient analysis.
9. To observe the characteristics of different DC motors using Lab View.
10. Biomedical signal analysis like ECG, EEG etc.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# LOW POWER VLSI DESIGN

**Course Code: ECM 105 Credit Units: 04**

## Course Objective:

This course deals with the design issues of low power circuit in digital perspective. In this course, MOS transistor modeling is emphasized for low power applications. After completing this course the student have thorough knowledge of modeling of various MOS parameter and SPICE simulation for low power applications, correlation analysis in DSP systems, Monte Carlo simulation, low power memory design.

## Course Contents:

**Module I: Low Power VLSI Design Methodology: An overview**
Need for low power VLSI design, sources of power dissipation in CMOS (S>C current, leakage current, static current), physics of power dissipation in CMOS devices, CMOS low voltage analytical model. CMOS power supply voltage scaling.

**Module II: Principles of low power design**
Sources of power dissipation, Impact of transistor sizing and oxide thickness, Technology & Device innovation.

**Module III: Simulation Power analysis**
SPICE circuit simulators, gate level logic simulation, capacitive power estimation, static state power, gate level capacitance estimation, architecture level analysis, data correlation analysis in DSP systems. Monte Carlo simulation.
Probabilistic power analysis: Random logic signals, probability & frequency, probabilistic power analysis techniques, signal entropy.

**Module IV: Low Power Design**
**Circuit level:** Power consumption in circuits. Flip Flops & Latches design, high capacitance nodes, low power digital cells library
**Logic level:** Gate reorganization, signal gating, logic encoding, state machine encoding, pre-computation logic.

**Module V: Low power: Special Techniques**
Power dissipation in clock distribution and reduction techniques, CMOS floating node, Low power bus, Switching activity reduction, Parallel architecture with voltage reduction, Flow graph transformation.
Adiabatic switching concepts, Multi threshold CMOS designing.

## Examination Scheme:

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***
- Gary K. Yeap, “Practical Low Power Digital VLSI Design”, KAP, 2002
- Rabaey, Pedram, “Low power design methodologies” Kluwer Academic, 1997

***References:***
- Kaushik Roy, Sharat Prasad, “Low-Power CMOS VLSI Circuit Design” Wiley, 2000

# ADVANCED INSTRUMENTATION AND SYSTEM DESIGN

**Course Code:** **ECM 106** **Credit Units: 04**

## Course Objective:

The basic objective of this course is to provide the students the core knowledge of industrial instrumentation so that they learn how to implement instrumentation techniques is industry.

## Course Contents:

**Module I**

General concepts and terminology of measurement systems, static and dynamic characteristics, errors, standards and calibration. Introduction, principle, construction and design of various active and passive transducers.Role of transducers in Instrumentation - Transducer construction, classification and characteristics, selection of Transducers, analogue and digital transducers, Principle of operation ,static and dynamic characteristics of transducer system .

**Module II**

Transducers for Measurement of length & thickness, linear Displacement, Angular Displacement, force, weight, torque, Moisture, Level, Flow, pH & Thermal Conductivity, Measurement of Frequency, Proportional, Geiger Muller & Scintillation Counters.

**Module III**

Transducers for Biomedical Application: Resistive transducers - Muscle force and Stress (Strain gauge), humidity, Respiration Inductive Transducers - Flow measurements, muscle movement (LVDT),Capacitive Transducers - Heart sound measurement, Pulse pick up, Photoelectric Transducers - Pulse transducers, Blood pressure, oxygen Analyses, Piezoelectric Transducers - Pulse pickup, ultrasonic blood flow meter, Chemical Transducer - Ag-Agfallas (Electrodes, PH electrode).

**Module IV**

Introduction to data acquisition on PC, Sampling fundamentals, Input/Output techniques and buses. ADC, DAC, Digital I/O, counters and timers, DMA, Software and hardware installation, Calibration, Resolution, Data acquisition interface requirements.

**Module V**

Virtual Instrumentation: Historical perspectives, advantages, block diagram and architecture of a virtual instrument, data-flow techniques, graphical programming in data flow, and comparison with conventional programming. Development of Virtual Instrument using GUI, Real-time systems, Acquisition Systems (SCADA) software.

Introduction to Lab VIEW: Software environment, front panel, block diagram, palettes, loops, structures and tunnels, arrays, clusters, plotting data.

## Examination Scheme:

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- W.D. Cooper & A.D. Helfrick, Electronic Instrumentation and Measurement Techniques, PHI.
- Doebelin E.O, Measurement Systems - Application and Design, Fourth edition, McGraw-Hill International Edition.
- B.C. Nakra and K.K. Chaudhary, Instrumentation Measurement Analysis, Tata McGraw-Hill.
- Instrument Transducers by Hermann, K.P. Neubert.
- Electrical Transducers for Industrial Measurement by pH Mansfield.
- Instrumentation systems by Mani Sharma, Rangan.
- J.G. Webster Medical instrumentation Application and Design, Houghton Mifilin Co.
- Jerome, PHI Virtual Instrumentation using Lab VIEW, Jovitha, ISBN 978-81-203-40305.
- Gary Johnson - Labview Graphical Programming, Second edition, McGraw Hill.

# WIRELESS COMMUNICATION

**Course Code: ECM 107 Credit Units: 04**

## Course Objective:

The purpose of this course is to provide a thorough insight of Wireless Communication. It gives a deep understanding of the Mobile Antennas, Interference reduction, handoffs and cellular system design.

## Course Contents:

**Module I: Cell coverage and Mobile Antenna**

General Introduction, obtain the mobile point to point model(Lee model),propagation over water or flat open area, foliage loss, propagation in near in distance, long distance propagation, obtain path loss from a point to point prediction model-a general approach ,form of a point to point model, computer generation of a point to point prediction, cell-site antenna heights and signal coverage cells, mobile to mobile propagation, Equivalent Circuits of Antennas, The gain and pattern relationship, sum and difference patterns, Antennas at cell site, unique situations of cell site antennas, mobile antennas.

**Module II: Co channel interference reduction and non co channel interference**

Co channel interference, exploring co channel interference areas in a system, real time co channel interference measurement at mobile radio transceivers, design of an omni directional antenna system in the worst case, design of a directional antenna system, lowering the antenna height ,reduction of co channel interference by means of a notch in the tilted antenna pattern, umbrella-pattern effect, use of parasitic elements, power control, diversity receiver, designing of a system to serve a predefined area that experiences co channel interference, subjective test versus objective test, adjacent channel interference, near end far end interference, effect on near end mobile units, cross talk, effects of coverage and interference by applying power decrease, antenna height decrease, beam tilting, effects on cell site components, interference between systems, UHF TV interference, Long distance interference.

**Module III: Handoffs, dropped calls and operational techniques**

Value of implementing handoffs, initiation of a handoff, delaying a handoff, forced handoffs, queuing of handoffs, power-difference handoffs, mobile assisted handoff and soft handoff, cell-site handoff only, intersystem handoff, introduction to dropped call rate, formula of dropped call rate, finding the values of δ and μ, adjusting the parameters of a system, coverage-hole filler, leaky feeder, cell splitting, small cells, narrow beam, separation between highway cell sites, low-density small market design Angle Modulation

**Module IV: Cellular system evaluations**

Performance evaluation, signaling evaluation, measurement of average received level and level crossings, spectrum efficiency evaluation, portable units, evaluation of data modem.

**Module V: Cellular code division multiple access (CDMA)**

Wideband mobile channel, The cellular CDMA system, Interference considerations, single-user receiver in a multi-user channel, improved single user receivers, adaptive single user receivers, CDMA system capacity, capacity of cellular CDMA system, system link outage effects of power control errors on link capacity, call blocking probability on the uplink.

## Examination Scheme:

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Lee, ”Mobile cellular Telecommunications” TMH
- Abu Rgheff, “Introduction to CDMA Wireless Communication” ELSIVER
- Rappaport, “Wireless Communication”, Pearson
- Yi-Bang Lin, Chlamtac, “Wireless and Mobile Network Architecture”, Wiley

# TERM PAPER

**Course Code: MTP 130 Credit Units: 03**

## Course Objective:

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

## GUIDELINES FOR TERM PAPER

The procedure for writing a term paper may consist of the following steps:
Choosing a subject
Finding sources of materials
Collecting the notes
Outlining the paper
Writing the first draft
Editing & preparing the final paper

1. **Choosing a Subject**
   The subject chosen should not be too general.
2. **Finding Sources of Materials**
   - The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
   - Begin by making a list of subject-headings under which you might expect the subject to be listed.
   - The sources could be books and magazine articles, news stories, periodicals, scientific journals etc.
3. **Collecting the notes**
   Skim through sources, locating the useful material, then make good notes of it, including quotes and Information for footnotes.
   a) Get facts, not just opinions. Compare the facts with author's conclusion.
   b) In research studies, notice the methods and procedures, results & conclusions.
   c) Check cross references.
4. **Outlining the paper**
   a) Review notes to find main sub-divisions of the subject.
   b) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.
5. **Writing the first draft**

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

1. statement of purpose
2. main body of the paper
3. statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main idea.

6. **Editing & preparing the final Paper**
   Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.
   Read the paper to ensure that the language is not awkward, and that it "flows" properly.
   Check for proper spelling, phrasing and sentence construction.
   Check for proper form on footnotes, quotes, and punctuation.
   Check to see that quotations serve one of the following purposes:
   a) Show evidence of what an author has said.
   b) Avoid misrepresentation through restatement.
   c) Save unnecessary writing when ideas have been well expressed by the original author.
   Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.
   Term papers should be composed of the following sections:

- Title page
- Table of contents
- Introduction
- Review
- Discussion & Conclusion
- References
- Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

**Discussion**

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

**Conclusion**

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

summary of question posed
summary of findings
summary of main limitations of the study at hand
details of possibilities for related future research

## Text & Reference:

From the very beginning of a research project, you should be careful to note all details of articles thered.

The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.

The key to a good bibliography is consistency. Choose a particular convention and stick to this.

**Conventions**

Monographs

Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

**Edited volumes**

Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.

[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

**Edited articles**

Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

**Journal articles**

McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

**Electronic book**

Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] From the World Wide Web, http://www.aber.ac.uk/media/Documents/S4B/.

**Electronic journal articles**

Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document]. German as a Foreign Language Journal [online] 1. Retrieved [12.09.'00] from the World Wide Web, http://www.gfl-journal.com/.

**Other websites**

Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document]. Retrieved [13.10.'01] from the World Wide Web, http://olaf.hiof.no/~sverrev/eng.html.

**Unpublished papers**

Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

**sUnpublished theses/ dissertations**

Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg.

Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

**Appendix**

The appendix should be used for data collected (e.g. questionnaires, transcripts, ...) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

## Assessment Scheme:

**Continuous Evaluation:** 40%

(Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)

**Final Evaluation:** 60%

(Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/ presented, outcomes vs. objectives, presentation/ viva etc.)

# COMPUTER COMMUNICATION AND NETWORKS

**Course Code: ECM 201 Credit Units: 04**

## Course Objective:

This course gives a through understanding of the advanced concepts of Computer Network by giving in depth knowledge of protocols used at various layers of the references model. It also impart student with complete understanding of High speed communication and networking along with Network Security issues. The course also includes all important protocols and techniques used currently at various levels in communication and networking industry.

## Course Contents:

**Module I: Link Layer Protocols and Networks**

Introduction to computer Networks: TCP/IP and OSI model. Design Issues for layers, Network topologies. Concepts of Physical Layer- Transmission media, Communication satellites, Mobile telephone System ; Data link layer -Error detection and correction, sliding window protocols, HDLC, PPP, ATM, Frame Relay, X.25.

**Module II: Routing**

Channel allocation problem, multiple access protocols: ALOHA, CSMA/CD, IEEE standard 802 for LAN and MAN, Bluetooth, Bridges, Transparent Bridging, Source Route Bridging. Types of Routing – Static, dynamic, shortest Path, Flooding, Link state, Distance Vector, Multicast. Routing protocols – OSPF, BGP, RIP, IGRP, EIGRP, and IGMP. Switching Techniques, Tag switching.

**Module III: Internetworking Protocols**

Internetworking, IPv6, Direct Enabled Networking. ARP, ICMP, UDP, TCP- Frame structure, Connection establishment, congestion control and connection release. Application Layer Protocols: HTTP, FTP, DNS, SMTP, SNMP, NLSP, Web caching, Content Distribution Networks.

**Module IV: High Speed Networks and Multimedia Communication**

Need of High Speed Networking and multimedia, Performance Attributes, FDDI, Fast Ethernet, RSVP, VLAN-Type of connections, Frame processing, Audio Compression, Video compression-VOD, MPEG formats, RTSP, RTP, RTCP, Scheduling and Policing Mechanisms. ISDN- BRI and PRI.

**Module V: Network Security**

Need for Network Security, Cryptography, Symmetric Key Algorithms- DES, AES, Public Key algorithms-RSA, Digital signatures- Public Key and Symmetric Key, Communication Security- IPsec, Firewalls, VPN, Wireless security, Authentication Protocols.

## Examination Scheme:

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:

***Text:***


- Tananbaum A.S., “Computer Networks”, 3rd Ed, PHI, 1999.
- Laura Chappell (ed), “Introduction to Cisco Router Configuration”, Techmedia, 1999.
- Computer Networking: A Top-Down Approach Featuring the Internet (3rd Edition) by James F. Kurose
- Data Communication & networking: Forouzan, B. A.


***References:***


- Black U., “Computer Networks-Protocols, Standards and Interfaces”, PHI, 996.
- Stallings W., “Computer Communication Networks”, PHI.
- Michael A. Miller, “Data & Network Communications”, Vikas Publication.
- William A. Shay, “Understanding Data Communications & Networks”.

# ADVANCED MICROWAVE ENGINEERING

**Course Code:** **ECM 202** **Credit Units: 04**

## Course Objective:

This course provides comprehensive knowledge of microwave frequencies, microwave devices, microwave transmission lines, microwave passive and active circuits and measurements.

## Course Contents:

**Module I**

Characteristics features of microwaves, applications of microwaves, Maxwell's equations, plane wave in dielectric and conducting media, waveguide analysis, VSWR, and impedance, waveguide discontinuities. S-matrix representations, matrices of some typical microwave components such as attenuator, matched load, power divider, directional coupler, magic tee, Ferrite devices, wave propagation in ferrite medium, Faraday rotation, isolator, circulator.

**Module II**

Microwave Transistor; Microwave Diode; MESFET, MOSFET mechanism, maximum operating frequency and microwave applications; HEMT; Charge Coupled Devices (CCD); Transferred Electron Devices: Gunn Diode, LSA Diode; Microwave Generation and Amplification; Avalanche Effect Devices: Read diode; IMPATT diodes.

Klystron: Velocity modulation process, bunching process, output power and beam loading; Reflex Klystron: power output and efficiency; Traveling Wave Tubes; Magnetron.

**Module III**

Review of development and application of transmission lines; closed form models for the micro strip line; closed form models for the coplanar waveguide line Characteristics of coupled micro strip and coupled coplanar waveguide; Circuit models of discontinuities in micro strip lines and the coplanar waveguides: Micro strip line resonator; Micro strip patch resonators: rectangular, circular and ring.

**Module IV**

Microwave Integrated Circuits (MIC), Technology of hybrid MICs. Design of MIC components: transitions, couplers, filters Power dividers, oscillators, modulators, phase shifters and amplifiers. Design of millimeter wave components: transitions, couplers, power dividers, filters, oscillators, switches, phase shifters and amplifiers.

**Module V**

Microwave power measurements. Slotted line techniques for VSWR Measurement. Impedance Measurement. Measurement of scattering parameters using network analyzer. Frequency Measurements. Slotted line method and frequency meter. Measurement of Q for transmission type cavity.

## Examination Scheme:

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & Reference:


- S.Y. Liao, "Microwave devices & Circuits", Prentice Hall of India, 3rd Ed. 1995.
- Edited by H.A. Watson, "Microwave Semiconductor devices and their circuit applications", McGraw Hill Book Co. New York 1969.
- K.C. Gupta, "Microstripline & Slot lines" Artech House.
- E.L. Giunzton, "Microwave Measurements", Mc Graw Hill Book Co. Inc. 1957.
- R. E. Colins: "Foundations for Microwave Engineering", John Wiley & Sons, Inc, 2005.

# ADVANCED INFORMATION THEORY AND CODING

**Course Code: ECM 203 Credit Units: 04**

## Course Objective:

This course introduces how various coding takes place in communication and what type of different codes are used in communication system. It also introduces different entropies, channel capacity and purpose of encoding.

## Course Contents:

**Module I: Fundamental Limits in Information Theory**
Measure of Information, Data Compaction, Discrete Memory less Channels, Relationship among different Entropies, Mutual information, Channel Capacity, Capacity of channel with symmetric noise structure BSC and BEC, Channel Coding Theorem, Differential Entropy and Mutual Information for Continuous Ensembles, Information Capacity Theorem, Rate Distortion Theory.

**Module II: Elements of Encoding**
**Source Coding:** Instantaneous Codes, Source Coding Theorem, The Kraft Inequality and McMillan's Theorem, Average Length and Compact Codes, Shannon's Noiseless Coding Theorem, Fano Coding, Huffman Coding, Arithmetic Coding, Higher-order Modelling.
**Fundamentals of Channel Coding**: Code Rate, Decoding Rules, Hamming Distance, Bounds on M, Maximal Codes and Perfect Codes, Error Probabilities, Shannon's Fundamental Coding Theorem.

**Module III: Introduction to Algebra**
Groups, Ring, Vector space and Fields, Linear Spaces, Linear Spaces over Binary Fields, Construction of Galois field GF (2m), Basic Properties of Galois Field GF (2m), Codes Derived from Hadamard Matrices.

**Module IV: Error Correcting Codes**
**Linear Block Codes**: Introduction to Linear Block codes, Syndrome and Error detection, Minimum distance of block code, error detecting and Error correcting capability a block code.
**Cyclic Codes:** Rings of Polynomials, Description of Cyclic codes, Encoding and Decoding of Cyclic Codes and its Circuits, Goley Codes, Hamming Codes, Cyclic Redundancy Check Codes, Reed-Muller Codes.

**Module V: Burst Correcting Codes**
Finite Fields, Irreducible Polynomials, Construction of Finite Fields, Bursts of Errors, Fire Codes, Minimum Polynomials, Bose-Chaudhuri-Hocquenghem Codes, Other Fields, Reed-Solomon Codes.
**Convolution Codes:** Binary Convolution Codes, Decoding Convolution Codes, the Viterbi Algorithm, Sequential Decoding, Trellis Modulation, Turbo Codes

## Examination Scheme:

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- F.M. Reza: Information Theory, McGraw Hill
- ShuLin & J Costeib: Error Control Coding, (PHI)
- Dass, Mullick & Chatterjee : Digital Communication, John Wiley, Ed. 1992

# COMPUTER COMMUNICATION AND NETWORKS LAB

**Course Code: ECM 221** **Credit Units: 02**

## List of Experiments:

**Tailor made experiments**

1. Study of Router Configuration in interface mode using packet tracer.
2. Study of CISCO switch 2960 series and setup VLAN.
3. To interconnect different network through routers.
4. To study and verify RIP Protocol.
5. To study and verify EIGRP protocol.
6. Socket Programming with JAVA.
7. Network Programming by using JAVA Program.
8. To study OSPF Protocol

**Open ended experiments**:

9. Implement the ALOHA protocol for packet communication between a number of nodes connected to a common bus.
10. Implement the CSMA protocol for packet communication between a number of nodes connected to a common bus
11. To implement the token passing access in RING-LAN.
12. To study reliable data transfer between two nodes over an unreliable network using the stop and-wait protocol
13. Provide reliable data transfer between two nodes over an unreliable network using the sliding window go back N protocol.
14. Provide reliable data transfer between two nodes over an unreliable network using the sliding window selective repeat protocol.
15. To simulate the distance vector routing protocol to maintain routing tables as the traffic and topology of the network changes.
16. To simulate the link state routing protocol to maintain routing tables as the traffic and topology of the network changes.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# ADVANCED MICROWAVE ENGINEERING LAB

**Course Code: ECM 222** **Credit Units: 02**

**List of experiments :**

1. To study of HFSS
2. To design a H-plane tee using HFSS
3. To design a E-plane tee using HFSS
4. To study the characteristic and functions of magic tee using HFSS
5. Design a Directional Coupler using HFSS
6. Design a circulator and study the characteristic and functions of a circulator using HFSS
7. To Study the frequency measurement using microwave bench
8. To study the characteristics of reflex klystron.
9. To measure frequency and guided wavelength of a microwave signal.
10. To study the characteristic and functions of an isolator

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# CDMA LAB USING QUALNET

**Course Code: ECM 224 Credit Units: 02**

**List of Experiments:**

1. **Study of QUALNET software.**
2. **Develop a Wireless network scenario.**
3. **Study and Analysis of various wireless routing protocols.**
4. **Study and Analysis of different mobility models.**
5. **Study and Analysis of different propagation models.**
6. **Study and Analysis of different fading channel models.**
7. **Noise modeling of wireless network.**
8. **Study and Analysis of different mobility models.**
9. **Study and Analysis of different Antenna models for wireless networks**
10. **Plotting different type of graphs for wirelessnetwork.**

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# ADVANCED OPTICAL COMMUNICATION

**Course Code:** **ECM 205** **Credit Units: 04**

## Course Objective:

The objective of this course is to introduce the student to the fundamental basics and understanding of fiber optical communications. This includes the properties of optical fibers and how they are used to establish optical links for communication systems. The course also gives exposure of Advance Optical Communication use in present communications networks.

## Course Contents:

**Module I: Wave Propagation in Optical Fibers**
Ray theory transmission in optical fiber, Electromagnetic mode theory for optical propagation, Modes in a planar guide, phase shift and Evanescent field, Goos-Haenchen Shift, Types of optical fibers, Intermodal dispersion.

**Module II: Transmission characteristics and Attenuation in optical fibers**
Losses in fiber, Intramodal and Intermodal dispersion, connectors &splices, bending loses, Absorption, scattering, low loss materials.

**Module III: Optical sources & detectors**
LED, double hetero junction structure, optical confinement and carrier confinement, Semiconductor injection laser, Single mode and multimode injection laser, buried hetero structure laser, transverse junction stripe laser, distributed feedback lasers, Semiconductor photodiodes with internal gains.

**Module IV: Components and Design issues**
Transmitter circuit, LED drive circuits, laser drive circuits, optical receiver circuit: pre-amplifier and AGC, Equalizations, Digital system design considerations: regenerative repeater, optical transmitter and optical receiver, temporal losses, Optical power budgeting, analog system planning, Pulse analog techniques.

**Module V: Optical Networking**
Optical TDM, subscriber multiplexing (SCM), WDM
Optical networking: data communication networks, network topologies, MAC protocols, Network Architecture-SONET/TDH, optical transport network, optical access network, optical premise network.

## Examination Scheme:

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Senior J., optical fiber communications, principles & practice, PHI.

- Keiser G., optical fiber communications, McGraw-hill.
- Gowar J., optical communication systems, PHI.
- William B. Jones jr., Introduction to optical fiber communication systems, Holt, Rinehart and Winston, Inc.

# SATELITE COMMUNICATION

**Course Code:** **ECM 206** **Credit Units: 04**

## Course Objective:

The course aims to provide a detailed understanding about the orbital mechanics, link design, DBS System and various satellite networks.

## Course Contents:

**Module I: Orbital mechanics and Launchers**

Orbital Mechanics look angle determination, orbital perturbation, orbit determination, launches and launch vehicles.

Satellite Subsystems, altitude and orbit control system, telemetry, tracking, and communication subsystem and satellite antennas

**Module II: Satellite link design**

System noise temperature and G/T ratio, design of downlinks and uplinks with examples, propagation effects and their impact on satellite earth links, rain and ice effects, attenuation.

Analog FM transmission by satellite, TV signals/N ratio for FM video Transmission, Digital transmission,

**Module III: Satellite in networks and DBS television**

ATM over satellite, satellite links and TCP, enhancing TCP over satellite channels, split TCP connections

C –band and Ku band home satellite TV, Orbital spacing, power rating and number of transponder, bit rates for digital television, MPEG compression standards, High definition TV, digital DBS TV,, Satellite radio broadcasting

**Module IV: Low earth Orbit and non – geostationary satellite system**

Orbit consideration, coverage and frequency consideration, frequency band elevation angle consideration, number of beams per coverage, off-axis scanning, optimal orbital altitude, Delay throughput, system consideration, Operational NGSO constellation designs, Ellipso, Globstar, Iridium, Orbcomm, GPS, Radarsat etc.

**Module V: VSAT System**

Network architectures, access control protocols, multiple access selection, signal formats, VSAT earth station engineering, calculation of link margins for a VSAT star network, System design procedure

## Examination Scheme:

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Satellite Communication - T. Pratt & C.W. Bostian and Jeremy Allnutt, John Wiley and Sons, 2003
- Satellite Communications – Dennis Roddy, TMH 2009
- Satellite Communication System Design Principles - M. Richharia
- Satellite Communication - R.M. Gagliardi

# MEMS AND IC INTEGRATION

**Course Code:** **ECM 207** **Credit Units: 04**

## Course Objective:

This course gives the exposure of various techniques used in MEMS and IC Integration. RF and Optical MEMS are also covered.

## Course Contents:

**Module I**
Overview of CMOS process in IC fabrication, MEMS system-level design methodology.

**Module II**
Equivalent Circuit representation of MEMS, signal-conditioning circuits, and sensor, noise calculation.

**Module III**
Pressure sensors with embedded electronics (Analog/Mixed signal): Accelerometer with transducer. Gyroscope, RF MEMS switch with electronics, Bolo meter design

**Module IV**
RF MEMS, and Optical MEMS MECS, thermo actuator MOEMS CILV, Digital Micro mirror device Laser light.

## Examination Scheme:

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Gregory T.A. Kovacs, Micro machined Transducers Sourcebook, The McGraw- Hill, Inc. 1998
- Stephen D. Senturia, Micro system Design, Kluar Publishers, 2001
- Nadim Maluf, An Introduction to Micro electro mechanical Systems Engineering, Artech House, 2000.
- M.H. Bao, Micro Mechanical Transducers, Volume 8, Handbook of Sensors and Actuators, Elsevier, 2000.
- Masood Tabib-Azar, Micro actuators, Kluwer, 1998.
- Ljubisa Ristic, Editor, Sensor Technology and Devices, Artech House, 1994
- D. S. Ballantine, et. al., Acoustic Wave Sensors, Academic Press, 1997
- H. J. De Los Santos, Introduction to Micro electro mechanical (MEM) Microwave Systems, Artech, 1999.
- James M. Gere and Stephen P. Timoshenko, Mechanics of Materials, 2nd Edition, Brooks/Cole Engineering Division, 1984

# MINOR PROJECT I

**Course Code: MMP 260** **Credit Units: 04**

## Methodology:

The student will submit a synopsis at the beginning of the semester for the approval to the school project committee in a specified format. The student will have to present the progress of the work through seminars and progress report. A report must be submitted to the school for evaluation purpose at the end of the semester in a specified format.

## Examination Scheme:

| | |
|---|---|
| Feedback from industry/work place | 20 |
| Training Report | 40 |
| Viva | 15 |
| Presentation | 25 |
| **Total** | **100** |

# ANTENNA THEORY AND DESIGN

**Course Code: ECM 301** **Credit Units: 04**

## Course Objective:

This course provides comprehensive knowledge about different antennas such as resonant antenna, array antenna, broad band antenna, aperture antenna and smart antenna. This describes antenna synthesis and different computational electromagnetic methods for antenna design.

## Course Contents:

**Module I**

Radiation mechanism - over view, near-and far-field regions, Electromagnetic Fundamentals, Solution of Maxwell's Equations for Radiation Problems, Ideal Dipole, Radiation Patterns, Directivity and Gain, Antenna Impedance, Radiation Efficiency. Antenna Polarization.

**Module II: Resonant Antennas**

Wires and Patches, Dipole antennas, Yagi - Uda Antennas, Micro strip Antenna.
Arrays: Array factor for linear arrays, uniformly excited, equally spaced Linear arrays, pattern multiplication, directivity of linear arrays, non- uniformly excited -equally spaced linear arrays, Mutual coupling, multidimensional arrays, phased arrays, feeding techniques, perspective on arrays.

**Module III: Broad band Antennas**

Traveling - wave antennas, helical antennas, Biconical antennas, sleave antennas, and Principles of frequency - independent Antennas, spiral antennas, and Log - Periodic Antennas.
**Aperture Antennas:** Techniques for evaluating Gain, reflector antennas - Parabolic reflector antenna principles, Axis - symmetric parabolic reflector antenna, offset parabolic reflectors, dual reflector antennas, Gain calculations for reflector antennas, feed antennas for reflectors, field representations, matching the feed to the reflector, general feed model, feed antennas used in practice.
Smart Antenna: Concept and benefits of smart antennas, fixed weight beam forming basics, Adaptive beam forming.

**Module IV: Antenna Synthesis**

Formulation of the synthesis problem, synthesis principles, line sources shaped beam synthesis, linear array shaped beam synthesis — Fourier Series, Woodward — Lawson sampling method, comparison of shaped beam synthesis methods, low side lobe narrow main beam synthesis methods Dolph Chebyshev linear array, Taylor line source method.

**Module V: Method of Moments**

Introduction to method of Moments, Pocklington's integral equation, integral equations and Kirchoff's Networking Equations, Source Modeling Weighted residuals formulations and computational consideration, calculation of antenna and scatter characteristics.

## Examination Scheme:

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Stutzman and Thiele, "Antenna Theory and Design", 2ndEd, John Wiley and Sons Inc.
- C. A. Balanis: "Antenna Theory Analysis and Design", John Wiley, 2nd Edition, 2008.
- Kraus, "Antennas", McGraw Hill, TMH, 3" Edition, 2003
- Kraus and R.J. Marhefka:, "Antennas", McGraw Hil1, 2nd Edition, 1998

# IMAGE PROCESSING AND PATTERN RECOGNITION

**Course Code: ECM 302 Credit Units: 04**

## Course Objective:
This course emphasizes general principles of image processing. Topics such as image enhancement, image restoration, image segmentation and multi resolution image analysis are covered. Some concepts of pattern recognition is introduced in this course.

## Course Contents:

**Module I: Image Enhancement and Restoration**
Image Enhancement: Spatial Domain Methods: Arithmetic and logical operations, pixel or point operations, size operations, Histogram based image enhancement. Smoothing filters-Mean, Median, Mode filters, Comparative study, Sharpening filters – Directorial filters, Robert, Prewitt, Sobel, Laplacian, LOG filter. Frequency Domain Methods: Design of Low pass, High pass filters in Frequency Domain. Homomorphic filters. Image Restoration: Restoration Process, Noise Models, Restoration in Presence of Noise Only, Periodic Noise Reduction by Frequency Domain Filtering, Estimating the Degradation Function, Degradation model, Algebraic Approach to Restoration, Inverse filtering, Wiener filter, Constrained Least Square Restoration.

**Module II: Wavelets and Multiresolution Processing**
Background, Multiresolution Expansion, And Wavelet Transformation in One Dimension. Morphological Image Processing -Introduction, Erosion and Dilation, Opening And Closing, HIT or MISS Transformation, Basic Morphological Algorithms- Boundary Extraction, Hole Filling, Convex Hull, Thinning, Thickening, Pruning, Gray-Scale Morphology.

**Module III: Image Segmentation**
Fundamentals. Point, Line and Edge Detection, Thresholding-Foundation, Basic Global Thresholding, Multiple Thresholds, Variable Thresholding, Multivariable Thresholding, Region-Based Segmentation, Segmentation Using Morphological Watersheds.

**Module IV: Introduction to Pattern Recognition**
Elements of Image Analysis, Pattern and Pattern Classes, Introduction to pattern classification. Issues in classifier design, learning from examples. Classifiers based on Bayes Decision Theory: Examples of classifiers, nearest neighbour, 2-class Bayes classifier

**Module V: Linear Classifiers**
Linear discriminant functions for 2-class case, Perceptron algorithm and convergence proof. Linear least squares regression, pseudo inverse and LMS algorithm. Fisher linear discriminant, linear discriminant functions for multi class case.

## Examination Scheme:

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Rafael C. Gonzalez and Richard E. Woods, “Digital Image Processing”, Pearson Reprint, 2001.
- R. O. Duda, P. E. Hart, D. G. Stork, Pattern Classification, 2nd edition, John Wiley & Sons, Inc., 2000.
- Anil K. Jain, “Fundamentals of Digital Image Processing”, Prentice-Hall of India, New Delhi, 2001.
- Image processing, Analysis, and Machine vision by Milan Sonka, Vaclav Hlavac Roger Boyle, Vikas Publishing House.
- S. Theodoridis, K. Koutroumbas, Pattern Recognition, 4th edition, Academic Press, 2009.

# RESEARCH METHODOLOGY

**Course Code: ECM 303** **Credit Units: 04**

**Course Objective:**

The main objective of this course is how the data is gathered, or how the researcher came up with his information. The second objective of which is focused on the method of data analysis employed by the researcher. Informing your readers on how you obtained your results is a critical part of any research paper because this can provide your readers an assessment on how reliable or credible your information is. In this line, you must also state the logic on why you have decided to choose a particular method of data gathering.

## Course Contents:

**Module I: Research**

Types, Research process and steps in it, Hypothesis, Research proposals and aspects. Research Design: Need, Problem Definition, variables, research design concepts, Literature survey and review, Research design process, Errors in research.

Research Modeling: Types of Models, Model building and stages, Data consideration and testing, Heuristic and Simulation modeling. Report Writing: Pre writing considerations, Thesis writing, Formats of report writing, formats of publications in Research journals.

**Module II: Research Design**

Concepts and Type of research design, Design of research of the basis of application – pure and applied, Design of research on the basis of Techniques / Methodology – Exploratory and Descriptive, Descriptive Research – Qualitative and Quantitative, Quantitative – Field studies, Field experiments and laboratory experiments, Design of research on the basis of area of research – research in Social sciences and Physical sciences, Sampling and Data collection, Population and samples, Techniques of sampling, Random, Stratified, Systematic, Multistage-sampling, Primary and secondary sources of data, Design of questionnaire'

**Module III: Design of Experiments**

Objectives, strategies, Factorial experimental design, Designing engineering experiments, basic principles-replication, randomization, blocking, Guidelines for design of experiments.

Single Factor Experiment: Hypothesis testing, Analysis of Variance components (ANOVA) for fixed effect model; Total, treatment and error of squares, Degrees of freedom, Confidence interval; ANOVA for random effects model, Estimation of variance

Components, Model adequacy checking.

Two factor Factorial Design, Basic definitions and principles, main effect and interaction, response surface and contour plots, General arrangement for a two factor factorial design; Models: Effects, means and regression, Hypothesis testing.

**Module IV: Computer Applications**

**Spreadsheet Tool:** Introduction to spreadsheet application, features and functions, Using formulas and functions, Data storing, Features for Statistical data analysis, Generating charts/ graph and other features. **Tools used may be Microsoft Excel, Open office or similar tool.**

**Presentation Tool:** Introduction to presentation tool, features and functions, Creating presentation, Customizing presentation, showing presentation. **Tools used may be Microsoft Power Point, Open Office or similar tool.**

**Web Search:** Introduction to Internet, Using advanced search techniques.

## Examination Scheme:

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance.

**Text & References:**


- Montgomery, Douglas C. (2007), 5/e, Design and Analysis of Experiments, (Wiley India)
- Montgomery, Douglas C. & Runger, George C. (2007), 3/e, Applied Statistics & Probability for Engineers (Wiley India)
- Kothari C.K. (2004), 2/e, Research Methodology- Methods and Techniques (New Age International, New Delhi)
- Krishnaswamy, K.N., Sivakumar, Appa Iyer and Mathiranjan M. (2006), Management Research Methodology; Integration of Principles, Methods and Techniques (Pearson Education, New Delhi)
- Fowler, F.J. Survey Research Methods. New Delhi, Sage, 1993 Kothari, C.R., (2008) Research Methodology", New Age International, Wishwa
- Publications, Delhi Reprint 2nd edition.
- Leddy, Paul. D Practical Research: Planning Design. London, Clive Bingley. 1980

# ANTENNA TECHNOLOGY LAB

**Course Code:** **ECM 321** **Credit Units: 02**

## List of experiments:

1. Introduction to HFSS

2. To study the parameters of Microstrip antenna.

3.To Design and implement Microstrip Square patch antenna on HFSS

4 To Design and implement Microstrip circular antenna on HFSS

5. To Design and implement Microstrip Rectangular antenna on HFSS

6. To Design and implement Microstrip Ring antenna on HFSS

7. To Design and implement Microstrip patch Array antenna on HFSS

8. Study of fabrication process of patch antenna.

9. Fabrication of patch antenna .

10. Testing of patch antenna.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# ADVANCED IMAGE PROCESSING LAB

**Course Code:** **ECM 322** **Credit Units: 02**

**Course Contents:**

**List of Experiments:**

- Simulate all programs using MATLAB
- To study about the basic image processing tools.
- Write program for histogram processing.
- Write program for filtering in frequency domain.
- Write program for filtering in spatial domain.
- Write programs for different compression schemes.
- Write program image restoration.
- Write program for performing different morphological operations.
- Write program for image segmentation.
- Open ended experiment

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# MSEMICONDUCTOR DEVICE PHYSICS AND MODELING LAB (USING SILVACO)

**Course Code:** **ECM 324** **Credit Units: 02**

## List of experiments :

1. Simulate 2-D fabrication of a Diode by B diffusion into an n-type substrate. Having doping profiles $N_A$=1e18 $cm^{-3}$ and $N_D$=5e16 $cm^{-3}$. Also find the following-
   a. V-I characteristics of diode.
   b. Knee point (Cut in point).
   c. Sheet resistance
   d. Junction Depth

2. Uses a channel implant to shift the threshold voltage by 150mV (approx.). Analysis the effect of threshold lowering on leakages.

3. Draw the I-V characteristics of HBT for a doping concentration of 3e+14 $cm^{-3.}$

4. Design an optically controlled MOSFET with Gaussian doping of 5e+14 for a channel length of 50 nm. Measure all the respective parameters.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# OPTIMIZATION TECHNIQUES

**Course Code:** **MAM 309** **Credit Units: 04**

## Course Objective:

In a fast changing environment an understanding is required which will provide facility to implement a problem for minimum cost, greater efficiency better customer service and higher quality. Optimization Techniques gives us help in solving such type of problems.

## Course Contents:

**Module I: Introduction to Optimization**
Statement of an optimization problem, Classification of optimization problems, Optimization techniques, Engg. applications of optimization.

**Module II: Classical Optimization Techniques**
Single variable optimization, Multivariable optimization with no constraints, Multivariable optimization with equality constraints, Multivariable optimization with in equality constraints.

**Module III: Linear Programming**
Standard form of linear programming, Graphical solution, Simplex method, Two-phase simplex method, Computer implementation of the simplex method, Duality theory.

**Module IV: Transportation Problem**
North-West Corner rule, Least cost method, Vogel approximation method, testing for optimality.

**Module V: Non-Linear Programming: One–dimensional minimization methods**
Unimodal function, Dichotomous search, Fibonacci search, Quadratic interpolation method, Cubic interpolation method.

**Module VI: Non-Linear Programming-Unconstrained Optimization Techniques**
Random search method, steepest descent method, Conjugate gradient method, Variable metric method.

**Module VII: Non-Linear Programming - Constrained Optimization Techniques**
Interior Penalty function method, Exterior penalty function method.
**Further Topics in Optimization**
Critical path method (CPM), Program evaluation and review technique (PERT).

## Examination Scheme:

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- S.S. Rao, Optimization: Theory and applications, Wiley Eastern Ltd.
- G.V. Reklaitis, Engg. Optimization Methods & applications, Wiley.

# PROJECT MANAGEMENT

**Course Code:** **ECM 305** **Credit Units: 04**

## Course Objective:

Project Management is a broad multi-level activity. The objectives of this course are to provide a thorough understanding of its various essentials to the student. At the completion of the course, the student should be able to apply criteria of selection for identification of a project and carry out a rational appraisal. He should be able to do project planning and be familiar with project control systems.

## Course Contents:

**Module I: Context of Project Management**
Concept of Projects, Project Management, importance; Project Goals, Functions; Categories of Projects, Phases of Projects, 7S' of Projects; Life Cycles

**Module II: Project Selection and Appraisal**
Criteria for selection: Checklist Model, Scoring Model, Analytic Hierarchy Process, Profile Model; identification of the project; Request for Proposal; Project appraisal: Technical, Commercial, Economic, Financial and Management appraisal; Feasibility Study: Payback Period, NPV, IRR, Options Model; Detailed Project Report

**Module III: Project Planning and Organization**
Project Planning: Planning steps, Master plan; Defining Project Scope, Developing Work Breakdown Structure, Project Activity, Project Coordination, Scheduling Charts; Schedule, Gantt Charts, Project Team, Role of the leader; Project Organization: Pure, Matrix, Mixed; Project Portfolio Management

**Module IV: Cost Estimation, Budgeting, Measurement of Risk**
Cost Estimating Process, Budgets and Estimates; Cost-Time Overrun; Risk analysis, Project Management Information System

**Module V: Project Review and Control**
Control Process, Cybernetic controls, Go-No-go Controls, Post controls; Project Quality Control; Critical Chain Project Management; Project Closeout; Project Termination and Abandonment Analysis; Project Audit

## Examination Scheme:

| Components | CPA | TP | Q/S | A | ME | EE |
|---|---|---|---|---|---|---|
| Weightage (%) | 5 | 5 | 5 | 5 | 10 | 70 |

## Text & References:


- Gray & Larson (2008), Project Management, Tata McGraw-Hill
- Harvard Business School Press (2007), The Essentials of Project Management (for HR Professionals)
- Kerzner (2008), Project Management, John Wiley
- Kloppenborg (2009), Contemporary Project Management, Cengage.
- Maylor (2008), Project Management, Pearson India
- Meredith, Mantel, (2008), Project Management, Wiley India
- Nagarajan (2008), Project Management, New Age Publishers
- Nicholas and Steyn (2008), Project Management for Business, Engineering, & Technology, Elsevier India
- Pinto (2009),Project Management: Achieving Competitive Advantage, Pearson India, Delhi

# RELIABILITY ENGINEERING

**Course Code: ECM 306 Credit Units: 04**

## Course Objective:

The primary objective of this presentation is to share the experience gained in improving reliability and maintainability (R&M) features of the Advances Light Helicopter (ALH), designed and developed by the Hindustan Aeronautics Limited, Bangalore, India. The presentation briefly describes the advance technology features adopted and their impact on R&M and outlines the reliability management aspects adopted during prototype development and production phases. The specific R&M features incorporated in design are elaborated. The failure reporting, analysis and corrective action system (FRACAS) established for R&M analysis is described and efforts made to improve R&M are illustrated with examples of held service data obtained from customers on initial production batches. The ALH experience reinforces the need for a well – established FRACAS and a system for customer interaction to improve product R&M.

## Course Contents:

**Module I: Reliability Mathematics**
Random experiments, probability, random variables, distribution functions, discrete distributions, Continuous distributions.

**Module II: Network Modelling and reliability evaluation of simple systems**
Series systems, parallel system, series-parallel systems, partially redundant systems, standby redundant systems.

**Module III: Networks and reliability evaluation of complex systems**
Cut set method, Tie-set method, Connection matrix techniques, Event trees, Fault trees.

**Module IV: Probability distributions in reliability Evaluation**
General reliability function, Poisson distribution, normal distribution, exponential distribution.

**Module V: Discrete Markov Chains**
General Modelling Concept, Stochastic transitional prob. matrix, Time dependent prob. evaluation, limiting state Prob. evaluation, Absorbing States.

**Module VI: Continuous Markov Processes:**
General modeling concepts, state space diagrams, stochastic transitional probability matrix, evaluating limiting state probabilities.

## Examination Scheme:

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- L.S. Srinath, Reliability Engineering, Affiliated East –West Press Pvt. Ltd., New Delhi
- E. Balagurusamy, Reliability Engineering, Tata McGraw Hill Publishing Company Ltd., New Delhi.
- R. Billinton & Ronald N. Allan, Reliability Evaluation of Engg. Systems: Concepts & Techniques, Plenum Press, N.Y. and London.

# CLUSTER AND GRID COMPUTING

**Course Code: CSM 311** **Credit Units: 04**

## Course Objective:

The basic objective of Cluster and Grid Computing is to provide introduction to Cluster Computing with special and details emphasis on grid technologies and Applications execution.

## Course Contents:

**Module I: Cluster Computing**
Introduction, Parallel systems, Cluster Architecture, Parallel Paradigms..

**Module II: Programming**
Parallel Programming with MPI, Resource management and scheduling.

**Module III: Grid Computing**
Introduction, Grids and Grid Technologies, Programming models and Parallelization Techniques, Standard application development tools and paradigms such as message-passing and parameter parallel programming, Grid Security Infrastructure, Data Management.

**Module IV: Application Case Study**
Molecular Modeling for Drug D5esign and Brain Activity, Analysis, Resource management and scheduling, setting up Grid, deployment of Grid, software and tools, and application execution.

## Examination Scheme:

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- R. Buyya (editor), High Performance Cluster Computing, Vol1. and Vol.2, Prentice Hall, USA, 1999.
- I. Foster and C. Kesselman (editors), The Grid: Blueprint for a New Computing Infrastructure, Morgan Kaufmann Publishers, 1999.
- R. Buyya, "Economic-based Distributed Resource Management and Scheduling for Grid Computing, Ph.D. Thesis, Monash University, Melbourne, Australia, April 2002

# SUMMER INTERNSHIP PROGRAMME

**Course Code: MSP 350 Credit Units: 06**

**GUIDELINES FOR PROJECT FILE AND PROJECT REPORT**

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation. Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critically analyzed by the faculty guide and corrected by the student at each stage.

**PROJECT FILE**

The Project File may be a very useful tool for undertaking an assignment along-with a normal semester, an exploratory study, sponsored projects, a project undertaken during summer period or any other period where the researcher is not working with a company/organization. The project/ assignment may also be a part of the bigger research agenda being pursued by a faculty/ institution/ department

The Project File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation. This file may be considered in continuous assessment.

**In general, the File should be comprehensive and include:**

A short account of the activities that were undertaken as part of the project;

A statement about the extent to which the project has achieved its stated objectives;

A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;

Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;

Any problems that have arisen and may be useful to document for future reference.

**PROJECT REPORT**

The Project Report is the final research report that the student prepares on the project assigned to him. In case of sponsored project the lay out of the project could be as prescribed by the sponsoring organization. However, in other cases the following components should be included in the project report:

**Title or Cover Page**

The title page should contain Project Title; Student's Name; Programme; Year and Semester and Name of the Faculty Guide.

**Acknowledgement(s)**

Acknowledgment to any advisory or financial assistance received in the course of work may be given. It is incomplete without student's signature.

**Abstract**

A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project. It should not exceed more than 1000 words.

**Table of Contents**

Titles and subtitles are to correspond exactly with those in the text.

**Introduction**

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

**Materials and Methods**
This section should aim at experimental designs, materials used (wherever applicable). Methodology should be mentioned in details including modifications undertaken, if any. It includes organization site(s), sample, instruments used with its validation, procedures followed and precautions.

**Results and Discussion**
Present results, discuss and compare these with those from other workers, etc. In writing this section, emphasis should be laid on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various secions, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary, do not write in “point” form.

While presenting the results, write at length about the the various statistical tools used in the data interpretation. The result interpretation should be simple but full of data and statistical analysis. This data interpretation should be in congruence with the written objectives and the inferences should be drawn on data and not on impression. Avoid writing straight forward conclusion rather, it should lead to generalization of data on the chosen sample.

Results and its discussion should be supporting/contradicting with the previous research work in the given area. Usually one should not use more than two researches in either case of supporing or contradicting the present case of research.

**Conclusion(s) & Recommendations**
A conclusion should be the final section in which the outcome of the work is mentioned briefly.
Check that your work answers the following questions:

- Did the research project meet its aims (check back to introduction for stated aims)?
- What are the main findings of the research?
- Are there any recommendations?
- Do you have any conclusion on the research process itself?

**Implications for Future Research**
This should bring out further prospects for the study either thrown open by the present work or with the purpose of making it more comprehensive.

**Appendices**
The Appendices contain material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

**References**
References should include papers, books etc. referred to in the body of the report. These should be written in the alphabetical order of the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

**Examples**

**For research article**
Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichia coli* O157: H7. *Clin Microbiol Infect*, **8** (suppl 1): 116–117.

**For book**
Kowalski,M.(1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), **7**: 63-67

**The Layout Guidelines for the Project File & Project Report**

- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5

- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

**ASSESSMENT OF THE PROJECT FILE AND THE PROJECT REPORT**

Essentially, the assessment will be based on the quality of the report, the technical merit of the project and the project execution. Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project. Project execution is concerned with assessing how much work has been put in.

The Project should fulfill the following ***assessment objectives***

- Range of Research Methods used to obtain information
- Execution of Research
- Data Analysis (Analyze Quantitative/ Qualitative information)
- Quality Control
- Conclusions

## Assessment Scheme:

**Continuous Evaluation:** 40% (Based on punctuality, regularity of work, adherence to plan and methodology, refinements/ mid-course corrections etc. as reflected in the Project File.)

**Final Evaluation:** 60% (Based on the Documentation in the file, Final report layout, analysis and results, achievement of objectives, presentation/ viva)

# MINOR PROJECT II

**Course Code:** **MMP 360** **Credit Units: 04**

## Course Objective:

The aim of the dissertation is to provide you with an opportunity to further your intellectual and personal development in your chosen field by undertaking a significant practical unit of activity, having an educational value at a level commensurate with the award of your degree.

The dissertation can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

**Selecting the Dissertation Topic**

It is usual to give you some discretion in the choice of topic for the dissertation and the approach to be adopted. You will need to ensure that your dissertation is related to your field of specialization.

Deciding this is often the most difficult part of the dissertation process, and perhaps, you have been thinking of a topic for some time.

It is important to distinguish here between ‘dissertation topic’ and ‘dissertation title’. The topic is the specific area that you wish to investigate. The title may not be decided until the dissertation has been written so as to reflect its content properly.

Few restrictions are placed on the choice of the topic. Normally we would expect it to be:

- relevant to business, defined broadly;
- related to one or more of the subjects or areas of study within the core program and specialisation stream;
- clearly focused so as to facilitate an in-depth approach, subject to the availability of adequate sources of information and to your own knowledge;
- of value and interest to you and your personal and professional development.

**Planning the Dissertation**

This will entail following:

- Selecting a topic for investigation.
- Establishing the precise focus of your study by deciding on the aims and objectives of the dissertation, or formulating questions to be investigated. Consider very carefully what is worth investigating and its feasibility.
- Drawing up initial dissertation outlines considering the aims and objectives of the dissertation. Workout various stages of dissertation
- Devising a timetable to ensure that all stages of dissertation are completed in time. The timetable should include writing of the dissertation and regular meetings with your dissertation guide.

**The Dissertation plan or outline**

It is recommended that you should have a dissertation plan to guide you right from the outset. Essentially, the dissertation plan is an outline of what you intend to do, chapter wise and therefore should reflect the aims and objectives of your dissertation.

There are several reasons for having a dissertation plan

- It provides a focus to your thoughts.
- It provides your faculty-guide with an opportunity, at an early stage of your work, to make constructive comments and help guide the direction of your research.
- The writing of a plan is the first formal stage of the writing process, and therefore helps build up your confidence.
- In many ways, the plan encourages you to come to terms with the reading, thinking and writing in a systematic and integrated way, with plenty of time left for changes.
- Finally, the dissertation plan generally provides a revision point in the development of your dissertation report in order to allow appropriate changes in the scope and even direction of your work as it progresses.

**Keeping records**
This includes the following:

- Making a note of everything you read; including those discarded.
- Ensuring that when recording sources, author's name and initials, date of publication, title, place of publication and publisher are included. (You may consider starting a card index or database from the outset). Making an accurate note of all quotations at the time you read them.
- Make clear what is a direct a direct quotation and what is your paraphrase.

**Dissertation format**
All students must follow the following rules in submitting their dissertation.

- Front page should provide title, author, Name of degree/diploma and the date of submission.
- Second page should be the table of contents giving page references for each chapter and section.
- The next page should be the table of appendices, graphs and tables giving titles and page references.
- Next to follow should be a synopsis or abstract of the dissertation (approximately 500 words)
- Next is the 'acknowledgements'.
- Chapter I should be a general introduction, giving the background to the dissertation, the objectives of the dissertation, the rationale for the dissertation, the plan, methodological issues and problems. The limitations of the dissertation should also be hinted in this chapter.
- Other chapters will constitute the body of the dissertation. The number of chapters and their sequence will usually vary depending on, among others, on a critical review of the previous relevant work relating to your major findings, a discussion of their implications, and conclusions, possibly with a suggestion of the direction of future research on the area.
- After this concluding chapter, you should give a list of all the references you have used. These should be cross - references with your text. For articles from journals, the following details are required e.g.

  Draper P and Pandyal K. 1991, The Investment Trust Discount Revisited, Journal of Business Finance and Accounting, Vol18, No6, Nov, pp 791-832.

  For books, the following details are required:
  Levi, M. 1996, International Financial Management, Prentice Hall, New York, 3rd Ed, 1996

Finally, you should give any appendices. These should only include relevant statistical data or material that cannot be fitted into the above categories.

**The Layout Guidelines for the Dissertation**

- A4 size Paper

Font: Arial (10 points) or Times New Roman (12 points)
Line spacing: 1.5
Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

**Guidelines for the assessment of the Dissertation**
While evaluating the dissertation, faculty guide will consider the following aspects:

1. Has the student made a clear statement of the objective or objective(s).
2. If there is more than one objective, do these constitute parts of a whole?
3. Has the student developed an appropriate analytical framework for addressing the problem at hand.
4. Is this based on up-to-date developments in the topic area?
5. Has the student collected information / data suitable to the frameworks?
6. Are the techniques employed by the student to analyze the data / information appropriate and relevant?
7. Has the student succeeded in drawing conclusion form the analysis?
8. Do the conclusions relate well to the objectives of the project?
9. Has the student been regular in his work?
10. Layout of the written report.

## Assessment Scheme:

| | |
|---|---|
| **Continuous Evaluation:** | 40% |
| (Based on Abstract, Regularity, Adherence to initial plan, Records etc.) | |
| **Final Evaluation:** Based on, | 60% |
| Contents & Layout of the Report, | 20 |
| Conceptual Framework, | 05 |
| Objectives & Methodology and | 05 |
| Implications & Conclusions | 10 |
| Viva & Presentation | 20 |

# DISSERTATION

**Course Code: MMP 460 Credit Units: 30**

**GUIDELINES FOR DISSERTATION**

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation. Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.

The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

**In general, the File should be comprehensive and include**

A short account of the activities that were undertaken as part of the project;

A statement about the extent to which the project has achieved its stated goals.

A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;

Any activities planned but not yet completed as part of the DISSERTION, or as a future initiative directly resulting from the project;

Any problems that have arisen that may be useful to document for future reference.

- Report Layout

The report should contain the following components:

- **Title or Cover Page**

The title page should contain the following information: Project Title; Student's Name; Course; Year; Supervisor's Name.

- **Acknowledgements** (optional)

Acknowledgment to any advisory or financial assistance received in the course of work may be given.

- **Abstract**

A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project

- **Table of Contents**

Titles and subtitles are to correspond exactly with those in the text.

- **Introduction**

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

- **Materials and Methods**

This section should aim at experimental designs, materials used. Methodology should be mentioned in details including modifications if any.

- **Results and Discussion**

Present results, discuss and compare these with those from other workers, etc. In writing these section, emphasis should be given on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

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- **Conclusion**

A conclusion should be the final section in which the outcome of the work is mentioned briefly.

- **Future prospects**

- **Appendices**

The Appendix contains material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

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## For book

Kowalski,M.(1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), **7**: 63-67

**ASSESSMENT OF THE DISSERTATION FILE**

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Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project.
Project execution is concerned with assessing how much work has been put in.
The File should fulfill the following ***assessment objectives:***

**Range of Research Methods used to obtain information**

**Execution of Research**

**Data Analysis**
Analyse Quantitative/ Qualitative information
Control Quality

**Draw Conclusions**

## Selecting the Dissertation Topic

It is usual to give you some discretion in the choice of topic for the dissertation and the approach to be adopted. You will need to ensure that your dissertation is related to your field of specialization.

Deciding this is often the most difficult part of the dissertation process, and perhaps, you have been thinking of a topic for some time.

It is important to distinguish here between 'dissertation topic' and 'dissertation title'. The topic is the specific area that you wish to investigate. The title may not be decided until the dissertation has been written so as to reflect its content properly.

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- related to one or more of the subjects or areas of study within the core program and specialisation stream;
- clearly focused so as to facilitate an in-depth approach, subject to the availability of adequate sources of information and to your own knowledge;
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- It provides a focus to your thoughts.
- It provides your faculty-guide with an opportunity, at an early stage of your work, to make constructive comments and help guide the direction of your research.
- The writing of a plan is the first formal stage of the writing process, and therefore helps build up your confidence.
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- Making a note of everything you read; including those discarded.
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- Make clear what is a direct a direct quotation and what is your paraphrase.

## Dissertation format

All students must follow the following rules in submitting their dissertation.

- Front page should provide title, author, Name of degree/diploma and the date of submission.
- Second page should be the table of contents giving page references for each chapter and section.
- The next page should be the table of appendices, graphs and tables giving titles and page references.
- Next to follow should be a synopsis or abstract of the dissertation (approximately 500 words)
- Next is the 'acknowledgements'.
- Chapter I should be a general introduction, giving the background to the dissertation, the objectives of the dissertation, the rationale for the dissertation, the plan, methodological issues and problems. The limitations of the dissertation should also be hinted in this chapter.
- Other chapters will constitute the body of the dissertation. The number of chapters and their sequence will usually vary depending on, among others, on a critical review of the previous relevant work relating to your major findings, a discussion of their implications, and conclusions, possibly with a suggestion of the direction of future research on the area.
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  Draper P and Pandyal K. 1991, The Investment Trust Discount Revisited, Journal of Business Finance and Accounting, Vol18, No6, Nov, pp 791-832.

  For books, the following details are required:
  Levi, M. 1996, International Financial Management, Prentice Hall, New York, 3rd Ed, 1996

- Finally, you should give any appendices. These should only include relevant statistical data or material that cannot be fitted into the above categories.

**The Layout Guidelines for the Dissertation**

- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

## Guidelines for the assessment of the Dissertation

While evaluating the dissertation, faculty guide will consider the following aspects:

11. Has the student made a clear statement of the objective or objective(s).
12. If there is more than one objective, do these constitute parts of a whole?
13. Has the student developed an appropriate analytical framework for addressing the problem at hand.
14. Is this based on up-to-date developments in the topic area?
15. Has the student collected information / data suitable to the frameworks?
16. Are the techniques employed by the student to analyse the data / information appropriate and relevant?
17. Has the student succeeded in drawing conclusion form the analysis?
18. Do the conclusions relate well to the objectives of the project?
19. Has the student been regular in his work?
20. Layout of the written report.

**Assessment Scheme:**

| | | |
|---|---|---|
| **Continuous Evaluation:** | | 40% |
| (Based on Abstract, Regularity, | | |
| Adherence to initial plan, Records etc.) | | |
| | | |
| **Final Evaluation:** Based on, | | 60% |
| Contents & Layout of the Report, | 20 | |
| Conceptual Framework, | 05 | |
| Objectives & Methodology and | 05 | |
| Implications & Conclusions | 10 | |
| Viva & Presentation | 20 | |

# Bachelor of Technology

# (Mechanical & Automation Engineering)

## Programme Code: BTM

## Duration – 4 Years Full Time

## Programme Structure
## And
## Curriculum & Scheme of Examination

## 2018-22

# AMITY UNIVERSITY
## MADHYA PRADESH

# PREAMBLE

Amity University aims to achieve academic excellence by providing multi-faceted education to students and encourage them to reach the pinnacle of success. The University has designed a system that would provide rigorous academic programme with necessary skills to enable them to excel in their careers.

This booklet contains the Programme Structure, the Detailed Curriculum and the Scheme of Examination. The Programme Structure includes the courses (Core and Elective), arranged semester wise. The importance of each course is defined in terms of credits attached to it. The credit units attached to each course has been further defined in terms of contact hours i.e. Lecture Hours (L), Tutorial Hours (T), Practical Hours (P). Towards earning credits in terms of contact hours, 1 Lecture and 1 Tutorial per week are rated as 1 credit each and 2 Practical hours per week are rated as 1 credit. Thus, for example, an L-T-P structure of 3-0-0 will have 3 credits, 3-1-0 will have 4 credits, and 3-1-2 will have 5 credits.

The Curriculum and Scheme of Examination of each course includes the course objectives, course contents, scheme of examination and the list of text and references. The scheme of examination defines the various components of evaluation and the weightage attached to each component. The different codes used for the components of evaluation and the weightage attached to them are:

| Components | Codes | Weightage (%) |
|---|---|---|
| Case Discussion/ Presentation/ Analysis | C | 05 - 10 |
| Home Assignment | H | 05 - 10 |
| Project | P | 05 - 10 |
| Seminar | S | 05 - 10 |
| Viva | V | 05 - 10 |
| Quiz | Q | 05 - 10 |
| Class Test | CT | 10 - 15 |
| Attendance | A | 05 |
| End Semester Examination | EE | 70 |

It is hoped that it will help the students study in a planned and a structured manner and promote effective learning. Wishing you an intellectually stimulating stay at Amity University.

March, 2018

| Amity School of Engineering and Technology: Objectives |
|---|
| The graduates of Amity School of Engineering and Technology shall:<br>A. Demonstrate technical competence in engineering design and analysis consistent with the practice of a specialist and with the broad perspective of the generalist.<br>B. Develop the hallmarks of professional conduct, including a keen cognizance of ethical choices, together with the confidence and skills to lead, to follow, and to transmit ideas effectively.<br>C. Inculcate learning as a lifelong activity and as a means to the creative discovery, development, and implementation of technology.<br>D. Become excellent professionals by developing strong human values and pride in their heritage and culture |

1. **<u>Goal of the Programme</u>:** The MAE program has established a broad goal and a set of specific objectives, given in Table below:

| MAE Program: Goal and Objectives | | |
|---|---|---|
| **Goal**<br>The aim of the Program is to provide practice oriented Mechanical and Automation engineering education that fosters personal, professional and social responsibility; technical excellence and creativity; and effective communication, teamwork and leadership so that the students are ready to meet the challenges of evolving society | | |
| **Detailed Objectives of MAE Program** | | |
| **MAE Objective** | | **ASET Objective** |
| 1 | Graduates will understand the evolving Mechanical and Automation Engineering systems from their underlying physical principles and properties. | A |
| 2 | Graduates will design Mechanical and Automation Engineering systems by applying underlying mathematical principles, supporting software for engineering model preparation and analysis. | A |
| 3 | Graduates will be effective in team-based Mechanical and Automation Engineering practice. | A |
| 4 | Graduates will be proficient in the systematic explorations of alternatives for Mechanical and Automation Engineering systems design. | A |

| | | |
|---|---|---|
| 5 | Graduates will demonstrate compliance with professional ethics. | B |
| 6 | Graduates will be proficient in the use of communications (oral presentations and written reports) to articulate their ideas effectively. | B |
| 7 | Graduates will be prepared for the continuing learning and self-improvement necessary for a productive career in Mechanical and Automation Engineering. | C |
| 8 | Graduates will play leadership roles in their professions, respect human values and have pride in their culture and heritage. | B, D |

**2.** **Students Outcomes** : The broad student outcomes are based on the students ability to demonstrate:

**Outcome 1**: (Scientific foundation) When faced with a technical problem the student should be able to use applied scientific knowledge

1A: to identify and implement relevant principles of mathematics and computer science.

1 B: to identify and implement relevant principles of physics and chemistry

1 C: to identify and implement relevant principles of engineering science

**Outcome 2**: (Experimentation) the ability to design experiments, conduct experiments, and analyze experimental data.

**Outcome 3**: (Tools) an ability to use the relevant tools necessary for engineering practice.

**Outcome 4**: (Technical design) the technical ability to design a prescribed engineering sub-system

**Outcome 5**: (Design assessment) the ability to develop and assess alternative system designs based on technical and non-technical criteria

**5A**: to define overall needs and constraints.

**5B**: to assess the social and environmental requirements of the system and its impact on the global society.

**Outcome 6**: (Professionalism) the ability to recognize and achieve high levels of professionalism in their work.

**Outcome 7**: (Leadership) ability to assume leadership roles and respect human values.

**Outcome 8**: (Teamwork) the ability to function on teams.

**Outcome 9**: (Communication) the ability to communicate effectively and persuasively.

**Outcome 10**: (Ethics and morals) a critical understanding of ethical and moral systems and respect for human values in a social context.

**Outcome 11**: (Diversity) an understanding and appreciation of diversity and pluralism.

**Outcome 12**: (Lifelong learning) a recognition of the need for and an ability to engage in lifelong learning and development.

3. This booklet contains the Program Structure, the Detailed Curriculum and the Scheme of Examination. The Program Structure includes the courses (Core & Elective), arranged semester wise. The importance of each course is defined in terms of credits attached to it. The credit units attached to each course has been further defined in terms of contact hours i.e. lecture Hours (L), Tutorial Hours (T), Practical Hours (P). Towards earning credits in terms of contact hours, 1 Lecture and 1 Tutorial per week are rated as 1 credit each and 2 Practical hours per week are rated as 1 credit. Thus, for example, an L-T-P structure of 3-0-0 will have 3 credits, 3-1-0 will have 4 credits, and 3-1-2 will have 5 credits.

4. The Curriculum & Scheme of Examination of each course includes the course objectives, course contents, scheme of examination and the list of text & references. The scheme of examination defines the various components of evaluation and the weightage attached to each component. The different codes used for the components of evaluation and the weightage attached to them are:

| **Components** | **Codes** | **Weightage (%)** |
|---|---|---|
| Case Discussion/ Presentation/ Analysis | C | 5 - 10 |
| Home Assignment | HA | 5 - 10 |
| Project | P | 5 - 10 |
| Seminar | S | 5 - 10 |
| Viva | V | 5 - 10 |
| Quiz | Q | 5 - 10 |
| Attendance | A | 5 |
| Class Test | CT | 10-15 |
| Term Paper | TP | 10 - 15 |
| End Semester Examination | EE | 70 |

5. It is hoped that it will help the students study in a planned and a structured manner and promote effective learning. Wishing an intellectually stimulating stay at Amity University.

## PROGRAMME STRUCUTRE-B.TECH(MAE)

| FIRST SEMESTER | | | | | |
|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Lecture (L) Hours Per week** | **Tutorial (T) Hours Per week** | **Practical (P) Hours Per week** | **Total Credits** |
| BTM 101 | Applied Mathematics – I | 3 | - | - | 3 |
| BTM 102 | Applied Physics - I – Fields & Waves | 2 | 1 | - | 3 |
| BTM 103 | Element of Mechanical Engineering | 2 | - | - | 2 |
| BTM 104 | Introduction to Computers & Programming in C | 2 | 1 | - | 3 |
| BTM 105 | Applied Chemistry | 2 | 1 | - | 3 |
| BTM 106 | Environmental Studies – I | 2 | - | - | 2 |
| BTM 120 | Applied Physics Lab – I | - | - | 2 | 1 |
| BTM 121 | Element of Mechanical Engineering Lab | - | - | 2 | 1 |
| BTM 122 | Programming in C Lab | - | - | 2 | 1 |
| BTM 123 | Applied Chemistry Lab | - | - | 2 | 1 |
| BTM 124 | Engineering Graphics Lab | - | - | 2 | 1 |
| BTM 141 | English Language usage essentials | 1 | - | - | 1 |
| BTM 143 | Understanding self for effectiveness | 1 | - | - | 1 |
| BTM 144 | Foreign Language – I French | 2 | - | - | 2 |
| **TOTAL CREDITS** | | | | | **25** |
| **CBCS** | | 3 | - | - | **28** |
| **Total Hrs Including CBCS** | | | | | **33** |

| SECOND SEMESTER | | | | | |
|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Lecture (L) Hours Per week** | **Tutorial (T) Hours Per week** | **Practical (P) Hours Per week** | **Total Credits** |
| BTM 201 | Applied Mathematics – II | 3 | - | - | 3 |
| BTM 202 | Applied Physics - II – Modern Physics | 2 | 1 | - | 3 |
| BTM 203 | Electrical Science | 2 | 1 | - | 3 |
| BTM 204 | Object oriented programming using C++ | 2 | 1 | - | 3 |
| BTM 205 | Engineering Mechanics | 2 | 1 | - | 3 |
| BTM 206 | Environmental Studies-II | 2 | - | - | 2 |
| BTM 220 | Applied Physics Lab – II | - | - | 2 | 1 |
| BTM 221 | Electrical Science Lab | - | - | 2 | 1 |
| BTM 222 | Object oriented programming using C++ Lab | - | - | 2 | 1 |
| BTM 223 | Engineering Mechanics Lab | - | - | 2 | 1 |
| BTM 240 | English | 1 | - | - | 1 |
| BTM 243 | Behavioural science - II | 1 | - | - | 1 |
| BTM 244 | Foreign Language – II French | 2 | - | - | 2 |
| **TOTAL CREDITS** | | | | | **25** |
| **CBCS** | | 3 | - | - | **28** |
| **Total Hrs Including CBCS** | | | | | **32** |
| **TERM PAPER DURING SUMMER BREAK** | | | | | |

# THIRD SEMESTER

| Course Code | Course Title | Lecture (L) Hours Per week | Tutorial (T) Hours Per week | Practical (P) Hours Per week | Total Credits |
|---|---|---|---|---|---|
| BTM 301 | Numerical Analysis & Programming | 2 | - | - | 2 |
| BTM 302 | Thermodynamics | 2 | 1 | - | 3 |
| BTM 303 | Mechanics of Solids | 2 | 1 | - | 3 |
| BTM 304 | Material Science & Metallurgy | 2 | 1 | - | 3 |
| BTM 305 | Mechanics of Fluids | 3 | - | - | 3 |
| BTM 306 | Electronics | 2 | - | - | 2 |
| BTM 320 | Mechanics of Solids & Fluids Lab | - | - | 2 | 1 |
| BTM 321 | Machine Drawing with CAD Lab | - | - | 2 | 1 |
| BTM 322 | Programming Lab - I (Numerical Analysis) | - | - | 2 | 1 |
| BTM 323 | Electronics Lab | - | - | 2 | 1 |
| BTM 324 | Thermodynamics Lab | - | - | 2 | 1 |
| BTM 341 | Communication Skills – I | 1 | - | - | 1 |
| BTM 343 | Behavioural Science - III | 1 | - | - | 1 |
| BTM 344 | Foreign Language – III French | 2 | - | - | 2 |
| BTM 330 | Term Paper (Evaluation) **(NTCC)** | - | - | - | 2 |
| **TOTAL CREDITS** | | | | | **27** |
| **CBCS** | | 3 | - | - | **30** |
| **Total Hrs Including CBCS** | | | | | **33** |

# FOURTH SEMESTER

| Course Code | Course Title | Lecture (L) Hours Per week | Tutorial (T) Hours Per week | Practical (P) Hours Per week | Total Credits |
|---|---|---|---|---|---|
| BTM 401 | Kinematics & Dynamics of Machines | 3 | - | - | 3 |
| BTM 402 | Heat & Mass Transfer | 2 | 1 | - | 3 |
| BTM 403 | Manufacturing Machines | 3 | - | - | 3 |
| BTM 404 | Theory of Metal Forming | 3 | - | - | 3 |
| BTM 405 | Electrical Machines | 3 | - | - | 3 |
| BTM 406 | Principles of Computer Graphics | 2 | - | - | 2 |
| BTM 420 | Kinematics & Dynamics of Machines Lab | - | - | 2 | 1 |
| BTM 421 | Manufacturing Machines Lab | - | - | 2 | 1 |
| BTM 422 | Electrical Machines Lab | - | - | 2 | 1 |
| BTM 423 | Principles of Computer Graphics Lab | - | - | 2 | 1 |
| BTM 424 | Heat & Mass Transfer Lab | - | - | 2 | 1 |
| BTM 441 | Communication Skills - II | 1 | - | - | 1 |
| BTM 443 | Behavioural Science - IV | 1 | - | - | 1 |
| BTM 444 | Foreign Language – IV French | 2 | - | - | 2 |
| **TOTAL CREDITS** | | | | | **26** |
| **CBCS** | | 3 | 1 | - | **30** |
| **Total Hrs Including CBCS** | | | | | **35** |
| **PRACTICAL TRAINING – I: 6 – 8 WEEKS** | | | | | |

# FIFTH SEMESTER

| Course Code | Course Title | Lecture (L) Hours Per week | Tutorial (T) Hours Per week | Practical (P) Hours Per week | Total Credits |
|---|---|---|---|---|---|
| BTM 501 | Machine Design – I | 3 | - | - | 3 |
| BTM 502 | Metrology | 3 | - | - | 3 |
| BTM 503 | Measurements & Controls | 2 | 1 | - | 3 |
| BTM 504 | Relational Database Management System | 3 | - | - | 3 |
| BTM 505 | Microprocessor System | 3 | 1 | - | 4 |
| BTM 521 | Metrology Lab | - | - | 2 | 1 |
| BTM 522 | Measurements & Controls Lab | - | - | 2 | 1 |
| BTM 523 | Microprocessor System Lab | - | - | 2 | 1 |
| BTM 524 | Programming Lab - II (MAT Lab) | - | - | 2 | 1 |
| BTM 525 | Relational Database Management System Lab | - | - | 2 | 1 |
| BTM 541 | Communication Skills - III | 1 | - | - | 1 |
| BTM 543 | Behavioural Science - V | 1 | - | - | 1 |
| BTM 544 | Foreign Language – V French | 2 | - | - | 2 |
| BTM 550 | Industrial Practical Training - I (Evaluation) **(NTCC)** | - | - | - | 3 |
| **TOTAL CREDITS** | | | | | **28** |
| **CBCS** | | 3 | 1 | - | **32** |
| **Total Hrs Including CBCS** | | | | | **34** |

## SIXTH SEMESTER

| Course Code | Course Title | Lecture (L) Hours Per week | Tutorial (T) Hours Per week | Practical (P) Hours Per week | Total Credits |
|---|---|---|---|---|---|
| BTM 601 | Management of Manufacturing Systems | 3 | - | - | 3 |
| BTM 602 | Machine Design – II | 3 | - | - | 3 |
| BTM 603 | Fluid Power Systems | 2 | 1 | - | 3 |
| BTM 604 | Metal Cutting & Tool Design | 3 | - | - | 3 |
| BTM 605 | IC Engine & Gas Turbine | 3 | - | - | 3 |
| BTM 606 | Computer Networks | 2 | 1 | - | 3 |
| BTM 620 | Machine Design Lab - II | - | - | 2 | 1 |
| BTM 621 | Fluid Power Systems Lab | - | - | 2 | 1 |
| BTM 622 | IC Engine & Gas Turbine Lab | - | - | 2 | 1 |
| BTM 641 | Communication Skills - IV | 1 | - | - | 1 |
| BTM 643 | Behavioural Science - VI | 1 | - | - | 1 |
| BTM 644 | Foreign Language – VI French | 2 | - | - | 2 |
| **TOTAL CREDITS** | | | | | **25** |
| **CBCS - (NTCC)** | | 1 | - | - | **26** |
| **Total Hrs Including CBCS** | | | | | **29** |
| **PRACTICAL TRAINING – II: 6 – 8 WEEKS** | | | | | |

# SEVENTH SEMESTER

| Course Code | Course Title | Lecture (L) Hours Per week | Tutorial (T) Hours Per week | Practical (P) Hours Per week | Total Credits |
|---|---|---|---|---|---|
| BTM 701 | Operations Research | 3 | - | - | 3 |
| BTM 702 | Computer Aided Manufacturing | 3 | - | - | 3 |
| BTM 703 | Mechatronics | 3 | - | - | 3 |
| BTM 720 | Operations Research (Programming) Lab | - | - | 2 | 1 |
| BTM 721 | Computer Aided Manufacturing Lab | - | - | 2 | 1 |
| BTM 722 | Mechatronics Lab | - | - | 2 | 1 |
| BTM 741 | Communication Skills - V | 1 | - | - | 1 |
| BTM 743 | Behavioural Science -VII | 1 | - | - | 1 |
| BTM 744 | Foreign Language – VII French | 2 | - | - | 2 |
| BTM 750 | Practical Training – II (Evaluation) **(NTCC)** | - | - | - | 6 |
| BTM 760 | Project (Dissertation) **(NTCC)** | - | - | - | 6 |
| **ELECTIVES (Any one from each category)** | | | | | |
| **A (With Practical)** | | | | | |
| **BTM 704** | **Automotive Engineering** | 3 | - | - | 3 |
| BTM 705 | Computer Aided Designing | 3 | - | - | 3 |
| **BTM 723** | **Automotive Engineering Lab** | - | - | 2 | 1 |
| BTM 724 | Computer Aided Designing Lab | - | - | 2 | 1 |
| **ELECTIVES** (Any one from each category) | | | | | |
| **B (Without Practical)** | | | | | |
| BTM 706 | Marketing Management | 3 | - | - | 3 |
| BTM 707 | Solar Energy | 3 | - | - | 3 |
| **BTM 708** | **Power Plant Practices** | 3 | - | - | 3 |
| BTM 709 | Combustion Engine Emissions | 3 | - | - | 3 |
| **TOTAL CREDITS** | | | | | **35** |
| **Total Hrs** | | | | | **33** |

| EIGHTH SEMESTER | | | | | |
|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Lecture (L) Hours Per week** | **Tutorial (T) Hours Per week** | **Practical (P) Hours Per week** | **Total Credits** |
| BTM 801 | Quality Control & Quality Assurance | 3 | - | - | 3 |
| BTM 802 | Refrigeration & Air-conditioning | 3 | - | - | 3 |
| BTM 820 | Refrigeration & Air-conditioning Lab | - | - | 2 | 1 |
| BTM 841 | Communication Skills - VI | 1 | - | - | 1 |
| BTM 843 | Behavioural Science - VIII | 1 | - | - | 1 |
| BTM 844 | Foreign Language – VIII French | 2 | - | - | 2 |
| BTM 860 | Project | - | - | - | 9 |
| **ELECTIVES (Any one from following with Practical)** | | | | | |
| BTM 803 | Advanced Methods of Manufacturing | 3 | - | - | 3 |
| **BTM 804** | **Gear Technology** | 3 | - | - | 3 |
| BTM 805 | Artificial Intelligence & Robotics | 3 | - | - | 3 |
| BTM 821 | Advanced Methods of Manufacturing Lab | - | - | 2 | 1 |
| **BTM 822** | **Gear Technology Lab** | - | - | 2 | 1 |
| BTM 823 | Artificial Intelligence & Robotics Lab | - | - | 2 | 1 |
| **TOTAL CREDITS** | | | | | **24** |
| **Total Hrs.** | | | | | **26** |

# Curriculum & Scheme of Examination

# APPLIED MATHEMATICS - I

**Course Code: BTM 101** **Credit Units: 03**

## Course Objective:

The knowledge of Mathematics is necessary for a better understanding of almost all the Engineering and Science subjects. Here our intention is to make the students acquainted with the concept of basic topics from Mathematics, which they need to pursue their Engineering degree in different disciplines.

## Course Contents:

**Module I: Differential Calculus**

Successive differentiation, Leibnitz's theorem (without proof), Mean value theorem, Taylor's theorem (proof), Remainder terms, Asymptote & Curvature, Partial derivatives, Chain rule, Differentiation of Implicit functions, Exact differentials, Tangents and Normals, Maxima, Approximations, Differentiation under integral sign, Jacobians and transformations of coordinates.

**Module II: Integral Calculus**

Fundamental theorems, Reduction formulae, Properties of definite integrals, Applications to length, area, volume, surface of revolution, improper integrals, Multiple Integrals-Double integrals, Applications to areas, volumes.

**Module III: Ordinary Differential Equations**

Formation of ODEs, Definition of order, degree & solutions, ODE of first order : Method of separation of variables, homogeneous and non homogeneous equations, Exactness & integrating factors, Linear equations & Bernoulli equations, General linear ODE of $n^{th}$ order, Solution of homogeneous equations, Operator method, Method of undetermined coefficients, Solution of simple simultaneous ODE.

### Module IV: Vector Calculus

Scalar & Vector Field, Derivative of a Vector, Gradient, Directional Derivative, Divergence and Curl and their Physical Significance, Arc Length, Tangent, Directional Derivative, Evaluation of Line Integral, Green's Theorem in Plane (without proof), Representation of Surfaces, Tangent Plane and Surface Normal, Surface Integral, Stoke's Theorem (without proof), Gauss Divergence Theorem (without proof).

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***

- Differential Calculus by Shanti Narain
- Integral Calculus by Shanti Narain

***References:***

- Differential Equation by A.R. Forsyth
- Higher Engineering Mathematics by H.K. Dass

# APPLIED PHYSICS - I - FIELDS AND WAVES

**Course Code: BTM 102 Credit Units: 03**

## Course Objective:

Aim of this course is to introduce the students to fundamentals of graduate level physics, which form the basis of all applied science and engineering

## Course Contents:

**Module I: Oscillations & Waves**

**Oscillations:** Introduction to S.H.M. Damped Oscillations: Differential Equation and its solution, logarithmic decrement, Quality Factor, Different conditions of damping of harmonic oscillations. Forced oscillations: Amplitude and Frequency Response, Resonance, Sharpness of Resonance

**Plane Progressive Waves:** Differential Equation and Solution, Superposition of Progressive Waves stationary waves.

**Ultrasonics**: Generation and application of ultrasonicwaves.

**Module II: Wave Nature of Light**

Interference: Coherent Sources, Conditions of interference, Interference due to division of wavefront, Fresnels biprism Interference due to division of amplitude, Newton’s rings, Interference due to thin films, .

Diffraction: Fresnel and Fraunhofer diffraction, Fraunhofer diffraction at a single slit, double slit, N Slits, Transmission grating, Rayleigh criterion and Resolving power of grating.

Polarization: Birefringence, Nicol prism, Production and analysis of plane, circularly and elliptically polarized light, Half and quarter wave plates, Optical rotation, Polarimeter.

**Module III: Electromagnetics**

Scalar and vector fields, gradient of a scalar field, physical significance of gradient, equipotential surface. Line, surface and volume integrals, Divergence and curl of vector field and mathematical analysis physical significance, Electric flux, Gauss’ law, Proof and Applications, Gauss divergence and Stokes theorems.

Differential form of Gauss’ Law, Amperes’ Law, Displacement current, Faradays Law, Maxwell equations in free space & isotropic media (Integral form & differential form), EM wave propagation in free space, Poynting vector.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

- Waves & oscillation, A. P. French
- Physics of waves, W. C. Elmore & M. A. Heald
- Introduction to Electrodynamics, D. J. Griffith
- Electrodynamics, Gupta, Kumar & Singh
- Optics, A. K. Ghatak
- Engineering Physics, Satya Prakash

# ELEMENTS OF MECHANICAL ENGINEERING

**Course Code: BTM 103 Credit Units: 02**

## Course Objective:
The objective of this course is to impart the basic knowledge of thermodynamics, stress- strain, materials & their properties and various manufacturing processes to the students of all engineering discipline.

## Course Contents:

**Module I: Fundamental Concepts**
Definition of thermodynamics, system, surrounding and universe, phase, concept of continuum, macroscopic & microscopic point of view, Thermodynamic equilibrium, property, state, path, process, cyclic process, Zeroth, first and second law of thermodynamics, Carnot Cycle, Introduction to I.C. Engines-two & four stoke S.I. and C.I. engines. Otto cycle. Diesel cycle.

**Module II: Stress And Strain Analysis**
Simple stress and strain: introduction, normal shear, and stresses-strain diagrams for ductile and brittle materials. Elastic constants, one-dimensional loadings of members of varying cross-section, Strain Energy, Properties of material-strength, elasticity, stiffness, malleability, ductility, brittleness, hardness and plasticity etc; Concept of stress and strain stress strain diagram, tensile test, impact test and hardness test.

**Module III: Casting & Forging**
Introduction of casting, pattern, mould making procedures, sand mould casting, casting defects, allowances of pattern. Forging-introduction, upsetting & drawing out, drop forging, press forging & m/c forging

**Module IV: Welding & Sheet metal working:**
Introduction of welding processes, classification, gas welding, arc welding, resistance welding. Introduction to sheet metal shop, Shearing, trimming, blanking, piercing, shaving, notching, stretch forming, nibbling coining, embossing and drawing.

### Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

### Text & References:


- Engineering thermodynamics, by P.K. Nag, Tata McGraw Hill.
- Thermal Engineering, by D.S. Kumar. S.K. Kataria and Sons.
- Thermal Engineering by PL Ballaney; Khanna Publishers, Delhi.
- Engineering Thermodynamics: Work and Heat Transfer, by Rogers and Mayhew, ELBS Publications
- Heine, R.W. C.R. Loper and P.C. Rosenthal, Principles of metal casting McGraw Hill
- Welding Technology by R.S. Parmar, Khanna Publishers.
- Thermodynamics and Heat Engines Volume-I, by R. Yadav: Central Publications.
- Ganesan, V. *Internal Combustion Engine*, Tata McGraw-Hill.

# INTRODUCTION TO COMPUTERS AND PROGRAMMING IN C

**Course Code: BTM 104 Credit Units: 03**

## Course Objective:

**The objective of this course module is to acquaint the students with the basics of computers system, its components, data representation inside computer and to get them familiar with various important features of procedure oriented programming language i.e. C.**

## Course Contents:

**Module I: Introduction**
Introduction to computer, history, von-Neumann architecture, memory system (hierarchy, characteristics and types), H/W concepts (I/O Devices), S/W concepts (System S/W & Application S/W, utilities). Data Representation: Number systems, character representation codes, Binary ,octal, hexadecimal and their interconversions. Binary arithmetic, floating point arithmetic, signed and unsigned numbers, Memory storage unit.

**Module II: Programming in C**
History of C, Introduction of C, Basic structure of C program, Concept of variables, constants and data types in C, Operators and expressions: Introduction, arithmetic, relational, Logical, Assignment, Increment and decrement operator, Conditional, bitwise operators, Expressions, Operator precedence and associativity. Managing Input and output Operation, formatting I/O.

**Module III: Fundamental Features in C**
C Statements, conditional executing using if, else, nesting of if, switch and break Concepts of loops, example of loops in C using for, while and do-while, continue and break. Storage types (automatic, register etc.), predefined processor, Command Line Argument.

**Module IV: Arrays and Functions**
One dimensional arrays and example of iterative programs using arrays, 2-D arrays Use in matrix computations. Concept of Sub-programming, functions Example of user defined functions. Function prototype, Return values and their types, calling function, function argument, function with variable number of argument, recursion.

**Module V: Advanced features in C**
Pointers, relationship between arrays and pointers Argument passing using pointers, Array of pointers. Passing arrays as arguments.
Strings and C string library.
Structure and Union. Defining C structures, Giving values to members, Array of structure, Nested structure, passing strings as arguments.
File Handling.

## Examination Scheme:

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

*Text:*
- "ANSI C" by E Balagurusamy
- Yashwant Kanetkar, "Let us C", BPB Publications, 2nd Edition, 2001.
- Herbert Schildt, "C: The complete reference", Osbourne Mcgraw Hill, 4th Edition, 2002.
- V. Raja Raman, "Computer Programming in C", Prentice Hall of India, 1995.

*References*:

- Kernighan & Ritchie, "C Programming Language", The (Ansi C Version), PHI, 2nd Edition.
- J. B Dixit, "Fundamentals of Computers and Programming in 'C'.
- P.K. Sinha and Priti Sinha, "Computer Fundamentals", BPB publication.

# APPLIED CHEMISTRY

**Course Code:** **BTM 105** **Credit Units: 03**

## Course Objective:

Four basic sciences, Physics, Chemistry, Mathematics and Biology are the building blocks in engineering and technology. Chemistry is essential to develop analytical capabilities of students, so that they can characterize, transform and use materials in engineering and apply knowledge in their field. All engineering fields have unique bonds with chemistry whether it is Aerospace, Mechanical, Environmental and other fields the makeup of substances is always a key factor, which must be known. For electronics and computer science engineering, apart from the material, computer modeling and simulation knowledge can be inherited from the molecule designing. The upcoming field of technology like Nanotechnology and Biotechnology depends fully on the knowledge of basic chemistry. With this versatile need in view, course has been designed in such a way so that the student should get an overview of the whole subject.

## Course Contents:

**Module I: Water Technology**
Introduction and specifications of water,
Hardness and its determination (EDTA method only),
Alkalinity,
Boiler feed water, boiler problems – scale, sludge, priming & foaming: causes & prevention, Boiler problems – caustic embrittlement & corrosion : causes & prevention,
Carbonate & phosphate conditioning, colloidal conditioning & calgon treatment
Water softening processes : Lime – soda process, Ion exchange method,
Water for domestic use.

**Module II: Fuels**
Classification, calorific value of fuel, (gross and net),
Determination of calorific value of fuels, bomb calorimeter,
Solid fuels - Proximate and ultimate analysis,
Octane & Cetane No. and its significance.
Numericals on combustion

**Module III: Instrumental Methods of analysis**
Introduction; Principles of spectroscopy; Laws of absorbance
IR : Principle, Instrumentation, Application
UV : Principle, Instrumentation, Application
NMR : Principle, Instrumentation, Application

**Module III : Lubricants:**
Introduction; Mechanism of Lubrication;
Types of Lubricants; Chemical structure related to Lubrication;
Properties of lubricants; Viscosity and Viscosity Index; Iodine Value; Aniline Point; Emulsion number; Flash Point; Fire Point; Drop Point; Cloud Point; Pour Point.
Selection of Lubricants.

**Module VI: Corrosion**
Introduction, Mechanism of dry and wet corrosion,
Types of corrosion-Galvanic, Concentration cell, soil, pitting, intergranular, waterline. Passivity.
Factors influencing corrosion.
Corrosion control.

## Examination Scheme:

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***

- Engineering Chemistry- Jain and Jain
- Engineering Chemistry- Sunita Rattan
- Engineering Chemistry-Shashi Chawla

***References:***

- Engineering Chemistry –Dara and Dara
- Spectroscopy- Y.R Sharma
- Corrosion Engineering – Fontenna and Greene

# ENVIRONMENTAL STUDIES-I

**Course Code:** **BTM 106** **Credit Units: 02**

**Course Objective:**
The term environment is used to describe, in the aggregate, all the external forces, influences and conditions, which affect the life, nature, behaviour and the growth, development and maturity of living organisms. At present a great number of environment issues, have grown in size and complexity day by day, threatening the survival of mankind on earth. A study of environmental studies is quite essential in all types of environmental sciences, environmental engineering and industrial management. The objective of environmental studies is to enlighten the masses about the importance of the protection and conservation of our environment and control of human activities which has an adverse effect on the environment.

**Course Contents:**

**Module I: The multidisciplinary nature of environmental studies**
Definition, scope and importance
Need for public awareness

**Module II: Natural Resources**
**Renewable and non-renewable resources**
Natural resources and associated problems
Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies.
Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

**Module III: Ecosystems**
Concept of an ecosystem
Structure and function of an ecosystem
Producers, consumers and decomposers
Energy flow in the ecosystem
Ecological succession
Food chains, food webs and ecological pyramids
Introduction, types, characteristic features, structure and function of the following ecosystem:

a. Forest ecosystem
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, ocean estuaries)

**Module IV: Biodiversity and its conservation**
Introduction – Definition: genetic, species and ecosystem diversity

Biogeographical classification of India
Value of biodiversity: consumptive use, productive use, social, ethical aesthetic and option values
Biodiversity at global, national and local levels
India as a mega-diversity nation
Hot-spots of biodiversity
Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts
Endangered and endemic species of India
Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity

**Examination Scheme:**

| Components | CT | HA | S/V/Q | A | EE |
|---|---|---|---|---|---|
| **Weightage (%)** | 15 | 5 | 5 | 5 | 70 |

**Text & References:**


- Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
- Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad 380 013, India, Email:mapin@icenet.net (R)
- Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
- Clark R.S., Marine Pollution, Clanderson Press Oxford (TB)
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- De A.K., Environmental Chemistry, Wiley Eastern Ltd.
- Down to Earth, Centre for Science and Environment (R)
- Gleick, H.P. 1993. Water in Crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford Univ. Press. 473p
- Hawkins R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R)
- Heywood, V.H & Waston, R.T. 1995. Global Biodiversity Assessment. Cambridge Univ. Press 1140p.
- Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284 p.
- Mckinney, M.L. & School, R.M. 1996. Environmental Science Systems & Solutions, Web enhanced edition. 639p.
- Mhaskar A.K., Matter Hazardous, Techno-Science Publication (TB)
- Miller T.G. Jr. Environmental Science, Wadsworth Publishing Co. (TB)
- Odum, E.P. 1971. Fundamentals of Ecology. W.B. Saunders Co. USA, 574p
- Rao M N. & Datta, A.K. 1987. Waste Water treatment. Oxford & IBH Publ. Co. Pvt. Ltd. 345p.
- Sharma B.K., 2001. Environmental Chemistry. Geol Publ. House, Meerut
- Survey of the Environment, The Hindu (M)
- Townsend C., Harper J, and Michael Begon, Essentials of Ecology, Blackwell Science
- Trivedi R.K., Handbook of Environmental Laws, Rules Guidelines, Compliances and Standards, Vol I and II, Enviro Media (R)
- Trivedi R. K. and P.K. Goel, Introduction to air pollution, Techno-Science Publication (TB)
- Wanger K.D., 1998 Environnemental Management. W.B. Saunders Co. Philadelphia, USA 499p

# APPLIED PHYSICS LAB - I

**Course Code:** **BTM 120** **Credit Units: 01**

## List of Experiments:

1. To determine the wavelength of sodium light by Newton's rings method.
2. To determine the dispersive power of the material of prism with the help of a spectrometer.
3. To determine the specific rotation of sugar by Bi-quartz or Laurent half shade polarimeter.
4. To determine the speed of ultrasonic waves in liquid by diffraction method.
5. To determine the width of a narrow slit using diffraction phenomena.
6. To determine the temperature coefficient of platinum wire, using a platinum resistance thermometer and a Callender & Griffth's bridge.
7. To determine the value of specific charge (ratio of e/m) of an electron by Thomson method.
8. To determine the internal resistance of Leclanche cell with the help of Potentiometer.
9. To determine the resistance per unit length of a Carey Foster's bridge wire and also to find out the specific resistance of a given wire.
10. To plot graph showing the variation of magnetic field with distance along the aixs of a circular coil carrying current, and hence estimate the radius of the coil.
11. To determine the value of acceleration due to gravity ('g') in the laboratory using bar pendulum.
12. To determine the moment of inertia of a flywheel about its own axis of rotation.
13. To determine the density of material of the given wire with the help of sonometer.

## Examination Scheme:

| **IA** | | | | **EE** | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# ELEMENTS OF MECHANICAL ENGINEERING - LAB (EME)

**Course Code:** **BTM 121** **Credit Units: 01**

**Course Contents:**

1. Welding

(a) Arc Welding - Butt Joint
- Lap Joint
- T Joint

(b) Gas Welding - Butt Joint
- Lap Joint
- Brazing of Broken pieces

2. Foundry - Sand mould casting by single piece pattern& Split pattern bracket with cores

3. Sheet Metal - Dust Bin
- Mug
- Funnel
- Cylindrical Mug with handle-Rectangular

4. Fitting Shop - Male – Female Joint
- Rectangular piece

Filing the job

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# PROGRAMMING IN C LAB

**Course Code:** **BTM 122** **Credit Units: 01**

**Software Required:** Turbo C

## Course Contents:

- C program involving problems like finding the nth value of cosine series , Fibonacci series. Etc.
- C programs including user defined function calls
- C programs involving pointers, and solving various problems with the help of those.
- File handling

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# APPLIED CHEMISTRY LAB

**Course Code: BTM 123 Credit Units: 01**

## Course Contents:

## List of Experiments:

(Any 10 Experiments)

1. To determine the ion exchange capacity of a given cation exchanger.

2. To determine the temporary, permanent and total hardness of a sample of water by complexometric titration method.

3. To determine the type and extent of alkalinity of given water sample.

4. To determine the number of water molecules of crystallization in Mohr's salt (ferrous ammonium sulphate) provided standard potassium dichromate solution (0.1N) using diphenylamine as internal indicator.

5. To determine the ferrous content in the supplied sample of iron ore by titrimetric analysis against standard $K_2Cr_2O_7$ solution using potassium ferricyanide [$K_3Fe(CN)_6$] as external indicator.

6. (a) To determine the surface tension of a given liquid by drop number method.
(b) To determine the composition of a liquid mixture A and B (acetic acid and water) by surface tension method.

7. To prepare and describe a titration curve for phosphoric acid – sodium hydroxide titration using pH-meter.

8. (a) To find the cell constant of conductivity cell.
(b) Determine the strength of hydrochloric acid solution by titrating it against standard sodium hydroxide solution conductometrically

9. Determination of Dissolved oxygen in the given water sample.

10 To determine the total residual chlorine in water.

11 Determination of amount of oxalic acid and $H_2SO_4$ in 1 L of solution using N/10 NaOH and N/10 $KMnO_4$ solution.

12 Determination of viscosity of given oil by means of Redwood viscometer I.

13 To determine flash point and fire point of an oil by Pensky Martin's Apparatus

14 To determine the Iodine value of the oil.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# ENGINEERING GRAPHICS LAB

**Course Code:** **BTM 124** **Credit Units: 01**

## Course Objective:

This course will provide students concepts on the drawings of different curves like straight line, parabola, ellipse etc. After completion of this course, students will be able to draw different figures manually and will be capable of using various instruments involved in drawings.

## Course Contents:

**Module I: General**

Importance, Significance and scope of engineering drawing, Lettering, Dimensioning, Scales, Sense of proportioning, Different types of projections, Orthographic Projection, B.I.S. Specifications.

**Module II: Projections of Point and Lines**

Introduction of planes of projection, Reference and auxiliary planes, projections of points and Lines in different quadrants, traces, inclinations, and true lengths of the lines, projections on Auxiliary planes, shortest distance, intersecting and non-intersecting lines.

**Module III: Planes other than the Reference Planes**

Introduction of other planes (perpendicular and oblique), their traces, inclinations etc., Projections of points and lines lying in the planes, conversion of oblique plane into auxiliary Plane and solution of related problems.

**Module IV: Projections of Plane Figures**

Different cases of plane figures (of different shapes) making different angles with one or both reference planes and lines lying in the plane figures making different given angles (with one of both reference planes). Obtaining true shape of the plane figure by projection.

**Module V: Projection of Solids**

Simple cases when solid is placed in different positions, Axis faces and lines lying in the faces of the solid making given angles.

**Module VI: Development of Surface**

Development of simple objects with and without sectioning. Isometric Projection

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

## Text & References:


- M.B. Shah & B.C. Rana, Engineering Drawing, Pearson Education, 2007
- PS Gill, Engineering Drawing, Kataria Publication
- ND Bhatt, Engineering Drawing, Charotar publications
- N Sidheshwar, Engineering Drawing, Tata McGraw Hill
- CL Tanta, Mechanical Drawing, “Dhanpat Rai”

# ENGLISH

## Course Objective:
The course is intended to give a foundation of English Language. The literary texts are indented to help students to inculcate creative & aesthetic sensitivity and critical faculty through comprehension, appreciation and analysis of the prescribed literary texts. It will also help them to respond form different perspectives.

## Course Contents:

Module I: Vocabulary
Use of Dictionary
Use of Words: Diminutives, Homonyms & Homophones

Module II: Essentials of Grammar - I
Articles
Parts of Speech
Tenses

Module III: Essentials of Grammar - II
Sentence Structure
Subject -Verb agreement
Punctuation

**Module IV: Communication**
The process and importance
Principles & benefits of Effective Communication

**Module V: Spoken English Communication**
Speech Drills
Pronunciation and accent
Stress and Intonation

**Module VI: Communication Skills-I**
Developing listening skills
Developing speaking skills

**Module VII: Communication Skills-II**
Developing Reading Skills
Developing writing Skills

**Module VIII: Written English communication**
Progression of Thought/ideas
Structure of Paragraph
Structure of Essays

**Module IX: Short Stories**
Of Studies, by Francis Bacon
Dream Children, by Charles Lamb
The Necklace, by Guy de Maupassant
A Shadow, by R.K.Narayan
Glory at Twilight, Bhabani Bhattacharya

**Module X: Poems**

| | |
|---|---|
| All the Worlds a Stage | Shakespeare |
| To Autumn | Keats |
| O! Captain, My Captain. | Walt Whitman |
| Where the Mind is Without Fear | Rabindranath Tagore |
| Psalm of Life | H.W. Longfellow |

## Examination Scheme:

| Components | A | CT | HA | EE |
|---|---|---|---|---|
| Weightage (%) | 05 | 15 | 10 | 70 |

## Text & References:

- Madhulika Jha, Echoes, Orient Long Man
- Ramon & Prakash, Business Communication, Oxford.
- Sydney Greenbaum Oxford English Grammar, Oxford.
- Successful Communications, Malra Treece (Allyn and Bacon)
- Effective Technical Communication, M. Ashraf Rizvi.

## * 30 hrs Programme to be continued for Full year

# BEHAVIOURAL SCIENCE - I
# (UNDERSTANDING SELF FOR EFFECTIVENESS)

**Course Code: BTM 143 Credit Units: 01**

## Course Objective:
This course aims at imparting:
Understanding self & process of self exploration
Learning strategies for development of a healthy self esteem
Importance of attitudes and its effective on personality
Building Emotional Competence

## Course Contents:

**Module I: Self: Core Competency**
Understanding of Self
Components of Self – Self identity
Self concept
Self confidence
Self image

**Module II: Techniques of Self Awareness**
Exploration through Johari Window
Mapping the key characteristics of self
Framing a charter for self
Stages – self awareness, self acceptance and self realization

**Module III: Self Esteem & Effectiveness**
Meaning and Importance
Components of self esteem
High and low self esteem
Measuring your self esteem

**Module IV: Building Positive Attitude**
Meaning and nature of attitude
Components and Types of attitude
Importance and relevance of attitude

**Module V: Building Emotional Competence**
Emotional Intelligence – Meaning, components, Importance and Relevance
Positive and Negative emotions
Healthy and Unhealthy expression of emotions

**Module VI: End-of-Semester Appraisal**
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

## Text & References:


- Organizational Behaviour, Davis, K.
- Hoover, Judhith D. Effective Small Group and Team Communication, 2002,Harcourt College Publishers
- Dick, Mc Cann & Margerison, Charles: Team Management, 1992 Edition, viva books
- Bates, A. P. and Julian, J.: Sociology - Understanding Social Behaviour
- Dressler, David and Cans, Donald: The Study of Human Interaction
- Lapiere, Richard. T – Social Change
- Lindzey, G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology, Addison – Welsley, US.
- Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.
- LaFasto and Larson: When Teams Work Best, 2001, Response Books (Sage), New Delhi
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 2, Group (1996); Pfeiffer & Company
- Smither Robert D.; The Psychology of Work and Human Performance, 1994, Harper Collins College Publishers

# FRENCH - I

**Course Code: BTM 144** **Credit Units: 02**

## Course Objective:

To familiarize the students with the French language

- with the phonetic system
- with the syntax
- with the manners
- with the cultural aspects

## Course Contents:

**Module A: pp. 01 to 37: Unités 1, 2, Unité 3 Object if 1, 2**
**Only grammar of Unité 3: object if 3, 4 and 5**

**Contenu lexical : Unité 1 : Découvrir la langue française : (oral et écrit)**

1. se présenter, présenter quelqu'un, faire la connaissance des autres, formules de politesse, rencontres
2. dire/interroger si on comprend
3. Nommer les choses

**Unité 2: Faire connaissance**

1. donner/demander des informations sur une personne, premiers contacts, exprimer ses goûts et ses préférences
2. Parler de soi: parler du travail, de ses activités, de son pays, de sa ville.

**Unité 3: Organiser son temps**

1. dire la date et l'heure

**Contenu grammatical :**

1. organisation générale de la grammaire
2. article indéfini, défini, contracté
3. nom, adjectif, masculin, féminin, singulier et pluriel
4. négation avec « de », "moi aussi", "moi non plus"
5. interrogation : Inversion, est-ce que, qui, que, quoi, qu'est-ce que, où, quand, comment, quel(s), quelle(s)
   Interro-négatif : réponses : oui, si, non
6. pronom tonique/disjoint- pour insister après une préposition
7. futur proche

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- le livre à suivre : Campus: Tome 1

# GERMAN - I

**Course Code: BTM 145 Credit Units: 02**

## Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany

## Course Contents:

**Module I: Introduction**
Self introduction: heissen, kommen, wohnwn, lernen, arbeiten, trinken, etc.
All personal pronouns in relation to the verbs taught so far.
Greetings: Guten Morgen!, Guten Tag!, Guten Abend!, Gute Nacht!, Danke sehr!, Danke!, Vielen Dank!, (es tut mir Leid!),
Hallo, wie geht's?: Danke gut!, sehr gut!, prima!, ausgezeichnet!,
Es geht!, nicht so gut!, so la la!, miserabel!

**Module II: Interviewspiel**
To assimilate the vocabulary learnt so far and to apply the words and phrases in short dialogues in an interview – game for self introduction.

**Module III: Phonetics**
Sound system of the language with special stress on Dipthongs

**Module IV: Countries, nationalities and their languages**
To make the students acquainted with the most widely used country names, their nationalitie and the language spoken in that country.

**Module V: Articles**
The definite and indefinite articles in masculine, feminine and neuter gender. All Vegetables, Fruits, Animals, Furniture, Eatables, modes of Transport

**Module VI: Professions**
To acquaint the students with professions in both the genders with the help of the verb "sein".

**Module VII: Pronouns**
Simple possessive pronouns, the use of my, your, etc.
The family members, family Tree with the help of the verb "to have"

**Module VIII: Colours**
All the color and color related vocabulary – colored, colorful, colorless, pale, light, dark, etc.

**Module IX: Numbers and calculations – verb "kosten"**
The counting, plural structures and simple calculation like addition, subtraction, multiplication and division to test the knowledge of numbers.
"Wie viel kostet das?"

**Module X: Revision list of Question pronouns**
W – Questions like who, what, where, when, which, how, how many, how much, etc.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:


- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

# SPANISH – I

**Course Code:** **BTM 146** **Credit Units: 02**

## Course Objective:

To enable students acquire the relevance of the Spanish language in today's global context, how to greet each other. How to present / introduce each other using basic verbs and vocabulary

## Course Contents:

**Module I**
A brief history of Spain, Latin America, the language, the culture…and the relevance of Spanish language in today's global context.
Introduction to alphabets

**Module II**
Introduction to '*Saludos*' (How to greet each other. How to present / introduce each other).
Goodbyes (despedidas)
The verb *llamarse* and practice of it.

**Module III**
Concept of Gender and Number
Months of the years, days of the week, seasons. Introduction to numbers 1-100, Colors, Revision of numbers and introduction to ordinal numbers.

**Module IV**
Introduction to *SER* and *ESTAR* (both of which mean To Be).Revision of '*Saludos*' and '*Llamarse*'. Some adjectives, nationalities, professions, physical/geographical location, the fact that spanish adjectives have to agree with gender and number of their nouns. Exercises highlighting usage of *Ser* and *Estar*.

**Module V**
Time, demonstrative pronoun (Este/esta, Aquel/aquella etc)

**Module VI**
Introduction to some key AR /ER/IR ending regular verbs.

## Examination Scheme:

| **Components** | **CT1** | **CT2** | **C** | **I** | **V** | **A** |
|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- Español, En Directo I A
- Español Sin Fronteras

# JAPANESE - I

**Course Code: BTM 147 Credit Units: 02**

## Course Objective:
To enable the students to learn the basic rules of grammar and Japanese language to be used in daily life that will later help them to strengthen their language.

## Course Contents:

Module I: Salutations
**Self introduction, Asking and answering to small general questions**

Module II: Cardinal Numbers
**Numerals, Expression of time and period, Days, months**

Module III: Tenses
Present Tense, Future tense

Module IV: Prepositions
**Particles, possession, forming questions**

Module V: Demonstratives
**Interrogatives, pronoun and adjectives**

Module VI: Description
**Common phrases, Adjectives to describe a person**

Module VII: Schedule
Time Table, everyday routine etc.

Module VIII: Outings
**Going to see a movie, party, friend's house etc.**

Learning Outcome
- Students can speak the basic language describing above mentioned topics

## Methods of Private study /Self help
- Handouts, audio-aids, and self-do assignments and role-plays will support classroom teaching

## Examination Scheme:

| **Components** | **CT1** | **CT2** | **C** | **I** | **V** | **A** |
|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

***Text:***
- Teach yourself Japanese

***References:***
- Shin Nihongo no kiso 1

# CHINESE – I

**Course Code:** **BTM 148** **Credit Units: 02**

## Course Objective:

There are many dialects spoken in China, but the language which will help you through wherever you go is Mandarin, or Putonghua, as it is called in Chinese. The most widely spoken forms of Chinese are Mandarin, Cantonese, Gan, Hakka, Min, Wu and Xiang. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

## Course Contents:

**Module I**
Show pictures, dialogue and retell.
Getting to know each other.
Practicing chart with Initials and Finals. (CHART – The Chinese Phonetic Alphabet Called "Hanyu Pinyin" in Mandarin Chinese.)
Practicing of Tones as it is a tonal language.
Changes in 3$^{rd}$ tone and Neutral Tone.

**Module II**
Greetings
Let me Introduce
The modal particle "ne".
Use of Please 'qing' – sit, have tea ………….. etc.
A brief self introduction – Ni hao ma? Zaijian!
Use of "bu" negative.

**Module III**
Attributives showing possession
How is your Health? Thank you
Where are you from?
A few Professions like – Engineer, Businessman, Doctor, Teacher, Worker.
Are you busy with your work?
May I know your name?

**Module IV**
Use of "How many" – People in your family?
Use of "zhe" and "na".
Use of interrogative particle "shenme", "shui", "ma" and "nar".
How to make interrogative sentences ending with "ma".
Structural particle "de".
Use of "Nin" when and where to use and with whom. Use of guixing.
Use of verb "zuo" and how to make sentences with it.

**Module V**
Family structure and Relations.
Use of "you" – "mei you".
Measure words
Days and Weekdays.
Numbers.
Maps, different languages and Countries.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- "Elementary Chinese Reader Part I" Lesson 1-10

# APPLIED MATHEMATICS - II

**Course Code: BTM 201** **Credit Units: 03**

## Course Objective:

The knowledge of Mathematics is necessary for a better understanding of almost all the Engineering and Science subjects. Here our intention is to make the students acquainted with the concept of basic topics from Mathematics, which they need to pursue their Engineering degree in different disciplines.

## Course Contents:

**Module I: Linear Algebra**

Hermitian and Skew Hermitian Matrix, Unitary Matrix, Orthogonal Matrix, Elementary Row Transformation, Reduction of a Matrix to Row Echelon Form, Rank of a Matrix, Consistency of Linear Simultaneous Equations, Gauss Elimination Method, Gauss-Jordan Method, Eigen Values and Eigen Vectors of a Matrix, Caley-Hamilton Theorem, Diagonalization of a Matrix, Vector Space, Linear Independence and Dependence of Vectors, Linear Transformations.

**Module II: Infinite Series**

Definition of Sequence, Bounded Sequence, Limit of a Sequence, Series, Finite and Infinite Series, Convergence and Divergence of Infinite series, Cauchy's Principle of Convergence, Positive Term Infinite Series, Comparison test, D'Alembert's Ratio test. Raabe's Test, Cauchy's nth root Test. Logarithmic Test, Alternating Series, Leibnitz's Test, Absolute and conditioinal convergence, Uniform Convergence, Power Series and its Interval of Convergence.

**Module III: Complex Analysis**

De Moivre's Theorem and Roots of Complex Numbers, Logarithmic Functions, Circular, Hyperbolic Functions and their Inverses.Functions of a Complex Variables, Limits, Continuity and Derivatives, Analytic Function, Cauchy-Riemann Equations (without proof), Harmonic Function, Harmonic Conjugates, Conformal Mapping, Bilinear Transformations, Complex Line Integral, Cauchy Integral Theorem, Cauchy Integral Formula, Derivative of Analytic Function, Power Series, Taylor Series, Laurent Series, Zeroes and Singularities, Residues, Residue Theorem, Evaluation of Real Integrals of the Form and $\int_{-\infty}^{\infty} \frac{f(x)}{F(x)} dx$.

**Module IV: Statistics and Probability**

Moments, Skewness, Kurtosis, Random Variables and Probability Distribution, Mean and Variance of a Probability Distribution, Binomial Distribution, Poisson Distribution and Normal Distribution.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 15 | 20 | 20 | 20 | 5 |

C – Project +Presentation
I – Interaction/Conversation Practice

## Text & References:

- Engineering Mathematics by Erwin Kreyszig.
- Engineering Mathematics by R.K. Jain and S.R.K. Iyengar.
- Higher Engineering Mathematics by H.K. Dass.
- Engineering Mathematics by B.S. Grewal.
- Differential Calculus by Shanti Narain.
- Integral Calculus by Shanti Narain.
- Linear Algebra- Schaum Outline Series.

# APPLIED PHYSICS - II - MODERN PHYSICS

**Course Code:** **BTM 202** **Credit Units: 03**

## Course Objective:

Aim of this course is to introduce the students to fundamentals of graduate level physics which form the basis of all applied science and engineering

## Course Contents:

**Module I: Special Theory of Relativity**

Michelson-Morley experiment, Importance of negative result, Inertial & non-inertial frames of reference, Einstein's postulates of Special theory of Relativity, Space-time coordinate system, Relativistic Space Time transformation (Lorentz transformation equation), Transformation of velocity, Addition of velocities, Length contraction and Time dilation, Mass-energy equivalence (Einstein's energy mass relation) & Derivation of Variation of mass with velocity,

**Module II: Wave Mechanics**

Wave particle duality, De-Broglie matter waves, phase and group velocity, Heisenberg uncertainty principle, wave function and its physical interpretation, Operators, expectation values. Time dependent & time independent Schrödinger wave equation for free & bound states, square well potential (rigid wall), Step potential.

**Module III: Atomic Physics**

Vector atom model, LS and j-j coupling, Zeceman effect (normal & anomalous), Paschen-Bach effect, X-ray spectra and energy level diagram, Moseleys Law, Lasers – Einstein coefficients, conditions for light amplification, population inversion, optical pumping, three level and four level lasers, He-Ne and Ruby laser, Properties and applications of lasers.

**Module IV: Solid State Physics**

Sommerfield's free electron theory of metals, Fermi energy, Introduction to periodic potential & Kronig-Penny model (Qualitative) Band Theory of Solids, Semi-conductors: Intrinsics and Extrinsic Semiconductors, photoconductivity and photovotaics, Basic aspects of Superconductivity, Meissner effect.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

- Concept of Modern Physics, A. Beiser
- Applied Physics II, Agarawal & Goel
- Solid State Physics, S. O. Pallai
- Physics of Atom, Wehr & Richards

# ELECTRICAL SCIENCE

**Course Code:** **BTM 203** **Credit Units: 03**

Course Objective:
The objective of the course is to provide a brief knowledge of Electrical Engineering to students of all disciplines. This Course includes some theorems related to electrical, some law's related to flow of current, voltages, basic knowledge of Transformer, basic knowledge of electromagnetism, basic knowledge of electrical network.

Course Contents:

Module I: Basic Electrical Quantities
Basic Electrical definitions-Energy, Power, Charge, Current, Voltage, Electric Field Strength, Magnetic Flux Density, etc., Resistance, Inductance and Capacitance. Ideal Source, Independent Source and Controlled Source

Module II: Network Analysis Techniques & Theorems
Circuit Principles: Ohm's Law, Kirchoff's Current Law, Kirchoff's Voltage Law Network Reduction: Star–Delta Transformation, Source Transformation, Nodal Analysis, Loop analysis. Superposition theorem, Thevenin's Theorem, Norton's theorem and Reciprocity theorem.

Module III: Alternating Current Circuits
Peak, Average and RMS values for alternating currents, Power calculation:
reactive power, active power, Complex power, power factor, impedance, reactance, conductance, susceptance Resonance: series Resonance, parallel resonance, basic definition of Q factor & Band-width.

Module IV: Transformers
Basic Transformer Operation principle, Construction, Voltage relations, current relations, Linear circuit models, open circuit test, short circuit test, Transformer Efficiency.

Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:


- R.J. Smith, R.C. Dorf: Circuits, devices and Systems
- B.L. Thareja: Electrical Technology: Part -1 & 2
- V. Deltoro: Electrical Engineering fundamentals
- Schaum's Series: Electrical Circuits

# OBJECT ORIENTED PROGRAMMING USING C++

**Course Code: BTM 204 Credit Units: 03**

### Course Objective:

The objective of this module is to introduce object oriented programming. To explore and implement the various features of OOP such as inheritance, polymorphism, Exceptional handling using programming language C++. After completing this course student can easily identify the basic difference between the programming approaches like procedural and object oriented.

### Course Contents:

**Module I: Introduction** Review of C, Difference between C and C++, Procedure Oriented and Object Oriented Approach. Basic Concepts: Objects, classes, Principals like Abstraction, Encapsulation, Inheritance and Polymorphism. Dynamic Binding, Message Passing. Characteristics of Object-Oriented Languages. Introduction to Object-Oriented Modeling techniques (Object, Functional and Dynamic Modeling).

**Module II: Classes and Objects**
Abstract data types, Object & classes, attributes, methods, C++ class declaration, Local Class and Global Class, State identity and behaviour of an object, Local Object and Global Object, Scope resolution operator, Friend Functions, Inline functions, Constructors and destructors, instantiation of objects, Types of Constructors, Static Class Data, Array of Objects, Constant member functions and Objects, Memory management Operators.

**Module III: Inheritance**

Inheritance, Types of Inheritance, access modes – public, private & protected, Abstract Classes, Ambiguity resolution using scope resolution operator and Virtual base class, Aggregation, composition vs classification hiérarchies, Overriding inheritance methods, Constructors in derived classes, Nesting of Classes.

**Module IV: Polymorphism**
Polymorphism, Type of Polymorphism – Compile time and runtime, Function Overloading, Operator Overloading (Unary and Binary) Polymorphism by parameter, Pointer to objects, this pointer, Virtual Functions, pure virtual functions.

**Module V: Strings, Files and Exception Handling**
Manipulating strings, Streams and files handling, formatted and Unformatted Input output. Exception handling, Generic Programming – function template, class Template Standard Template Library: Standard Template Library, Overview of Standard Template Library, Containers, Algorithms, Iterators, Other STL Elements, The Container Classes, General Theory of Operation, Vectors.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

## Text & References:

*Text:*
- A.R. Venugopal, Rajkumar, T. Ravishanker “Mastering C++”, TMH, 1997
- R. Lafore, “Object Oriented Programming using C++”, BPB Publications, 2004.
- “Object Oriented Programming with C++” By E. Balagurusamy.
- Schildt Herbert, “C++: The Complete Reference”, Wiley DreamTech, 2005.

*References:*
- Parasons, “Object Oriented Programming with C++”, BPB Publication, 1999.
- Steven C. Lawlor, “The Art of Programming Computer Science with C++”, Vikas Publication, 2002.
  Yashwant Kanethkar, “Object Oriented Programming using C++”, BPB, 2004

# ENGINEERING MECHANICS

**Course Code:** **BTM 205** **Credit Units: 03**

## Course Objective:

Objective of this course is to provide fundamental knowledge of force system and its effect on the behaviour of the bodies that may be in dynamic or in static state. It includes the equilibrium of different structures like beams, frames, truss etc and the force transfer mechanism in the different components of a body under given loading condition.

## Course Contents:

**Module I: Force system & Structure**

Free body diagram, Equilibrium equations and applications. Plane truss, perfect and imperfect truss, assumption in the truss analysis, analysis of perfect plane trusses by the method of joints, method of section.

**Module II: Friction**

Static and Kinetic friction, laws of dry friction, co-efficient of friction, angle of friction, angle of repose, cone of friction, friction lock, efficiency of screw jack, transmission of power through belt

**Module III: Distributed Force**

Determination of center of gravity, center of mass and centroid by direct integration and by the method of composite bodies, mass moment of inertia and area moment of inertia by direct integration and composite bodies method, radius of gyration, parallel axis theorem, Pappus theorems and its application, polar moment of inertia.

**Module IV: Work -Energy**

Work energy equation, conservation of energy, Virtual work, impulse, momentum conservation, impact of bodies, co-efficient of restitution, loss of energy during impact, D'alembert principle

## Examination Scheme:

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- S.S. Bhavikatti, Engineering Mechanics, New Age International Ltd
- Timoshenko, Engineering Mechanics, McGraw Hill
- R. S. Khurmi, Engineering Mechanics, S. Chand Publication
- H. Shames & G. K. M. Rao, Engineering Mechanics, Pearson Education, 2006

# ENVIRONMENTAL STUDIES-II

**Course Code:** **BTM 206** **Credit Units: 02**

## Course Objective:

The term environment is used to describe, in the aggregate, all the external forces, influences and conditions, which affect the life, nature, behaviour and the growth, development and maturity of living organisms. At present a great number of environment issues, have grown in size and complexity day by day, threatening the survival of mankind on earth. A study of environmental studies is quite essential in all types of environmental sciences, environmental engineering and industrial management. The objective of environmental studies is to enlighten the masses about the importance of the protection and conservation of our environment and control of human activities which has an adverse effect on the environment.

**Course Contents:**

**Module I: Environmental Pollution**

Definition

Causes, effects and control measures of:

a. Air pollution
b. Water pollution
c. Soil pollution
d. Marine pollution
e. Noise pollution
f. Thermal pollution
g. Nuclear pollution

Solid waste management: Causes, effects and control measures of urban and industrial wastes.
Role of an individual in prevention of pollution.
Pollution case studies.
Disaster management: floods, earthquake, cyclone and landslides.

**Module II: Social Issues and the Environment**

From unsustainable to sustainable development
Urban problems and related to energy
Water conservation, rain water harvesting, watershed management
Resettlement and rehabilitation of people; its problems and concerns. Case studies.
Environmental ethics: Issues and possible solutions
Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
Wasteland reclamation
Consumerism and waste products
Environmental Protection Act
Air (Prevention and Control of Pollution) Act
Water (Prevention and control of Pollution) Act
Wildlife Protection Act
Forest Conservation Act
Issues involved in enforcement of environmental legislation
Public awareness

**Module III: Human Population and the Environment**

Population growth, variation among nations
Population explosion – Family Welfare Programmes
Environment and human health
Human Rights
Value Education
HIV / AIDS
Women and Child Welfare
Role of Information Technology in Environment and Human Health
Case Studies

**Module IV: Field Work**

Visit to a local area to document environmental assets-river / forest/ grassland/ hill/ mountain.
Visit to a local polluted site – Urban / Rural / Industrial / Agricultural
Study of common plants, insects, birds
Study of simple ecosystems-pond, river, hill slopes, etc (Field work equal to 5 lecture hours)

**Examination Scheme:**

| Components | CT | HA | S/V/Q | A | EE |
|---|---|---|---|---|---|
| Weightage (%) | 15 | 5 | 5 | 5 | 70 |

**Text & References:**


- Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
- Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad 380 013, India, Email:mapin@icenet.net (R)
- Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
- Clark R.S., Marine Pollution, Clanderson Press Oxford (TB)
- Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p
- De A.K., Environmental Chemistry, Wiley Eastern Ltd.
- Down to Earth, Centre for Science and Environment (R)
- Gleick, H.P. 1993. Water in Crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford Univ. Press. 473p
- Hawkins R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R)
- Heywood, V.H & Waston, R.T. 1995. Global Biodiversity Assessment. Cambridge Univ. Press 1140p.
- Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284 p.
- Mckinney, M.L. & School, R.M. 1996. Environmental Science Systems & Solutions, Web enhanced edition. 639p.
- Mhaskar A.K., Matter Hazardous, Techno-Science Publication (TB)
- Miller T.G. Jr. Environmental Science, Wadsworth Publishing Co. (TB)
- Odum, E.P. 1971. Fundamentals of Ecology. W.B. Saunders Co. USA, 574p
- Rao M N. & Datta, A.K. 1987. Waste Water treatment. Oxford & IBH Publ. Co. Pvt. Ltd. 345p.
- Sharma B.K., 2001. Environmental Chemistry. Geol Publ. House, Meerut
- Survey of the Environment, The Hindu (M)
- Townsend C., Harper J, and Michael Begon, Essentials of Ecology, Blackwell Science
- Trivedi R.K., Handbook of Environmental Laws, Rules Guidelines, Compliances and Standards, Vol I and II, Enviro Media (R)
- Trivedi R. K. and P.K. Goel, Introduction to air pollution, Techno-Science Publication (TB)
- Wanger K.D., 1998 Environnemental Management. W.B. Saunders Co. Philadelphia, USA 499p

# APPLIED PHYSICS LAB - II

**Course Code: BTM 220 Credit Units: 01**

## List of Experiments:

1. To determine the wavelength of sodium light by Newton's rings method.
2. To determine the dispersive power of the material of prism with the help of a spectrometer.
3. To determine the specific rotation of sugar by Bi-quartz or Laurent half shade polarimeter.
4. To determine the speed of ultrasonic waves in liquid by diffraction method.
5. To determine the width of a narrow slit using diffraction phenomena.
6. To determine the temperature coefficient of platinum wire, using a platinum resistance thermometer and a Callender & Griffth's bridge.
7. To determine the value of specific charge (ratio of e/m) of an electron by Thomson method.
8. To determine the internal resistance of Leclanche cell with the help of Potentiometer.
9. To determine the resistance per unit length of a Carey Foster's bridge wire and also to find out the specific resistance of a given wire.
10. To plot graph showing the variation of magnetic field with distance along the aixs of a circular coil carrying current, and hence estimate the radius of the coil.
11. To determine the value of acceleration due to gravity ('g') in the laboratory using bar pendulum.
12. To determine the moment of inertia of a flywheel about its own axis of rotation.
13. To determine the density of material of the given wire with the help of sonometer.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# ELECTRICAL SCIENCE LAB

**Course Code: BTM 221 Credit Units: 01**

## List of Experiments:

1. To verify KVL & KCL in the given network.
2. To verify Superposition Theorem.
3. To verify Maximum Power Transfer Theorem.
4. To verify Reciprocity Theorem.
5. To determine and verify RTh, VTh, RN, IN in a given network.
6. To perform open circuit & short circuit test on a single-phase transformer.
7. To study transient response of a given RLC Circuit.
8. To perform regulation, ratio & polarity test on a single-phase transformer.
9. To measure power & power factor in a three phase circuit by two wattmeter method.
10. To measure power & power factor in a three phase load using three ammeter & three voltmeter method.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# OBJECT ORIENTED PROGRAMMING USING C++ LAB

**Course Code:** **BTM 222** **Credit Units: 01**

**Software Required:** Turbo C++

**Course Contents:**

- Creation of objects in programs and solving problems through them.
- Different use of private, public member variables and functions and friend functions.
- Use of constructors and destructors.
- Operator overloading
- Use of inheritance in and accessing objects of different derived classes.
- Polymorphism and virtual functions (using pointers).
- File handling.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# ENGINEERING MECHANICS LAB

**Course Code: BTM 223 Credit Units: 01**

## Engineering Mechanics:

1. To verify the law of Force Polygon
2. To verify the law of Moments using Parallel Force apparatus. (Simply supported type)
3. To determine the co-efficient of friction between wood and various surface (like
4. Leather, Wood, Aluminum) on an inclined plane.
5. To find the forces in the members of Jib Crane.
6. To determine the mechanical advantage, Velocity ratio and efficiency of a screw jack.
7. To determine the mechanical advantage, Velocity ratio and Mechanical efficiency of the
8. Wheel and Axle
9. To determine the MA, VR, $\eta$ of Worm Wheel (2-start)
10. Verification of force transmitted by members of given truss.
11. To verify the law of moments using Bell crank lever
12. To find CG and moment of Inertia of an irregular body using Computation method

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| A | PR | LR | V | PR | V |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# ENGLISH

**Course Code: BTM 240 Credit Units: 01**

## Course Objective:

The course is intended to give a foundation of English Language. The literary texts are indented to help students to inculcate creative & aesthetic sensitivity and critical faculty through comprehension, appreciation and analysis of the prescribed literary texts. It will also help them to respond form different perspectives.

## Course Contents:

Module I: Vocabulary
Use of Dictionary
Use of Words: Diminutives, Homonyms & Homophones

**Module II**: Essentials of Grammar - I
Articles
Parts of Speech
Tenses

**Module III**: Essentials of Grammar - II
Sentence Structure
Subject -Verb agreement
Punctuation

**Module IV: Communication**
The process and importance
Principles & benefits of Effective Communication

**Module V: Spoken English Communication**
Speech Drills
Pronunciation and accent
Stress and Intonation

**Module VI: Communication Skills-I**
Developing listening skills
Developing speaking skills

**Module VII: Communication Skills-II**
Developing Reading Skills
Developing writing Skills

**Module VIII: Written English communication**
Progression of Thought/ideas
Structure of Paragraph
Structure of Essays

**Module IX: Short Stories**
Of Studies, by Francis Bacon
Dream Children, by Charles Lamb
The Necklace, by Guy de Maupassant
A Shadow, by R.K.Narayan
Glory at Twilight, Bhabani Bhattacharya

**Module X: Poems**

| | |
|---|---|
| All the Worlds a Stage | Shakespeare |
| To Autumn | Keats |
| O! Captain, My Captain. | Walt Whitman |
| Where the Mind is Without Fear | Rabindranath Tagore |
| Psalm of Life | H.W. Longfellow |

## Examination Scheme:

| **Components** | **A** | **CT** | **HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 05 | 15 | 10 | 70 |

## Text & References:


- Madhulika Jha, Echoes, Orient Long Man
- Ramon & Prakash, Business Communication, Oxford.
- Sydney Greenbaum Oxford English Grammar, Oxford.
- Successful Communications, Malra Treece (Allyn and Bacon)
- Effective Technical Communication, M. Ashraf Rizvi.

# BEHAVIOURAL SCIENCE - II
# (PROBLEM SOLVING AND CREATIVE THINKING)

**Course Code: BTM 243** **Credit Units: 01**

## Course Objective:
To enable the students:
Understand the process of problem solving and creative thinking.
Facilitation and enhancement of skills required for decision-making.

## Course Contents:
**Module I: Thinking as a tool for Problem Solving**
What is thinking: The Mind/Brain/Behaviour
Critical Thinking and Learning:
Making Predictions and Reasoning
Memory and Critical Thinking
Emotions and Critical Thinking
Thinking skills

**Module II: Hindrances to Problem Solving Process**
Perception
Expression
Emotion
Intellect
Work environment

**Module III: Problem Solving**
Recognizing and Defining a problem
Analyzing the problem (potential causes)
Developing possible alternatives
Evaluating Solutions
Resolution of problem
Implementation
Barriers to problem solving:
Perception
Expression
Emotion
Intellect
Work environment

**Module IV: Plan of Action**
Construction of POA
Monitoring
Reviewing and analyzing the outcome

**Module V: Creative Thinking**
Definition and meaning of creativity
The nature of creative thinking
Convergent and Divergent thinking
Idea generation and evaluation (Brain Storming)
Image generation and evaluation
Debating
The six-phase model of Creative Thinking: ICEDIP model

**Module VI: End-of-Semester Appraisal**
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

## Text & References:

- Michael Steven: How to be a better problem solver, Kogan Page, New Delhi, 1999
- Geoff Petty: How to be better at creativity; Kogan Page, New Delhi, 1999
- Richard Y. Chang and P. Keith, Kelly: Wheeler Publishing, New Delhi, 1998.
- Phil Lowe Koge Page: Creativity and Problem Solving, New Delhi, 1996
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 3, Management (1996); Pfeiffer & Company
- Bensley, Alan D.: Critical Thinking in Psychology – A Unified Skills Approach, (1998), Brooks/Cole Publishing Company.

# FRENCH - II

**Course Code:** **BTM 244** **Credit Units: 02**

## Course Objective:

To enable the students to overcome the fear of speaking a foreign language and take position as a foreigner speaking French.

To make them learn the basic rules of French Grammar.

## Course Contents:

**Module A : pp.38 – 47 : Unité 3: Objectif 3, 4, 5, 6**

**Module B: pp. 47 to 75 Unité 4, 5**

**Contenu lexical:** **Unité 3 : Organiser son temps**

1. donner/demander des informations sur un emploi du temps, un horaire SNCF – Imaginer un dialogue
2. rédiger un message/ une lettre pour …
   i) prendre un rendez-vous/ accepter et confirmer/ annuler
   ii) inviter/accepter/refuser
3. Faire un programme d'activités
4. imaginer une conversation téléphonique/un dialogue
5. Propositions- interroger, répondre

**Unité 4**: **Découvrir son environnement**

6. situer un lieu
7. s'orienter, s'informer sur un itinéraire.
8. Chercher, décrire un logement
9. connaître les rythmes de la vie

**Unité 5: s'informer**

10. demander/donner des informations sur un emploi du temps passé.
11. donner une explication, exprimer le doute ou la certitude.
12. découvrir les relations entre les mots
13. savoir s'informer

**Contenu grammatical:**

1. Adjectifs démonstratifs
2. Adjectifs possessifs/exprimer la possession à l'aide de :
   i. « de » ii. A+nom/pronom disjoint
3. Conjugaison pronominale – négative, interrogative - construction à l'infinitif
4. Impératif/exprimer l'obligation/l'interdiction à l'aide de « il faut…. »/ «il ne faut pas… »
5. passé composé
6. Questions directes/indirectes

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- le livre à suivre : Campus: Tome 1

# GERMAN – II

**Course Code: BTM 245 Credit Units: 02**

## Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany
Introduction to Grammar to consolidate the language base learnt in Semester I

## Course Contents:

**Module I: Everything about Time and Time periods**
Time and times of the day.
Weekdays, months, seasons.
Adverbs of time and time related prepositions

**Module II: Irregular verbs**
Introduction to irregular verbs like to be, and others, to learn the conjugations of the same, (fahren, essen, lessen, schlafen, sprechen und ähnliche).

**Module III: Separable verbs**
To comprehend the change in meaning that the verbs undergo when used as such
Treatment of such verbs with separable prefixes

**Module IV: Reading and comprehension**
Reading and deciphering railway schedules/school time table
Usage of separable verbs in the above context

**Module V: Accusative case**
Accusative case with the relevant articles
Introduction to 2 different kinds of sentences – Nominative and Accusative

**Module VI: Accusative personal pronouns**
Nominative and accusative in comparison
Emphasizing on the universal applicability of the pronouns to both persons and objects

**Module VII: Accusative prepositions**
Accusative propositions with their use
Both theoretical and figurative use

**Module VIII: Dialogues**
Dialogue reading: 'In the market place'
'At the Hotel'

## Examination Scheme:

| **Components** | **CT1** | **CT2** | **C** | **I** | **V** | **A** |
|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:


- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

# SPANISH – II

## Course Code: BTM 246 Credit Units: 02

## Course Objective:
To enable students acquire more vocabulary, grammar, Verbal Phrases to understand simple texts and start describing any person or object in Simple Present Tense.

## Course Contents:

**Module I**
Revision of earlier modules.

**Module II**
Some more AR/ER/IR verbs. Introduction to root changing and irregular AR/ER/IR ending verbs

**Module III**
More verbal phrases (eg, Dios Mio, Que lastima etc), adverbs *(bueno/malo, muy, mucho, bastante, poco).*
Simple texts based on grammar and vocabulary done in earlier modules.

**Module IV**
Possessive pronouns

**Module V**
Writing/speaking essays like my friend, my house, my school/institution, myself….descriptions of people, objects etc, computer/internet related vocabulary

## Examination Scheme:

| **Components** | **CT1** | **CT2** | **C** | **I** | **V** | **A** |
|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- Español, En Directo I A
- Español Sin Fronteras

# JAPANESE - II

**Course Code:** **BTM 247** **Credit Units: 02**

## Course Objective:
To enable the students to converse in the language with the help of basic particles and be able to define the situations and people using different adjectives.

## Course Contents:

Module I: Verbs
**Transitive verbs, intransitive verbs**

Module II: More prepositions
More particles, articles and likes and dislikes.

Module III: Terms used for instructions
**No parking, no smoking etc.**

Module IV: Adverbs
Different adverbial expression.

Module V: Invitations and celebrations
Giving and receiving presents,
**Inviting somebody for lunch, dinner, movie and how to accept and refuse in different ways**

Module VI: Comprehension's
Short essay on Family, Friend etc.

Module VII: Conversations
Situational conversations like asking the way, At a post office, family

Module VIII: Illness
Going to the doctor, hospital etc.

## Learning Outcome
- Students can speak the language describing above-mentioned topics

## Methods of Private study /Self help
- Handouts, audio-aids, and self-do assignments
- Use of library, visiting and watching movies in Japan and culture center every Friday at 6pm

## Examination Scheme:

| **Components** | **CT1** | **CT2** | **C** | **I** | **V** | **A** |
|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

***Text:***
- Teach yourself Japanese

***References:***
- Shin Nihongo no kiso 1

# CHINESE – II

**Course Code: BTM 248 Credit Units: 02**

## Course Objective:

Chinese is a tonal language where each syllable in isolation has its definite tone (flat, falling, rising and rising/falling), and same syllables with different tones mean different things. When you say, “ma” with a third tone, it mean horse and “ma” with the first tone is Mother. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

## Course Contents:

**Module I**
Drills
Practice reading aloud
Observe Picture and answer the question.
Tone practice.
Practice using the language both by speaking and by taking notes.
Introduction of basic sentence patterns.
Measure words.
Glad to meet you.

**Module II**
Where do you live?
Learning different colors.
Tones of “bu”
Buying things and how muchit costs?
Dialogue on change of Money.
More sentence patterns on Days and Weekdays.
How to tell time. Saying the units of time in Chinese. Learning to say useful phrases like – 8:00, 11:25, 10:30 P.M. everyday, afternoon, evening, night, morning 3:58, one hour, to begin, to end ….. etc.
Morning, Afternoon, Evening, Night.

**Module III**
Use of words of location like-li, wais hang, xia
Furniture – table, chair, bed, bookshelf,.. etc.
Description of room, house or hostel room.. eg what is placed where and how many things are there in it?
Review Lessons – Preview Lessons.
Expression ‘yao”, “xiang” and “yaoshi” (if).
Days of week, months in a year etc.
I am learning Chinese. Is Chinese difficult?

**Module IV**
Counting from 1-1000
Use of “chang-chang”.
Making an Inquiry – What time is it now? Where is the Post Office?
Days of the week. Months in a year.
Use of Preposition – “zai”, “gen”.
Use of interrogative pronoun – “duoshao” and “ji”.
“Whose”??? Sweater etc is it?
Different Games and going out for exercise in the morning.

**Module V**
The verb “qu”

- Going to the library issuing a book from the library
- Going to the cinema hall, buying tickets
- Going to the post office, buying stamps
- Going to the market to buy things.. etc
- Going to the buy clothes …. Etc.

Hobby. I also like swimming.
Comprehension and answer questions based on it.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|

| | | | | | | |
|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- "Elementary Chinese Reader Part I" Lesson 11-20

# NUMERICAL ANALYSIS AND PROGRAMMING

**Course Code:** **BTM 301** **Credit Units: 02**

## Course Objective:

This course deals with the techniques of numerical analysis, which gives the solution to applied problem when ordinary analytical method fails. Emphasis is given on computer programming also so that the given techniques can be used in design of engineering and scientific problems.

## Course Contents:

**Module I: Solution of Algebraic and Transcendental Equation**
Error in a series approximation, Bisection Method, Iteration method, Method of false position, Newton-Raphson method
**Solutions of Simultaneous equation**
Gauss elimination method, Jacobi iteration method, Gauss Seidal method

**Module II: Interpolation**
Finite Differences, Difference tables
Polynomial Interpolation**:** Newton's forward and backward formula
Central Difference Formulae: Gauss forward and backward formula.
Interpolation with unequal intervals: Lagrange's Interpolation, Newton Divided difference formula

**Module III: Numerical Integration and Differentiation**
Introduction, Numerical differentiation Numerical Integration: Trapezoidal rule, Simpson's 1/3 and 3/8 rules.

**Module IV: Solution of differential Equations**
Euler's Method, Runga-Kutta Methods.

**Module V: Statistical Computation**
Frequency chart, Curve fitting by method of least squares, fitting of straight lines, polynomials, exponential curves etc, Data fitting with Cubic splines.

## Examination Scheme:

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***

- Rajaraman V, "Computer Oriented Numerical Methods", Pearson Education
- Gerald & Whealey, "Applied Numerical Analyses", AW
- Jain, Iyengar and Jain, "Numerical Methods for Scientific and Engineering Computations", New Age Int.
- Grewal B S, "Numerical methods in Engineering and Science", Khanna Publishers, Delhi

***References:***

- T Veerarajan, T Ramachandran, "Theory and Problems in Numerical Methods, TMH
- Pradip Niyogi, "Numerical Analysis and Algorithms", TMH
- Francis Scheld, " Numerical Analysis", TMH
- Sastry S. S, "Introductory Methods of Numerical Analysis", Pearson Education.
- Gupta C.B., Vijay Gupta, "Introduction to Statistical Methods", Vikas Publishing.
- Goyal, M, "Computer Based Numerical and Statistical Techniques", Firewall Media, New Delhi.

# THERMODYNAMICS

**Course Code: BTM 302** **Credit Units: 03**

## Course Objective:

Objective of this course is to impart in depth understanding of the principles of thermodynamics and heat transfer. This course also helps students understand the application of basic fluid mechanics, thermodynamic, and heat transfer principles and techniques, including the use of empirical data, to the analysis of representative fluid and thermal energy components and systems encountered in the practice of electrical, electronic, industrial, and related disciplines of engineering.

## Course Contents:

**Module I: Basic concepts**
Thermodynamic system, intensive and extensive properties, cyclic process, Zeroth Law of Thermodynamics, Work and heat, Flow work

**Module II: First Law of Thermodynamics**
Mechanical equivalent of heat, internal energy, Analysis of non-flow system, flow process and control volume, steady flow, energy equation, flow processes

**Module III: Second Law of Thermodynamics and Entropy**
Heat Engine, heat pump, Kelvin Planck and Clausius statement of Second Law of Thermodynamics, Perpetual motion machine, Reversible cycle- Carnot Cycle, Clausius inequality, entropy, Principle of entropy increase, concepts of availability, irreversibility.

**Module IV: Air-Cycles**
Carnot cycle, Otto cycle, Diesel cycle, Dual cycle, Stirling cycle, Erricsson cycle, Brayton cycle; Reversed Carnot cycle.

**Module V: Properties of Steam**
Use of steam tables, wet steam, superheat steam, different processes of vapour, Mollier Diagram.

**Module VI: Reciprocating Air compressors**
Single stage compressor, Isothermal efficiency, adiabatic efficiency, clearance volume, volumetric efficiency, and multi-stage compression with intercooling.

## Examination Scheme:

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***

- P.K. Nag, “Engineering Thermodynamics”, Tata McGraw Hill
- Incropera, “Engineering Thermodynamics”, John Willy

***References:***

- Engel, T. and Reid, P., Thermodynamics, Statistical Thermodynamics & Kinetics, Pearson Education, 2006
- Cengel & Boles, “Thermodynamics”, Tata McGraw Hill.
- Sonntag/Vanhylene, Fundamentals of Thermodynamics, Wiley
- Rahul Gupta, Engineering Thermodynamics, Asian Books P. Ltd.
- Y.V.C. Rao, Engineering Thermodynamics, Khanna Publications
- Onkar Singh, Applied Thermodynamics, New Age Publications.
- Dhomkundwar Kothandaraman, “A Course in Thermal Engineering”, Dhanpat Rai Publications

# MECHANICS OF SOLIDS

**Course Code:** **BTM 303** **Credit Units: 03**

## Course Objective:

The objective of this course is to make the students understand the concept of stress and strain in different types of structure/machine under different loading conditions. The course also covers the simple and compound stresses due to forces, stresses and deflection in beams due to bending, torsion in circular section, strain energy, different theories of failure, stress in thin cylinder thick cylinder and spheres due to external and internal pressure.

## Course Contents:

**Module I: Simple stresses and strains**
Stress and Strain- Tension and Compression -Thermal Stresses -pure shear –Young’s modulus of elasticity, Poisson’s ratio, Modulus of rigidity and Bulk modulus - Relation between elastic constants –Stress -strain diagrams for brittle and ductile materials-working stress Strain energy in tension and compression. Stress at a point, stress and strains in bars subjected to axial loading. Stress produced in compound bars subject to axial loading.

**Module II: Compound stress and strains**
Principal Stresses and Strains: Analysis of Biaxial state of stress with and without shear - Mohr's Circle. Shear Force And Bending Moment: Types of supports-Types of beams –Types of loads –articulated beams -Shear Force and Bending Moment diagrams.

**Module III: Bending Stress**
Theory of Simple Bending: Assumptions -Bending stresses in beams - Derivation of formula for Efficiency of various cross sections of beams (rectangular, circular and channel sections). Shear Stress Distribution: Flexural shear stress distribution in different cross sections of beams.

**Module IV: Torsion**
Torsion of Circular cross sections: Theory of pure torsion -transmission of Power in Solid and Hollow circular shafts–Combined bending and torsion.

**Module V: Thin cylinders and spheres**
Thin and Thick Cylinders: Thin and Thick Cylinders – spherical shells subjected to internal fluid pressure

**Module VI: Columns and struts**
Columns and struts: column and failure of columns, Euler’s formulas.

**Module VII: Slope and deflection**
Deflection of Beams: Slope and deflection of beams- Double Integration method – Macaulay’s method –strain energy method.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

*Text:*


- Jindal U.C., “Strength of Materials”, Galgotia Publication, New Delhi, 1998.
- Ryder G.H., “Strength of Materials”, Macmillan, Delhi, 2003.
- R.K. Bansal, “Strength of Materials”, Laxmi Publication, New Delhi, 2001.


*References:*


- Sadhu Singh, “Strength of Materials”, Khanna Publishers, New Delhi, 2000.
- Timoshenko S.P., “Elements of Strength of Materials”, East-West affiliated, New Delhi, 2000.
- Hibbler R.C., “Mechanics of Materials”, Prentice Hall, New Delhi, 1994.
- Popov Eger P., “Engg. Mechanics of solids”, Prentice Hall, New Delhi, 1998.

- Fenner, Roger. T, “Mechanics of Solids”, U.K. B.C. Publication, New Delhi, 1990.
- Srinath L.S. et.al., “Strength of Materials”, McMillan, New Delhi,2001

# MATERIAL SCIENCE AND METALLURGY

**Course Code: BTM 304 Credit Units: 03**

## Course Objective:

Metallurgy and Materials deal with the structure and properties of all materials, which have engineering applications. Metallurgists and Materials Engineers are responsible for designing, producing, examining and testing materials as diverse as metallic engineering alloys, semiconductors and superconductors, ceramics, plastics and composites. This course will help students understand the properties of different types of materials and their applications.

## Course Contents:

**Module I**

Atomic structure of metals crystal structure, crystal lattice of (i) Body centered cubic (ii) face centered cubic (iii) closed packed hexagonal, crystallographic notation of atomic planes, polymorphism and allotropy, solidification of crystallization (i) nuclear formation (crystal growth) (ii) crystal imperfection Elementary treatment of theories of plastic deformation, phenomenon of slip twinning, dislocation, identification of crystallographic possible slip planes and direction in FCC, BCC, C.P., recovery, re-crystallization, preferred orientation causes and effects on the property of metals.

**Module II**

Introduction to Engineering materials, their mechanical behaviour, testing and manufacturing properties of materials, physical properties of materials, classification of engineering materials.

**Module III**

General principles of phase transformation in alloys, phase rule and equilibrium diagrams, Equilibrium diagrams of Binary system in which the components form a mechanical mixture of crystals in the solid state and are completely mutually soluble in both liquid state. Equilibrium diagrams of a systems whose components have complete mutual solubility in the liquid state and limited solubility in the solid state in which the solid state solubility deceases with temperature. Equilibrium diagram of alloys whose components have complete mutual solubility in the liquid state and limited solubility in solid state (Alloy with a peritectic transformation) Equilibrium diagrams of a system whose components are subject to allotropic change. Iron carbon equilibrium diagram. Phase transformation in the iron carbon diagram (i) Formation of Austenite (ii) Transformation of austenite into pearlite (iii) Martensite transformation in steel, time temperature transformation curves.

**Module IV**

Principles and applications of heat treatment processes viz. annealing, normalizing hardening, tempering; harden ability & its measurement, surface hardening processes. Defects in heat treatment and their remedies; effects produced by alloying elements on the structures and properties of steel. Distribution of alloying elements (Si, Mn. Ni. Cr. Mo. TL. Al) in steel.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***


- V. Raghavan, "Material Science & Engineering", Prentice Hall India Ltd., 2001.
- Shackelford, J.F. and Muralidhara, M.K., Introduction to Material Science for Engineers (6/e), Pearson Education, 2007
- S.K. Hazra Chaudhuri, "Material Science & Processes", Indian Book Publishers, Calcutta, 1983.
- R.B. Gupta, "Material Science Processes", Satya Prakashan, New Delhi, 2000.


***References:***


- Degarmo E. Paul et.al, "Materials & Processes in Manufacture", Prentice Hall India, New Delhi, 2001.
- Raymond A Higgim., "Engineering Metallurgy Part 1", Prentice Hall India, New Delhi, 1998.
- L. Krishna Reddi, "Principles of Engineering Metallurgy", New Age Publication, New Delhi, 2001.
- Buduisky et al, "Engineering Materials & Properties", Prentice Hall India, New Delhi, 2004.
- Peter Haasten, "Physical Metallurgy", Cambridge Univ. Press, 1996.

# MECHANICS OF FLUIDS

**Course Code:** **BTM 305** **Credit Units: 03**

## Course Objective:

The objective of Fluid Mechanics subject is that students should understand the, properties of fluids, pressure measurement devices, hydraulic forces on surfaces, bouncy and flotation in fluids, kinematics and static behaviour of fluids, dimension and model analysis, laminar and turbulent flow, flow through pipes and orifices, boundary layer theory.

## Course Contents:

**Module I:** Fluid Properties and Fluid Statics
Review of fluid properties, Newtonian and Non-Newtonian Fluids; Incompressible and compressible fluids, compressibility. Pressure at a point, manometers, Forces on plane surfaces, forces on curved surfaces, buoyant forces, and stability of floating bodies, metacentre and metacentre height.

**Module II:** Kinematics of Fluid Motion
Steady and unsteady flow; uniform and non-uniform flow; Laminar and turbulent flow; streamline, path line and streak line; continuity equation, irrotational and rotational flow, velocity potential and stream function, vortex flow, free and forced vortex.

**Module III**: Dynamics of Fluid Flow
Euler's equation of motion and its integration to yield Bernoulli's equation, its practical applications – Pitot tube, Venturi meter, Orificemeter; steady flow momentum equation, force exerted on a pipe bend.

**Module IV:** Dimensional Analysis and Principles of Similarity
Dimensional analysis, Dimensional homogeneity, Buckingham p-Theorem and its applications, Geometric, Kinematics and Dynamic similarity; Dimensionless numbers- Reynolds, Froude, Euler, Mach, Weber Number and their significance.

**Module V**: Laminar and Turbulent Flow
Reynold's experiment, critical velocity, steady laminar flow through a circular tube, flow between parallel plates. Transition from laminar to turbulent flow, courses of turbulence, velocity distribution law near a solid boundary, velocity distribution in rough pipes, Hazen – Williams's formula.

**Module VI**: Analysis of Pipe Flow
Energy losses, minor losses in pipe lines, concept of equivalent length, flow between two reservoirs, and multiple pipe systems – in series and parallel, siphon.

**Module VII**: **Industrial Visit**
At least one visit to local industry in the field of Mechanical Engineering.
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## Examination Scheme:

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***

- R.K. Bansal, "Fluid Mechanics & Hydraulic Machines", Laxmi Publications (P) Ltd., 2002.
- Gupta, S. C., Fluid Mechanics and Hydraulic Machines, Pearson Education, 2007
- D.S. Kumar, "Fluid Mechanics and Fluid Power Engineering", S.K. Kataria & Sons, 2000.

***References:***


- F. M. White, Introduction to Fluid Mechanics, McGraw Hill
- I.H. Shames, "Mechanics of Fluids", Tata McGraw Hill
- Douglas, J. F., Gasiorek, J.M. and Swaffield, J., Fluid Mechanics, Pearson Education, 4/e, 2006

- V.L. Streeter and E.B. Wylie, “Fluid Mechanics”, Tata McGraw Hill
- Massey B S, Mechanics of Fluids, Van Nostrand Reinhold Co

# ELECTRONICS

**Course Code:** **BTM 306** **Credit Units: 02**

## Course Objective:
Basic knowledge of Electronics is very essential for an engineer, it will help in building up the electronics & automation skills in Mechanical Engineers.

## Course Contents:

**Module I**
Review of Diodes LED, Zener and Tunnel Diode and their characteristics, Applications of diodes-Rectifiers (Half and full wave, Bridge).

**Module II**
BJT-construction and characteristics, Transistor as an amplifier, CE, CB and CC configurations, Introduction to MOSFET.

**Module III**
Coupling, RC coupled Amplifiers, Transformer coupling,, Introduction to feedback-Positive and negative, Introduction to oscillators.

**Module IV**
Introduction to OPAMP characteristics and specifications, OPAMP as adder, subtractor. Integrator, differentiator.

**Module V**
Introduction to digital electronics, logic gates, basic laws and theorems of Boolean algebra, Introduction to Combinational Circuits, Concept of memory cell and introduction to Flip-flops R S, J K, D and T.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***
- Boylestead & Neshlesky, "Electronics Devices & Circuits". PHI
- Millman & Halkias, "Integrated Electronics", TMH.

***References:***
- Schilling & Belove "Electronics".
- R P Jain, Digital Electronics.

# MECHANICS OF SOLIDS AND FLUIDS LAB

**Course Code:** **BTM 320** **Credit Units: 01**

## Course Contents:

Experimental work will be based on the following papers:
Mechanics of Solids
Fluid Mechanics

## List of Experiments:

### MECHANICS OF SOLIDS LAB

1. Universal Testing Machine
2. Tensile Test (MS)
3. Double Shear Test (MS)
4. Compression Test (CI)
5. Brinell Hardness No.
6. Izod Impact
7. Testing Machine
8. Rockwell Hardness Tester
9. Spring Stiffness (Spring Compression Testing machine)
10. Torsion testing machine

### FLUID MECHANICS LAB

1. Verification of Bernoulli's Theorem
2. Experiment using Venturimeter
3. Determination of coefficient of Discharge $C_d$, $C_c$, $C_!$ Using
4. Circular/triangular/rectangular orifice
5. To find major head losses in a pipe line
6. To find minor head losses in a pipe line (sudden expansion/contraction/bend)

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# MACHINE DRAWING WITH CAD LAB

## Course Code: BTM 321 Credit Units: 01

## Course Contents:

**Free-Hand Sketching & Shaft Scale Drawing**
Components like cotter joint, knuckle joint; rivets and riveted joints; couplings; flywheels, pulleys, bush bearings, Engine parts. Isometric views from Orthographic Projections of Machine Components.

**Introduction to CAD**
Basics of Auto CAD, Modeling of machine Components such as Connecting Rod, Piston etc.,2D modeling for different Geometrics such as Hexagon, Pentagon etc, 3D modeling for Nuts and Bolts, Modeling of Gear. Modeling of Compound Geometrics such as Hollow Cylinder containing Sphere, Triangle etc.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

## Text & References:


- Pohit, G and Gosh, G., Machine Drawing with Auto CAD, Pearson Education, 2007
- PS Gill, Machine Drawing, S. Chand.
- ND Bhatt, Machine Drawing, Charotar publications
- N Sidheshwar, Machine Drawing , Tata McGraw Hill
- CL Tanta, Mechanical Drawing , “Dhanpat Rai”

# PROGRAMMING LAB – I (NUMERICAL ANALYSIS)

**Course Code:** **BTM 322** **Credit Units: 01**

**Software Required:** Turbo C/C++

## Course Contents:

## Assignments will be provided for the following:

1. Analysis of various numerical and statistical techniques

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# ELECTRONICS LAB

**Course Code:** **BTM 323** **Credit Units: 01**

## Course Contents:

## List of Experiments:

1. To study the VI characteristic of a diode.
2. To study Zener breakdown.
3. To study the characteristics of a CE Transistor.
4. To study the VI characteristic of CB &CC Transistor
5. To study transistor as an a amplifiers
6. To study the Truth Table of Universal gates
7. To study OP Amp. As inverting and non-inverting Amp.
8. To study OP Amp in open loop and close loop.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# THERMODYNAMICS LAB

**Course Code: BTM - 324** **Credits: 01**

## List of Experiments:

1. To study of various types of boilers.
2. To study various types of Boiler mountings and accessories.
3. To study the working of two stroke petrol Engine.
4. To study the working of four stroke petrol Engine.
5. To study the working of two stroke Diesel Engine.
6. To study the working of four stroke Diesel Engine.
7. To study of Velocity & Pressure compounded steam turbine.
8. To study of Impulse & Reaction turbine.
9. To study of steam Engine model.
10. To study of Gas Turbine Model.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# COMMUNICATION SKILLS - I

**Course Code:** **BTM 341** **Credit Units: 01**

## Course Objective:
To form written communication strategies necessary in the workplace

## Course Contents:

**Module I: Introduction to Writing Skills**
Effective Writing Skills
Avoiding Common Errors
Paragraph Writing
Note Taking
Writing Assignments

**Module II: Letter Writing**
Types
Formats

**Module III**
Memo
Agenda and Minutes
Notice and Circulars

**Module IV: Report Writing**
Purpose and Scope of a Report
Fundamental Principles of Report Writing
Project Report Writing
Summer Internship Reports

## Examination Scheme:

| **Components** | **CT1** | **CT2** | **CAF** | **V** | **GD** | **GP** | **A** |
|---|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 25 | 10 | 10 | 10 | 5 |

CAF – Communication Assessment File
GD – Group Discussion
GP – Group Presentation

## Text & References:


- Business Communication, Raman – Prakash, Oxford
- Creative English for Communication, Krishnaswamy N, Macmillan
- Textbook of Business Communication, Ramaswami S, Macmillan
- Working in English, Jones, Cambridge
- A Writer's Workbook Fourth edition, Smoke, Cambridge
- Effective Writing, Withrow, Cambridge
- Writing Skills, Coe/Rycroft/Ernest, Cambridge
- Welcome!, Jones, Cambridge

# BEHAVIOURAL SCIENCE - III
# (INTERPERSONAL COMMUNICATION)

**Course Code: BTM 343** **Credit Units: 01**

## Course Objective:
This course provides practical guidance on
- Enhancing personal effectiveness and performance through effective interpersonal communication
- Enhancing their conflict management and negotiation skills

## Course Contents:

**Module I: Interpersonal Communication: An Introduction**
Importance of Interpersonal Communication
Types – Self and Other Oriented
Rapport Building – NLP, Communication Mode
Steps to improve Interpersonal Communication

**Module II: Behavioural Communication**
Meaning and Nature of behavioural communication
Persuasion, Influence, Listening and Questioning
Guidelines for developing Human Communication skills
Relevance of Behavioural Communication for personal and professional development

**Module III: Interpersonal Styles**
Transactional Analysis
Life Position/Script Analysis
Games Analysis
Interactional and Transactional Styles

**Module IV: Conflict Management**
Meaning and nature of conflicts
Styles and techniques of conflict management
Conflict management and interpersonal communication

**Module V: Negotiation Skills**
Meaning and Negotiation approaches (Traditional and Contemporary)
Process and strategies of negotiations
Negotiation and interpersonal communication

**Module VI: End-of-Semester Appraisal**
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

## Examination Scheme:

| Components | SAP | A | Mid Term Test (CT) | VIVA | Journal for Success (JOS) |
|---|---|---|---|---|---|
| Weightage (%) | 20 | 05 | 20 | 30 | 25 |

## Text & References:


- Vangelist L. Anita, Mark N. Knapp, Inter Personal Communication and Human Relationships: Third Edition, Allyn and Bacon
- Julia T. Wood. Interpersonal Communication everyday encounter
- Simons, Christine, Naylor, Belinda: Effective Communication for Managers, 1997 1st Edition Cassel
- Goddard, Ken: Informative Writing, 1995 1st Edition, Cassell
- Harvard Business School, Effective Communication: United States of America
- Foster John, Effective Writing Skills: Volume-7, First Edition 2000, Institute of Public Relations (IPR)
- Beebe, Beebe and Redmond; Interpersonal Communication, 1996; Allyn and Bacon Publishers.

# FRENCH - III

**Course Code:** **BTM 344** **Credit Units: 02**

## Course Objective:

To provide the students with the know-how

- To master the current social communication skills in oral and in written.
- To enrich the formulations, the linguistic tools and vary the sentence construction without repetition.

## Course Contents:

**Module B: pp. 76 – 88 Unité 6**

**Module C: pp. 89 to103 Unité 7**

**Contenu lexical:** **Unité 6: se faire plaisir**

1. acheter : exprimer ses choix, décrire un objet (forme, dimension, poids et matières) payer
2. parler de la nourriture, deux façons d'exprimer la quantité, commander un repas au restaurant
3. parler des différentes occasions de faire la fête

**Unité 7: Cultiver ses relations**

1. maîtriser les actes de la communication sociale courante (Salutations, présentations, invitations, remerciements)
2. annoncer un événement, exprimer un souhait, remercier, s'excuser par écrit.
3. caractériser une personne (aspect physique et caractère)

**Contenu grammatical:**

1. accord des adjectifs qualificatifs
2. articles partitifs
3. Négations avec de, ne…rien/personne/plus
4. Questions avec combien, quel…
5. expressions de la quantité
6. ne…plus/toujours - encore
7. pronoms compléments directs et indirects
8. accord du participe passé (auxiliaire « avoir ») avec l'objet direct
9. Impératif avec un pronom complément direct ou indirect
10. construction avec « que » - Je crois que/ Je pense que/ Je sais que

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- le livre à suivre: Campus: Tome 1

# GERMAN - III

**Course Code: BTM 345 Credit Units: 02**

## Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany

## Course Contents:

**Module I: Modal verbs**
Modal verbs with conjugations and usage
Imparting the finer nuances of the language

**Module II: Information about Germany (ongoing)**
Information about Germany in the form of presentations or "Referat"– neighbors, states and capitals, important cities and towns and characteristic features of the same, and also a few other topics related to Germany.

**Module III: Dative case**
Dative case, comparison with accusative case
Dative case with the relevant articles
Introduction to 3 different kinds of sentences – nominative, accusative and dative

**Module IV: Dative personal pronouns**
Nominative, accusative and dative pronouns in comparison

**Module V: Dative prepositions**
Dative preposition with their usage both theoretical and figurative use

**Module VI: Dialogues**
In the Restaurant,
At the Tourist Information Office,
A telephone conversation

**Module VII: Directions**
Names of the directions
Asking and telling the directions with the help of a roadmap

**Module VIII: Conjunctions**
To assimilate the knowledge of the conjunctions learnt indirectly so far

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:


- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

# SPANISH – III

**Course Code:** **BTM 346** **Credit Units: 02**

## Course Objective:
To enable students acquire knowledge of the Set/definite expressions (idiomatic expressions) in Spanish language and to handle some Spanish situations with ease.

## Course Contents:

**Module I**
Revision of earlier semester modules
Set expressions (idiomatic expressions) with the verb *Tener*, *Poner, Ir….*
Weather

**Module II**
Introduction to *Gustar*…and all its forms. Revision of *Gustar* and usage of it

**Module III**
Translation of Spanish-English; English-Spanish. Practice sentences.
How to ask for directions (using estar)
Introduction to IR + A + INFINITIVE FORM OF A VERB

**Module IV**
Simple conversation with help of texts and vocabulary
En el restaurante
En el instituto
En el aeropuerto

**Module V**
Reflexives

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- Español, En Directo I A
- Español Sin Fronteras -Nivel Elemental

# JAPANESE - III

**Course Code: BTM 347 Credit Units: 02**

## Course Objective:
To enable the students to converse in the language with the help of basic verbs and to express themselves effectively and narrate their everyday short encounters. Students are also given projects on Japan and Japanese culture to widen their horizon further.
**Note:** The Japanese script is introduced in this semester.

## Course Contents:

**Module I: Verbs**
Different forms of verbs: present continuos verbs etc

**Module II**
More Adverbs and adverbial expressions

**Module III: Counters**
Learning to count different shaped objects,

**Module IV: Tenses**
Past tense, Past continuous tense.

**Module V: Comparison**
Comparative and Superlative degree

**Module VI: Wishes and desires**
Expressing desire to buy, hold, possess. Usage in negative sentences as well.
Comparative degree, Superlative degree.

**Module VII: Appointment**
Over phone, formal and informal etc.

## Learning Outcome
- Students can speak the language and can describe themselves and situations effectively
- They also gain great knowledge in terms of Japanese lifestyle and culture, which help them at the time of placements.

## Methods of Private study /Self help
- Handouts, audio-aids, and self-do assignments.
- Use of library, visiting and watching movies in Japan and culture center every Friday at 6pm.

## Examination Scheme:

| **Components** | **CT1** | **CT2** | **C** | **I** | **V** | **A** |
|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

***Text:***
- Teach yourself Japanese

***References:***
- Shin Nihongo no kiso 1

# CHINESE – III

**Course Code: BTM 348 Credit Units: 02**

## Course Objective:

Foreign words are usually imported by translating the concept into Chinese, the emphasis is on the meaning rather than the sound. But the system runs into a problem because the underlying name of personal name is often obscure so they are almost always transcribed according to their pronciation alone. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

## Course Contents:

**Module I**
Drills
Dialogue practice
Observe picture and answer the question.
Introduction of written characters.
Practice reading aloud
Practice using the language both by speaking and by taking notes.
Character writing and stroke order

**Module II**
Measure words
Position words e.g. inside, outside, middle, in front, behind, top, bottom, side, left, right, straight.
Directional words – beibian, xibian, nanbian, dongbian, zhongjian.
Our school and its different building locations.
What game do you like?
Difference between “hii” and “neng”, “keyi”.

**Module III**
Changing affirmative sentences to negative ones and vice versa
Human body parts.
Not feeling well words e.g.; fever, cold, stomach ache, head ache.
Use of the modal particle “le”
Making a telephone call
Use of “jiu” and “cal” (Grammar portion)
Automobiles e.g. Bus, train, boat, car, bike etc.
Traveling, by train, by airplane, by bus, on the bike, by boat.. etc.

**Module IV**
The ordinal number “di”
“Mei” the demonstrative pronoun e.g. mei tian, mei nian etc.
use of to enter to exit
Structural particle “de” (Compliment of degree).
Going to the Park.
Description about class schedule during a week in school.
Grammar use of “li” and “cong”.
Comprehension reading followed by questions.

**Module V**
Persuasion-Please don’t smoke.
Please speak slowly
Praise – This pictorial is very beautiful
Opposites e.g. Clean-Dirty, Little-More, Old-New, Young-Old, Easy-Difficult, Boy-Girl, Black-White, Big-Small, Slow-Fast … etc.
Talking about studies and classmates
Use of “it doesn’t matter”
Enquiring about a student, description about study method.
Grammar: Negation of a sentence with a verbal predicate.

## Examination Scheme:

| **Components** | **CT1** | **CT2** | **C** | **I** | **V** | **A** |
|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- “Elementary Chinese Reader Part I, Part-2” Lesson 21-30

# TERM PAPER

**Course Code: BTM 330 Credit Units: 02**

## GUIDELINES FOR TERM PAPER

A term (or research) paper is primarily a record of intelligent articulation through several sources on a particular topic of a given subject.

The students will choose the topic at the beginning of the session in consultation with the faculty assigned/chosen. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned/chosen. The evaluation will be done by Board of examiners comprising of the faculties.

The procedure for writing a term paper may consists of the following steps:

1. Choosing a topic
2. Finding sources of material
3. Collecting the notes
4. Outlining the paper
5. Writing the first draft
6. Editing & preparing the final paper

**1. Choosing a Topic**

The topic chosen should not be too general. Student will normally consult the faculty guide while finalizing the topic.

## Finding Sources of material

- The material sources should be not more than 5 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
- Begin by making a list of subject-headings under which you might expect the topics to be listed.
- The sources could be books and magazines articles, news stories, periodicals, journals, internet etc.

## Collecting the notes

Skim through sources, locate the useful material, make notes of it, including quotes and information for footnotes.

- ***Get facts, not just opinions***. Compare the facts with author's conclusion(s)/recommendations.
- In research studies, notice the methods and procedures, results & conclusions.
- Check cross references.

## Outlining the paper

- Review notes to find main sub-divisions of the topic.
- Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

## Writing the first draft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

- statement of purpose/objectives
- main body of the paper
- statement of summary and possible conclusion(s)/recommendations

Avoid short, bumpy telegraphic sentences and long straggling sentences with more than one main ideas.

## Editing & preparing the final paper

a) Before writing a term paper, you should ensure you have an issue(s) which you attempt to address in your paper and this should be kept in mind throughout the paper. Include only information/ details/ analyses that are relevant to the issue(s) at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure that you briefly explain the relevance of every section.

b) Read the paper to ensure that the language is not awkward, and that it "flows" smoothly.

c) Check for proper spelling, phrasing and sentence construction.

d) Check for proper form on footnotes, quotes, and punctuation.

e) Check to see that quotations serve one of the following purposes:

   (i) Show evidence of what an author has said.

(ii) Avoid misrepresentation through restatement.
(iii) Save unnecessary writing when ideas have been well expressed by the original author.

f) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

**Term papers should be composed of the following sections:**

1) Title page
2) Abstract
3) Introduction
4) Review of the Literature
5) Discussion & Conclusion
6) References
7) Appendix

Generally, the introduction, discussion, conclusion and references should account for a third of the paper and the review part should be two thirds of the paper.

**Discussion**

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the paper.

**Conclusion**

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

a) summary of objectives and issues raised.
b) summary of findings
c) summary of limitations of the study at hand
d) details of possibilities for related future research

## References

From the very beginning of the research work, one should be careful to note all details of articles or any other material gathered. The Reference part should list ALL references included in the paper. References not included in the text in any form should NOT be listed here. The key issue here is consistency. Choose a particular convention and stick to this.

## Conventions

**Monographs**

Crystal, D. (2001), *Language and the internet.* Cambridge: Cambridge University Press.

**Edited volumes**

Gass, S./Neu, J. (eds.) (1996), *Speech acts across cultures. Challenges to communication in a second language.* Berlin/ NY: Mouton de Gruyter.
[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

**Edited articles**

Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), *Speech acts across cultures. Challenges to communication in a second language.* Berlin/ NY: Mouton de Gruyter: 285-316.

**Journal articles**

McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. *Journal of consumer research* 19, 180-197.

**Electronic book**

Chandler, D. (1994), *Semiotics for beginners* [HTML document]. Retrieved [5.10.'01] from the World Wide Web, http://www.aber.ac.uk/media/Documents/S4B/.

**Electronic journal articles**

Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document]. *German as a Foreign Language Journal [online] 1.* Retrieved [12.09.'00] from the World Wide Web, http://www.gfl-journal.com/.

**Other websites**

Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document]. Retrieved [13.10.'01] from the World Wide Web, http://olaf.hiof.no/~sverrev/eng.html.

**Unpublished papers**
Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

**Unpublished theses/ dissertations**
Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg.

Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD Dissertation, University College Dublin.

**Appendix**
The appendix should be used for data collected (e.g. questionnaires, transcripts etc.) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

**The Layout Guidelines for the Term Paper**

- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

## Assessment Scheme:

**Continuous Evaluation:** 40%
(Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)

**Final Evaluation:** 60%
(Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/ presented, outcomes vs. objectives, presentation/ viva etc.)

# KINEMATICS AND DYNAMICS OF MACHINES

**Course Code:** **BTM 401** **Credit Units: 03**

## Course Objective:

The objective of this course is to identify the alternatives to satisfy the needs of the customer and to quantify and evaluate the alternatives. It includes an introduction to the study of motion of constrained mechanism in machine systems. The objective is to develop the students understanding of basic machine design. Concepts, such as linkages, cams, sliders, crank and rocker, offset crank slider etc. The combination of several of these elements in machine drive trains and the resulting static and dynamic forces will also be studied. This course also includes study of forces, motion and inertia in machines, analysis of linkages, cams, rotor dynamics, reciprocal and rotational balancing.

## Course Contents:

**Module I: General Concepts, Velocity and Acceleration Analysis**

General Concepts, Velocity and Acceleration Analysis: Introduction to simple mechanisms. Different types of link, joint and kinematics pairs. Grubler's rule for degrees of freedom, Grashof's criterion for mobility determination. Inversions of 3R-P, 2R-2P chains. Kinematics analysis of planar mechanism. Oldham coupling. Universal coupling. Application of Kennedy's theorem.

**Module II: Gears**

Gears -geometry of tooth profiles, Law of gearing, interference. Helical, spiral and worm gears, simple, compound gear trains. Clutches,

**Module III: Dynamic Analysis**

Slider-crank mechanism, turning moment computation. Balancing: Static and dynamic balancing, balancing of revolving and reciprocating masses, single and multi-cylinder engine Gyroscopic law, effect of gyroscopic couple on automobiles, ships, aircrafts.

**Module IV: Cams**

Cam & Follower: Classification- types of CAM and Followers, Cams with uniform acceleration and retardation. SHM, Cylcloidal motion. Design of CAM profile

**Module V: Vibrations**

Mechanical Vibrations: Free and forced vibrations, analysis and applications of discrete and continuous system of vibration.

**Examination Scheme:**

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

- PL Ballaney, Theory of Machines,
- Hams Crone and Roggers, Theory of Machines
- Shigley, Theory of Machines
- J. Lal, Theory of Machines
- SS Rattan, Theory of Machines
- Ghosh and Mallick, Mechanisms and Machines, EWP publication.
- R.S. Khurmi, Theory of Machine, S. Chand.

# HEAT AND MASS TRANSFER

**Course Code:** **BTM 402** **Credit Units: 03**

## Course Objective:

The main objective of the course to understand the behaviour of thermal systems. To illustrate the development of the governing differential, algebraic and finite difference equations associated with thermal systems. To introduce the possible methods of solution to the governing equation. To investigate the influences of boundary and initial conditions and system parameters on the resulting steady or transient response of the system. To provide the basic tools those are used in thermal system design. To expose students to heat transfer applications in industry.

## Course Contents:

### Module I

Conduction, Fourier's law and general conduction equation, One-dimensional steady-state conduction through homogeneous and composite plane walls, cylinders and spheres, critical thickness of insulation; heat transfer from fins of uniform cross section, effectiveness and efficiency of fin.

### Module II

Concept of hydrodynamic and thermal boundary layers, momentum and energy equation for boundary layers on a flat plate, application of dimensional analysis to free and force convection; important dimensionless number.

### Module III

Thermal radiation; Electromagnetic spectrum, reflectivity, absorptivity, transmissivity, emissivity, emisive power , intensity of radiation, Stefan-Boltzmann's relation, Kirchoff's law; Planck's distribution law, Wien's displacement law; Concept of black and gray body; radiant interchange between black and grey surfaces; Configuration factors radiation shielding solar radiation.

### Module IV

Combined heat transfer analysis; overall heat transfer co-efficient; fouling factor, types of heat exchangers, LMTD methods of heat exchanger design; simple heat exchanger calculations.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Incropera, F.P. and DeWitt, D.P. (2002). Fundamentals of Heat and Mass Transfer, John Willy & Sons, New York, NY.
- Nag, P.K. (2002). Heat and Mass Transfer, TMH.
- John R.Howell & Richrd O Buckius, Fundamentals of Engg. Thermodynamics, McGraw Hill International.
- Holman, J.P. (1997). Heat Transfer, 9$^{th}$ edition, McGraw-Hill.
- Mills, A.F. (1999). Basic Heat and Mass Transfer. Prentice-Hall.
- Thirumaleshwar, M. (2006). Fundamentals of Heat and Mass Transfer, Pearson education.
- Ghoshdastidar, P.S. (2004). Heat Transfer. Oxford University Press.
- Arora, Domkundwar, S. and Domkundwar, A. (1988). A Course in Heat & Mass Transfer, Dhanpat Rai & Co.

# MANUFACTURING MACHINES

**Course Code: BTM 403 Credit Units: 03**

## Course Objective:

This is a new developmental graduate course for students interested in learning how to design, analyze and build specialty manufacturing process machines. It anticipated that this course would become part of the new manufacturing emphasis area in mechanical engineering.

## Course Contents:

**Module I: Introduction to Machine Tools**
Classification of machine tools, kinds of motion in machine tool operations, definition of cutting speed, feed and depth of cut.

**Module II: Lathe**
Classification and various parts of Lathe, specification, Description of important mechanism viz. apron, tail stock, head stock, work holding, devices and operations, e.g. taper, turning, eccentric turning and screw-cutting, Geometry of a single point cutting tool. Calculation of machining time, Capstan and turret lathe

**Module III: Drilling Machine**
Geometry and nomenclature of a twist drill, specification and classification of drilling machines, cutting speed, feed, depth of cut and calculation machining time in drilling, tool holding devices, different types of operations performed on a drilling machine.

**Module IV: Milling Machine**
Classification, up milling and down milling, dividing Head, different types of operations – simple, compound and differential indexing, slab milling, spiral milling, slot milling, T-slot milling and end milling.

**Module V: Shaper, Slotter & Planner**
Principal part of a shaper, classification, Quick Return mechanism, table feed mechanism of a shaper, Operations, e.g. horizontal, vertical and inclined shaping, difference between a shaper, planer and slotter, cutting speed, feed, and depth of cut and calculation of machining time in shaping.

**Module VI: Grinding Machines**
Construction and specification of a grinding wheel, wheel turning and dressing, Grinding machines surface, cylindrical and center less grinding.

**Module VII: Special Machines**
Horizontal and vertical boring machines, Gear Geometry, Gear generation and hobbing; Lapping, honing and super finishing processes.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***
- P.N. Rao, “Manufacturing Technology: Metal Cutting & Machine Tools”, Tata McGraw Hill, Delhi, 2004.
- B.S. Raghuwanshi, “Workshop Technology”, Vol.2, Dhanpat Rai & Sons, 2003.
- Hazra Chandhari S.K., “Elements of Workshop Technology”, Vol.2, Media Promoters, 2003.

***References:***
- P.C. Sharma, “A Text Book of Production. Engineering”, S. Chand, New Delhi, 2004.
- Bawa H.S., “Workshop Technology”, Vol.2, Tata McGraw Hill, 2004.
- Juneja & Shekhon, “Fundamental of Metal Cutting”, New Age Publications
- S.F. Krar Stevan F. and Check A.F., “Technology of M/C Tools”, McGraw Hill Book Co., 1986.
- Kibbe Richard et al, “M/c Tool practices”, Prentice Hall India, 2003.
- Bangalore HMT, “Production Technology”, Tata McGraw Hill, 1980.
- R.K. Jain, “Production Technology”, Khanna Publishers
- Gerling Heinrich, “All about Machine Tools”, New Age Publication, 2003.

# THEORY OF METAL FORMING

**Course Code: BTM 404 Credit Units: 03**

## Course Objective:
The objective of this course is to introduce the fundamentals of basic manufacturing processes (solidification process, heat treatment, deformation processes, material removal processes, and joining processes). The students are expected to be able to select, analyze and design basic manufacturing processes for product development.

## Course Contents:

**Module I: Introduction**
Review of tensile test, True stress and true strain, Yielding criteria for ductile metals, Yield locus, Plastic stress-strain relations-Levymises equation, prandtl-Reuss equations.

**Module II: Plastic deformation**
Crystal Geometry, Lattice defects, Deformation by slip, Shear Stress required to cause slip in a perfect Crystal, Deformation by twinning, Fracture, Types of Fracture, Creep Failure.

**Module III: Introduction to metal working**
Classification of metal working processes-Cold working, Hot working, Effect of variables on metal working processes, Methods of Analysis of metal working processes.

**Module IV: Forging**
Classification of Forging Processes, Forging equipment, Open die forging, Closed die forging, Load calculation in Plane strain forging, Forging defects.

**Module V: Rolling**
Rolling Mills, Hot rolling, Cold rolling, Forces and Geometrical Relationships in Rolling, Rolling load & torque, rolling defects.

**Module VI: Extrusion**
Methods of Extrusion, Hot Extrusion, Cold Extrusion, Analysis of Extrusion processes, Effect of Variables on Extrusion pressure, Extrusion defects.

**Module VII: Sheet metal forming**
Forming Methods, Forming Operations-Shearing, Blanking, Bending, Stretch Forming, Deep Drawing, Stresses developed in Deep Drawing, Defects in Formed Parts.

## Examination Scheme:

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Mechanical Metallurgy by George E. Dieter: Mc Graw-Hill Book Company
- Metal working by Surinder Kumar, Dhanpat Rai & Sons

# ELECTRICAL MACHINES

**Course Code: BTM 405 Credit Units: 03**

## Course Objective:

Electrical Machines provides the backbone for successful and uninterrupted smooth functioning of any industry. Knowledge of this subject in any engineering branch is vital in process industry. The course covers the machines e.g. Motors & generators characteristics and classifications related to mechanical & automation as well as recent development engineering applications. Successful completion of this course will be very helpful for the students who wish to join challenging industry.

## Course Contents:

**Module I**

Introduction to Subject, Some important fundamentals, Electrical Power generation, Utilization & distribution facts & figures. Simple Loop Generator, D C Machines, Construction Features, Principle of Operation.

**Module II**

DC Generator Analysis & DC Motor, Classification & Characteristics & Analysis. Speed Torque Characteristics, Speed control of D C Motor. Application of D C Motor. Starters.

**Module III**

A C Machines, 3 phase IM, Revolving Magnetic field theory, IM as a transformer, Equivalent Circuit. 3 phase Synchronous Machines, Synchronous Motor, Synchronous Generator, Equivalent Ckt.

**Module IV**

Single phase Induction Motor, Double Revolving Field theory, Different types of 3 phase IM.
Characteristics & typical Applications., Stepper Motor, Hysterisis Motor, A C Series Motors
.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***


- I J Nagrath & D P Kothari. “Electrical Machines”. TMH
- Irvin Kosow, “Electrical Machines & Transformers”, PHI.


***References:***


- B L Theraja “Electrical Engineering”.

# PRINCIPLES OF COMPUTER GRAPHICS

**Course Code: BTM 406 Credit Units: 02**

## Course Objective:

The objective of the course is to provide the understanding of the fundamental graphical operations and the implementation on computer, the mathematics behind computer graphics, including the use of spline curves and surfaces. It gives the glimpse of recent advances in computer graphics, user interface issues that make the computer easy, for the novice to use.

## Course Contents:

**Module I: Introduction to Graphics and Graphics Hardware System**

Video display devices, CRT, LCD Display devices Raster scan displays, Random scan displays, Raster scan systems, Random scan Systems.

Input devices, keyboard, mouse, Trackball and spaceball, Joystick, Data glove, Digitizers, Image scanners, Touch panels, Light pens, Voice systems.

Hardcopy devices, Printers, Plotters.

**Module II: Output Primitives and Clipping operations**

Algorithms for drawing 2D Primitives lines (DDA and Bresenham's line algorithm),circles (bresenham's and midpoint circle algorithm),ellipses(midpoint ellipse algorithm),other curves(conic sections, polynomials and spline curves).

Antialiasing and filtering techniques

Line clipping (cohen-sutherland algorithm), clip windows, circles, ellipses, polygon, clipping with Sutherland Hodgeman algorithm.

**Module III: Geometric transformation**

2D Transformation: Basic transformation, Translation, Rotation, scaling, Matrix Representations and Homogeneous coordinates, window to viewport transformation.

3D Concepts: Parallel projection and Perspective projection, 3D Transformation.

**Module IV: 3D object Representation, Colour models and rendering**

Polygon meshes in 3D, Spheres, Ellipsoid, Bezier curves and Bezier surfaces, Bspline curves and surfaces, solid modeling, sweep representation, constructive solid geometry methods. Achromatic and color models.

Shading ,rendering techniques and visible surface detection method: Basic illumination, diffuse reflection, specular reflection. Polygon rendering method, Gouraud & Phong shading. Depth-buffer method, A-buffer method, Depth-sorting method(painter's algorithm).

**Module V: Introduction to multimedia**

File formats for BMP, GIF, TIFF, IPEG, MPEG-II, Animation techniques and languages.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References*:*

***Text:***

- Foley et. al., "Computer Graphics Principles & practice", 2nd ed. AWL., 2000.
- D. Hearn and P. Baker, "Computer Graphics", Prentice Hall, 1986.
- R. Plastock and G. Kalley, "Theory and Problems of Computer Graphics", Schaum's Series, McGraw Hill, 1986

***References:***

- R.H. Bartels, J.C. Beatty and B.A. Barsky, "An Introduction to Splines for use in Computer Graphics and Geometric Modeling", Morgan Kaufmann Publishers Inc., 1987.
- C.E. Leiserson, T.H. Cormen and R.L. Rivest, "Introduction to Algorithms", McGraw-Hill Book Company, 1990.
- W. Newman and R. Sproul, "Principles of Interactive Computer Graphics, McGraw-Hill, 1973.
- F.P. Preparata and M.I. Shamos, "Computational Geometry: An Introduction", Springer-Verlag New York Inc., 1985.
- D. Rogers and J. Adams, "Mathematical Elements for Computer Graphics", McGraw-Hill International Edition, 1989
- David F. Rogers, "Procedural Elements for Computer Graphics", McGraw Hill Book Company, 1985.
- Alan Watt and Mark Watt, "Advanced Animation and Rendering Techniques", Addison-Wesley, 1992

# KINEMATICS AND DYNAMICS OF MACHINES LAB

**Course Code:** **BTM 420** **Credit Units: 01**

## Course Contents:

## List of Experiments:

1. To study inversion of 3 R-IP Kinematics chain
2. To study inversions of 2R-2P Kinematics Chain
3. To carry out computer implementable kinematics analysis of 4 R mechanisms
4. To carry out computer implementable kinematics analysis of slider bar mechanism
5. To study gear box, clutch and differential gear
6. To find coefficient of friction for clutch plate
7. To determine gear ratio for an epicyclical gear train and verify it by analytical method
8. To study different types of Cam follower systems
9. To verify Gyroscopic Law
10. To determine and verify the whirling speed of a shaft-disc system
11. To determine the damping factor for a given horizontal vibration set up
12. To obtain dynamic balance for an unbalanced system with revolving masses

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# MANUFACTURING MACHINES LAB

**Course Code:** **BTM 421** **Credit Units: 01**

## Course Contents:

1. Operations on the Lathe Machine.
2. Operations on the Shaper Machine.
3. Operations on the Planner Machine.
4. Operations on the Drilling Machine.
5. Operations on the Grinding Machine.
6. Operations on the Milling Machine.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# ELECTRICAL MACHINES LAB

**Course Code: BTM 422 Credit Units: 01**

## Course Contents:

| S. NO. | NAME OF THE EXPERIMENTS |
|---|---|
| 1. | Speed Control of DC Shunt Motor |
| 2. | To obtain magnetization characteristics of<br>1) Separately excited DC Generator<br>2) Shunt Generator |
| 3. | To obtain the load characteristics<br>1) DC Shunt Motor<br>2) Cumulative Compound generator |
| 4. | To conduct Swinburne Test on a DC. Shunt Motor and hence obtain its efficiency at full load. |
| 5. | To perform No Load Test and blocked rotor test on a three phase Induction motor and hence determine its equivalent circuit parameters. |
| 6. | To perform load test on a three phase Induction Motor and obtain its various performance characteristics. |
| 7. | Retardation Test on a three phase induction motor and calculate its moment of inertia. |
| 8. | To perform No Load and Blocked Rotor Test on a single phase Induction motor and hence determine its equivalent circuit parameters. |
| 9. | To perform open circuit and short circuit test on a three phase alternator and hence determine its voltage regulation by synchronous Impedance Method. |
| 10. | To obtain V curves of a three phase synchronous motor at no load. |

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# PRINCIPLES OF COMPUTER GRAPHICS LAB

**Course Code: BTM 423 Credit Units: 01**

**Software Required**: Turbo C/C++

**Course Contents:**

## Assignments will be provided for the following:

1. Geometrical shapes based on graphics algorithms
2. 2D Geometric transformation translation, rotation, scaling, reflection.
3. Clipping
4. Animation

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# HEAT AND MASS TRANSFER LAB

**Course Code: BTM – 424** **Credit Units: 01**

**List of Experiments:**

1. To determine the thermal conductivity of a Metal Bar
2. To determine the convective heat transfer co-efficient for a vertical cylinder by free or natural convection.
3. To determine the convective heat transfer co-efficient for a Horizontal Pipe by forced convection.
4. To determine the value of Stefan – Boltzman constant for radiation heat transfer
5. To determine the heat transfer coefficient under forced condition using Pin Fin apparatus
6. To determine the effectiveness & overall heat transfer coefficient for parallel & counter parallel flow heat exchanger
**7.** To determine the emissivity of a Grey surface at different temperatures.
8. To determine the overall heat transfer co-efficient for the composite wall and to compare the same with that calculated from the equations.
9. Determination of effectiveness of temperature distribution plotted for the temperature.
10. To determine the effectiveness of temperature distribution of Pin Fin
11. Determination of thermal effectiveness of insulating Powder

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# COMMUNICATION SKILLS - II

**Course Code:** **BTM 441** **Credit Units: 01**

## Course Objective:
To teach the participants strategies for improving academic reading and writing.
Emphasis is placed on increasing fluency, deepening vocabulary, and refining academic language proficiency.

## Course Contents:

**Module I: Social Communication Skills**
Small Talk
Conversational English
Appropriateness
Building rapport

**Module II: Context Based Speaking**
In general situations
In specific professional situations
Discussion and associated vocabulary
Simulations/Role Play

**Module III: Professional Skills**
Presentations
Negotiations
Meetings
Telephony Skills

## Examination Scheme:

| Components | CT1 | CT2 | CAF | V | GD | GP | A |
|---|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 25 | 10 | 10 | 10 | 5 |

CAF – Communication Assessment File
GD – Group Discussion
GP – Group Presentation

## Text & References:


- Essential Telephoning in English, Garside/Garside, Cambridge
- Working in English,  Jones, Cambridge
- Business Communication, Raman – Prakash, Oxford
- Speaking Personally, Porter-Ladousse, Cambridge
- Speaking Effectively, Jermy Comfort, et.al, Cambridge
- Business Communication, Raman – Prakash, Oxford

# BEHAVIOURAL SCIENCE - IV
# (RELATIONSHIP MANAGEMENT)

**Course Code:** **BTM 443** **Credit Units: 01**

## Course Objective:
To understand the basis of interpersonal relationship
To understand various communication style
To learn the strategies for effective interpersonal relationship

## Course Contents:

**Module I: Understanding Relationships**
Importance of relationships
Role and relationships
Maintaining healthy relationships

**Module II: Bridging Individual Differences**
Understanding individual differences
Bridging differences in Interpersonal Relationship – TA
Communication Styles

**Module III: Interpersonal Relationship Development**
Importance of Interpersonal Relationships
Interpersonal Relationships Skills
Types of Interpersonal Relationships

**Module IV: Theories of Interpersonal Relationships**
Theories: Social Exchange, Uncertainty Reduction Theory
Factors Affecting Interpersonal Relationships
Improving Interpersonal Relationships

**Module V: Impression Management**
Meaning & Components of Impression Management
Impression Management Techniques (Influencing Skills)
Impression Management Training-Self help and Formal approaches

**Module VI: End-of-Semester Appraisal**
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

## Examination Scheme:

| **Components** | **SAP** | **A** | **Mid Term Test (CT)** | **VIVA** | **Journal for Success (JOS)** |
|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 05 | 20 | 30 | 25 |

## Text & References:


- Vangelist L. Anita, Mark N. Knapp, Inter Personal Communication and Human Relationships: Third Edition, Allyn and Bacon
- Julia T. Wood. Interpersonal Communication everyday encounter
- Simons, Christine, Naylor, Belinda: Effective Communication for Managers, 1997 1st Edition Cassell
- Goddard, Ken: Informative Writing, 1995 1st Edition, Cassell
- Harvard Business School, Effective Communication: United States of America
- Foster John, Effective Writing Skills: Volume-7, First Edition 2000, Institute of Public Relations (IPR)
- Beebe, Beebe and Redmond; Interpersonal Communication, 1996; Allyn and Bacon Publishers.

# FRENCH - IV

**Course Code:** **BTM 444** **Credit Units: 02**

## Course Objective:

To enable students:

- To develop strategies of comprehension of texts of different origin
- To present facts, projects, plans with precision

## Course Contents:

**Module C: pp. 104 – 139: Unités 8, 9**

**Contenu lexical:** **Unité 8: Découvrir le passé**

1. parler du passé, des habitudes et des changements.
2. parler de la famille, raconter une suite d'événements/préciser leur date et leur durée.
3. connaître quelques moments de l'histoire

**Unité 9: Entreprendre**

1. faire un projet de la réalisation: (exprimer un besoin, préciser les étapes d'une réalisation)
2. parler d'une entreprise
3. parler du futur

**Contenu grammatical:**

1. Imparfait
2. Pronom « en »
3. Futur
4. Discours rapporté au présent
5. Passé récent
6. Présent progressif

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- le livre à suivre : Campus: Tome 1

# GERMAN - IV

**Course Code: BTM 445 Credit Units: 02**

## Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany.
Introduction to Advanced Grammar Language and Professional Jargon

## Course Contents:

**Module I: Present perfect tense**
Present perfect tense, usage and applicability
Usage of this tense to indicate near past
Universal applicability of this tense in German

**Module II: Letter writing**
To acquaint the students with the form of writing informal letters.

**Module III: Interchanging prepositions**
Usage of prepositions with both accusative and dative cases
Usage of verbs fixed with prepositions
Emphasizing on the action and position factor

**Module IV: Past tense**
Introduction to simple past tense
Learning the verb forms in past tense
Making a list of all verbs in the past tense and the participle forms

**Module V: Reading a Fairy Tale**
Comprehension and narration

- Rotkäppchen
- Froschprinzessin
- Die Fremdsprache

**Module VI: Genitive case**
Genitive case – Explain the concept of possession in genitive
Mentioning the structure of weak nouns

**Module VII: Genitive prepositions**
Discuss the genitive propositions and their usage: (während, wegen, statt, trotz)

**Module VIII: Picture Description**
Firstly recognize the persons or things in the picture and identify the situation depicted in the picture;
Secondly answer questions of general meaning in context to the picture and also talk about the personal experiences which come to your mind upon seeing the picture.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:


- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant - 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

# SPANISH - IV

**Course Code: BTM 446 Credit Units: 02**

## Course Objective:

To enable students acquire working knowledge of the language; to give them vocabulary, grammar, voice modulations/intonations to handle everyday Spanish situations with ease.

## Course Contents:

**Module I**
Revision of eaSrlier semester modules
Introduction to Present Continuous Tense (Gerunds)

**Module II**
Translation with Present Continuous Tense
Introduction to Gustar, Parecer, Apetecer, doler

**Module III**
Imperatives (positive and negative commands of regular verbs)

**Module IV**
Commercial/business vocabulary

**Module V**
Simple conversation with help of texts and vocabulary
En la recepcion del hotel
En el restaurante
En la agencia de viajes
En la tienda/supermercado

## Examination Scheme:

| **Components** | **CT1** | **CT2** | **C** | **I** | **V** | **A** |
|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- Español Sin Fronteras (Nivel – Elemental)

# JAPANESE - IV

**Course Code: BTM 447 Credit Units: 02**

## Course Objective:
To enable the students to comfortably interact using basic Japanese.
**Note:** Teaching is done in roman as well as Japanese script, students will be taught katankana (another form of script) in this semester i.e. to be able to write all the foreign words in Japanese.

## Course Contents:

**Module I**
Comparison using adjectives, making requests

**Module II**
Seeking permission

**Module III**
Practice of conversations on:
Visiting people, Party, Meetings, after work, At a ticket vending machine etc

**Module IV**
Essays, writing formal letters

## Learning Outcome
- Students can speak the language describing above-mentioned topics.

## Methods of Private study /Self help
- Handouts, audio-aids, and self-do assignments, role-plays.
- Students are also encouraged to attend Japanese film festival and other such fairs and workshops organized in the capital from time to time.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

***Text:***
- Teach yourself Japanese

***References:***
- Shin Nihongo no kiso 1

# CHINESE – IV

**Course Code:** **BTM 448** **Credit Units: 02**

## Course Objective:

How many characters are there? The early Qing dynasty dictionary included nearly 50,000 characters the vast majority of which were rare accumulated characters over the centuries. An educate person in China can probably recognize around 6000 characters. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

## Course Contents:

**Module I**
Dialogue Practice
Observe picture and answer the question
Pronunciation and intonation
Character writing and stroke order.
Electronic items

**Module II**
Traveling – The Scenery is very beautiful
Weather and climate
Grammar question with – "bu shi …. Ma?"
The construction "yao … le" (Used to indicate that an action is going to take place)
Time words "yiqian", "yiwai" (Before and after).
The adverb "geng".

**Module III**
Going to a friend house for a visit meeting his family and talking about their customs.
Fallen sick and going to the Doctor, the doctor examines, takes temperature and writes prescription.
Aspect particle "guo" shows that an action has happened some time in the past.
Progressive aspect of an actin "zhengzai" Also the use if "zhe" with it.
To welcome someone and to see off someone …. I cant go the airport to see you off… etc.

**Module IV**
Shipment. Is this the place to checking luggage?
Basic dialogue on – Where do u work?
Basic dialogue on – This is my address
Basic dialogue on – I understand Chinese
Basic dialogue on – What job do u do?
Basic dialogue on – What time is it now?

**Module V**
Basic dialogue on – What day (date) is it today?
Basic dialogue on – What is the weather like here.
Basic dialogue on – Do u like Chinese food?
Basic dialogue on – I am planning to go to China.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- "Elementary Chinese Reader, Part-2" Lesson 31-38

# MACHINE DESIGN - I

**Course Code:** **BTM 501** **Credit Units: 03**

## Course Objective:

The objective of this course is to help students apply concepts learned in the mechanics, structure, material and manufacturing courses. This course offers working knowledge in the use of proper failure theories under steady and variable loading, design of mechanical elements, such as shaft, coupling, power screws, and detachable, permanent and welded connections.

## Course Contents:

**Module I: Variable stresses in Machine Parts**
Fatigue and Endurance Limit, Factor of Safety for Fatigue Loading, Stress concentration, Notch sensitivity, Gerber Method, Goodman Method and Soderberg Method for combination of stresses.

**Module II: Power Screws**
Types of screw threads, Torque required to raise and lower the load, Efficiency of square threaded screw, overhauling and self locking screw, stresses in power screw, design of screw jeck.

**Module III: Cotter and Knuckle Joints**
Types of cotter joints, design of socket and spigot joint, design of sleeve and cotter joint, design of jib and cotter joint, Design procedure of Knuckle joint.

**Module IV: Riveted and Welded Joint**
Types of Riveted joint, Lap joint , Butt Joint, Caulking and Fullering, Failure of Riveted joint, Strength of Riveted joint, Efficiency of Riveted joint. Advantages and Disadvantages of welded joint over Riveted joint, Strength of Fillet joint, strength of Butt joints.

**Module V: Keys and Couplings**
Types of Keys, Splines, Strength of Sunk Key, types of shaft coupling, Sleeve and muff coupling, Flange coupling, Flexible coupling, Oldham coupling, Universal coupling.

**Module VI: Drives**
Types of Belt drives, Flat Belt drives, Velocity ratio, Sleep, Creep of Belt, Length of open Belt, length of cross belt, power transmission by belt, Maximum tesion in the belt. Types of V belt and Pulleys, advantages and disadvantages of V belt over Flat Belt, Ratio of Driving tensions for V belt, Rope drives. Chain drives, advantages and disadvantages of Chain drives.

**Module VII: Industrial Visit**
At least one visit to local industry in the field of Mechanical Engineering.

## Examination Scheme:

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- J.E. Shigley, Mechanical Engineering Design.
- Sadhu Singh, Machine Design
- R.S. Khurmi & J.K. Gupta, Machine design
- D.K. Aggarwal & P.C. Sharma, Machine Design

# METROLOGY

## Course Code: BTM 502 Credit Units: 03

## Course Objective:
The main objective of this course is to give the student: a basic understanding of the physical loss governing metrology and tolerance design. Gain and appreciation for the capabilities and applications of metrology through hands own experiences.

## Course Contents:

**Module I: Principles of measurement**
Definition of Metrology, difference between precision and accuracy. Sources of errors: Controllable and Random Errors, Effects of Environment and Temperature, Effects of support, alignment errors.
**Length Standards:** Line standards, end standards and wavelength standards, transfer from line standards to end standards. Numerical based on line standards. Slip gauges – its use and care, methods of building different heights using different sets of slip gauges.
**Limits, fits and tolerances:** Various definitions, different types of fits and methods to provide these fits. Numerical to calculate the limits, fits and tolerances, ISO system of limits and fits; Gauges and its types, limit gauges – plug and ring gauges. Gauge Design – Taylor's Principle, wear allowance on gauges.

**Module II: Comparators**
Principles and working of Mechanical, Electrical, Optical and Pneumatic Comparators.
**Angular Measurement:** Sine Bar – different types of sine bars, use of sine bars in conjunction with slip gauges, Use of angle gauges, spirit level, errors in use of sine bars. Numericals. Principle and working of autocollimator.

**Module III: Straightness and flatness**
Definition of Straightness and Flatness error. Numericals based on determination of straightness error of straight edge with the help of spirit level and auto collimator
**Screw Thread Measurement:** Errors in threads, Measurement of elements of screw threads –major diameter, minor diameter, pitch, flank angle and effective diameter (Two and three wire methods). Effect of errors in pitch and flank angles
**Gear Measurement:** Measurement of tooth thickness – Gear tooth vernier caliper, Constant chord method, base tangent method and derivation of mathematical formulae for each method. Parkinson Gear Tester.

**Module IV**
**Machine Tool Alignment:** Machine tool tests and alignment tests on lathe. Alignment tests on milling machine. Alignment tests on a radial drilling machine, Interferometry.
**Surface texture:** Introduction, types of irregularities, Elements of surface
Texture, Measurement of surface finish, Examination of surface Roughness.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***
- R.K. Jain, "Engineering Metrology", Khanna Publishers, Delhi
- I.C. Gupta, "Engineering Metrology", Dhanpat Rai Publications, Delhi

***References:***
- F.W. Galyer & C.R. Shotbolt, "Metrology for Engineers", ELBS edition.

# MEASUREMENTS AND CONTROLS

**Course Code: BTM 503 Credit Units: 03**

## Course Objective:

Knowledge of Measurement & Control in any engineering branch is vital in designing and industrial production/application. The course covers the characteristics and classifications of measurement related to mechanical & automation as well as recent development in measurement & control engineering applications. Successful completion of this course will be very helpful for the students who wish to join challenging industry.

## Course Contents:

**Module I**

Introduction to generalized measurement system and their functional elements. Basic characteristics of measuring devices, Standards & Calibration. Accuracy, Precision, Sensitivity, Resolution, Linearity & Errors in measurement.

**Module II**

Transducers, Stages & their classification, Resistive transducers, Strain gauges, Rosettes, Inductive transducers, Displacement measurement, LVDT.

**Module III: Applications**

Miscellaneous instruments in Industrial & Environmental Applications, Measurement of viscosity & flow, Transient Time & Doppler’s flow meter, Measurement of liquid level, humidity, hair hygrometers.

**Module IV**

Control engineering applications, Introduction to type of control Systems, Open loop & close loop Control Systems; Examples & their block diagrams. Transfer function, Stability of Control System, Hurwitz Polynomial& Routh Hurwitz Criterian. Block diagram representation & reduction.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***


- Sawhney A. K 2000, “A course in Electrical & Electronics Measurement & Instrumentation”, Dhanpat Rai & Son’s.
- B.C Nakra, K K Chaudhary. 2004,”Instrumentation, Measurement & Analysis”. TMH.
- M Ogata, “Modern Control Engineering” PHI.


***References:***


- H.S Kalsi, 1999, Electronic Instrumentation”, TMH.
- B. C Kuo, “Automatic Control System”, Prentice Hall.

# RELATIONAL DATABASE MANAGEMENT SYSTEM

## Course Code: BTM 504 Credit Units: 03

## Course Objective:
Database applications have grown enormously in number and importance in the past two decades. They are used to store, manipulate and retrieve data in nearly every type of organization. The applications are used by individuals on PCs, by workgroups on network servers and by all employees using enterprise-wide distributed systems. Database technology will assume even greater importance in the future due to the highly competitive environment and the explosive use of the internet in Business-to-Client and Business-to-Business applications and the need to store more data. That is why a course database management is a core course in the CS&IT curriculum.

## Course Contents:

**Module I: Introduction**
Concept and goals of DBMS, Database Languages, Database Users, Database Abstraction.
Basic Concepts of ER Model, Relationship sets, Keys, Mapping, Design of ER Model

**Module II: Hierarchical model & Network Model**
Concepts, Data definition, Data manipulation and implementation.
Network Data Model, DBTG Set Constructs, and Implementation

**Module III: Relational Model**
Relational database, Relational Algebra, Relational & Tuple Calculus.

**Module IV: Relational Database Design and Query Language**
SQL, QUEL, QBE, Normalization using Functional Dependency, Multivalued dependency and Join dependency.

**Module V: Concurrency Control and New Applications**
Lock Based Protocols, Time Stamped Based Protocols, Deadlock Handling, Crash Recovery. Distributed Database, Objective Oriented Database, Multimedia Database, Data Mining, Digital Libraries.

## Examination Scheme:

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***


- Korth, Silberschatz, “Database System Concepts”, 4th Ed., TMH, 2000.
- Steve Bobrowski, “Oracle 8 Architecture”, TMH, 2000


***References:***


- Date C. J., “An Introduction to Database Systems”, 7th Ed., Narosa Publishing, 2004
- Elmsari and Navathe, “Fundamentals of Database Systems”, 4th Ed., A. Wesley, 2004
- Ullman J. D., “Principles of Database Systems”, 2nd Ed., Galgotia Publications, 1999

# MICROPROCESSOR AND MICROCONTROLLER SYSTEMS

**Course Code: BTM - 505** **Credit Units: 04**

## Course Objective:

This course deals with the systematic study of the Architecture and programming issues of 8085-microprocessor and 8051microcontroller family. The aim of this course is to give the students basic knowledge of the above microprocessor needed to develop the systems using it.

## Course Contents:

**Module I: Microprocessor 8086**

Introduction to 16 bit Microprocessors, Block diagram of 8086 family, architecture and pin configuration of 8086, minimum mode & maximum mode Operation, Bus Interface Unit, Register Organization, Instruction Pointer, Stack & Stack pointer, merits of memory segmentation, Execution Unit, Register Organization.

**Module II: Microprocessor 8086 Programming**

Instruction set of 8086, Addressing Modes, Assembler directives, Assembly language programming, Subroutine Call and returns, Stack structure and programming, Interrupt and Interrupt service routines, Timings and Delays.

**Module III: Memory System Design & I/O Interfacing**

Memory interfacing with 8085. Interfacing with input/output devices like ADC and DAC, Traffic light controller etc. (memory mapped, peripheral I/O), Cache memory system. Study of following peripheral devices 8255, 8253, 8257, 8259, 8251.

**Module IV: 8051 Microcontroller**

Features, architecture, Pin Diagram, Interrupts, Interrupt structure and priorities, Port structure and operation, memory organization, external memory interfacing, instruction syntax, data types, subroutines, addressing Modes, instruction set, ALP of 8051

**Module V: 8051 Microcontroller Interfacing and Applications**

Programming 8051 Timers and Serial port programming, 8051 interfacing to ADC and DAC, stepper motor and Sensors. Serial Communication, Modes and Programming.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

*Text:*

- Ramesh. S. Gaonkar, "Microprocessor architecture Programming and Application with 8085" Penram International Publishing, 4th Edition
- B.Ram, "Fundamentals of microprocessors and microcomputer" Dhanpat Rai, 5th Edition.
- Douglas V Hall.

*References:*

- M. Rafiquzzaman, "Microprocessor Theory and Application" PHI – 10th Indian Reprint.
- Naresh Grover, "Microprocessor comprehensive studies Architecture, Programming and Interfacing" Dhanpat Rai, 2003.
- Gosh," 0000 to 8085" PHI.

# METROLOGY LAB

**Course Code: BTM 521** **Credit Units: 01**

## Course Contents:

## Name of Experiments:

1 Set up a dimension by slip gauges (example 36.936; 14.727…..) Measure this set up by micrometer (least count 0.01) several times and read dimensions. Find statistical mean and record the expected variation between the actual dimension and dimension measured by micrometer.

2 To check the roundness of a circular bar with the help of dial gauge.

3 Mill a component to dimension (23, 57.6,…). Set up a comparator by slip gauge set to this dimension. Check component deviation by the comparator and record the deviation. Measure several times and obtain the mean value.

4 Check the bore in a component by a bore-indicator. Set the bore indicator by micrometer and measure the deviation in the bore. Measure several times and obtain the mean value at three positions along the length of the bore.

5 Set – up a sine bar for measuring the angle of an inclined surface (of a bracket, milling cutter arbor with 7/24 taper, ….). Measure the angle several times and record the mean value. Use height gauge wherever necessary.

6 Check angular dimension of a dovetail guide way by measuring across rollers.
Check the included angle of a V – block (90º, 60º, …) / or a machined groove by measuring over a roller using height gauge and parallel blocks/slip gauges.

7 Measure the straightness of a surface (surface plate; guide way of machine tool) by using straight edge and dial gauge and dial gauge stand. Set up straight edge on jacks such that dial reading at each end coincide. Move the dial stand along the straight edge. Record readings at 50 mm interval and draw a plot. Obtain maximum deviation which is the straightness.

8 Measure straightness using a spirit level. Place spirit level at an initial position and note level reading. Move the level on a straight line and take readings at 50 mm intervals. Plot the difference from the original reading and obtain the straightness value.

9 Draw a trapezoidal and any other profile in AutoCAD to 1:1 scale. On a steel plate make the profile by fitting and filing. Set up the drawing on profile projector. Check the component and note deviations. Correct the profile and recheck. Make the profile as close to the required one.

10 To machine a given surface and study its roughness characteristics

11 To measure the geometry of a screw using profile projector

12 To study the cutting tool geometry using tool makers microscope

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# MEASUREMENTS AND CONTROLS LAB

**Course Code:** **BTM 522** **redit Units: 01**

## Course Contents:

## List of Experiments:

1. Measurement of resolution and sensitivity of thermocouple (study of various thermocouples J, K, T, etc.) (Calibration)
2. Measurement of resolution, sensitivity and non linearity of termistor. (termistor instability)
3. Measurement of thickness of LVDT.
4. Measurement of resolution of LVDT (and displacement measurement)
5. Study of proportional control and offset Problems.
6. Study of proportional integral control.
7. Study of proportional integral derivative (PID) control.
8. Vibration measurement by stroboscope (natural frequency of a cantilever)
9. Angular frequency (speed of rotating objects) measurement by stroboscope.
10. Pressure transducer study and calibration.
11. Proving ring (force measurement)
12. Torque cell.
13. Closed loop study of an electric circuit.
14. Young's modulus of a cantilever.
15. Young's modulus and poison's ratio of tensile test piece of M.S.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# MICROPROCESSOR SYSTEM LAB

**Course Code:** **BTM 523** **Credit Units: 01**

## Course Contents:

## List of Experiments:

1. ALP for 8 bit addition with and without carry
2. ALP for 8 bit subtraction with and without borrow
3. ALP for 8 bit multiplication and division
4. ALP for sorting an array of numbers in ascending and descending order
5. ALP with additional instructions
6. Study of programmable peripheral interface (8255) board
7. Study of programmable interval timer (8253) board
8. Study of programmable DMA controller (8257) board
9. Study of programmable interrupt controller (8259) board
10. Study of programmable serial communication interface (8251) board
11. Study of 16 bit Microprocessor (8086) Kit

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# PROGRAMMING LAB - II (MAT LAB)

**Course Code:** **BTM 524** **Credit Units: 01**

## Course Objective:

It is matrix based simulation software which works on algorithms. It carries various tool boxes which is helpful for day -to-day accessibility to real world. It helps in designing graphic user interface, provides tools for neural network. Hardware which are not economical for general purpose, this software tool box helps to minimize the cost ability.

## Course Contents:

**Software Requirement:** MAT LAB 6.5

## Name of Experiments:

1 To draw the time response for first order transfer function

$$H(S) = \frac{6}{S+9}$$

second order transfer function

$$H(S) = \frac{45}{S^2 + 6S + 49}$$

third order transfer function

$$H(S) = \frac{8S}{S(S+2)(S+3)}$$

2 To realize the time response in simulink by importing the system parameters from the work window for given transfer function

$$H(S) = \frac{4S}{S(S+9)(S+5)}$$

3 To draw the bode plot for following function

$$H(S) = \frac{46S}{(S+2)(S+4)(S^2+2S+4)}$$

and draw the bode plot using input arguments that represents the continuous state space system:

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ -3 & -4 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u$$

$$y = \begin{bmatrix} 10 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + [0]u$$

4 To draw the Nyquist plot for following function

$$H(S) = \frac{46S}{(S+2)(S+4)(S^2+2S+4)}$$

and draw the Nyquist plot using input arguments that represents the continuous state space system:

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ -3 & -4 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u$$

$$y = \begin{bmatrix} 10 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + [0]u$$

5 To draw the root locus plot for following transfer function

$$H(S) = \frac{45}{S(S+2)(S+4)^2}$$

6 Write a program to determine the values of the DTFT of a real sequence described as a rational function in $e^{-j\omega}$

$$X\left(e^{-j\omega}\right)=\frac{0.008-0.033e^{-j\omega}+0.05e^{-j2\omega}-0.033e^{-j3\omega}+0.033e^{-j4\omega}}{1+2.37e^{-j\omega}+2.7e^{-j2\omega}+1.6e^{-j3\omega}+0.41e^{-j4\omega}}$$

where K= 256

7 Write a program to determine the M-point DFT $u[k]$ of the following N-points sequence

$$u[n]=\begin{cases}1, & 0\le n\le N-1\\ 0, & \text{Otherwise}\end{cases}$$

here N=8 and M=16

8 Express the following Z- transform in factored form , plot its poles and zeros, and then determine its ROCs

$$G(Z)=\frac{2z^4+16z^3+44z^2+56z+32}{3z^4+3z^3-15z^2+18z-12}$$

9 Write a program to test the stability of the transfer function

$$H(Z)=\frac{1}{4z^4+3z^3+2z^2+z+1}$$

10 Design a DAS of given four signals with signal conditioning equipments in SIMULINK

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# RELATIONAL DATABASE MANAGEMENT SYSTEM LAB

**Course Code:** **BTM 525** **Credit Units: 01**

**Software Required:** Oracle 9i

## Course Contents:

**Topics covered in Lab will include:**

1. Database Design
2. Data Definition (SQL)
3. Data Retrieval (SQL)
4. Data Modification (SQL)
5. Views
6. Triggers and Procedures

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# COMMUNICATION SKILLS - III

**Course Code: BTM 541 Credit Units: 01**

## Course Objective:

To equip the participant with linguistic skills required in the field of science and technology while guiding them to excel in their academic field.

## Course Contents:

**Module I**
Reading Comprehension
Summarising
Paraphrasing

**Module II**
Essay Writing
Dialogue Report

**Module III**
Writing Emails
Brochure
Leaflets

**Module IV: Introduction to Phonetics**
Vowels
Consonants
Accent and Rhythm
Accent Neutralization
Spoken English and Listening Practice

## Examination Scheme:

| Components | CT1 | CT2 | CAF | V | GD | GP | A |
|---|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 25 | 10 | 10 | 10 | 5 |

CAF – Communication Assessment File
GD – Group Discussion
GP – Group Presentation

## Text & References:


- Effective English for Engineering Students, B Cauveri, Macmillan India
- Creative English for Communication, Krishnaswamy N, Macmillan
- A Textbook of English Phonetics, Balasubramanian T, Macmillan

# BEHAVIOURAL SCIENCE - V
# (GROUP DYNAMICS AND TEAM BUILDING)

**Course Code: BTM 543 Credit Units: 01**

## Course Objective:
To inculcate in the students an elementary level of understanding of group/team functions
To develop team spirit and to know the importance of working in teams

## Course Contents:

**Module I: Group formation**
Definition and Characteristics
Importance of groups
Classification of groups
Stages of group formation
Benefits of group formation

**Module II: Group Functions**
External Conditions affecting group functioning: Authority, Structure, Org. Resources, Organizational policies etc.
Internal conditions affecting group functioning: Roles, Norms, Conformity, Status, Cohesiveness, Size, Inter group conflict.
Group Cohesiveness and Group Conflict
Adjustment in Groups

**Module III: Teams**
Meaning and nature of teams
External and internal factors effecting team
Building Effective Teams
Consensus Building
Collaboration

**Module IV: Leadership**
Meaning, Nature and Functions
Self leadership
Leadership styles in organization
Leadership in Teams

**Module V: Power to empower: Individual and Teams**
Meaning and Nature
Types of power
Relevance in organization and Society

**Module VI: End-of-Semester Appraisal**
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

## Examination Scheme:

| Components | SAP | A | Mid Term Test (CT) | VIVA | Journal for Success (JOS) |
|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 05 | 20 | 30 | 25 |

## Text & References:


- Organizational Behaviour, Davis, K.
- Hoover, Judhith D. Effective Small Group and Team Communication, 2002,Harcourt College Publishers
- Dick, Mc Cann & Margerison, Charles: Team Management, 1992 Edition, viva books
- Bates, A. P. and Julian, J.: Sociology - Understanding Social Behaviour
- Dressers, David and Cans, Donald: The Study of Human Interaction
- Lapiere, Richard. T – Social Change
- Lindzey, G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology, Addison – Welsley, US.
- Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.

- LaFasto and Larson: When Teams Work Best, 2001, Response Books (Sage), New Delhi
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 2, Group (1996); Pfeiffer & Company
- Smither Robert D.; The Psychology of Work and Human Performance, 1994, Harper Collins College Publishers

# FRENCH - V

**Course Code: BTM 544** **Credit Units: 02**

## Course Objective:
To furnish some basic knowledge of French culture and civilization for understanding an authentic document and information relating to political and administrative life.

## Course Contents:

**Module D: pp. 131 – 156 Unités 10, 11**

**Contenu lexical:**

**Unité 10:** Prendre des décisions
1. Faire des comparaisons
2. décrire un lieu, le temps, les gens, l'ambiance
3. rédiger une carte postale

**Unité 11: faire face aux problèmes**
1. Exposer un problème.
2. parler de la santé, de la maladie
3. interdire/demander/donner une autorisation
4. connaître la vie politique française

**Contenu grammatical:**
1. comparatif - comparer des qualités/ quantités/actions
2. supposition : Si + présent, futur
3. adverbe - caractériser une action
4. pronom "Y"

## Examination Scheme:

| **Components** | **CT1** | **CT2** | **C** | **I** | **V** | **A** |
|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- le livre à suivre : Campus: Tome 1

# GERMAN - V

**Course Code: BTM 545 Credit Units: 02**

## Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany
Introduction to Advanced Grammar and Business Language and Professional Jargon

## Course Contents:

**Module I: Genitive case**
Genitive case – Explain the concept of possession in genitive
Mentioning the structure of weak nouns

**Module II: Genitive prepositions**
Discuss the genitive propositions and their usage: (während, wegen, statt, trotz)

**Module III: Reflexive verbs**
Verbs with accusative case
Verbs with dative case
Difference in usage in the two cases

**Module IV: Verbs with fixed prepositions**
Verbs with accusative case
Verbs with dative case
Difference in the usage of the two cases

**Module V: Texts**
A poem 'Maxi'
A text Rocko

**Module VI: Picture Description**
Firstly recognize the persons or things in the picture and identify the situation depicted in the picture;
Secondly answer questions of general meaning in context to the picture and also talk about the personal experiences which come to your mind upon seeing the picture.

## Examination Scheme:

| **Components** | **CT1** | **CT2** | **C** | **I** | **V** | **A** |
|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:


- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant - 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

# SPANISH - V

**Course Code:** **BTM 546** **Credit Units: 02**

## Course Objective:

To enable students acquire working knowledge of the language; to give them vocabulary, grammar, voice modulations/intonations to handle everyday Spanish situations with ease.

## Course Contents:

**Module I**
Revision of earlier semester modules

**Module II**
Future Tense

**Module III**
Presentations in English on
Spanish speaking countries'
Culture
Sports
Food
People
Politics
Society
Geography

**Module IV**
Situations:
En el hospital
En la comisaria
En la estacion de autobus/tren
En el banco/cambio

**Module V**
General revision of Spanish language learnt so far.

## Examination Scheme:

| **Components** | **CT1** | **CT2** | **C** | **I** | **V** | **A** |
|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:


- Español Sin Fronteras, Greenfield

# JAPANESE - V

**Course Code: BTM 547 Credit Units: 02**

## Course Objective:
To enable the students to converse, read and write language comfortably and be able to converse using different patterns and forms taught through out. Students are taught and trained enough to get placed themselves in Japanese companies.
**Note:** Teaching is done in roman as well as Japanese script.

## Course Contents:

**Module I**
Dictionary form of the verbs, Joining of verbs
Negative form of verbs
Potential form

**Module II**
Joining of many actions together
Usage of dictionary form of the verbs in sentences
Introducing colloquial language.

**Module III**
Direct form of the speech, quotations,
Expressing thoughts
Actions and reasoning

**Module IV**
Conclusion
Receiving and giving things, favour etc.
Different forms like 'tara' form.

**Module V**
Revision of the whole syllabus

## Learning Outcome
- Students can speak and use different patterns, ways to describe a particular situation and can converse comfortably in mentioned situations through out.
- Students can appear in the interviews for placements in Japanese companies.

## Methods of Private study /Self help
- Teaching will be supported by handouts, audio-aids, and self-do assignments and role plays.
- Use of library, visiting and watching movies in Japan and culture center every Friday at 6pm.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

***Text:***
- Teach yourself Japanese

***References:***
- Shin Nihongo no kiso 1

# CHINESE – V

**Course Code: BTM 548 Credit Units: 02**

## Course Objective:

What English words come from Chinese? Some of the more common English words with Chinese roots areginseng, silk, dim sum, fengshui, typhoon, yin and yang, T'al chi, kung-fu. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

## Course Contents:

**Module I**
Drills
Dialogue practice
Observe picture and answer the question.
Pronunciation and intonation.
Character writing and stroke order

**Module II**
Intonation
Chinese foods and tastes – tofu, chowmian, noodle, Beijing duck, rice, sweet, sour….etc. Learning to say phrases like – Chinese food, Western food, delicious, hot and spicy, sour, salty, tasteless, tender, nutritious, god for health, fish, shrimps, vegetables, cholesterol is not high, pizza, milk, vitamins, to be able to cook, to be used to, cook well, once a week, once a month, once a year, twice a week……
Repetition of the grammar and verbs taught in the previous module and making dialogues usingit.
Compliment of degree "de".

**Module III**
Grammar the complex sentence "suiran … danshi…."
Comparison – It is colder today than it was yesterday…..etc.
The Expression "chule….yiwai". (Besides)
Names of different animals.
Talking about Great Wall of China
Short stories

**Module IV**
Use of "huozhe" and "haishi"
Is he/she married?
Going for a film with a friend.
Having a meal at the restaurant and ordering a meal.

**Module V**
Shopping – Talking abut a thing you have bought, how much money you spent on it? How many kinds were there? What did you think of others?
Talking about a day in your life using compliment of degree "de". When you get up? When do you go for class? Do you sleep early or late? How is Chinese? Do you enjoy your life in the hostel?
Making up a dialogue by asking question on the year, month, day and the days of the week and answer them.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- "Elementary Chinese Reader " Part-II Lesson 39-46

# INDUSTRIAL PRACTICAL TRAINING - I

**Course Code:** **BTM 550** **Credit Units: 03**

## Methodology

Practical training is based on the theoretical subjects studied by students. It can be arranged within the college or in any related industrial unit. The students are to learn various industrial, technical and administrative processes followed in the industry. In case of on-campus training the students will be given specific task of fabrication/assembly/testing/analysis. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation on same.

## Examination Scheme:

| | |
|---|---|
| Feedback from industry/work place | 20 |
| Training Report | 40 |
| Viva | 15 |
| Presentation | 25 |
| **Total** | **100** |

# MANAGEMENT OF MANUFACTURING SYSTEMS

**Course Code:** **BTM 601** **Credit Units: 03**

## Course Objective:
The overall objective of this course is to provide high caliber engineering students with an in-depth understanding of strategic, tactical and operational issues relating to manufacturing industries worldwide. On completion of the course the students will be equipped with the state-of-the-art concepts, methods, techniques and tools to allow them to contribute towards the competitiveness of manufacturing organizations.

## Course Contents:

**Module-I**
Introduction
Production functions, Plant Organization: Principles of organization, Organization structure-line and staff Organization, Plant Location layout, Process layout product layout and combination layout methods of layout, economics of layout.
**Module- II**
Production Planning & Control
Types of products, demand, demand forecasting, marketing strategies, scheduling and control of scheduling, production control.
**Module –III**
Work and method study
Definition and concepts, method study procedures, symbols, advantages, Flow process charts, Motion study, micro motion, SIMO charts, system concepts, classification, analysis techniques.
**Module –IV**
Industrial maintenance
Definition and concepts of Maintenance, Need of Maintenance Management, Maintenance Policies, Strategies and options in Maintenance management. Types, organization for maintenance department, Breakdown and preventive maintenance.
**Module –V**
Inventory control and replacement analysis
Purpose of Inventory – Cost related to inventors – Basic EOQ model, Introduction replacement policy and method adopted, ABC Analysis, MRP Analysis.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

*Text:*
- S.K. Sharma, “Industrial Engg. & Operation Management”, S.K. Kataria & Sons.
- Dr. Ravi Shankar, “Industrial Engg. & Management”, Galgotia Publications
- M. Mahajan, “Industrial Engg. & Production Management”, Dhanpat Rai & Co.
- J Moore, Manufacturing Management, Prentice Hall
- Buffa, Modern production and operations management, E.S. Wiley eastern.

*References:*
- Joseph S. Martinich, “Production & Operation Management”, John Wiley & Sons.

# MACHINE DESIGN - II

**Course Code:** **BTM 602** **Credit Units: 03**

## Course Objective:
The course aims at developing concepts as to how to analyze mechanical systems and select proper machine elements (bearing, gears, belts, chains). It prepares the students how to design machine element by specifying their type, geometry, material and how to integrate these elements to build a mechanical systems.

## Course Contents:

**Module I:**
Introduction: Different theories of failure and design based on theories. Design for fatigue, design for creep and design for wear and corrosion.
**Module II: Belt and Chain drives**
Belt Drives: Types of Belt drives, Flat Belt drives, Velocity ratio, Creep of Belt, Length of open Belt, length of cross belt. Power transmission by belt, Maximum tension in the belt. Types of V belt and Pulleys, advantages and disadvantages of V belt over Flat Belt. Ratio of driving tensions for V belt, Rope drives. Chain drives, advantages and disadvantages of Chain drives.
**Module III: Brakes and Clutches Brakes**
Types, Design of shoe brakes, and Design of Band and Disc Brakes. Clutches: Types, Plate clutches –design for uniform pressure and wear.
**Module IV:** Bearings
Design of Bearings: Brief overview of bearings, Design of Fluid Film bearings and Rolling contact bearings. Types of sliding bearing. Materials, type of lubrication, design of sliding bearing. Selection and application of rolling bearing, seals.
**Module V: - Gears**
Design of Gears: Law of gearing -conjugate action and gear tooth profile-basics Analysis of forces on spur, helical, bevel and worm gears. Design procedure of various gears.
**Module VI: - Engine Parts**
Design of Engine parts: Design of cylinder and cylinder head, Design of Piston. Design of connecting rod. Design of crankshaft.
.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***
- Maleeve Hartman and O.P. Grover, “Machine Design”, CBS Publication & Publishers.
- V.B Bhandari, “Machine Design”, Tata McGraw Hill.
- P.C. Sharma and D.K Aggarwal., “Machine Design”, S.K. Kataria & Sons.

***References:***
- Mahadevan, “Design Data Book”, CBS Publication & Publisher

# FLUID POWER SYSTEMS

**Course Code: BTM 603 Credit Units: 03**

## Course Objective:
Fluid power systems cover generation, transmission, and control applications of power by using pressurized fluids. This course imparts the knowledge of different fluid power systems (pneumatic and hydraulic) which are used in industries and hydropower plants.

## Course Contents:

**Module I: Introduction**
Euler's equations for turbo machines; impulse and reaction forces due to fluid systems on stationery and moving system of vanes; jet propulsion.

**Module II: Water Turbines**
Classification: Pelton, Francis, Propeller and Kaplan turbines; velocity triangles; efficiency; draft tubes, governing.

**Module III: Pumps**
Centrifugal pumps, velocity triangles, efficiency, turbine pumps, axial and mixed flow pumps.

**Module IV: Performance of Fluid Machines**
Similarity laws applied to rotodynamic machines; specific speed, unit quantities; characteristic curves; use of models; cavitations and attendant problems in turbo machines; selection of turbines hydroelectric plants.

**Module V: Hydraulic Power Transmission**
Transmission of hydraulic power through pipe lines; water hammer; precautions against water hammer in turbine and pump installations: hydraulic ram.

**Module VI: Power Hydraulics**
Positive pumps: gear, vane, screw, pump, variable delivery valves: flow control, pressure control, direction control, solenoid operated valve, hydraulic circuits, fluid coupling and torque converter.
Pneumatic Power: Basic principles, comparison of pneumatic and hydraulic Systems.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***
- Gupta, S. C., Fluid Mechanics and Hydraulic Machines, Pearson Education, 2007
- R.K. Bansal, "Fluid Mechanics & Hydraulic Machines", Laxmi Publications (P) Ltd., 2002.

***References:***
- Dr. D.S. Kumar, "Fluid Mechanics & Fluid Power Engineering", S.K. Kataria & Sons,2001
- D.R. Malhotra & N.K. Malhotra, "The Fluid Mech. & Hydraulics", Satya Prakashan, 2001
- V.P. Gupta, Alam Singh, Manish Gupta, "Fluid Mechanics, Fluid Mechanics & Hydraulics", CBS Publishers; 1999.

# METAL CUTTING AND TOOL DESIGN

**Course Code: BTM 604** **Credit Units: 03**

## Course Objective:

Metal cutting involves removing metal through machining operations. Machining traditionally takes place on lathes, drill presses, and milling machines with the use of various cutting tools. Successful machining also requires knowledge about the material being cut. This course is designed in such way that it explains all aspects (process and tools) of metal cutting. The course also covers the common tooling setups and operations as well as specialized applications for the more experienced users.

## Course Contents:

**Module I: Introduction**
Basic shape of cutting tools, Function of different angles of cutting tools, tool geometry and Nomenclatures-ASA, ORS systems, Conversion of angles, Tool Materials.

**Module II: Mechanism of chip formation**
Fracture & yielding mechanism, Types of chips, Factors involved in chip formation analysis, shear plane in flat chips, chip formation in drilling and milling.

**Module III: Mechanism of metal cutting**
Force system during turning, merchant circle diagram, velocity relationship, stress in conventional shear plane, Energy of cutting process, Ernst& merchant angle relationship, Lee-Shafer relationship, measurement of forces, Heat generation and temperature distribution in metal cutting.

**Module IV: Theory of Tool wears**
Criteria of wear, mach inability and tool life, Flank wear, Crater wear, Taylor’s tool life equation, causes and mechanism of tool failure, cutting fluid, Economics of metal machining.

**Module V: Design for sheet metal works**
Press working Terminology, press operation, types of dies, clearance, cutting forces, methods of reducing cutting forces, minimum diameter of piercing, center of pressure, Drawing dies-blank diameter, drawing force.

**Module VI: Jigs and Fixture design**
Important considerations in jig and fixture design, Locating and clamping, principles for location purposes, principles for clamping purposes, design principles for jigs and fixtures.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***
- A Bhattacharya , “Metal cutting theory& practice”, C.B. Publication

***References:***
- Geoffrey Boothroyd, “Fundamentals of Metal Machining & Machine Tools”, Tata McGraw Hill Kogakusha Ltd.
- P.N. Rao, “Manufacturing Technology”, Tata McGraw Hill Publication Ltd.
- Dr. P.C. Pandey & C.K. Singh, “Production Engg. Sciences”, Standard Publisher. Distributors.
- Dr. B.J. Ranganath, “Metal Cutting & Tool Design” Vikas Publishing House Pvt. Ltd.

# IC ENGINE AND GAS TURBINE

**Course Code:** **BTM 605** **Credit Units: 03**

## Course Objective:

This course provides an in-depth knowledge of the functioning of IC Engine & Gas Turbine, and also deals with the combustion techniques used for various fuels. This course finds immense application in automobile industry and gas-operated power plants.

## Course Contents:

**Module I: Fundamentals**
Development of IC engine, Classification, Working Cycles, Indicator diagram, comparison of SI Engine and CI Engine, two stroke and four-stroke engine, Valve timing diagram of SI and CI engine.

**Module II: Air Standard Cycle**
Assumptions in air standard cycle & fuel-air cycle, fuel-air cycle calculations, factors influencing fuel-air cycle, effects of variable specific heats, dissociation.

**Module III: Fuel and Combustion**
Combustion of SI engine, ignition limits, normal combustion, abnormal combustion, effect of engine Variable in ignition lag, spark advance and factors affecting ignition timing, pre-ignition, theory, and factors affecting detonation, PN, HUCR. Combustion in CI engine, fundamentals of combustion process in Diesel engine, delay period, diesel knock, and cold starting of CI engine. IC engine Fuel, combustion equations, theoretical air and excess air, stoichiometric air fuel ratio, desirable Properties of good IC engine fuels knock rating of SI engine fuel.

**Module IV: Performance & Testing**
Testing and performance of IC engine, performance parameters, basic measurement, engine Performance curve, fuel consumption, load outputs, engine power, heat balance.

**Module V: Gas Turbine**
General aspect of gas turbine, Jules cycle, Brayton cycle, classification, merits of gas turbine, open- cycle gas turbine, closed cycle gas turbine, Inter cooling, Reheating, Re-generation in gas turbine.

## Examination Scheme:

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***
- Ganesan, V. Internal Combustion Engine, Tata McGraw-Hill.
- Mathur, M.L. and Sharma, R.P. Internal Combustion Engine. Dhanpat Rai Publication
- Vladimir Leonidas Maleev. Internal-combustion Engines, Theory and Design. McGraw-Hill.

***References:***
- Lester Clyde Lichty, Robert Leroy Streeter. Internal Combustion Engines, McGraw-Hill
- Wallace Ludwig Lind. Internal-combustion Engines: Their Principles and Applications to Automobile, Aircraft, Ginn.
- Edward Frederic Obert, Burgess Hill Jennings, Internal Combustion Engines: Analysis and Practice
- Joseph Albert Polson. Internal Combustion Engines, Chapman & Hall, limited
- Rolla Clinton Carpenter, Herman Diederichs. Internal Combustion Engines, Their Theory Construction and Operation. Van Nostrand companies
- John Benjamin Heywood. Internal Combustion Engine Fundamentals. McGraw-Hill

# COMPUTER NETWORKS

**Course Code: BTM 606 Credit Units: 03**

## Course Objective:

The objective of this course is to gain an understanding of the fundamentals of data communications networks. The course provides a unified and fundamental view of the broad field of data communications networks. The major areas are covered: 1) Introduction to computer networks 2) Data transmission, 3) Data Communication, 4) Network layer 5) Application layer and Advanced N/w.

## Course Contents:

**Module I: Introduction**

Introduction to Computer Networks. Computer Networks: evolution, uses, hardware and software. OSI & TCP/IP reference models, with functionality and design issues of all layers presented in the models. Different topologies.

**Module II: Data Transmission**

Analog and Digital transmission, transmission media, line configuration, data communications codes, error detection and correlation methods. Multiplexing techniques (TDM, FDM). Data encoding methods: analog to digital, digital to analog etc.

**Module III: Data Communication Methods**

Data communication interface, line control unit, UART, USRT, Serial interface, terminal types. SDLC, HDLC, Addressing Switched networks, circuit switching, packet switching, broadcast networks. IEEE 802 LAN Standards, framing, error control, flow control.

**Module IV: Network layer and Transport Layer**

Design issues of Network Layer and Transport Layer, Routing algorithms, Virtual circuit and datagram. TCP, UDP, Ip4, ICMP, introduction of Ip6. Subnet, Virtual Private Networks, Repeaters, Hub, Routers, diff. types of Bridges, Switches, Gateways etc

**Module V: Application Layers and Advanced N/w**

Application layers: DNS, E-Mail, HTTP, WWW.
Advanced N/w: ATM, Frame relay, ISDN, Bluetooth.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***

- William Stallings, “Data & Computer Communications”, 6$^{th}$ Edition, PHI, 2000.
- Forouzan, “Data Communication & Networking”, 2$^{nd}$ Edition, McGraw Hill, 2003.

***References:***

- W. Tomasi, “Advanced Electronic Communication Systems”, 2000
- James Martin, “Telecommunications & The Computer”, 3$^{rd}$ Edition, PHI. 2001
- P. C. Gupta, “Data Communications, PHI, 2001.

# MACHINE DESIGN LAB - II

**Course Code:** **BTM 620** **Credit Units: 01**

## Course Contents :

Design and drawing using software Ansys and PRO-E based upon the course Machine Design-I & II such as Automotive Transmission ,Brakes, Clutches ,Connecting Rod ,I.C Engine ,Piston, Hydraulic Rivet, Mechanical Hoist, Pipe Joint, Spur Gear Train Etc.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# FLUID POWER SYSTEMS LAB

**Course Code:** **BTM 621** **Credit Units: 01**

## Course Contents:

## Name of Experiments:

1. To conduct a test on Centrifugal Pump and plot its characteristics
2. To Plot the characteristics of Pelton turbine.
3. To conducts an experiment on Francis turbine.
4. To study the effect of a draft tube on reaction turbines.
5. To find the friction factor for flow through pipes
6. To study the hydraulic controls rig.
7. To conduct an experiment for verifying model laws.
8. To study the cavitations phenomenon in turbines.
9. Study of hydraulic couplings and torque converters.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# IC ENGINE AND GAS TURBINE LAB

**Course Code: BTM - 622** **Credit Units: 01**

**List of Experiments:**

1. Load test on Diesel Engine

2. Testing and performance of IC engines using Morse Test.

3. Prepare the heat balance sheet for Diesel Engine test rig

4. Prepare the heat balance sheet for Petrol Engine test rig

5. Study of Fuel Injection system in SI Engine

6. Study of lubricating system in CI Engines

5. Study of Battery Ignition system and Electronic Ignition System

8. Study of a Carburetors.

9. Study of Gas Turbine Model

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# COMMUNICATION SKILLS - IV

**Course Code:** **BTM 641** **Credit Units: 01**

## Course Objective:
To enhance the skills needed to work in an English-speaking global business environment.

## Course Contents:

**Module I: Business/Technical Language Development**
Advanced Grammar: Syntax, Tenses, Voices
Advanced Vocabulary skills: Jargons, Terminology, Colloquialism
Individualised pronunciation practice

**Module II: Social Communication**
Building relationships through Communication
Communication, Culture and Context
Entertainment and Communication
Informal business/ Technical Communication

**Module III: Business Communication**
Reading Business/ Technical press
Listening to Business/ Technical reports (TV, radio)
Researching for Business /Technology

**Module IV: Presentations**
Planning and getting started
Design and layout of presentation
Information Packaging
Making the Presentation

## Examination Scheme:

| Components | CT1 | CT2 | CAF | V | GD | GP | A |
|---|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 25 | 10 | 10 | 10 | 5 |

CAF – Communication Assessment File
GD – Group Discussion
GP – Group Presentation

## Text & References:


- Business Vocabulary in Use: Advanced Mascull, Cambridge
- Business Communication, Raman – Prakash, Oxford
- Business Communications, Rodgers, Cambridge
- Working in English, Jones, Cambridge
- New International Business English, Jones/Alexander, Cambridge

# BEHAVIOURAL SCIENCE - VI
# (STRESS AND COPING STRATEGIES)

**Course Code: BTM 643** **Credit Units: 01**

## Course Objective:
To develop an understanding the concept of stress its causes, symptoms and consequences.
To develop an understanding the consequences of the stress on one's wellness, health, and work performance.

## Course Contents:

**Module I: Stress**
Meaning & Nature
Characteristics
Types of stress

**Module II: Stages and Models of Stress**
Stages of stress
The physiology of stress
Stimulus-oriented approach.
Response-oriented approach.
The transactional and interact ional model.
Pressure – environment fit model of stress.

**Module III: Causes and symptoms of stress**
Personal
Organizational
Environmental

**Module IV: Consequences of stress**
Effect on behaviour and personality
Effect of stress on performance
Individual and Organizational consequences with special focus on health

**Module V: Strategies for stress management**
Importance of stress management
Healthy and Unhealthy strategies
Peer group and social support
Happiness and well-being

**Module VI: End-of-Semester Appraisal**
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

## Examination Scheme:

| Components | SAP | A | Mid Term Test (CT) | VIVA | Journal for Success (JOS) |
|---|---|---|---|---|---|
| Weightage (%) | 20 | 05 | 20 | 30 | 25 |

## Text & References:


- Blonna, Richard; Coping with Stress in a Changing World: Second edition
- Pestonjee, D.M, Pareek, Udai, Agarwal Rita; Studies in Stress and its Management
- Pestonjee, D.M.; Stress and Coping: The Indian Experience
- Clegg, Brian; Instant Stress Management – Bring calm to your life now

# FRENCH - VI

**Course Code: BTM 644** **Credit Units: 02**

## Course Objective:

To strengthen the language of the students both in oral and written so that they can:
i) express their sentiments, emotions and opinions, reacting to information, situations;
ii) narrate incidents, events;
iii) perform certain simple communicative tasks.

## Course Contents:

**Module D: pp. 157 – 168 – Unité 12**

**Unité 12: s'évader**

1. présenter, caractériser, définir
2. parler de livres, de lectures
3. préparer et organiser un voyage
4. exprimer des sentiments et des opinions
5. téléphoner
6. faire une réservation

**Contenu grammatical:**

1. proposition relative avec pronom relatif "qui", "que", "où" - pour caractériser
2. faire + verbe

## Examination Scheme:

| **Components** | **CT1** | **CT2** | **C** | **I** | **V** | **A** |
|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- le livre à suivre: Campus: Tome 1

# GERMAN - VI

**Course Code: BTM 645 Credit Units: 02**

## Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany
Introduction to Advanced Grammar and Business Language and Professional Jargon

## Course Contents:

**Module I: Adjective endings**
Adjective endings in all the four cases discussed so far
Definite and indefinite articles
Cases without article

**Module II: Comparative adverbs**
Comparative adverbs as and like

**Module III: Compound words**
To learn the structure of compound words and the correct article which they take
Exploring the possibility of compound words in German

**Module IV: Infinitive sentence**
Special usage of ‘to’ sentences called zu+ infinitive sentences

**Module V: Texts**
A Dialogue: ‘Ein schwieriger Gast’
A text: ‘Abgeschlossene Vergangenheit’

**Module VI: Comprehension texts**
Reading and comprehending various texts to consolidate the usage of the constructions learnt so far in this semester.

**Module VII: Picture Description**
Firstly recognize the persons or things in the picture and identify the situation depicted in the picture;
Secondly answer questions of general meaning in context to the picture and also talk about the personal experiences which come to your mind upon seeing the picture.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:


- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

# SPANISH – VI

**Course Code:** **BTM 646** **Credit Units: 02**

## Course Objective:

To enable students acquire working knowledge of the language; to give them vocabulary, grammar, voice modulations/intonations to handle everyday Spanish situations in Present as well as in Present Perfect Tense with ease.

## Course Contents:

**Module I**
Revision of the earlier modules

**Module II**
Present Perfect Tense

**Module III**
Commands of irregular verbs

**Module IV**
Expressions with **Tener que** and **Hay que**

**Module V**
En la embajada
Emergency situations like fire, illness, accident, theft

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- Español, En Directo I A
- Español Sin Fronteras

# JAPANESE - VI

**Course Code:** **BTM 647** **Credit Units: 02**

## Course Objective:
To enable the students to converse in the language with the help of verbs and the usage of different sentence patterns, which help them to strengthen the language.
Students are taught and trained enough to get placed in Japanese companies.
**Note:** The teaching is done in roman as well as Japanese script. 10 more kanjis are introduced in this semester.

## Course Contents:

**Module I: Polite form of verbs**
Expressing feelings with the polite forms of verb.

**Module II: Potential form**
Ability of doing or not doing something

**Module III: Conjunctions**
Joining two sentences with the help of *shi* and *mo*

**Module IV: Intransitive Verbs**
Sentence patterns of indirect speech

**Module V: Feelings and expressions**
Regret, existence etc.

## Learning Outcome
- Students can speak the language with the use of different forms of verb.

## Methods of Private study/ Self help
- Hand-outs, audio -aids, assignments and role-plays will support classroom teaching.
- Students are encouraged to watch Japanese movies at Japan Cultural and information center.

## Examination Scheme:

| **Components** | **CT1** | **CT2** | **C** | **I** | **V** | **A** |
|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:


- Shin Nihon-go no Kiso Lesson No. 26 to 30.
- All vocabulary and topics taught are from the above-mentioned book.

# CHINESE – VI

**Course Code:** **BTM 648** **Credit Units: 02**

## Course Objective:

Chinese emperor Qin Shi Huang – Ti who built the great wall of China also built a network of 270 palaces, linked by tunnels, and was so afraid of assassination that he slept in a different palace each night. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

## Course Contents:

**Module I**

Drills
Dialogue practice
Observe picture and answer the question.
Pronunciation and intonation.
Character writing and stroke order.

**Module II**

Going out to see a science exhibition
Going to the theatre.
Train or Plane is behind schedule.
Indian Economy-Chinese Economy
Talking about different Seasons of the Year and Weather conditions. Learning to say phrases like-spring, summer, fall, winter, fairly hot, very cold, very humid, very stuffy, neither hot nor cold, most comfortable, pleasant …. etc.

**Module III**

Temperature – how to say – What is the temperature in May here?

- How is the weather in summer in your area?
- Around 30 degrees
- Heating, air-conditioning
- Is winter is Shanghai very cold?

Talking about birthdays and where you were born?
The verb "shuo" (speak) saying useful phrases like speak very well, do not speak very well, if speak slowly then understand if speak fast then don't understand, difficult to speak, difficult to write, speak too fast, speak too slow, listen and can understand, listen and cannot understand … etc.
Tell the following in Chinese – My name is …. I was born in … (year). My birthday is ……… Today is … (date and day of the week). I go to work (school) everyday. I usually leave home at . (O'clock). In the evening, I usually ………. (do what)? At week end, I ………. On Sundays I usually …………… It is today….. It will soon be my younger sisters birthday. She was born in ….. (year). She lives in ………. (where). She is working (or studying)…… where… She lives in …….. (where.)

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- Elementary Chinese Reader Part-2, 3; Lesson 47-54

# OPERATIONS RESEARCH

**Course Code:** **BTM 701** **Credit Units: 03**

## Course Objective:

In a rapidly changing environment an understanding is sought which will facilitate the choice and the implementation of more effective solutions, which, typically, may involve complex interactions among people, materials and money. Organizations may seek a very wide range of operational improvements - for example, greater efficiency, better customer service, higher quality or lower cost. Whatever the business, engineering aim, Operation Research can offer the flexibility and adaptability to provide objective help. This course introduces students to the principles of operational research.

## Course Contents:

**Module I: Linear Programming**
Formulation of problem. Graphical and simplex method for maximization and minimization. Duality theory and sensitivity analysis

**Module II: Transportation Models & Assignment Models**
Stepping stone algorithm, MODI method and Vogel's Approximation Method (VAM) for selfing balanced, unbalanced transportation problems and problems of degeneracy and maximization. Assignment model for maximization and traveling salesman problems, Industrial Problems

**Module III: Queuing Theory**
Basic structured, Terminology, classification. Birth and death process. Sequencing: Processing in jobs through machines with the same processing order. Processing of 2 jobs through machines with each having different processing order.

**Module IV: Network Models**
Introduction to PERT and CPM. Fundamental concept of Network models and construction of network diagrams. PERT activity, time estimate. Critical path and project time duration. Probability of completing the project on or before specified time. Float of a activity.

**Module V: Project Management**
Gantt chart, milestone char. Network scheduling terminology. Path enumeration, Activity on node & activity on arc network precedence diagrams. Reliability: Concept of reliability, objectives, applications, area of use, use of reliability in industry.

**Module VI**: **Games Theory**
Zero Sum two person competitive games, Minimax and maximini principle Arithmetic, algebraic, matrix algebra method,. Solution by dominance, sub game, Graphical and linear programming method.

**Module VII**: **Industrial Visit**
At least one visit to local industry in the field of Mechanical Engineering.

**Examination Scheme:**

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- HM Wagner, Principles of Operations Research, Prentice Hall
- Heizer, J. & Render B., Operations Management, Pearson Education (8/e), 2006
- PK Gupta and DS Hira, Operations Research, S. Chand & Co.
- Taha, Introduction to Operation Research
- F.S. Hiller and G.I. Libermann, Introduction to Operation Research, Holden Ray.

# COMPUTER AIDED MANUFACTURING

**Course Code: BTM 702 Credit Units: 03**

## Course Objective:

The aim of the course is to impart the students the basic and essential concepts in using Computer Assisted Manufacturing (CAM) and Computer Numerical Control (CNC) machines. Students will learn the basic concepts of manufacturing planning and control. They will be offered hands on experience in using CAM software to design, simulate and write CNC programs.

## Course Contents:

**Module I**
Introduction to Numerical control. Programmed automation. Nomenclature, type and features of NC machines tools. Axes designation. Point to point, straight and continuous control systems.

**Module II**
Machining centre and Turning centre, Automatic tool changer, Machine Tool beds and automated pallet changers**.**

**Module III**
Machine Control Unit, Actuation Systems, open and close loop systems, transducers for NC Systems, revolves, encoders and inductosyn.

**Module IV**
Manual Part Programming: Processes planning, G&M codes. Interpolation Cycles. Tool compensation, Subroutines, Introduction to Computer Aided Part Programming.

**Module V**
Tooling and tool presetting. Computer Aided inspection - Contact Inspection (Coordinate Measuring Machine) & Non Contact Inspection.

## Examination Scheme:

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***

- Mikell P. Groover, “Automation, Production Systems and Computer-Integrated Manufacturing”, 2nd Edition, Pentice Hall, 2001.
- Rao, Kundra & Tiwari, “Computer aided Manufacturing” Tata McGraw Hill, 2007.
- Numerical Control: by Koren, Khanna Publisher.

***References:***

- Mikell P. Groover, Emory W. Zimmers, “CAD/CAM”, Pearson Education, 2006.
- P.N. Rao, “CAD/CAM Principles and Applications”, Tata McGraw Hill, 2006.

# MECHATRONICS

**Course Code: BTM 703** **Credit Units: 03**

## Course Objective:

Mechatronics is basically combination of mechanical and electronics engineering. With growing demands of automation of different mechanical operation this subject fulfills the needs. Main objective of this course is to provide knowledge of different combinations of mechanical and electronics processes and various software used in it.

## Course Contents:

**Module I: Introduction**
Measurement systems, control systems, Microprocessor-based controllers, Sensors and tranducers, Signal conditioning processes.

**Module II: Actuation Systems**
Pneumatic and hydraulic actuation systems, Directional control valves, pressure control valves, process control valves.

**Module III: System Models**
Mathematical models, Mechanical system building blocks, modeling dynamic systems, First order systems, Second order systems.

**Module IV: Principles of Feedback & Intelligent Control**
Control Systems, Open & Closed loop control Systems, Controllers, Artificial Neural Network.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***

- W. Bolton, “Mechatronics”, Pearson Education Ltd., 2003.

***References:***


- Mohammad Ali Mazidi Janice Gillispier Mazidi, “The 8051 Microcontroller”, Pearson Education Inc., 2004.
- Gary Dunning, “Introduction to Programmable Logic Controllers”, Thomson Asia P. Ltd., Singapore, 1998.
- Gopal K. Dubey, “Fundamentals of Electrical Drives”, Narosa Publishing House, 2001.
- Charles H. Roth, “Jr. Fundamentals of Logic Design”, Jaico Publishing House, 2001.
- "HMT Mechatronics”, Tata McGraw Hill Publishing Co. Ltd., 2001.
- Devdas Shetty, Richard A. Kolk “Mechatronics System Design”, Thomson Asia Pvt. Ltd., Singapore, 2001.
- A.K. Tayal, “Instrumentation & Mechanical Measurements”, Galgotia Publication Pvt. Ltd., 2003.
- D. Rana Durgaiah, “Fluid Mechanics & Machinery”, New Age Int. Publishers, 2004.
- Nitaigour Premchand Mahalik, “Mechatronics Principles, Concepts & Application”, Tata McGraw Hill Publishing Co.Ltd, 2003.
- Mikell P. Groover, “Automation, Production Systems and Computer-Integrated Manufacturing”, 2$^{nd}$ Edition, Prentice Hall, 2001.

# OPERATIONS RESEARCH (PROGRAMMING) LAB

**Course Code:** **BTM 720** **Credit Units: 01**

## Course Contents:

1. Program on C or C++ for Linear Programming.
2. Program on C or C++ for Simplex Problem.
3. Program on C or C++ for Assignment Problem.
4. Program on C or C++ for Transportation Problem.
5. Program on C or C++ for PART, CPM Problem.
6. Program on C or C++ for Sequencing Problem.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# COMPUTER AIDED MANUFACTURING LAB

**Course Code:** **BTM 721** **Credit Units: 01**

**Course Contents:**

**Name of Experiments:**

1. Make a sketch of CNC lathe showing major assemblies and indicate the CNC axes with designations. Make a sketch of the conventional lathe and, if it is considered as a CNC lathe, show the axes with designations.

2. Make a Kinematics diagram of CNC Lathe showing all machine sub-assemblies. Indicate bearing arrangements, ball screw arrangements with sizes, wherever available.

3. Repeat (1) on CNC machining centre and conventional milling machine.

4. Repeat (2) for CNC machining centre.

5. Study the CNC lathe. Prepare a block diagram of controls. Identify location and type of transducers and indicate on an outline of the machine. Describe how they function.

6. Repeat (5) on machining centre.

7. Study the work holding and tool holding devices in the CNC lathe and machining centre and draw up their specifications and capacities.

8. Prepare part programs for 2 specified components for CNC lathe by manual part programming. First write the machining technology in full; then prepare part program and then enter in the machine. Test the program in dry run and by tool path graphic simulation. Machine the component.

9. Do the above work for machining centre.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# MECHATRONICS LAB

**Course Code:** **BTM 722** **Credit Units: 01**

## Course Contents:

## Name of Experiments:

1. To make the sequential operation
   $A^+ B^+ A^- B^-$ ; $A^+$, $B^+$, $B^-$ $A^-$ using Pneumatic trainer

2. For the above write a ladder logic giving time delays

3. Design a Pneumatic Circuit for clamping type & operated by PLC

4. To make the sequential operation
   $A^+$, $B^+$, $A^-$, $B^-$ ; $A^+$, $B^+$, $B^-$ $A^-$ using Hydraulic trainer kit.

5. For the above write a ladder logic giving time delays

6. Design a Hydraulic Circuit for clamping type & operated by PLC

7. To make the ladder logic for water level control & reaction vessel to detect different levels of water and switch off the water supply.

8. Starter Control & Star Delta Starter for ¼ HP AC. Motor to demonstrate the use of PLC Motor Starting

9. Design Fan operation using PLC

10. Design n a Lift Control

11. Design a pick & Place

12 Design Sequential Switching Motors

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# COMMUNICATION SKILLS - V

**Course Code:** **BTM 741** **Credit Units: 01**

## Course Objective:

To facilitate the learner with Academic Language Proficiency and make them effective users of functional language to excel in their profession.

## Course Contents:

**Module I**
Introduction to Public Speaking
Business Conversation
Effective Public Speaking
Art of Persuasion

**Module II: Speaking for Employment**
Types of Interview
Styles of Interview
Facing Interviews-Fundamentals and Practice Session
Conducting Interviews- Fundamentals and Practice Session
Question Answer on Various Dimensions

**Module III**
Resume Writing
Covering Letters
Interview Follow Up Letters

**Module IV: Basic Telephony Skills**
Guidelines for Making a Call
Guidelines for Answering a Call

**Module V: Work Place Speaking**
Negotiations
Participation in Meetings
Keynote Speeches

## Examination Scheme:

| Components | CT1 | CT2 | CAF | V | GD | GP | A |
|---|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 25 | 10 | 10 | 10 | 5 |

CAF – Communication Assessment File
GD – Group Discussion
GP – Group Presentation

## Text & References:


- Jermy Comfort, Speaking Effectively, et.al, Cambridge
- Krishnaswamy, N, Creative English for Communication, Macmillan
- Raman Prakash, Business Communication, Oxford.
- Taylor, Conversation in Practice,

# BEHAVIOURAL SCIENCE - VII
# (INDIVIDUAL, SOCIETY AND NATION)

**Course Code: BTM 743 Credit Units: 01**

## Course Objective:
This course aims at enabling students towards:
- Understand the importance of individual differences
- Better understanding of self in relation to society and nation
- Facilitation for a meaningful existence and adjustment in society
- Inculcating patriotism and national pride

## Course Contents:

**Module I: Individual differences & Personality**
Personality: Definition& Relevance
Importance of nature & nurture in Personality Development
Importance and Recognition of Individual differences in Personality
Accepting and Managing Individual differences (adjustment mechanisms)
Intuition, Judgment, Perception & Sensation (MBTI)
BIG5 Factors

**Module II: Managing Diversity**
Defining Diversity
Affirmation Action and Managing Diversity
Increasing Diversity in Work Force
Barriers and Challenges in Managing Diversity

**Module III: Socialization**
Nature of Socialization
Social Interaction
Interaction of Socialization Process
Contributions to Society and Nation

**Module IV: Patriotism and National Pride**
Sense of pride and patriotism
Importance of discipline and hard work
Integrity and accountability

**Module V: Human Rights, Values and Ethics**
Meaning and Importance of human rights
Human rights awareness
Values and Ethics- Learning based on project work on Scriptures like- Ramayana, Mahabharata, Gita etc.

**Module VI: End-of-Semester Appraisal**
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

## Examination Scheme:

| Components | SAP | A | Mid Term Test (CT) | VIVA | Journal for Success (JOS) |
|---|---|---|---|---|---|
| Weightage (%) | 20 | 05 | 20 | 30 | 25 |

## Text & References:


- Davis, K. Organizational Behaviour,
- Bates, A. P. and Julian, J.: Sociology - Understanding Social Behaviour
- Dressler, David and Cans, Donald: The Study of Human Interaction
- Lapiere, Richard. T – Social Change
- Lindzey, G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology, Addison – Welsley, US.
- Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.
- Robbins O.B.Stephen;. Organizational Behaviour

# FRENCH - VII

**Course Code:** **BTM 744** **Credit Units: 02**

## Course Objective:
Revise the portion covered in the first volume, give proper orientation in communication and culture.

## Course Contents:

**Module A: Unités 1 – 3: pp. 06 - 46**

**Contenu lexical:**

**Unité 1:** Rédiger et présenter son curriculum vitae
Exprimer une opinion
Caractériser, mettre en valeur
Parler des rencontres, des lieux, des gens

**Unité 2:** Imaginer **-** Faire des projets
Proposer - conseiller
Parler des qualités et des défauts
Faire une demande écrite
Raconter une anecdote
Améliorer son image

**Unité 3:** Exprimer la volonté et l'obligation
Formuler des souhaits
Exprimer un manque/un besoin
Parler de l'environnement, des animaux, des catastrophes naturelles

**Contenu grammatical:**

1. Le passé : passé composé/imparfait
2. Pronoms compléments directs/indirects, y/en (idées/choses)
3. Propositons relatives introduites par qui, que, où
4. Comparatif et superlatif
5. Le conditionnel présent
6. Situer dans le temps
7. Féminin des adjectifs
8. La prise de paroles : expressions
9. Le subjonctif : volonté, obligation

## Examination Scheme:

| **Components** | **CT1** | **CT2** | **C** | **I** | **V** | **A** |
|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- le livre à suivre : Campus: Tome 2

# GERMAN - VII

**Course Code:** **BTM 745** **Credit Units: 02**

## Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany
Introduction to Advanced Grammar and Business Language and Professional Jargon

## Course Contents:

**Module I: Dass- Sätze**
Explain the use of the conjunction "-that", where verb comes at the end of the sentence

**Module II: Indirekte Fragesätze**
To explain the usage of the "Question Pronoun" as the Relative Pronoun in a Relative Sentence, where again the verb falls in the last place in that sentence.

**Module III: Wenn- Sätze**
Equivalent to the conditional "If-" sentence in English. Explain that the verb comes at the end of the sentence.

**Module IV: Weil- Sätze**
Explain the use of the conjunction "because-" and also tell that the verb falls in the last place in the sentence.

**Module V: Comprehension texts**
Reading and comprehending various texts to consolidate the usage of the constructions learnt so far in this semester.

**Module VI: Picture Description**
Firstly recognize the persons or things in the picture and identify the situation depicted in the picture;
Secondly answer questions of general meaning in context to the picture and also talk about the personal experiences which come to your mind upon seeing the picture.

## Examination Scheme:

| **Components** | **CT1** | **CT2** | **C** | **I** | **V** | **A** |
|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:


- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

# SPANISH - VII

**Course Code:** **BTM 746** **Credit Units: 02**

## Course Objective:

To enable students acquire working knowledge of the language; to give them vocabulary, grammar, expressions used on telephonic conversation and other situations to handle everyday Spanish situations with ease.

## Course Contents:

**Module I**
Revision of earlier semester modules

**Module II**
Zodiac signs. More adjectives…to describe situations, state of minds, surroundings, people and places.

**Module III**
Various expressions used on telephonic conversation (formal and informal)

**Module IV**
Being able to read newspaper headlines and extracts (Material to be provided by teacher)

**Module V**
Negative commands (AR ending verbs)

**Module VI**
Revision of earlier sessions and introduction to negative ER ending commands, introduction to negative IR ending verbs

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- Español En Directo I A, 1B
- Español Sin Fronteras
- Material provided by the teacher from various sources

# JAPANESE - VII

**Course Code: BTM 747 Credit Units: 02**

## Course Objective:
To enable the students to converse in the language with the help of different speech, possibilities, probabilities etc.
**Note:** The teaching is done in roman as well as Japanese script. 10 more kanjis (Japanese characters) are taught in this semester.

## Course Contents:

**Module I: Thought**
Expressing one's thought and intentions on different situations.

**Module II: Advice**
Giving advice, probability, possibility and suggestions.

**Module III: Informal Speech**
Addressing friends and close people using informal ways.

**Module IV: Simultaneous Verbs**
Describing two situations simultaneously.

**Module V: Possibility**
Explaining the probability and possibility of any situation.

## Learning Outcome
- Students can interact in a formal as well as informal way on above-mentioned topics.

## Methods of Private study/ Self help
- Hand-outs, audio-aids, assignments and role-plays will support classroom teaching.

## Examination Scheme:

| **Components** | **CT1** | **CT2** | **C** | **I** | **V** | **A** |
|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- Shin Nihon-go no Kiso Lesson No.-31 to 35.
- All vocabulary and topics taught to the students are from the above mentioned book.

# CHINESE – VII

**Course Code:** **BTM 748** **Credit Units: 02**

## Course Objective:

The story of Cinderella first appears in a Chinese book written between 850 and 860 A.D. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

## Course Contents:

**Module I**
Drills
Dialogue practice
Observe picture and answer the question.
About china part –I Lesson 1,2.

**Module II**
Pronunciation and intonation
Character Writing and stroke order.

**Module III**
Ask someone what he/she usually does on weekends?
Visiting people, Party, Meeting, After work….etc.

**Module IV**
Conversation practice
Translation from English to Chinese and vise-versa.
Short fables.

**Module V**
A brief summary of grammar.
The optative verb "yuanyi".
The pronoun "ziji".

## Examination Scheme:

| **Components** | **CT1** | **CT2** | **C** | **I** | **V** | **A** |
|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- "Kan tu shuo hua" Part-I Lesson 1-7

# INDUSTRIAL TRAINING

**Course Code: BTM 750 Credit Units: 04**

## Methodology:

Practical training is based on the theoretical subjects studied by students. It can be arranged within the college or in any related industrial unit. The students are to learn various industrial, technical and administrative processes followed in the industry. In case of on-campus training the students will be given specific task of fabrication/assembly/testing/analysis. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation on same.

## Examination Scheme:

| | |
|---|---|
| Feedback from industry/work place | 20 |
| Training Report | 40 |
| Viva | 15 |
| Presentation | 25 |
| **Total** | **100** |

# PROJECT (DISSERTATION)

**Course Code:** **BTM 760** **Credit Units: 6**

## Methodology

Topics of project are to be based on the latest trends, verifying engineering concepts /principals and should involve elementary research work. The projects may involve design, computer modeling, and analysis of any engineering problem. On completion of the above the students are to present a report covering various aspects learnt by them and give a presentation on same.

## Examination Scheme:

| | |
|---|---|
| Literature study/ Fabrication/ Experimentation | 40 |
| Written Report | 20 |
| Viva | 15 |
| Presentation | 25 |
| **Total** | **100** |

# AUTOMOTIVE ENGINEERING

**Course Code: BTM 704 Credit Units: 03**

## Course Objective:

This course emphasizes on constructional details of automotive vehicles which includes – Basic structure, engine, transmission systems, suspension systems, steering system, braking systems and wheels & tyres..

## Course Contents:

**Module I**
Introduction, Components of an automobile, basic engine terminology, engine cycles, working of an IC engine. Basic engine design considerations, constructional details of C.I. and S.I. engines. crank shafts, connecting rod, piston, values, cams, manifolds, air cleaners, mufflers, radiators, and oil filters.

**Module II: Transmission System**
Description and working of manually operated gearboxes like sliding mesh, constant mesh, synchromesh and epicycle; hydraulic torque convertor and its construction working and performance, sem-automatic and fully automatic transmission, Hydramatic transmission, analysis of differentials, live axles, construction working and requirements of overdrive.

**Module III: Steering System**
Introduction, Front axle, wheel alignment, Steering geometry, steering mechanisms, Ackerman steering, center point steering, power steering.

**Module IV: Suspension**
Objective, requirement, function, types Shock absorbers, Independent suspension, Stabilizer, air suspension, Hydroelastic suspension, Hydragas interconnected suspension.

**Module V**
Principle, braking requirements, brake efficiency, fading of brakes, types of brakes, bleeding of brakes, brake fluid.

## Examination Scheme:

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***


- Kirpal Singh, "Automobile Engg.", Vol. I & II, Standard Publishers, 2004
- N.K. Giri, "Automotive Mechanics", Khanna Publishers
- Narang G.B.S., "Automobile Engg.", Khanna Publishers
- Srinivasan, "Automotive Engines", Tata McGraw Hill
- K.K. Jain & R.B. Asthana, "Automobile Engineering", Tata McGraw Hill


***References:***


- James D. Halderman and Chase D. Mitchell Jr., Automotive Engines- Theory and Servicing, Pearson Education, 2007
- Joseph Haitner, "Automotive Mechanics", C.B.S. Publications

# COMPUTER AIDED DESIGNING

**Course Code: BTM 705** **Credit Units: 03**

## Course Objective:

The objective of this course is to impart students an in-depth exposure to methods in geometric modeling and its applications in CAD/CAM. This course introduces integrated approach to CAD including: Overview of CAD, numerical techniques for CAD, Computer graphics and design, Principle and management of design data base system, finite element analysis and CAD, Design optimization. Along with the theoretical presentations, commercial CAD software are also introduced and applied to create Engineering components and assemblies.

## Course Contents:

**Module I**
Introduction to CAD. Design process, Introduction to solid modeling and aided design of some elements/ components, hardware requirements, concurrent engineering.

**Module II**
Elementary Computer Graphics. Transformations, Mappings, Projections – orthographic, isometric, perspective.

**Module III**
Representation of surfaces. Plane surfaces, Ruled surfaces, Surfaces of revolution, Sweep surfaces, Bezier surface, Bicubic surface patch, Approximation B – spline surface, composite surfaces.

**Module IV: Solid Modeling**
Set theory, Graph theory, Regularized Boolean operations, B-rep modeling, Sweep representations, Spatial occupancy enumeration.

**Module V: Advanced CAD**
Mechanical assembly, Geometric property formulation- curve length, surface are calculations, volume calculation, centriod calculation, Tolerances representations, Animation, Simulation, Strategic factors in product design, Robust design for product, Introduction to Finite element modeling and analysis.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***

- Ibrahim Zeid, "CAD/CAM Theory and Practice", Tata McGraw-Hill Publishing Company Limited, 6th Edition 1998.
- David F. Rogers and J. Alan Adams, "Mathematical Elements for Computer GraPrentice Hall Indiacs", Tata McGraw-Hill, 2nd Edition 2002.

***References:***

- Ibrahim Zeid, "Mastering CAD/CAM", Tata McGraw-Hill Publishing Company Limited,

# AUTOMOTIVE ENGINEERING LAB

**Course Code:** **BTM 723** **Credit Units: 01**

**Course Contents:**

## List of Experiments:

1. Drawing Valve Timing Diagram
2. Determination of Firing Order of engine
3. Specification of engine
4. Study of different parts of engine
5. Study of Clutch
6. Study of Hydraulic Brake System
7. Study of Carburetor
8. Study of various parts of Auxiliary systems
9. Study of Wheel
10. Study of emission system
11. Study of steering system

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

# COMPUTER AIDED DESIGNING LAB

**Course Code:** **BTM 724** **Credit Units: 01**

## Course Contents:

## List of Experiments:

1. Analysis and design using ANSYS/Pro-E software for:
2. Flange Coupling.
3. Design Shaft.
4. Design for Key.
5. Design for Spur Gear.
6. Design for Helical Gear.
7. Parts of Thin Cylinder Pressure Vessels.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

# MARKETING MANAGEMENT

**Course Code: BTM 706 Credit Units: 03**

## Course Objective:
The course aims at making students understand concepts, philosophies, process and techniques of managing marketing operations of a firm.

## Course Contents:

**Module I: Introduction to Marketing**
Meaning, nature and scope of marketing; Marketing philosophies; Marketing management process; Concept of marketing mix.

**Module II: Market Analysis**
Understanding marketing environment; Consumer and industrial buyer behaviour; Market measurement; Market segmentation, selection and positioning.

**Module III: Product Planning and Pricing**
Product concept; Types of products; Major product decisions; Brand management; Product life cycle, New product development process; Pricing decisions; Determinants of price; Pricing process, policies and strategies.

**Module IV: Promotion and Distribution decisions**
Communication process; Promotion tools – advertising, personal selling, publicity and sales promotion; Distribution channel decisions – types and functions of intermediaries, Selection and management of intermediaries; Logistics decisions – inventory management, warehousing, transportation and insurance.

**Module V: Marketing Organization and Control**
Emerging trends and issues in marketing – Consumerism, rural marketing, social marketing; direct and online marketing; green marketing.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Baker, Michael J., Marketing: An Introductory Text, McMillan Press Ltd.
- Czinkota, Michael R., Massaki, Kotabe and David Mercer B., Marketing Management: Text and Cases, Blackwell Publishers, Massachusetts.
- Kotler, Philip, Marketing Management: Analysis Planning, Implementation and Control, 9th Ed., Prentice Hall of India Pvt. Ltd. , New Delhi.
- Kotler, Philip and Armstrong, Gary, Principles of Marketing, 6$^{th}$ ed., Prentice Hall of Indi, Pvt. Ltd., New Delhi.
- Mc Carthy, E.Jerome and Pessault, William D. Jr., Basic Marketing, Richard D. Irwin Inc., Homewood, Illinois.
- Saxena, Rajan, Marketing Management, Tata McGraw Hill Publishing Company, New Delhi.
- Stanton, William J., Eizel, Michael J. and Walker Bruce J., Fundamentals of Marketing, 10$^{th}$ ed., McGraw Hill.

# SOLAR ENERGY

**Course Code: BTM 707 Credit Units: 03**

## Course Objective:

The objective of this course is to introduce materials relevant to the engineering of solar electric and thermal systems. Students will develop the skills to calculate the amount of incident solar flux, the amount of useful energy collected, the amount stored and the amount ultimately used. Many of these calculations will be based on solar applications in different area. Finally the concepts of engineering economics applied to solar energy will also be introduced.

## Course Contents:

**Module I: Selected topics in Heat Transfer**
Heat transfer modes, properties and radiation characteristics of opaque and partially transparent media.

**Module II: Model Solar Radiation**
Origin, nature and availability of solar radiation, measurements of solar radiation data and its estimation, effects of receiving surface orientation and motion.

**Module III: Components, process and system modes**
Design consideration and performance of flat plate and focussing collectors; energy storage components, water storage, packed bed and phase-change energy storage; mathematical models of various solar systems and components.

**Module IV: Application**
Solar water heating, solar air heaters, solar space heating and cooling, solar pumps, solar thermal power, solar furnaces and solar distillation.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- H.P. Garg and J. Prakash, "Solar Energy fundamental and Applications", Tata McGraw Hill Pulishing Co. Ltd.
- Magal, "Solar Power Engineering", Tata McGraw Hill Publishing Co. Ltd

# POWER PLANT PRACTICES

**Course Code: BTM 708 Credit Units: 03**

## Course Objective:
The objective of this course is that the students come to know different ways of producing energy such as thermal energy from gas and steam, hydraulic energy nuclear energy, non conventional source of energy from wind, solar and tidal. And their different uses in productive works.

## Course Contents:

**Module I: Steam Generator Plant**
Fuel handling systems, Indian coals, combustion of coal in furnaces; fluidized bed combustion; High pressure heavy duty boilers, Super critical and once through boilers influence of operating conditions on layout of evaporator, superheated, reheated and economizer; dust collectors; ash disposal, fans and draft systems.

**Module II: Turbine Plane**
Layout of turbine plant room, corrosion in condensers and boilers, feed water treatment; feed heating and de aeration system; cooling water systems and cooling towers.

**Module III: Control**
Important instruments on steam generator and turbine; drum water level control, combustion control and super heat temperature control; testing of power plants and heat balance.

**Module IV: Other Power Plant**
General layout of I.C. Engines and turbine power plants, types, gas turbine plants, fields of application, Nuclear power plants, power reactors and nuclear steam turbines; handling of nuclear waste and safety measures, peak load power generation methods.

**Module V: Economics**
Planning for power generation in India, super thermal power plants, estimation of cost of power generation; choice of plant site.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***
- Arora & Domkundwar, “A course in Power Plant Engineering”, Dhanpat Rai & Sons

***References:***
- Black Veatch, “Power Plant Engineering”, CBS Publisher

# COMBUSTION ENGINE EMISSIONS

**Course Code: BTM 709 Credit Units: 03**

## Course Objective:

The main objective of this course is to introduce students the fundamentals, Operations and performance of internal combustion engines and their different types; to provide them with the theoretical and experimental ability to operate, analyze and design internal combustion engines; to assess the relation between engine power output to the required power for vehicle propulsion; to make them understand the fuel metering systems and assembling and dismantling internal combustion engines.

## Course Contents:

**Module I: Engine Fundamentals**

Cycle analysis, fuels, and types of hydrocarbons, gasoline specifications, effect of engine parameters on performance, carburetion, engine vehicle road performance, road performance and fuel economy.

**Module II: Emission and Air Pollution**

Automotive emissions and their role in air pollution, photochemical smog, Chemistry of smog formation, Combustion in homogeneous mixtures, emission formation, Incomplete combustion formation of Hydrocarbons (HC), carbon monoxide and oxides of nitrogen, Aldehyde emissions of unregulated toxic pollutants such as benzene, 1, 3, butadiene etc.

**Module III**

Influence of engine design and operating parameters on S.I. engine exhaust emissions. Hydrocarbon Evaporative Emissions, Various sources and method of their control, Canisters for controlling evaporative emissions, emission control system for S.I. engines, Blow by control closed PCV system, Reduction of exhaust emissions / Various methods, fuels system design.

**Module IV: Exhaust Treatment devices**

Air injection into exhaust system, Thermal reactors, Catalytic converters. Stratified charge engines, Honda CVCC engine.

Diesel engine emissions: Source of emissions during combustion, Effect of Air injection timing on performance and formation. D.I. and I.D.I. engines emissions, Diesel smoke, PM and RSPM emission.

**Module V**

Methods of reducing emission, Exhaust gas re-circulation smoke emission form diesel engines, Particulate Traps, Continuous regeneration Traps (CRT).

Emission from CNG and LPG engines. Emission Instruments: Non-dispersive infrared analyzer, Gas chromatography, Flame ionization Detector, Chemiluminescent analyser.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***

- R.P. Sharma and M.L. Mathur, “Internal Combustion Engine”, Dhanpat Rai Publications
- V. Ganeshan, “Internal Combustion Engine”, Tata McGraw Hill

***References:***

- Angli M Course., “Automotive Engines”, CBS Publications
- Harper, “Fuel Systems Emission Control”, CBS Publications

# QUALITY CONTROL AND QUALITY ASSURANCE

**Course Code: BTM 801 Credit Units: 03**

## Course Objective:
In engineering and manufacturing, quality control and quality assurance is a set of measures taken to ensure that defective product or services are not produced, and that the design meets performance requirements. Course includes the regulation of the quality of raw materials, assemblies, products and components; services related to production; and management, production, and inspection processes.

## Course Contents:

**Module I: Introduction**
Meaning of Quality and quality improvement, need of Quality, Statistical methods for quality control, Process capability.

**Module II: Quality Control**
Statistical Quality Control, control charts, Control charts for attributes & variables, Moving average chart.

**Module III: Production Control**
Acceptance Sampling, OC curve, Sampling Plan, Producer' risk, Consumer's risk, Average Quality Level, AOQL, Design of Single & double sampling plan.

**Module IV: Quality Assurance**
Need of Quality Assurance, Quality Audit, Concept of Zero defect, ISO 9000 quality systems, total quality management.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***
- EL Grant & RS Leavenworth, "Statistical Quality Control", McGraw Hill & Co.
- M. Mahajan, "Statistical Quality Control", Dhanpat Rai & Co.
- O.P. Khanna, "Statistical Quality Control", Dhanpat Rai & Co.
- R.C. Gupta, "Statistical Quality Control", Khanna Pulishers

***References:***
- Amitav Mitra, "Fundamentals of Quality Control", Pearson Education
- Feigenbaum, "Total Quality Control", McGraw Hill & Co.
- Suresh Dalela, "Quality Systems", Standard Publishers & Distributors
- Montgomery DC, "Introduction to Statistical Quality Control", John Wiley & Sons Inc.
- Stephan B. Vardeman, J Marcus Jobe, "Statistical QA Methods for Engineers", John Wiley & Sons Inc.
- Taylor J.R., "Quality Control systems", McGraw Hill Int. Education
- K.C. Arora, "Total Quality Management", S.K. Kataria & Sons.

# REFRIGERATION AND AIR CONDITIONING

**Course Code:** **BTM 802** **Credit Units: 03**

## Course Objective:

The aim of this course is to provide the students with the understanding of the basic principles of Refrigeration and Air Conditioning such that they could build simple mathematical models representing the conditioned space and its components used to control environmental conditions. The application of thermodynamics, heat transfer, and fluid mechanics includes an understanding of refrigerants and refrigeration systems, psychometrics, human comfort and air quality, calculation of heating and cooling loads, and heat and mass transfer processes and associated R & AC components and systems.

## Course Contents:

**Module I:** Refrigeration

Fundamental of refrigeration, Heat engine, heat pump and refrigerating machine, Coefficient of performance, Basic components of the plant, reversed Carnot cycle, Vapor compression refrigeration system, Effect of operating parameters, Air refrigeration systems, Air cycle refrigeration of aircraft.

**Module II**

Refrigerants, Types of refrigerants, Properties and choice of refrigerants, Eco-friendly refrigerants multiple compression and evaporation system, cascading.

**Module III**

Vapour absorption cycle, Electrolux system, Steam jet refrigeration, vortex tube, application of refrigeration systems cascading, vapour absorption cycle.

**Module IV:** Air-conditioning

Psychometric processes, applied psychometric, comfort air-conditioning, ventilation requirements, cooling and dehumidification system, estimation of cooling and heating loads, air handling, air distribution, duct design, industrial air conditioning.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- CP Arora, Refrigeration and Conditioning, Tata McGraw Hill
- Manohar Prasad, Refrigeration and Conditioning , Wiley Eastern Limited
- Jordan and Priester, Refrigeration and Conditioning, Prentice Hall of India
- WF Stoecker, Refrigeration and Conditioning, McGraw Hill.

# REFRIGERATION AND AIR-CONDITIONING LAB

**Course Code:** **BTM 820** **Credit Units: 01**

## Course Contents:

## List of Experiments:

1. Study of refrigeration testing.
2. Study of Air-Conditioning testing.
3. To calculate the COP of Refrigerator.
4. Study of effect of superheating.
5. To calculate the efficiency of Compressor.
6. To calculate total Heat Load for Air-Conditioning unit.
7. To calculate the COP of Heat Pump.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# ADVANCED METHODS OF MANUFACTURING

**Course Code: BTM 803** **Credit Units: 03**

## Course Objective:

The aim of the course is to provide the students with the understanding of the basic principles underlying the design, analysis, and synthesis of robotic systems plus machine vision technology in automation. In particular, the course will start from simple problem in transformations, kinematics and inverse kinematics, dynamics and control. Later in the semester more complex problems in sensing, force control, mobile robots and robot programming will be discussed.

## Course Contents:

**Module I: Kinematics Analysis of Robot**
Matrix algebra or coordinate transformation, kinematics analysis; geometric and dynamic analysis of robot manipulators.

**Module II: Robot Control**
Robot Control, RobotVision, RobotControlled, CNNC, Pathplanning, Obstruction Avoidance

**Module III: Material Handling**
Computer aided Materials Management-inventory control, materials requirements planning. Computer Controlled parts handling and equipments.

**Module IV: Automation Protocol**
Manufacturing Automation protocol, cross functional implementation Technology for system integration.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***
- Raghuvanshi, Manufacturing Process.
- P.N. Rao, Manufacturing Technology, TMH publications

***References:***
- Hazra-Chowdhary , Workshop Technology
- R.K. Jain, Production Engineering

# GEAR TECHNOLOGY

**Course Code: BTM 804 Credit Units: 03**

## Course Objective:

The objective of gear technology is to provide information on gears, gear manufacturing, and the gear industry in general. This course includes information about hobbing, shaping, shaving, broaching and other gear manufacturing processes. It also covers gear design, gear engineering and related topics

## Course Contents:

**Module I: Introduction to gears**
Types of gears, Geometric and Kinetics characteristics, Undercutting and interference-correction, Non-Circular gears.

**Module II: Gear design**
Design of tools to make gear teeth, Kinds and cases of gear failures, Special Design Problems; Center distance problem, profile modification.

**Module III: Gear trains**
Problem Combined bending and Torsion of pinions with large length to diameter ratio, high speed gearing. Geneva Mechanisms (Analysis & Synthesis),
Gear Trains (Analysis & Synthesis)

**Module IV: Gear Set design**
Some example of optimal kinematics system Design; Gear Set design Design of sub-system consisting of Geneva wheel and elliptical gears for reduction of maximum acceleration of the wheel.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***

- D.W. Dudley, “Practical Gear Design”, Tata McGraw Hill Co. Inc.
- S.S. Rattan, “Theory of Machines”, Tata McGraw Hill, 2000

***References:***

- AGMA (American Gear Manufacturing Association) Standards

# ARTIFICIAL INTELLIGENCE AND ROBOTICS

**Course Code: BTM 805 Credit Units: 03**

## Course Objective:

To develop semantic-based and context-aware systems to acquire, organise, process, share and use the knowledge embedded in multimedia content. Research will aim to maximise automation of the complete knowledge lifecycle and achieve semantic interoperability between Web resources and services. The field of Robotics is a multi disciplinary as robots are amazingly complex system comprising mechanical, electrical, electronic H/W and S/W and issues germane to all these.

## Course Contents:

**Module I: Scope of AI**
Games, theorem proving, natural language processing, vision and speech processing, robotics, expert systems, AI techniques- search knowledge, abstraction.
Problem solving
State space search; Production systems, search space control: depth-first, breadth-first search, heuristic search - Hill climbing, best-first search, branch and bound. Problem Reduction, Constraint Satisfaction End, Means-End Analysis

**Module II: Knowledge Representation**
Predicate Logic: Unification, modus ponens, resolution, dependency directed backtracking. Rule based Systems: Forward reasoning: conflict resolution, backward reasoning: use of no backtracks.
Structured Knowledge Representation: Semantic Nets: slots, exceptions and default frames, conceptual dependency, scripts.
Expert Systems
Need and justification for expert systems, knowledge acquisition, Case studies: MYCIN, RI.
Learning: Concept of learning, learning automation, genetic algorithm, learning by inductions, neural nets.

**Module III: Manipulator kinematics**
Kinematics: Introduction, solvability, algebraic solution by reduction to polynomial, standard frames, repeatability and accuracy, computational considerations.

**Module IV: Manipulator dynamics**
Introduction, acceleration of rigid body, mass distribution, Newton's equation, Euler's equation, Iterative Newton-Euler dynamic formulation, closed dynamic equation, Lagrangian formulation of manipulator dynamics, dynamic simulation, computational consideration.

**Module V: Trajectory Generation**
Introduction, general considerations in path description and generation, joint space schemes, Cartesian space schemes, Path generation in runtime, Planning path using dynamic model.

**Module VI: Linear control of manipulators**
Introduction, feedback and closed loop control, second order linear systems, control of second-order systems, Trajectory following control, modeling and control of a single joint, sensor and vision system.
Robot Programming languages & systems: Introduction, the three level of robot programming, requirements of a robot programming language, problems peculiar to robot programming languages.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

***Text:***


- E. Rich and K. Knight, "Artificial intelligence", TMH, 2nd ed., 1992.
- N.J. Nilsson, "Principles of AI", Narosa Publ. House, 1990.
- John J. Craig, "Introduction to Robotics", Addison Wesley publication
- Richard D. Klafter, Thomas A. Chmielewski, Michael Negin, "Robotic Engineering – An integrated approach", PHI Publication

- Tsuneo Yoshikawa, “Foundations of Robotics”, PHI Publication

***References:***


- D.W. Patterson, “Introduction to AI and Expert Systems”, PHI, 1992.
- Peter Jackson, “Introduction to Expert Systems”, AWP, M.A., 1992.
- R.J. Schalkoff, “Artificial Intelligence - an Engineering Approach”, McGraw Hill Int. Ed., Singapore, 1992.
- M. Sasikumar, S. Ramani, “Rule Based Expert Systems”, Narosa Publishing House, 1994.

# ADVANCED METHODS OF MANUFACTURING LAB

**Course Code:** **BTM 821** **Credit Units: 01**

## Course Contents:

1. Practice of part programming and operations of
    i) Turning Center.
    ii) Machining Center.

2. Tool planning and selection for
    i) Turning Center.
    ii) Machining Center.

3. Tool Design for a plastic component.
    i) Core and Cavity Extraction of Industrial switch Knob.
    ii) Gating Design.

4. Assembly of various die components for the above.

5. Pattern design for a casting component
    i) Cope and Drag design of a butterfly valve.
    ii) Gating design.

6. Assembly of various pattern components for the above.

7. Generation of G and M codes for the above assemblies and electrodes.

8. Programming and study of Robots for material handling.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# GEAR TECHNOLOGY LAB

**Course Code:** **BTM 822** **Credit Units: 01**

## Course Contents:

## List of Experiments:

1. To study the different elements of Worm Gear.
2. To study the different elements of Bevel Gear.
3. To study the different elements of Helical Gear.
4. To study the Differential Gear System.
5. Calculation of train ratio and velocity ratio for compound Gear
6. Calculation of train ratio and velocity ratio for Sun and Planet Gear.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

# ARTIFICIAL INTELLIGENCE AND ROBOTICS LAB

**Course Code: BTM 823** **Credit Units: 01**

## Course Contents:

## Name of Experiments:

1. Robot Arm (Model 1055)

2. Write a prolog program to define a relations knowledge base as follows : Assume the following in the kbase :
   Male (person), female (person), husband (person, person0, wife(person, person), father (person, person), mother (person, person). Define the predicates for
   Parent
   Brother
   Sister
   Grandfather
   Ancestor

3. Write a prolog program to simulate a non deterministic finite automation (NFA)

4. A computer system accepts a user's name and password which are stored as facts in the kbase. Validate this information through a predicate login. If not valid, display a suitable message.

5. Write prolog predicates to perform list manipulation as follows :
   List membership relation
   Length of a list
   Concatenate 2 list to produce a third list
   Reverse a list
   Subset of a list
   Appending an element to a list
   Summing the element of a list

6. Write a prolog program to implement Depth first search algorithm.

7. Write a prolog program to simulate the Towers of Hanoi problem.

8. There is a gold treasure hidden inside a cave. The cave is a maze of galleries connecting different rooms in which there are dangerous beings like monsters and robbers. The gold treasure is all in one room. Determine a route by which a person can get to the treasure and escape with it unhurt. Enclosed is a photocopy of the cave lay out. Write the corresponding prolog program.

9. Write a prolog program to simulate the xor logic circuit. In this program make use of the predicate definitions for AND, NOT and OR gate.

10. A hungry monkey finds himself in a room in which a bunch of bananas is hanging from the ceiling. The monkey cannot reach the bananas. In the room there is a chair and a stick. The ceiling is just the right height so that a monkey standing on a chair could knock the bananas down with the stick. The monkey knows how to move around, carry other things around, reach for the bananas and wave a stick in the air. Write prolog predicate that define the monkey's legal moves, the different legal states and enable the monkey to got to the bananas.

11. In the block world problem, assure a sequence of 3 blocks a, b, c on a table. Write prolog predicates to define valid states in the blocks world domain and also to define valid legal moves in the system.

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

# COMMUNICATION SKILLS - VI

**Course Code:** **BTM 841** **Credit Units: 01**

## Course Objective:
The modules are designed to enhance the communicative competence of the learners to equip them with efficient interpersonal communication.

## Course Contents:

**Module I: Dynamics of Group Discussion**
Introduction,
Methodology
Role Functions
Mannerism
Guidelines

**Module II: Communication through Electronic Channels**
Introduction
Technology based Communication Tools
Video Conferencing
Web Conferencing
Selection of the Effective Tool
E-mails, Fax etc.

**Module III: Effective Public Speaking**
Types
Essentials
Success in Public Speaking
Dos and Don'ts

## Examination Scheme:

| Components | CT1 | CT2 | CAF | V | GD | GP | A |
|---|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 25 | 10 | 10 | 10 | 5 |

CAF – Communication Assessment File
GD – Group Discussion
GP – Group Presentation

## Text & References:


- Jermy Comfort, Speaking Effectively, et.al, Cambridge
- Krishnaswamy, N, Creative English for Communication, Macmillan
- Raman Prakash, Business Communication, Oxford.
- Taylor, Conversation in Practice,

# BEHAVIOURAL SCIENCE - VIII
# (PERSONAL AND PROFESSIONAL EXCELLENCE)

**Course Code: BTM 843 Credit Units: 01**

## Course Objective:
Importance of Personal and Professional excellence
Inculcating the components of excellence

## Course Contents:

**Module I: Components of Excellence**
Personal Excellence:
Identifying long-term choices and goals
Uncovering the talent, strength & style
Analyzing choke points in your personal processes by analysis in area of placements, events, seminars, conference, extracurricular activities, projects etc.

**Module II: Managing Personal Effectiveness**
Setting goals to maintain focus
Dimensions of personal effectiveness (self disclosure, openness to feedback and perceptiveness)
Integration of personal and organizational vision for effectiveness
A healthy balance of work and play
Managing Stress creatively and productively

**Module III: Personal Success Strategy**
Time management
Handling criticism and interruptions
Dealing with difficult people
Mapping and evaluating the situations
Identifying long-term goals

**Module IV: Positive Personal Growth**
Understanding & Developing positive emotions
Positive approach towards future
Resilience during loss and challenge

**Module V: Professional Success**
Building independence & interdependence
Reducing resistance to change
Continued reflection (Placements, events, seminars, conferences, projects extracurricular Activities etc.)

**Module VI: End-of-Semester Appraisal**
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

## Examination Scheme:

| Components | SAP | A | Mid Term Test (CT) | VIVA | Journal for Success (JOS) |
|---|---|---|---|---|---|
| Weightage (%) | 20 | 05 | 20 | 30 | 25 |

# FRENCH - VIII

**Course Code:** **BTM 844** **Credit Units: 02**

## Course Objective:

Provide students with the necessary linguistic tools

- to face up to different situations of communication
- to enhance their capacity in oral/written comprehension/expression

## Course Contents:

**Module B: Unités 4, 5, 6: PP. 48 - 86**

**Contenu lexical:**

**Unité 4:**
1. Présenter une information/les circonstances d'un événement
2. Exprimer la possibilité/la probabilité
3. Exprimer une quantité indéfinie
4. Comprendre et raconter un fait div

**Unité 5:**
1. Parler d'une passion, d'une aventure
2. Choisir/créer
3. Exprimer la surpirse/des sentiments

**Unité 6:**
1. Exprimer la cause et la conséquence
2. Exprimer la crainte et rassurer
3. Faire une démonstration

**Contenu grammatical:**

1. la construction passive
2. la forme impersonnelle
3. l'interrogation
4. les adjectifs et les pronoms indéfinis
5. les pronoms interrogatifs et démonstratifs
6. la construction avec deux pronoms
7. le subjonctif dans l'expression des sentiments, de la crainte, du but
8. constructions permettant l'expression de la cause et de la conséquence
9. l'enchaînement des idées : succession et opposition

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- le livre à suivre : Campus: Tome 2

# GERMAN - VIII

**Course Code: BTM 845 Credit Units: 02**

## Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany
Introduction to Advanced Grammar and Business Language and Professional Jargon

## Course Contents:

**Module I: Reading and comprehension**
Reading texts and comprehending them

**Module II: Information about German History**
Acquiring information about German History through appropriate texts and stories

**Module III: Bio data/Curriculam vitae**
Writing a bio-data in the proper format with all essential components

**Module IV: Informal letters**
Reading and writing informal letters

**Module V: Business etiquette**
Business etiquette in Germany and types of companies

**Module VI: Interview skills**
To learn to face interviews
Read a text 'Interviewspiel'

**Module VII: Picture Description**
Firstly recognize the persons or things in the picture and identify the situation depicted in the picture;
Secondly answer questions of general meaning in context to the picture and also talk about the personal experiences which come to your mind upon seeing the picture.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:


- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

# SPANISH – VIII

**Course Code: BTM 846 Credit Units: 02**

## Course Objective:

To enable students to deal with Spanish situations putting things in perspective, using Past Tense. Enabling them to comprehend and form slightly complex sentences. Give students vocabulary of various situations.

## Course Contents:

**Module I**
Situational exercises/Picture Description:
At the cine
At the Chemist's/Hospital

**Module II**
At a corporate client's informal/formal meeting/gathering
Looking for accommodation

**Module III**
Past Tense (Indefinido) of regular verbs
Past Tense (Indefinido) of irregular verbs
Exercises related to the above

**Module IV**
Past Tense (Imperfecto)

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- Español En Directo I A, 1B
- Español Sin Fronteras
- Material provided by the teacher from various sources

# JAPANESE - VIII

**Course Code: BTM 847** **Credit Units: 02**

## Course Objective:

To enable the students to converse in the language with the help of different forms as volitional forms, active and passive voice and decision making etc.
**Note:** The course and teaching in Roman as well as Japanese script. Also introducing next 10 to 20 kanjis.

## Course Contents:

**Module I: Volitional forms**
Explaining the situation when one is thinking of doing something.

**Module II: Active and Passive voice**
Direct and indirect ways of speech.

**Module III: Plain Forms**
Sentence patterns using plain forms of verb.

**Module IV: Causes and effects**
Explaining causes and effects with different forms of verb.

**Module V: Decision making**
Expressing different occupations and how to make decision.

## Learning Outcome

- Students can speak the language and will be able to express their views and opinions comfortably.

## Methods of Private study/ Self help

- Hand-outs, audio-aids, assignments and role-plays will support classroom teaching.

## Examination Scheme:

| Components | CT1 | CT2 | C | I | V | A |
|---|---|---|---|---|---|---|
| Weightage (%) | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- Shin Nihon-go no Kiso Lesson No.-36 to 40.
- All vocabulary and topics taught to the students are from the above mentioned book.

# CHINESE – VIII

**Course Code:** **BTM 848** **Credit Units: 02**

## Course Objective:

Paper was first invented n China in 105 AD. It was a closely guarded secret and didn't reach Europe until the 8th Century. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

## Course Contents:

**Module I**
Drills
Dialogue practice
Observe picture and answer the question.
The aspect particle "le" and the modal particle "le".

**Module II**
Optative verbs
Texts based on different topics
Enriching vocabulary by dealing with various daily scenarios and situations.

**Module III**
Sentences with subject predicate construction as its predicate
Pronunciation and intonation
Character writing and stroke order

**Module IV**
About china Part I Lesson 2, 3
Chinese to English and English to Chinese translations from the news paper.

**Module V**
Questions with an interrogative pronoun
Essays, writing formal letters.
Conversation practice.

## Examination Scheme:

| **Components** | **CT1** | **CT2** | **C** | **I** | **V** | **A** |
|---|---|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 20 | 20 | 15 | 5 |

C – Project + Presentation
I – Interaction/Conversation Practice

## Text & References:

- "Kan tu shuo hua" Part-I Lesson 8-13

# PROJECT

**Course Code: BTM 860 Credit Units: 15**

## Methodology

Topics of project are to be based on the latest trends, verifying engineering concepts /principals and should involve elementary research work. The projects may involve design, fabrications, testing, computer modeling, and analysis of any engineering problem. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation on same.

## Examination Scheme:

| | |
|---|---|
| Literature study/ Fabrication/ Experimentation | 40 |
| Written Report | 20 |
| Viva | 15 |
| Presentation | 25 |
| **Total** | **100** |

# Bachelor of Technology
# (Mechanical Engineering)

# BME

AICTE MODEL

CURRICULUM

(2019-23 Batch)

# Bachelor of Technology
# (Mechanical Engineering)

## Programme Code: BME

## Duration – 4 Years Full Time

## Programme Structure
## &
## Curriculum & Scheme of Examination

## 2019-23
## (Based on AICTE)

# AMITY UNIVERSITY
# MADHYA PRADESH

**PREAMBLE**

Amity University aims to achieve academic excellence by providing multi-faceted education to students and encourage them to reach the pinnacle of success. The University has designed a system that would provide rigorous academic programme with necessary skills to enable them to excel in their careers.

This booklet contains the Programme Structure, the Detailed Curriculum and the Scheme of Examination. The Programme Structure includes the courses (Core and Elective), arranged semester wise. The importance of each course is defined in terms of credits attached to it. The credit units attached to each course has been further defined in terms of contact Hours i.e. Lecture Hours (L), Tutorial Hours (T), Practical Hours (P). Towards earning credits in terms of contact Hours, 1 Lecture and 1 Tutorial per week are rated as 1 credit each and 2 Practical Hours per week are rated as 1 credit. Thus, for example, an L-T-P structure of 3-0-0 will have 3 credits, 3-1-0 will have 4 credits, and 3-1-2 will have 5 credits.

The Curriculum and Scheme of Examination of each course includes the course objectives, course contents, scheme of examination and the list of text and references. The different codes used for the components of evaluation are given below:-

| **Components** | **Codes** |
|---|---|
| Case Discussion/ Presentation/ Analysis | C |
| Home Assignment | H |
| Project | P |
| Seminar | S |
| Viva | V |
| Quiz | Q |
| Class Test | CT |
| Attendance | A |
| End Semester Examination | ESE |

It is hoped that it will help the students study in a planned and a structured manner and promote effective learning. Wishing you an intellectually stimulating stay at Amity University.

May, 2019

## PROGRAM OUTCOMES

**PO1**. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

**PO2. Problem Analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

**PO3. Design/Development of Solutions** :Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

**PO4. Conduct Investigations of Complex Problems** :Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

**PO5. Modern Tool Usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

**PO6. The Engineer and Society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

**PO7. Environment and Sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**PO8. Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

**PO9. Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**PO10. Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

**PO11. Life-long Learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

**PO12. Project Management and Finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

## PROGRAM SPECIFIC OUTCOMES

**PSO1.Professional Skills** : An ability to understand the basic concepts in Mechanical Engineering and to apply them to various areas, like Automobile, power plant, Production, Manufacturing etc., in the design and implementation of complex systems.

**PSO2. Problem-solving skills**: An ability to solve complex Mechanical Engineering problems, using latest hardware and software tools, along with analytical skills to arrive cost effective and appropriate solutions.

**PSO3. Successful career and Entrepreneurship**: An understanding of social-awareness & environmental-wisdom along with ethical responsibility to have a successful career and to sustain passion and zeal for real-world applications using optimal resources as an Entrepreneur.

**PROGRAMME STRUCTURE**

| FIRST SEMESTER | | | | | | |
|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Lecture (L) Hours Per week** | **Tutorial (T) Hours Per week** | **Practical (P) Hours Per week** | **Total Credits** | **Hours** |
| MAT101 | Applied Mathematics – I<br>(Calculus and Linear Algebra) | 3 | 1 | - | 4 | 40 |
| CHE101 | Applied Chemistry | 3 | 1 | - | 4 | 40 |
| ECE 101 | Basic Electrical Engineering | 3 | - | - | 3 | 30 |
| BME 101 | Engineering Graphics & Design | 1 | - | - | 1 | 10 |
| CHE121 | Applied Chemistry Lab | - | - | 2 | 1 | 20 |
| ECE 121 | Basic Electrical Engineering Lab | - | - | 2 | 1 | 20 |
| BME 121 | Engineering Graphics & Design Lab | - | - | 4 | 2 | 40 |
| BCU141 | Communication Skills – I | 1 | - | - | 1 | 10 |
| EVS142 | Environmental Studies – I | 2 | - | - | 2 | 20 |
| BSU143 | Behavioural Science – I | 1 | - | - | 1 | 10 |
| FLU144 | French– I | 2 | - | - | 2 | 20 |
| **CBCS** | | 3 | - | - | 3 | 30 |
| **TOTAL CREDITS (Including CBCS)** | | | | | **25** | |
| **Total Hrs Including CBCS per week** | | | | | **29** | |
| **Total Hrs in the Semester** | | | | | **290** | |

| **SECOND SEMESTER** | | | | | | |
|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Lecture (L) Hours Per week** | **Tutorial (T) Hours Per week** | **Practical (P) Hours Per week** | **Total Credits** | **Hours** |
| MAT201 | Applied Mathematics-II (Ordinary & Partial Differential Equations and Transform) | 3 | 1 | - | 4 | 40 |
| PHY101 | Applied Physics – I | 3 | 1 | - | 4 | 40 |
| CSE 104 | Programming for Problem Solving | 3 | - | - | 3 | 30 |
| BME 102 | Workshop/ Manufacturing Practices | 1 | - | - | 1 | 10 |
| PHY121 | Applied Physics Lab – I | - | - | 2 | 1 | 20 |
| CSE 124 | Programming for Problem Solving Lab | - | - | 4 | 2 | 40 |
| BME 122 | Workshop/ Manufacturing Practices Lab | - | - | 4 | 2 | 40 |
| BCU241 | Communication Skills – II | 1 | - | - | 1 | 10 |
| EVS242 | Environmental Studies – II | 2 | - | - | 2 | 20 |
| BSU243 | Behavioural Science – II | 1 | - | - | 1 | 10 |
| FLU244 | French– II | 2 | - | - | 2 | 20 |
| CBCS | | 3 | - | - | 3 | 30 |
| **TOTAL CREDITS (Including CBCS)** | | | | | **26** | |
| **Total Hrs Including CBCS** | | | | | **31** | |
| **Total Hrs in the Semester** | | | | | **310** | |
| TERM PAPER DURING SUMMER BREAK | | | | | | |

| **THIRD SEMESTER** | | | | | | |
|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Lecture (L) Hours Per week** | **Tutorial (T) Hours Per week** | **Practical (P) Hours Per week** | **Total Credits** | **Hours** |
| MAT 301 | Applied Mathematics – III (Probability, Statistics and Numerical Methods) | 3 | - | - | 3 | 30 |
| PHY 303 | Applied Physics – II | 3 | - | - | 3 | 30 |
| BME 301 | Engineering Mechanics | 3 | - | - | 3 | 30 |
| BME 302 | Material science & Metallurgy | 3 | - | - | 3 | 30 |
| BME 303 | Thermodynamics | 3 | - | - | 3 | 30 |
| ECE 307 | Basic Electronics | 2 | - | - | 2 | 20 |
| PHY 323 | Applied Physics Lab – II | - | - | 2 | 1 | 20 |
| BME 321 | Engineering Mechanics Lab | - | - | 2 | 1 | 20 |
| BME 323 | Thermodynamics lab | - | - | 2 | 1 | 20 |
| ECE 327 | Basic Electronics lab | - | - | 2 | 1 | 20 |
| BCU 341 | Communication Skills – III | 1 | - | - | 1 | 10 |
| BSU 343 | Behavioural Science – III | 1 | - | - | 1 | 10 |
| FLU 344 | French– III | 2 | - | - | 2 | 20 |
| NTP 330 | **Term paper (Evaluation)** | - | - | - | 2 | |
| **CBCS** | | 3 | - | - | 3 | 30 |
| **TOTAL CREDITS (Including CBCS)** | | | | | **30** | |
| **Total Hrs Including CBCS** | | | | | **32** | |
| **Total Hrs in the Semester** | | | | | **320** | |

| FOURTH SEMESTER | | | | | | |
|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Lecture (L) Hours Per week** | **Tutorial (T) Hours Per week** | **Practical (P) Hours Per week** | **Total Credits** | **Hours** |
| BME 401 | Fluid mechanics | 3 | - | - | 3 | 30 |
| BME 402 | Heat and Mass Transfer | 3 | - | - | 3 | 30 |
| BME 403 | Kinematic of Machine | 3 | - | - | 3 | 30 |
| BME 404 | Manufacturing Machine | 3 | - | - | 3 | 30 |
| BME 405 | Strength of Material | 3 | - | - | 3 | 30 |
| BME 422 | Heat and Mass Transfer Lab | - | - | 2 | 1 | 20 |
| BME 423 | Kinematic of Machine Lab | - | - | 2 | 1 | 20 |
| BME 424 | Manufacturing Machine Lab | - | - | 2 | 1 | 20 |
| BME 425 | Strength of Material & Fluid Mechanics Lab | - | - | 2 | 1 | 20 |
| BCU 441 | Communication Skills – IV | 1 | - | - | 1 | 10 |
| BSU 443 | Behavioural Science – IV | 1 | - | - | 1 | 10 |
| FLU 444 | French– IV | 2 | - | - | 2 | 20 |
| **CBCS** | | 3 | 1 | - | 4 | 40 |
| **TOTAL CREDITS (Including CBCS )** | | | | | **27** | |
| **Total Hrs Including CBCS** | | | | | **31** | |
| **Total Hrs in the Semester** | | | | | **310** | |
| INDUSTRIAL PRACTICAL TRAINING – I: 6 – 8 WEEKS | | | | | | |

| **FIFTH SEMESTER** | | | | | | |
|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Lecture (L) Hours Per week** | **Tutorial (T) Hours Per week** | **Practical (P) Hours Per week** | **Total Credits** | **Hours** |
| BME 501 | Applied Thermodynamics | 3 | - | - | 3 | 30 |
| BME 502 | Dynamics of Machines | 3 | - | - | 3 | 30 |
| BME 503 | Machine Design –I | 3 | - | - | 3 | 30 |
| BME 504 | Measurement and Control | 3 | - | - | 3 | 30 |
| BME 505 | Metrology | 3 | - | - | 3 | 30 |
| BME 522 | Dynamics of machine Lab | - | - | 2 | 1 | 20 |
| BME 524 | Measurement and control Lab | - | - | 2 | 1 | 20 |
| BME 525 | Metrology lab | - | - | 2 | 1 | 20 |
| BCU 541 | Communication Skills –V | 1 | - | - | 1 | 10 |
| BSU 543 | Behavioural Science – V | 1 | - | - | 1 | 10 |
| FLU 544 | French– V | 2 | - | - | 2 | 20 |
| NPT 550 | **Industrial Practical Training - I (Evaluation)** | - | - | - | 3 | - |
| **CBCS** | | 3 | 1 | - | 4 | 40 |
| **TOTAL CREDITS (Including CBCS )** | | | | | | **29** |
| **Total Hrs Including CBCS** | | | | | | **29** |
| **Total Hrs in the Semester** | | | | | | **290** |

| SIXTH SEMESTER | | | | | | |
|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Lecture (L) Hours Per week** | **Tutorial (T) Hours Per week** | **Practical (P) Hours Per week** | **Total Credits** | **Hours** |
| BME 601 | Fluid Power Systems | 3 | - | - | 3 | 30 |
| BME 602 | IC Engine & Gas Turbine | 3 | - | - | 3 | 30 |
| BME 603 | Machine Design – II | 3 | - | - | 3 | 30 |
| BME 604 | Manufacturing Technology | 3 | - | - | 3 | 30 |
| BME 621 | Fluid Power Systems Lab | - | - | 2 | 1 | 20 |
| BME 622 | IC Engine & Gas Turbine Lab | - | - | 2 | 1 | 20 |
| BME 623 | Machine Design Lab – II | - | - | 2 | 1 | 20 |
| **ELECTIVES (Anyone from following with Practical)** | | | | | **4** | **50** |
| BME 606 | Mechatronics | 3 | - | - | | |
| BME 607 | Artificial Intelligence and Robotics | 3 | - | - | | |
| BME 626 | Mechatronics Lab | - | - | 2 | | |
| BME 627 | Artificial Intelligence and Robotics lab | - | - | 2 | | |
| | | | | | | |
| BCU 641 | Communication Skills – VI | 1 | - | - | 1 | 10 |
| BSU 643 | Behavioural Science – VI | 1 | - | - | 1 | 10 |
| FLU 644 | French– VI | 2 | - | - | 2 | 20 |
| NMP 660 | **Minor Project** | - | - | - | 2 | - |
| **CBCS** | | - | - | - | 1 | - |
| **TOTAL CREDITS (Including CBCS )** | | | | | **26** | |
| **Total Hrs Per Week** | | | | | **27** | |
| **Total Hrs in the Semester** | | | | | **270** | |
| INDUSTRIAL PRACTICAL TRAINING –II: 6 – 8 WEEKS | | | | | | |

| **SEVENTH SEMESTER** | | | | | | |
|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Lecture (L) Hours Per week** | **Tutorial (T) Hours Per week** | **Practical (P) Hours Per week** | **Total Credits** | **Hours** |
| BME 701 | Operations Research | 3 | - | - | 3 | 30 |
| BME 702 | Computer Aided Manufacturing | 3 | - | - | 3 | 30 |
| BME 703 | Management of Manufacturing Systems | 3 | - | - | 3 | 30 |
| BME 721 | Operations Research (Programming) Lab | - | - | 2 | 1 | 20 |
| BME 722 | Computer Aided Manufacturing Lab | - | - | 2 | 1 | 20 |
| **ELECTIVES (Any one from each category)** | | | | | **4** | **50** |
| **A (With Practical)** | | | | | | |
| BME 704 | Automotive Engineering | 3 | - | - | | |
| BME 705 | Computer Aided Designing | 3 | - | - | | |
| BME 724 | Automotive Engineering Lab | - | - | 2 | | |
| BME 725 | Computer Aided Designing Lab | - | - | 2 | | |
| **ELECTIVES (Any one from each category)** | | | | | **3** | **30** |
| **B (Without Practical)** | | | | | | |
| BME 706 | Marketing Management | 3 | - | - | | |
| BME 707 | Solar Energy | 3 | - | - | | |
| BME 708 | Power Plant Practices | 3 | - | - | | |
| BME 709 | Combustion Engine Emissions | 3 | - | - | | |
| | | | | | | |
| BCU 741 | Communication Skills – VII | 1 | - | - | 1 | 10 |
| BSU 743 | Behavioural Science – VII | 1 | - | - | 1 | 10 |
| FLU 744 | French– VII | 2 | - | - | 2 | 20 |
| NPT 750 | **Industrial Practical Training–II(Evaluation)** | - | - | - | 5 | |
| NMP 760 | **Major Project – I** | - | - | - | 6 | |
| **TOTAL CREDITS** | | | | | **33** | |
| **Total Hrs Per Week** | | | | | **25** | |
| **Total Hrs in the Semester** | | | | | **250** | |

| **EIGHT SEMESTER** | | | | | | |
|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Lecture (L) Hours Per week** | **Tutorial (T) Hours Per week** | **Practical (P) Hours Per week** | **Total Credits** | **Hours** |
| BME 801 | Quality Control & Quality Assurance | 3 | - | - | 3 | 30 |
| BME 802 | Refrigeration & Air-conditioning | 3 | - | - | 3 | 30 |
| BME 822 | Refrigeration & Air-conditioning Lab | - | - | 2 | 1 | 20 |
| **ELECTIVES (Any one from following with Practical)** | | | | | **4** | **50** |
| BME 803 | Advanced Methods of Manufacturing | 3 | - | - | | |
| BME 804 | Gear Technology | 3 | - | - | | |
| BME 823 | Advanced Methods of Manufacturing Lab | - | - | 2 | | |
| BME 824 | Gear Technology Lab | - | - | 2 | | |
| | | | | | | |
| BCU 841 | Communication Skills – VIII | 1 | - | - | 1 | 10 |
| BSU 843 | Behavioural Science – VIII | 1 | - | - | 1 | 10 |
| FLU 844 | French– VIII | 2 | - | - | 2 | 20 |
| NMP 860 | **Major Project – II** | - | - | - | 9 | |
| **TOTAL CREDITS** | | | | | **24** | |
| **Total Hrs Per Week** | | | | | **17** | |
| **Total Hrs in the Semester** | | | | | **170** | |

# APPLIED MATHEMATICS-I
# CALCULUS AND LINEAR ALGEBRA

**Course Code: MAT 101** **Credit Units: 04**
**Total Hours: 40**

**Course Objective:**
The objective of this course is to familiarize the prospective engineers with techniques in calculus, multivariate analysis and linear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

**Course Contents:**

**Module 1: Calculus: (6 Hours)**
Taylor's and Maclaurin theorems with remainders, Partial Differentiation, Total derivative, Maxima and minima for Two variables, Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions, Multiple Integration: Double integrals (Cartesian), Triple integrals (Cartesian).

**Module 2: Vector Calculus: (6 Hours)**
Scalar and vector field, Gradient, Divergence and Curl, Directional Derivative, Evaluation of a Line Integral, Green's theorem in plain (without proof), Stoke's theorem (without proof) and Gauss Divergence theorem (without proof).

**Module 3: Complex Variable – Differentiation: (7 Hours)**
Function of complex variable, differentiation, analytic functions, Cauchy-Riemann equations, harmonic functions, finding harmonic conjugate; elementary analytic functions (exponential, trigonometric, logarithm) and their properties; conformal mappings, Mobius transformations and their properties.

**Module 4: Complex Variable – Integration: (7 Hours)**
Contour integrals, Cauchy-Goursat theorem (without proof), Cauchy Integral formula (without proof), Liouville's theorem and Maximum-Modulus theorem (without proof); Taylor's series, zeros of analytic functions, singularities, Laurent's series; Residues, Cauchy Residue theorem (without proof), Evaluation of definite integral involving sine and cosine, Evaluation of certain improper integrals.

**Module 5: Matrices: (6 Hours)**
Rank of a matrix, Linear systems of equations, Consistency of Linear Simultaneous Equations, linear Independence, Gauss elimination and Gauss-Jordan elimination, Eigen values, eigenvectors, Caley-Hamilton theorem, Diagonalization.

**Module 6: Linear algebra & Vector spaces: (8 Hours)**
Linear algebra: Group, ring, field (Definition), Vector Space, linear dependence of vectors, basis, dimension; Linear transformations (maps), range and kernel of a linear map, Inverse of a linear transformation, rank- nullity theorem (without proof), composition of linear maps, Matrix associated with a linear map.

**Course Outcomes**
The objective of this course is to familiarize the prospective engineers with techniques in basic calculus and linear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.
The students will learn:

- To apply differential and integral calculus to notions of curvature and to improper integrals. Apart from various applications, they will have a basic understanding of Beta and Gamma functions.
- The mathematical tools needed in evaluating multiple integrals and their usage.
- The tools of differentiation and integration of functions of a complex variable that are used in various techniques dealing engineering problems.
- The essential tools of matrices and linear algebra including linear transformations, eigen values, diagonalization.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

**Suggested Text/Reference Books**


- Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
- B.S. Grewal, Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
- G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
- V. Krishnamurthy, V.P. Mainra and J.L. Arora, An introduction to Linear Algebra, Affiliated East–West press, Reprint 2005.
- J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Ed., Mc-Graw Hill, 2004.

# APPLIED CHEMISTRY

**Course Code: CHE 101** **Credit Units: 04**
**Total Hours: 40**

**Course Objective:**

Chemistry is essential to develop analytical capabilities of students, so that they can characterize, transform and use materials in engineering and apply knowledge in their field. All engineering fields have unique bonds with chemistry whether it is Aerospace, Mechanical, Environmental and other fields. The makeup of substances is always a key factor, which must be known. The upcoming field of technology like Nanotechnology and Biotechnology depends fully on the knowledge of basic chemistry. With this versatile need in view, course has been designed in such a way so that the student should get an overview of the whole subject starting from the very basic bonding mechanism to the application of materials. To train students practically in basic and applied principles of Chemistry.

**Course Contents:**

**Module I: Chemical Bonding & Chemical Equilibrium: (4Hours)**
Types of bond: Ionic, Covalent and Co-ordinate bond. Fajan's rule; Hybridisation. H- bonding. Valence bond and Molecular orbital theory for diatomic molecule.
Le Chatelier's Principle; Equilibrium constant from Thermodynamic Constants; Acid-Base Concept; Weak acid and Weak base and their salts; Solubility Product; pH and pOH, Buffer Solution, Buffer Action.

**Module II: Thermodynamics (Use of free energy in chemical equilibrium): (6 Hours)**
Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies.Free energy and emf.Cell potentials, the Nernst equation and applications.Acid base, oxidation reduction and solubility equilibria.Water chemistry.Corrosion.

**Module III: Stereochemistry, Organic reactions & mechanism: (10 Hours)**
Representations of 3 dimensional structures, structural isomers and stereoisomers, configurations and symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis. Isomerism in transitional metal compounds.
Electronegativity and dipole moment. Electron Displacement Effects: Inductive Effect; Mesomeric Effect; Electromeric Effects. Fission of covalent bonds.Intermediates of Organic reactions; Carbonium, Carbanion, Free Radical and Carbene.
Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings.

**Module IV: Polymers:(6 Hours)**
Introduction; Polymerization; Addition and Condensation Polymerization.Thermosetting and Thermoplastic Polymers.Molecular Weight of Polymer; Rubber, Plastic and Fiber; Preparation.
Properties and uses of PMMA, Polyester, Epoxy Resins and Bakelite, Silicone Polymers.

**Module V: Water Technology: (6 Hours)**
Introduction and specifications of water, Hardness and its determination (EDTA method only), Alkalinity, Boiler feed water, boiler problems; scale, sludge, priming & foaming: causes & prevention, caustic embrittlement & corrosion; causes & prevention, Carbonate & phosphate conditioning, colloidal conditioning & calgon treatment, Water softening processes; Lime – soda process, Ion exchange method.
Water for domestic use.

**Module VI: Instrumental Methods of analysis: (8 Hours)**
Introduction; Principles of spectroscopy; Laws of absorbance,
IR: Principle, Instrumentation, Application
UV : Principle, Instrumentation, Application
NMR : Principle, Instrumentation, Application

## Course Outcomes:

The concepts developed in this course will aid in quantification of several concepts in chemistry that have been introduced at the 10+2 levels in schools. Technology is being increasingly based on the electronic, atomic and molecular level modifications. To understand phenomena at nanometer levels, one has to base the description of all chemical processes at molecular levels. The course will enable the student to:

- Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.

- Rationalise bulk properties and processes using thermodynamic considerations.
- Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques
- Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.
- List major chemical reactions that are used in the synthesis of molecules.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **ESE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

A: Attendance, CT: Class Test, S/V/Q/HA - Seminar/Viva/Quiz/Home Assignment, ESE - End Semester Examination.

## Text & References:


- Physical Chemistry, by P. W. Atkins
- Engineering Chemistry , by Dr. Sunita Rattan
- Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane
- Organic Spectroscopy, by Jagmohan
- Engineering Chemistry by Jain & Jain
- University chemistry, by B. H. Maha
- Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore.

# BASIC ELECTRICAL ENGINEERING

**Course Code: ECE 101** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The objective of the course is to provide a brief knowledge of Electrical Engineering to students of all disciplines. This Course includes some theorems related to electrical, some law's related to flow of current, voltages, basic knowledge of Transformer, basic knowledge of electromagnetism, basic knowledge of electrical network.

**Course Contents:**

**Module 1: DC Circuits: (7 Hours)**
Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff's current and voltage laws, analysis of simple circuits with dc excitation.Superposition, Thevenin's and Norton's Theorems.Time-domain analysis of first-order RL and RC circuits.

**Module 2: AC Circuits: (7 Hours)**
Representation of sinusoidal waveforms, peak and R.M.S. values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance. Three- phase balanced circuits, voltage and current relations in star and delta connections.

**Module 3: Transformers: (6 Hours)**
Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency.Auto-transformer and three-phase transformer connections.

**Module 4: Electrical Machines: (6 Hours)**
Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited dc motor. Construction and working of synchronous generators.

**Module 5: Power Converters: (4 Hours)**
DC-DC buck and boost converters, duty ratio control. Single-phase and three-phase voltage source inverters; sinusoidal modulation.

## Course Outcomes:

- To understand and analyze basic electric and magnetic circuits.
- To study the working principles of electrical machines and power converters.
- To introduce the components of low voltage electrical installations.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:


- D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering" , Tata McGraw Hill, 2010.
- D. C. Kulshreshtha, " Basic Electrical Engineering", McGraw Hill, 2009.
- L. S. Bobrow, " Fundamentals of Electrical Engineering", Oxford University Press, 2011.
- E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
- V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

# ENGINEERING GRAPHICS & DESIGN

**Course Code: BME 101** **Credit Units: 01**
**Total Hours: 10**

**Except the basic essential concepts, most of the teaching part can happen concurrently in the laboratory itself**

**Course Objective:**
This course will provide students concepts on the drawings of different curves like straight line, parabola, ellipse etc. After completion of this course, students will be able to draw different figures manually and will be capable of using various instruments involved in drawings.

**Module 1:** Introduction to Engineering Drawing, Orthographic Projections, Projections of Regular Solids, Sections and Sectional Views of Right Angular Solids. **(3 Hours)**

**Module 2:** Sections and Sectional Views of Right Angular Solids, Isometric Projections, Overview of Computer Graphics. **(3 Hours)**

**Module 3:** Customization & CAD Drawing, Annotations, layering & other functions, Demonstration of a simple team design project. **(4 Hours)**

## Course Outcomes:

- To prepare students to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- To prepare students to use the techniques, skills, and modern engineering tools necessary for engineering practice
- To prepare for actual work situations through practical training in a new state-of-the-art computer designed CAD laboratory using engineering software.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:


- M.B. Shah & B.C. Rana, Engineering Drawing, Pearson Education, 2007
- PS Gill, Engineering Drawing, Kataria Publication
- ND Bhatt, Engineering Drawing, Charotar publications
- N Sidheshwar, Engineering Drawing, Tata McGraw Hill
- CL Tanta, Mechanical Drawing, “Dhanpat Rai”
- Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication
- Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers
- (Corresponding set of) CAD Software Theory and User Manuals

# APPLIED CHEMISTRY LAB

**Course Code: CHE 121** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
Principles of chemistry relevant to the study of science and engineering have clarity of understanding through experiments. Learning process and learning outcomes get enhanced through experiments relevant to and commensurate with theoretical knowledge. The lab course is designed to teach the students the basiucs and advanced chemical principles through experiments.
Four basic sciences, Physics, Chemistry, Mathematics and Biology are the building blocks in engineering and technology. Chemistry is essential to develop analytical capabilities of students, so that they can characterize, transform and use materials in engineering and apply knowledge in their field. All engineering fields have unique bonds with chemistry whether it is Aerospace, Mechanical, Environmental and other fields the makeup of substances is always a key factor, which must be known. For electronics and computer science engineering, apart from the material, computer modeling and simulation knowledge can be inherited from the molecule designing. The upcoming field of technology like Nanotechnology and Biotechnology depends fully on the knowledge of basic chemistry. With this versatile need in view, course has been designed in such a way so that the student should get an overview of the whole subject starting from the very basic application of principles.

**Course Contents:**

**List of experiments: [Any 10]**

1. Chemical analysis of water for determination of hardness. **(2 Hours)**
2. Chemical analysis of water for determination of Alkalinity. **(2 Hours)**
3. Chemical analysis of water for determination of residual Chlorine. **(2 Hours)**
4. Synthesis of urea - formaldehyde resin. **(2 Hours)**
5. Determination of dissolved oxygen in water. **(2 Hours)**
6. Determination of surface tension of a given liquid**. (2 Hours)**
7. Plant pigments separation by paper chromatography. **(2 Hours)**
8. Conductometric titration. **(2 Hours)**
9. Determination of water modules of crystallization in Mohr's salt. **(2 Hours)**
10. Application of distribution law in the determination of equilibrium constant**. (2 Hours)**
11. Determination of amount of Oxalic acid and Sulphuric acid in one litre of solution. **(2 Hours)**
12. pH metric titration. **(2 Hours)**

## Laboratory Outcome:
The chemistry laboratory course will consist of experiments illustrating the principles of chemistry relevant to the study of science and engineering. The students will learn to measure molecular/system properties such as surface tension, viscosity, conductance of solutions, redox potentials, chloride content of water, etc.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance Attendance

# BASIC ELECTRICAL ENGINEERING LAB

**Course Code: ECE 121** **Credit Units: 01**

**Total Hours: 20**

**Course Objectives:**
To impart basic knowledge of electrical quantities such as current, voltage, power, energy and frequency to understand the impact of technology in a global and societal context. Provide working knowledge for the analysis of basic DC and AC circuits used in electrical and electronic devices. To explain the working principle, construction, applications of DC machines, AC machines & measuring instruments.

**List of experiments/demonstrations:**

1. Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors. **(2 Hours)**
2. To verify KVL & KCL in the given network. **(2 Hours)**
3. To verify Superposition Theorem. **(2 Hours)**
4. To verify Maximum Power Transfer Theorem. **(2 Hours)**
5. Demonstration of cut-out sections of machines: dc machine (commutator-brush arrangement), induction machine (squirrel cage rotor), synchronous machine (field winging - slip ring arrangement) and single-phase induction machine. **(2 Hours)**
6. Torque Speed Characteristic of separately excited dc motor. **(2 Hours)**
7. To determine $R_{Th}$, $V_{Th}$, $R_N$, $I_N$ and verify Thevenin's and Norton's Theorem in a given network. **(2 Hours)**
8. To perform open circuit & short circuit test on a single-phase transformer. **(2 Hours)**
9. To study and draw the voltage vs frequency characteristics of the series and parallel resonance for given RLC Circuit **(2 Hours)**
10. Demonstration of (a) dc-dc converters (b) dc-ac converters – PWM waveform (c) the use of dc-ac converter for speed control of an induction motor. **(2 Hours)**

## Laboratory Outcomes:

- Get an exposure to common electrical components and their ratings.
- Make electrical connections by wires of appropriate ratings.
- Understand the usage of common electrical measuring instruments.
- Understand the basic characteristics of transformers and electrical machines.
- Get an exposure to the working of power electronic converters.

**Examination Scheme:**

| IA | | | EE | | | |
|---|---|---|---|---|---|---|
| **Class Test (Practical Based)** | **Mid Term Viva** | **Attendance** | **Major Experiment** | **Minor Experiment/ Spotting** | **Practical Record** | **Viva** |
| 15 | 10 | 05 | 35 | 15 | 10 | 10 |

Note: IA –Internal Assessment, EE- External Exam

# ENGINEERING GRAPHICS & DESIGN LAB

**Course Code: BME 121** **Credit Units: 02**
**Total Hours: 40**

**Course Objective:**
This course will provide students concepts on the drawings of different curves like straight line, parabola, ellipse etc. After completion of this course, students will be able to draw different figures manually and will be capable of using various instruments involved in drawings.

**Course Contents:**

**List of experiments/ demonstrations:**
**Module 1: Introduction to Engineering Drawing: (4 Hours)**
Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales – Plain, Diagonal and Vernier Scales

**Module 2: Orthographic Projections: (4 Hours)**
Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes; Projections of planes inclined Planes - Auxiliary Planes

**Module 3: Projections of Regular Solids: (4 Hours)**
Those inclined to both the Planes- Auxiliary Views; Draw simple annotation, dimensioning and scale. Floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc.

**Module 4: Sections and Sectional Views of Right Angular Solids: (4 Hours)**
Prism, Cylinder, Pyramid, Cone – Auxiliary Views; Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry and dwellings (foundation to slab only)

**Module 5: Isometric Projections: (4 Hours)**
Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa,Conventions

**Module 6: Overview of Computer Graphics: (4 Hours)**
Listing the computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.; Isometric Views of lines, Planes, Simple and compound Solids

**Module 7: Customization & CAD Drawing: (4 Hours)**
consisting of set up of the drawing page and the printer, including scale settings, Setting up of units and drawing limits; ISO and ANSI standards for coordinate dimensioning and tolerancing; Orthographic constraints, Snap to objects manually and automatically; Producing drawings by using various coordinate input entry methods to draw straight lines, Applying various ways of drawingcircles

**Module 8: Annotations, layering & other functions: (6 Hours)**
Applying dimensions to objects, applying annotations to drawings; Setting up and use of Layers, layers to create drawings, Create, edit and use customized layers; Changing line lengths through modifying existing lines (extend/lengthen); Printing documents to paper using the print command; orthographic projection techniques; Drawing sectional views of composite right regular geometric solids and project the true shape of the sectioned surface; Drawing annotation, Computer-aided design (CAD) software modeling of parts and assemblies. Parametric and non-parametric solid, surface, and wireframe models.Part editing and two-dimensional documentation of models.Planar projection theory, including sketching of perspective, isometric, multiview, auxiliary, and section views. Spatial visualization exercises. Dimensioning guidelines, tolerancing techniques; dimensioning and scale multi views ofdwelling.

**Module 9: Demonstration of a simple team design project: (6 Hours)**
Geometry and topology of engineered components: creation of engineering models and their presentation in standard 2D blueprint form and as 3D wire-frame and shaded solids; meshed topologies for engineering analysis and tool-path generation for component manufacture; geometric dimensioning and tolerancing; Use of solid-modeling software for creating associative models at the component and assembly levels; floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc. Applying colour coding according to building drawing practice; Drawing sectional elevation showing foundation to ceiling; Introduction to Building Information Modelling (BIM)

## Laboratory Outcomes

- Introduction to engineering design and its place in society
- Exposure to the visual aspects of engineering design
- Exposure to engineering graphics standards
- Exposure to solid modeling
- Exposure to computer-aided geometric design
- Exposure to creating working drawings
- Exposure to engineering communication

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

# ENVIRONMENTAL STUDIES – I

**Course Code: EVS 142** **Credit Units: 02**
**Total Hours: 20**

**Course Objectives**

The term environment is used to describe, in the aggregate, all the external forces, influences and conditions, which affect the life, nature, behavior and the growth, development and maturity of living organisms. At present a great number of environmental issues, have grown and complexity day by day, threatening the survival of mankind on earth. Environment study is quite essential in all streams of studies including environmental engineering and industrial management. The objective of environmental studies is to enlighten the masses about the importance of the protection and conservation of our environment and control of human activities which has an adverse effect on the environment.

**Course Contents:**

**Module I: The multidisciplinary nature of environmental studies: (06 Hours)**

Definition, scope and importance

Need for public awareness

**Module II: Natural Resources: (08 Hours)**

Renewable and non-renewable resources:
Natural resources and associated problems

Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.

Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies.

Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.
Role of an individual in conservation of natural resources.

Equitable use of resources for sustainable lifestyles.

**Module III: Ecosystems: (03 Hours)**

Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession

Food chains, food webs and ecological pyramids
Introduction, types, characteristic features, structure and function of the following ecosystem:

- **a.** Forest ecosystem
- **b.** Grassland ecosystem
- **c.** Desert ecosystem
- **d.** Aquatic ecosystems (ponds, streams, lakes, rivers, ocean estuaries)

**Module IV: Biodiversity and its conservation: (03 Hours)**

Introduction – Definition: genetic, species and ecosystem diversity
Biogeographical classification of India
Value of biodiversity: consumptive use, productive use, social, ethical aesthetic and option values Biodiversity at global, national and local levels

India as a mega-diversity nation, Hot-spots of biodiversity

Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts, Endangered and endemic species of India

Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity

## Course Outcome

Upon course completion, students will be able to understand:

- The multidisciplinary nature of environmental studies, including its definition, scope and need for public awareness.
- Our natural resources including renewable and non-renewable resources comprising of forest, water, mineral, food, energy and land resources.
- The ecosystem, their structure and function, energy flow, bio-geochemical cycles, community ecology, ecological succession, ecological pyramids, forest, grassland, aquatic and tundra ecosystem.
- Biodiversity and its conservation.
- Ecosystem diversity, species diversity and genetic diversity.
- Biological classification of India.
- Value of biodiversity.
- Biodiversity at global national and local level.
- Conservation of biodiversity.
- Characteristic of ideal ecosystem.
- Study of an artificial ecosystem.

**Examination Scheme:**

| Components | CT | HA | S/V/Q | A | ESE |
|---|---|---|---|---|---|
| Weightage (%) | 15 | 5 | 5 | 5 | 70 |

**Text & References:**


- Chauhan B. S. 2009: Environmental Studies, University Science Press New Delhi.
- Dhameja S.K., 2010; Environmental Studies, Katson Publisher, New Delhi.
- Smriti Srivastava, 2011: Energy Environment Ecology and Society, Katson Publisher, New Delhi.
- Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
- Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad 380 013, India, Email:mapin@icenet.net (R)
- Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p Clark R.S., Marine Pollution, Clanderson Press Oxford (TB)
- Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopaedia, Jaico Publ. House, Mumbai, 1196p
- De A.K., Environmental Chemistry, Wiley Eastern Ltd. Down to Earth, Centre for Science and Environment (R)
- Gleick, H.P. 1993. Water in Crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford Univ. Press. 473p
- Hawkins R.E., Encyclopaedia of Indian Natural History, Bombay Natural History Society, Bombay (R) Heywood, V.H & Waston, R.T. 1995. Global Biodiversity Assessment. Cambridge Univ. Press 1140p.
- Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284 p. McKinney, M.L. & School, R.M. 1996. Environmental Science Systems & Solutions, Web enhanced edition. 639p.
- Mhaskar A.K., Matter Hazardous, Techno-Science Publication (TB) Miller T.G. Jr. Environmental Science, Wadsworth Publishing Co. (TB)
- Odum, E.P. 1971. Fundamentals of Ecology. W.B. Saunders Co. USA, 574p
- Rao M N. & Datta, A.K. 1987. Waste Water treatment. Oxford & IBH Publ. Co. Pvt. Ltd. 345p. Sharma B.K., 2001. Environmental Chemistry. Geol Publ. House, Meerut
- Survey of the Environment, The Hindu (M)
- Townsend C., Harper J, and Michael Begon, Essentials of Ecology, Blackwell Science
- Trivedi R.K., Handbook of Environmental Laws, Rules Guidelines, Compliances and Standards, Vol I and II, Enviro Media (R)
- Trivedi R. K. and P.K. Goel, Introduction to air pollution, Techno-Science Publication (TB) Wanger K.D., 1998 Environmental Management. W.B. Saunders Co. Philadelphia, USA 499p

# APPLIED MATHEMATICS – II
## (ORDINARY & PARTIAL DIFFERENTIAL EQUATIONS AND TRANSFORM)

**Course Code: MAT 201** **Credit Units: 04**
**Total Hours: 40**

**Course Objectives :**
The objective of this course is to familiarize the prospective engineers with techniques in multivariate integration, ordinary and partial differential equations and transforms. It aims to equip the students to deal with advanced level of mathematics and applications that would be essential for their disciplines.

**Course Contents:**

**Module I: First order ordinary differential equations: (6 Hours)**
Exact, linear and Bernoulli's equations, Euler's equations, Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

**Module II: Ordinary differential equations of higher orders: (9 Hours)**
Higher order linear differential equations with constant coefficients, Second order linear differential equations with variable coefficients, method of variation of parameters, Solution by series Method.

**Module III: Partial Differential Equations : (9 Hours)**
Formation of Partial Differential Equations, First order partial differential equations, solutions of first order linear PDEs; Solution to homogenous and non-homogenous linear partial differential equations of second order by complimentary function and particular integral method with constant coefficients. Non linear partial differential equation of first order, charpit's method. Separation of variable method for the solution of wave and heat equations.

**Module IV: Laplace Transform: (8 Hours)**
Laplace Transform: Introduction of Laplace Transform, Laplace Transform of elementary functions, properties of Laplace Transform, Change of scale property, second shifting property. Laplace transform of the derivative, inverse Laplace transform and its properties. Convolution theorem.Applications of Laplace Transform to solve the ODEs.

**Module V: Fourier Transform: (8 Hours)**
Fourier series: Introduction of Fourier series, Fourier series for discontinuous functions, Fourier series for even and odd function, Half range series, Fourier Transform: Definition and properties of Fourier Transform, Sine and Cosine transform.

## Course Outcomes:

- Upon completion of this course, students will be able to solve field problems in engineering involving PDEs.
- The effective mathematical tools for the solutions of differential equations that model physical processes.

**Examination Scheme**:

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | **5** | **15** | **10** | **70** |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Suggested Text/Reference Books


- G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson,Reprint, 2002.
- Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006.
- W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9th Edn., Wiley India, 2009.
- S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.
- E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India, 1995.
- E. L. Ince, Ordinary Differential Equations, Dover Publications, 1958.
- N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.

B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

# APPLIED PHYSICS – I

**Course Code: PHY 101** **Credit Units: 04**

**Total Hours: 40**

**Course Objective:**
Aim of this course is to introduce the students to fundamentals of graduate level physics, which form the basis of all applied science and engineering

**Course Contents:**

**Module I: Electromagnetics: (10 Hours)**
Scalar and vector fields, gradient of a scalar field, physical significance of gradient, equipotential surface. Line, surface and volume integrals, Divergence and curl of vector field and mathematical analysis physical significance, Electric flux, Gauss' law, Proof and Applications, Gauss divergence and Stokes theorems.
Differential form of Gauss' Law, Amperes' Law, Displacement current, Faradays Law, Maxwell equations in free space & isotropic media (Integral form & differential form), EM wave propagation in free space, Poynting vector.

**Module II: Special Theory of Relativity: (10 Hours)**
Michelson-Morley experiment, Importance of negative result, Inertial & non-inertial frames of reference, Einstein's postulates of Special theory of Relativity, Space-time coordinate system, Relativistic Space Time transformation (Lorentz transformation equation), Transformation of velocity, Addition of velocities, Length contraction and Time dilation, Mass-energy equivalence (Einstein's energy mass relation) & Derivation of Variation of mass with velocity,

**Module III: Wave Mechanics: (10 Hours)**
Wave particle duality, De-Broglie matter waves, phase and group velocity, Heisenberg uncertainty principle, wave function and its physical interpretation, Operators, expectation values. Time dependent & time independent Schrödinger wave equation for free & bound states, square well potential (rigid wall), Step potential.

**Module IV: Semiconductor and Electronic Materials: (10 Hours)**
Band Theory of Solids, Semi-conductors: Intrinsic and Extrinsic, Carreir concentration, Direct and indirect band- gaps, Types of Electronic materials, p-n Junction Diode,Diode Equation, Breakdown in p-n Junction Diode: Avalanche and Zener, Zener Diode and its applications photoconductivity and photovoltaics.
Superconductivity, Meissner Effect, Type I and Type II Superconductors

## Course Outcomes:
After successful completion of the course students will have the knowledge and skill to:
- Apply vector calculus to static electric-magnetic fields in different engineering situations.
- Analyze and Apply Maxwell's equation to diverse engineering problems.
- Relate semiconductor material properties to semiconductor devices.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

- Physics of waves, W. C. Elmore & M. A. Heald
- Introduction to Electrodynamics, D. J. Griffith
- Engineering Physics, Satya Prakash
- Concept of Modern Physics, A. Beiser
- Solid State Physics, S. O. Pallai

# PROGRAMMING FOR PROBLEM SOLVING

**Course Code: CSE 104** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The objective of this course module is to acquaint the students with the basics of computers system, its components, data representation inside computer and to get them familiar with various important features of procedure oriented programming language i.e. C.

**Course Contents:**

**Module 1: Introduction to Programming: (3 Hours)**
Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.) Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/ Pseudocode with examples. From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code.

**Module II: Programming Essential: (8 Hours)**
Arithmetic expressions and precedence, Conditional Branching and Loop, Writing and evaluation of conditionals and consequent branching , Iteration and loops.

**Module III: Arrays: (4 Hours)**
Arrays (1-D, 2-D), Character arrays and Strings.

**Module IV: Basic Algorithms: (3 Hours)**
Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required)

**Module V: Function: (3 Hours)**
Functions (including using built in libraries), Parameter passing in functions, call by value, Passing arrays to functions: idea of call by reference

**Module VI: Recursion: (3 Hours)**
Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort.

**Module VII: Structure: (2 Hours)**
Structures, Defining structures and Array of Structures.

**ModuleVIII: Pointers: (2 Hours)**
Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation)

**Module IX: File handling: (2 Hours)**
Basics of file Handling.

## Course Outcomes:
The student will learn

- To formulate simple algorithms for arithmetic and logical problems.
- To translate the algorithms to programs (in C language).
- To test and execute the programs and correct syntax and logical error
- To implement conditional branching, iteration and recursion.
- To decompose a problem into functions and synthesize a complete program using divide and conquer approach.
- To use arrays, pointers and structures to formulate algorithms and programs.
- To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.
- To apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:

- Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
- E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill
- Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India

# WORKSHOP/ MANUFACTURING PRACTICES

**Course Code: BME 102** **Credit Units: 01**

**Total Hours: 10**

**Course Objective:**

The objective of this course is to impart the basic knowledge of Manufacturing methods, CNC machines, materials & their properties and various manufacturing processes to the students of all engineering discipline.

**Course Contents:**

**Module 1:** Manufacturing Methods- casting, forming, machining, joining, advanced manufacturing methods: **(3 Hours)**

**Module 2:** CNC machining, Additive manufacturing, Fitting operations & power tools: **(2 Hours)**

**Module 3:** Electrical &Electronics, Carpentry, Plastic moulding, glass cutting:**(3 Hours)**

**Module 4:** Metal casting, Welding (arc welding & gas welding), brazing:**(2 Hours)**

## Course Outcomes:

- To gain knowledge of the different manufacturing processes which are commonly employed in the industry
- To fabricate components using different materials

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:


- Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., “Elements of Workshop Technology”, Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.
- Kalpakjian S. And Steven S. Schmid, “Manufacturing Engineering and Technology”, 4th edition, Pearson Education India Edition, 2002.
- Gowri P. Hariharan and A. Suresh Babu,” Manufacturing Technology – I” Pearson Education, 2008.
- Roy A. Lindberg, “Processes and Materials of Manufacture”, 4th edition, Prentice Hall India, 1998.
- Rao P.N., “Manufacturing Technology”, Vol. I and Vol. II, Tata McGrawHill House, 2017.

# APPLIED PHYSICS LAB – I

**Course Code: PHY 121** **Credit Units: 01**
**Total Hours: 20**

**Course Objective**

**To provide detailed introduction to the principal class of semiconductor and electronics components**
**Time allocated for experiments No.1-10 is 2 Hours Each.**

**List of Experiments:**

1. To determine the forbidden band gap energy of a semiconductor.
2. To determine the frequency of AC mains using sonometer.
3. To determine the value of specific charge (ratio of e/m) of an electron by Thomson method.
4. To study the common base characteristics of a PNP junction transistor, by drawing input characteristic curves and output characteristic curves.
5. To study the common emitter characteristics of a NPN junction transistor, by drawing input characteristic curves and output characteristic curves.
6. To study a series /parallel resonant LCR circuit, its resonate frequency and quality factor
7. To study the voltage regulation characteristics of a zener diode.
8. To study the characteristics of a solar cell.
9. To draw V – I characteristics of a photocell and to verify the inverse square law of radiation.
10. To plot graph showing the variation of magnetic field with distance along the axis of a circular coil carrying current, and hence estimate the radius of the coil.

**Course Outcomes:**
After completion of course student will develop: Practical understanding and applications of fundamental concept of classical and modern Physics.

**Examination Scheme:**

| | IA | | | | EE | |
|---|---|---|---|---|---|---|
| **Components** | **A** | **PR** | **LR** | **V** | **PR** | **V** |
| **Weightage (%)** | 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# PROGRAMMING FOR PROBLEM SOLVING LAB

**Course Code: CSE 124** **Credit Units: 02**
**Total Hours: 40**

**List of experiments/ demonstrations:**
**Tutorial 1**: Problem solving using computers: **(2 Hours)**
**Lab1**: Familiarization with programming environment

**Tutorial 2**: Variable types and type conversions: **(2 Hours)**
**Lab 2**: Simple computational problems using arithmetic expressions

**Tutorial 3:** Branching and logical expressions: **(4 Hours)**
**Lab 3:** Problems involving if-then-else structures

**Tutorial 4**: Loops, while and for loops: **(4 Hours)**
**Lab 4:** Iterative problems e.g., sum of series

**Tutorial 5**: 1D Arrays: searching, sorting**: (4 Hours)**
**Lab 5**: 1D Array manipulation

**Tutorial 6**: 2D arrays and Strings**: (4 Hours)**
**Lab 6**: Matrix problems, String operations

**Tutorial 7**: Functions, call by value: **(4 Hours)**
**Lab 7**: Simple functions

**Tutorial 8 &9**: Numerical methods (Root finding, numerical differentiation, numerical integration): **(4 Hours)**
**Lab 8 and 9:** Programming for solving Numerical methods problems

**Tutorial 10**: Recursion, structure of recursive calls: **(4 Hours)**
**Lab 10:** Recursive functions

**Tutorial 11**: Pointers, structures and dynamic memory allocation: **(4 Hours)**
**Lab 11**: Pointers and structures

**Tutorial 12**: File handling: **(4 Hours)**
**Lab 12**: File operations

## Laboratory Outcomes:

- To formulate the algorithms for simple problems
- To translate given algorithms to a working and correct program
- To be able to correct syntax errors as reported by the compilers
- To be able to identify and correct logical errors encountered at run time
- To be able to write iterative as well as recursive programs
- To be able to represent data in arrays, strings and structures and manipulate them through a program
- To be able to declare pointers of different types and use them in defining self- referential structures.
- To be able to create, read and write to and from simple text files.

**Examination Scheme:**

| | IA | | | | EE | |
|---|---|---|---|---|---|---|
| **Components** | **A** | **PR** | **LR** | **V** | **PR** | **V** |
| **Weightage (%)** | 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# WORKSHOP/MANUFACTURING PRACTICES – LAB

**Course Code: BME 122** **Credit Units: 02**
**Total Hours: 40**

**Course Objective:**
The objective of this course is to impart the basic knowledge of Manufacturing methods, CNC machines, materials & their properties and various manufacturing processes to the students of all engineering discipline.

**List of experiments/demonstrations:**

1. Machine shop **(4Hours)**
2. Fitting shop **(4Hours)**
3. Carpentry **(4Hours)**
4. Electrical & Electronics **(6Hours)**
5. Welding shop **(Arc welding 4 hrs + gas welding 4hrs)** **(8Hours)**
6. Casting **(4Hours)**
7. Smithy **(4Hours)**
8. Plastic molding & Glass Cutting) **(6Hours)**

Examinations could involve the actual fabrication of simple components, utilizing one or more of the techniques covered above.

## Laboratory Outcomes:

- Upon completion of this laboratory course, students will be able to fabricate components with their own hands.
- They will also get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.
- By assembling different components, they will be able to produce small devices of their interest.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

# APPLIED MATHEMATICS III
# PROBABILITY, STATISTICS AND NUMERICAL METHODS

**Course Code : MAT 301** **Credit Units: 03**
**Total Hours: 30**

**Course Objective :**
The objective of this course is to familiarize the students with statistical techniques, Probability distribution and numerical techniques. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling various problems in the discipline.

**Course Contents :**

**Module I : Basic Statistics : (08 Hours)**
Measures of Central tendency: Moments, skewness and Kurtosis, Correlation and regression – Rank correlation.
**Applied Statistics :** Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves.

**Module II : Basic Probability and expectation : (04 Hours)**
Discrete and Continuous random variables and their properties, Dependent and Independent random variables. Probability spaces, conditional probability, the multinomial distribution, Poisson approximation to the binomial distribution, infinite sequences of Bernoulli trials, sums of independent random variables.
Expectation of Discrete Random Variables; Moments, Variance of a sum, Correlation coefficient.

**Module III: Probability distributions and probability density function (p. d. f.) for discrete and continuous variable: (06 Hours)**

**Probability distributions and probability density function for discrete variable**: For Binomial and Poisson's distribution and evaluation of statistical parameters.

**Probability distributions and probability density function for continuous variable**: For Normal distribution and evaluation of its statistical parameters.

**Module IV : Test of significance for Small and large samples : (04 Hours)**
Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations.
Test for single mean, difference of means and correlation coefficients, test for ratio of variances - Chi-square test for goodness of fit and independence of attributes.

**Module V Numerical Methods (08 Hours)**
Solution of simultaneous linear equations by numerical techniques; Jacobi's and Gauss-Seidel method.Solution of algebraic and transcendental equations – Bi-section method, Newton-Raphson method and Regula-Falsi method.

**Interpolation** : Finite differences, Relation between operators, Interpolation using Newton's forward and backward difference formula.

**Interpolation for unequal intervals**: Newton's divided difference and Lagrange's formulae. **Numerical differentiation and integration**: Picard's method, Trapezoidal rule and Simpson's 1/3rd and 3/8 rules.
**Solution of Ordinary differential equation** : Taylor's series, Euler's and modified Euler's methods, Runge-Kutta method of fourth order, Milne's and Adam's predicator-corrector methods.

## Course Outcome:

- The objective of this course is to familiarize the students with statistical techniques. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling various problems in the discipline.
- The students will learn: The ideas of probability and random variables and various discrete and continuous probability distributions and their properties.
- The basic ideas of statistics including measures of central tendency, correlation and regression.
- The statistical methods of studying data samples.
- Numerical techniques to solve simultaneous linear equations, interpolation and extrapolation.
- Numerical techniques of differential and integral.
- Solution of ordinary differential equation by numerical techniques.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

**Suggested Text/Reference Books**


- Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
- P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003(Reprint).
- S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.
- (iv) W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Ed.,Wiley, 1968.
- N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
- B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition,2000.
- Veerarajan T., Engineering Mathematics (for semester III), Tata McGraw-Hill, New Delhi, 2010.

# APPLIED PHYSICS – II

**Course Code: PHY 303** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The aim is to provide the basic understanding of oscillations, waves, optics and related day to day phenomenon.

**Module 1:** Simple harmonic motion, damped and forced simple harmonic oscillator:**(6 Hours)**
Mechanical and electrical simple harmonic oscillators, complex number notation and phasor representation of simple harmonic motion, damped harmonic oscillator – heavy, critical and light damping, energy decay in a damped harmonic oscillator, quality factor, forced mechanical and electrical oscillators, electrical and mechanical impedance, steady state motion of forced damped harmonic oscillator, power absorbed by oscillator

**Module 2:** Non-dispersive transverse and longitudinal waves in one dimension and introduction to dispersion: **(6 Hours)**
Transverse wave on a string, the wave equation on a string, Harmonic waves, reflection and transmission of waves at a boundary, impedance matching, standing waves and their eigenfrequencies, longitudinal waves and the wave equation for them, acoustics waves and speed of sound, standing sound waves.
Waves with dispersion, water waves, superposition of waves and Fourier method, wave groups and group velocity.
**Module 3:** The propagation of light and geometric optics: **(6 Hours)**
Fermat's principle of stationary time and its applications e.g. in explaining mirage effect, laws of reflection and refraction, Light as an electromagnetic wave and Fresnel equations, reflectance and transmittance, Brewster's angle, total internal reflection, and evanescentwave.
Mirrors and lenses and optical instruments based on them, transfer formula and the matrix method

**Module 4:** Wave optics: **(6 Hours)**
Huygens' principle, superposition of waves and interference of light by wavefront splitting and amplitude splitting; Young's double slit experiment, Newton's rings, Michelson interferometer, Mach-Zehnder interferometer.
Farunhofer diffraction from a single slit and a circular aperture, the Rayleigh criterion for limit of resolution and its application to vision; Diffraction gratings and their resolving power

**Module 5:** Lasers: **(6 Hours)**
Einstein's theory of matter radiation interaction and A and B coefficients; amplification of light by population inversion, different types of lasers: gas lasers ( He-Ne, $CO_2$), solid-state lasers(ruby Neodymium), dye lasers; Properties of laser beams: mono-chromaticity, coherence, directionality and brightness, laser speckles, applications of lasers in science, engineering and medicine.

## Course Outcomes:
After studying through lectures and assignments, students will be able to:
- Solve relatedEngineering problemsand apply the concepts while designing a project.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination;

## Reference books:

- Ian G. Main, Oscillations and waves inphysics
- H.J. Pain, The physics of vibrations andwaves
- E. Hecht,Optics
- A. Ghatak,Optics
- O. Svelto, Principles ofLasers

# ENGINEERING MECHANICS

**Course Code: BME 301** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
Objective of this course is to provide fundamental knowledge of force system and its effect on the behaviour of the bodies that may be in dynamic or in static state. It includes the equilibrium of different structures like beams, frames, truss etc and the force transfer mechanism in the different components of a body under given loading condition.

**Course Contents:**

**Module I: Force system & Structure: (7 Hours)**
Free body diagram, Resultant and equilibrium of concurrent, parallel and non-concurrent co-planar force system, General numerical applications, Vector Mechanics.

**Module II: Plane Truss: (6 Hours)**
Plane truss, perfect and imperfect truss, assumption in the truss analysis, analysis of perfect plane trusses by the method of joints, method of section.

**Module III:Friction: (6 Hours)**
Static and Kinetic friction, laws of dry friction, co-efficient of friction, angle of friction, angle of repose, cone of friction, friction lock, efficiency of screw jack, transmission of power through belt.

**Module IV: Distributed Force: (6 Hours)**
Determination of center of gravity, center of mass and centroid by direct integration and by the method of composite bodies, mass moment of inertia and area moment of inertia by direct integration and composite bodies method, radius of gyration, parallel axis theorem, polar moment of inertia.

**Module V: Work –Energy: (5 Hours)**
Work energy equation, conservation of energy, Virtual work, impulse, momentum conservation, impact of bodies, co-efficient of restitution, loss of energy during impact, D'alembert principle.

## Course Outcomes:

- Use scalar and vector analytical techniques for analyzing forces in statically determinate structures.
- Apply fundamental concepts of kinematics and kinetics of particles to the analysis of simple, practical problems.
- Apply basic knowledge of math's and physics to solve real-world problems.
- Understand measurement error, and propagation of error in processed data.
- Understand basic kinematics concepts – displacement, velocity and acceleration (and their angular counterparts).
- Understand basic dynamics concepts – force, momentum, work and energy.
- Understand and be able to apply Newton's laws of motion.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- S.S. Bhavikatti, Engineering Mechanics, New Age International Ltd
- Timoshenko, Engineering Mechanics, McGraw Hill.
- R. S. Khurmi, Engineering Mechanics, S. Chand Publication.
- H. Shames & G. K. M. Rao, Engineering Mechanics, Pearson Education, 2006.
- Egor P. Popov, Engineering Mechanics of Solids, Prentice Hall of India, New Delhi,2001.
- R. Subramanian, Strength of Materials, Oxford University Press,2007.

# MATERIAL SCIENCE AND METALLURGY

**Course Code: BME 302** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
Metallurgy and Materials deal with the structure and properties of all materials, which have engineering applications. Metallurgists and Materials Engineers are responsible for designing, producing, examining and testing materials as diverse as metallic engineering alloys, semiconductors and superconductors, ceramics, plastics and composites. This course will help students understand the properties of different types of materials and their applications.

**Course Contents:**

**Module I:Crystal geometry:(10 Hours)**
Atomic structure of metals crystal structure, crystal lattice of (i) Body centered cubic (ii) face centered cubic (iii) closed packed hexagonal, crystallographic notation of atomic planes, polymorphism and allotropy, solidification of crystallization (i) nuclear formation (crystal growth) (ii) crystal imperfection Elementary treatment of theories of plastic deformation, phenomenon of slip twinning, dislocation, identification of crystallographic possible slip planes and direction in FCC, BCC, C.P., recovery, re-crystallization, preferred orientation causes and effects on the property of metals.

**Module II:Mechanical properties :(5 Hours)**
Introduction to Engineering materials, their mechanical behaviour, testing and manufacturing properties of materials, physical properties of materials, classification of engineering materials.

**Module III:Steels and Cast Irons :(8 Hours)**
General principles of phase transformation in alloys, phase rule and equilibrium diagrams, Equilibrium diagrams of Binary system in which the components form a mechanical mixture of crystals in the solid state and are completely mutually soluble in both liquid state. Equilibrium diagrams of a systems whose components have complete mutual solubility in the liquid state and limited solubility in the solid state in which the solid state solubility deceases with temperature. Equilibrium diagram of alloys whose components have complete mutual solubility in the liquid state and limited solubility in solid state (Alloy with a peritectic transformation) Equilibrium diagrams of a system whose components are subject to allotropic change. Iron carbon equilibrium diagram. Phase transformation in the iron carbon diagram (i) Formation of Austenite (ii) Transformation of austenite into pearlite (iii) Martensite transformation in steel, time temperature transformation curves.

**Module IV: Heat treatment: (7 Hours)**
Principles and applications of heat treatment processes viz. annealing, normalizing hardening, tempering; harden ability & its measurement, surface hardening processes. Defects in heat treatment and their remedies; effects produced by alloying elements on the structures and properties of steel. Distribution of alloying elements (Si, Mn. Ni. Cr. Mo. TL. Al) in steel.

## Course Outcomes

- After completing this course, the students will be able to understand metallic engineering alloys, semiconductors and superconductors, ceramics, plastics and composites.

### Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- V. Raghavan, “Material Science & Engineering”, Prentice Hall India Ltd., 2001.
- Shackelford, J.F. and Muralidhara, M.K., Introduction to Material Science for Engineers (6/e), Pearson Education, 2007
- S.K. Hazra Chaudhuri, “Material Science & Processes”, Indian Book Publishers, Calcutta, 1983.
- R.B. Gupta, “Material Science Processes”, Satya Prakashan, New Delhi, 2000.
- Degarmo E. Paul et.al, “Materials & Processes in Manufacture”, Prentice Hall India, New Delhi, 2001.
- Raymond A Higgim., “Engineering Metallurgy Part 1”, Prentice Hall India, New Delhi, 1998.
- L. Krishna Reddi, “Principles of Engineering Metallurgy”, New Age Publication, New Delhi, 2001.
- Buduisky et al, “Engineering Materials & Properties”, Prentice Hall India, New Delhi, 2004.
- Peter Haasten, “Physical Metallurgy”, Cambridge Univ. Press, 1996.

# THERMODYNAMICS

**Course Code: BME 303** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
Objective of this course is to impart in depth understanding of the principles of thermodynamics and heat transfer. This course also helps students understand the application of basic fluid mechanics, thermodynamic, and heat transfer principles and techniques, including the use of empirical data, to the analysis of representative fluid and thermal energy components and systems encountered in the practice of electrical, electronic, industrial, and related disciplines of engineering.

**Course Contents:**

**Module I: Basic concepts (6 Hours)**
Thermodynamic system, intensive and extensive properties, cyclic process, Zeroth Law of Thermodynamics, Heat and Work, Flow work

**Module II: First Law of Thermodynamics (5 Hours)**
Mechanical equivalent of heat, internal energy, Analysis of non-flow system, flow process and control volume, steady flow, energy equation, flow processes

**Module III: Second Law of Thermodynamics and Entropy (7 Hours)**
Heat Engine, heat pump, Kelvin Planck and Clausius statement of Second Law of Thermodynamics, Perpetual motion machine, Reversible cycle- Carnot Cycle, Clausius inequality, entropy, Principle of entropy increase, concepts of availability, irreversibility.

**Module IV: Air-Cycles (6 Hours)**
Carnot cycle, Otto cycle, Diesel cycle, Dual cycle, Stirling cycle, Erricsson cycle, Brayton cycle; Reversed Carnot cycle.

**Module V: Properties of Steam (6 Hours)**
Definition of Pure substance, Definitions of saturated states; P-v-T surface; Use of steam tables and R134a tables; Saturation tables; Superheated tables; Identification of states & determination of properties, Mollier's chart.

## Course Outcomes

- After completing this course, the students will be able to apply energy balance to systems and control volumes, in situations involving heat and work interactions.
- Students can evaluate changes in thermodynamic properties of substances.
- The students will be able to evaluate the performance of energy conversion devices
- The students will be able to differentiate between high grade and low-grade energies.

**Examination Scheme:**

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text Books & References:


- Cengel& Boles, "Thermodynamics", Tata McGraw Hill.
- Nag, P.K, 1995, Engineering Thermodynamics, Tata McGraw-Hill Publishing Co. Ltd.
- V. Wylen and Sonntag, Fundamentals of Classical Thermodynamics, John Wiley.
- Y.V.C. Rao, Engineering Thermodynamics, Khanna Publications
- DhomkundwarKothandaraman, "A Course in Thermal Engineering", Dhanpat Rai Publications.
- P. L. Ballany, *Thermal Engineering* –Khanna Publishers.

# BASIC ELECTRONICS

**Course Code: ECE 307** **Credit Units: 02**
**Total Hours: 20**

**Course Objective:**
The objective of this Course is to provide the students with an introductory and broad treatment of the field of Electronics Engineering to facilitate better understanding of the devices, instruments and sensors used in Civil & Mechanical Engineering applications. Lab should be taken concurrently. This course emphasizes more on the laboratory/practical use of the knowledge gained from the course lectures.

**Module 1: Diodes and Applications: (5Hours)**
Semiconductor Diode - Ideal versus Practical, Diode Equivalent Circuits, Load Line Analysis; Diode as a Switch, Diode as a Rectifier, Half Wave and Full Wave Rectifiers; Breakdown Mechanisms, Zener Diode – Operation and Applications; Opto-Electronic Devices – LEDs, Clipper and clampers.

**Module 2: Transistor Characteristics: (5 Hours)**
Bipolar Junction Transistor (BJT) –Construction, Operation, Amplifying Action, Common Base, Common Emitter and Common Collector Configurations, Operating Point, Voltage Divider Bias Configuration.
Introduction to FET, Feedback Amplifiers – Principle, Advantages of Negative Feedback, Topologies, Current Series and Voltage Series Feedback Amplifiers.

**Module 3: Operational Amplifiers and Applications: (5 Hours)**
Introduction to Op-Amp, Differential Amplifier Configurations, CMRR, PSRR, Slew Rate; Block Diagram, Pin Configuration of 741 Op-Amp, Characteristics of Ideal Op-Amp, Concept of Virtual Ground; inverting and non-inverting amplifier applications: summing and difference amplifier, unity gain buffer, comparator, integrator and differentiator.

**Module 4: Digital Electronics Fundamentals: (5 Hours)**
Difference between analog and digital signals, Boolean algebra, Basic and Universal Gates, Symbols, Truth tables, logic expressions, Logic simplification using K- map, Logic ICs, half and full adder/subtractor, multiplexers, de- multiplexers

## Course Outcomes:

- Know broadly the concepts and functionalities of the electronic devices, tools and instruments
- Understand use, general specifications and deploy abilities of the electronic devices, and assemblies
- Confidence in handling and usage of electronic devices, tools and instruments in engineering applications

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Suggested Text/Reference Books

- David. A. Bell (2003), Laboratory Manual for Electronic Devices and Circuits, Prentice Hall, India
- SantiramKal (2002), Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall, India
- Thomas L. Floyd and R. P. Jain (2009), Digital Fundamentals by Pearson Education,
- Paul B. Zbar, A.P. Malvino and M.A. Miller (2009), Basic Electronics – A Text-Lab. Manual, TMH
- R. T. Paynter (2009), Introductory Electronic Devices & Circuits, Conventional Flow Version, Pearson

# APPLIED PHYSICS LAB – II

**Course Code: PHY 323** **Credit Units: 01**
**Total Hours: 20**

**Course Objectives**
To develop understanding of various laws associated with oscillations, waves and optics and associated phenomena.

**List of Experiments:**
**Time allocated for experiments is 2 hours each.**

1. To determine the wavelength of sodium light by Newton's rings method.
2. To determine the dispersive power of the material of prism with the help of a spectrometer.
3. To determine the specific rotation of sugar by Bi-quartz or Laurent half shade polarimeter.
4. To determine the speed of ultrasonic waves in liquid by diffraction method.
5. To determine the width of a narrow slit using diffraction phenomena.
6. To determine the density of material of the given wire with the help of sonometer.
7. To determine the value of acceleration due to gravity ('g') in the laboratory using bar pendulum.
8. To determine the moment of inertia of a flywheel about its own axis of rotation.
9. To determine the frequency of an electrically maintained tunning fork by Melde's method.
10. To determine the frequency of AC mains using sonometer

**Course Outcomes:**
After completion of course student will develop
- Practical understanding and applications of oscillations and optics.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

# ENGINEERING MECHANICS LAB

**Course Code:BME 321** **CreditUnits: 01**
**Total Hours: 20**

**Course Objective:**
To understand the measurement of force system and its effect on the behaviour of the bodies that may be in dynamic or in static state. It includes the equilibrium of different structures like beams, frames, truss etc and the force transfer mechanism in the different components of a body under given loading condition.

**List of Experiments/demonstrations: [Any 10]**
**Time allocated for experiments No. 1 -12 is 2 Hours each**

1. To verify the law of Force Polygon
2. To verify the law of Moments using Parallel Force apparatus. (Simply supported type)
3. To determine the co-efficient of friction between wood and various surface (like
4. Leather, Wood, Aluminum) on an inclined plane.
5. To find the forces in the members of Jib Crane.
6. To determine the mechanical advantage, Velocity ratio and efficiency of a screw jack.
7. To determine the mechanical advantage, Velocity ratio and Mechanical efficiency of the
8. Wheel and Axle
9. To determine the MA, VR, η of Worm Wheel (2-start)
10. Verification of force transmitted by members of given truss.
11. To verify the law of moments using Bell crank lever
12. To find CG and moment of Inertia of an irregular body using Computation method.

## Course Outcomes:
- Understand and be able to apply Newton's laws of motion.
- Understand basic dynamics concepts – force, momentum, work and energy.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# THERMODYNAMICS LAB

**Course Code: BME 323** **Credit Units: 01**
**Total Hours: 20**

**Course Objective**
To understand the theory and applications of classical thermodynamics, thermodynamic properties, equations of state, methods used to describe and predict phase equilibrium.

**List of Experiments:**
**Time allocated for experiments is 2 hours each.**

1. To study of various types of boilers.
2. To study various types of Boiler mountings and accessories.
3. To study the working of two stroke petrol Engine.
4. To study the working of four stroke petrol Engine.
5. To study the working of two stroke Diesel Engine.
6. To study the working of four stroke Diesel Engine.
7. To study of Velocity & Pressure compounded steam turbine.
8. To study of Impulse & Reaction turbine.
9. To study of steam Engine model.
10. To study of Gas Turbine Model.

## Course Outcome

- Ability to apply fundamental concepts of thermodynamics to engineering applications.
- Ability to estimate thermodynamic properties of substances in gas and liquid state.
- Capability to determine thermodynamic efficiency of various energy related processes.

**Examination Scheme**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# BASIC ELECTRONICS LAB

**Course Code: ECE 327** **Credit Units: 01**

**Total Hours:20**

**Course Objective**
To understand the theory and applications of diode & transistors.

**List of Experiments:**
**Time allocated for experiments is 2 hours each.**

1. To study and verify the VI characteristic of a diode.
2. To study the Zener diode in breakdown region.
3. To study diode as a half wave rectifier.
4. To study diode as a full wave rectifier.
5. To study the characteristics of a CE Transistor.
6. To study the VI characteristic of CB &CC Transistor.
7. To study transistor as an amplifier.
8. To study OP Amp. As inverting and non-inverting Amp.
9. To study OP Amp in open loop and close loop.
10. To study OP Amp. As summer and differentiator Amp.
11. To study the Truth Table of Universal gates.
12. Verification of truth table of Half adder and full adder.
13. Verification of MUX and DEMUX.

## Course Outcomes:

- Know broadly the concepts and functionalities of the electronic devices, tools and instruments
- Understand use, general specifications and deploy abilities of the electronic devices, and assemblies
- Confidence in handling and usage of electronic devices, tools and instruments in engineering applications

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# TERM PAPER

**Course Code:NTP 330** **Credit Units: 02**

**Course Objective:** A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject. The objective of this course to make a student to carry out intense study on a specific topic related to current development in their field of specialization and Develop skills of presentation and report writing.

**METHODOLOGY:** The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

**GUIDELINES FOR TERM PAPER**

The procedure for writing a term paper may consist of the following steps:

1. Choosing a subject
2. Finding sources of materials
3. Collecting the notes
4. Outlining the paper
5. Writing the first draft
6. Editing & preparing the final paper

**1. Choosing a Subject**

The subject chosen should not be too general.

**2. Finding Sources of Materials**

a) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
b) Begin by making a list of subject-headings under which you might expect the subject to be listed.
c) The sources could be books and magazine articles, news stories, periodicals, scientific journals etc.

**3. Collecting the notes**

Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

a) Get facts, not just opinions. Compare the facts with author's conclusion.
b) In research studies, notice the methods and procedures, results & conclusions.
c) Check cross references.

**4. Outlining the paper**

a) Review notes to find main sub-divisions of the subject.
b) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

**5. Writing the first draft**

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

a) statement of purpose
b) main body of the paper
c) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main idea.

**6. Editing & Preparing the final Paper**

a) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.
b) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
c) Check for proper spelling, phrasing and sentence construction.
d) Check for proper form on footnotes, quotes, and punctuation.
e) Check to see that quotations serve one of the following purposes:
   (i) Show evidence of what an author has said.

(ii) Avoid misrepresentation through restatement.

(iii) Save unnecessary writing when ideas have been well expressed by the original author.

f) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

1) Title page
2) Table of contents
3) Introduction
4) Review
5) Discussion &Conclusion
6) References
7) Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

**Discussion**
The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

**Conclusion**
The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

a) summary of question posed
b) summary of findings
c) summary of main limitations of the study at hand
d) details of possibilities for related future research

**Reference**
From the very beginning of a research project, you should be careful to note all details of articles gathered. The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.
The key to a good bibliography is consistency. Choose a particular convention and stick to this.

**Conventions**
Monographs
Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

**Edited volumes**
Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.
[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hoursg.) for Herausgeber].

**Edited articles**
Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

**Journal articles**
McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

**Electronic book**
Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] from the World Wide Web, http://www.aber.ac.uk/media/Documents/S4B/.

**Electronic journal articles**
Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document].German as a Foreign Language Journal [online] 1.Retrieved [12.09.'00] from the World Wide Web, http://www.gfl-journal.com/.

**Other websites**

Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document].Retrieved [13.10.'01] from the World Wide Web, http://olaf.hiof.no/~sverrev/eng.html.

**Unpublished papers**

Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

**Unpublished theses/ dissertations**

Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg.
Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

**Appendix**

The appendix should be used for data collected (e.g. questionnaires, transcripts, ...) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

**Assessment Scheme:**

**Continuous Evaluation:** **40%**

(Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)

**Final Evaluation:** **60%**

(Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/ presented, outcomes vs. objectives, presentation/ viva etc.)

**Course Outcomes:**

After successful completion of this course, students will be able to

1. Carry out intense study on a specific topic related to current development in their field of specialization
2. Collect, interpret and analyze the information
3. Compare and evaluate the existing solutions for a specific cases study
4. Develop skills of presentation and report writing.

# FLUID MECHANICS

**Course Code: BME 401** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The objective of this subject is to familiarize the students with the properties of fluids, application of pressure measurement devices, application of mass and momentum conservation laws for fluid flows, importance of dimension and model analysis, laminar and turbulent flow, flow measurement devices and to obtain velocity and pressure variations in various types of simple flow.

**Course Contents:**

**Module I: Fluid Properties and Fluid Statics:(8 Hours)**
Definition of fluid, Newton's Law of viscosity, Properties of fluids, mass density, specific volume, specific gravity, viscosity, compressibility and surface tension. Pressure at a point, manometers, Forces on plane surfaces, forces on curved surfaces, buoyant forces, and stability of floating bodies, metacentre and metacentric height.

**Module II: Kinematics of Fluid Motion:(5 Hours)**
Steady and unsteady flow; uniform and non-uniform flow; Laminar and turbulent flow; streamline, path line and streak line; continuity equation, irrotational and rotational flow, velocity potential and stream function, vortex flow, free and forced vortex.

**Module III: Dynamics of Fluid Flow:(5 Hours)**
Euler's equation of motion and its integration to yield Bernoulli's equation, its practical applications – Pitot tube, Venturi meter, Orificemeter; steady flow momentum equation, force exerted on a pipe bend.

**Module IV: Dimensional Analysis and Principles of Similarity:(4 Hours)**
Dimensional analysis, Dimensional homogeneity, Buckingham π-Theorem and its applications, Geometric, Kinematics and Dynamic similarity; Dimensionless numbers-Reynolds, Froude, Euler, Mach, Weber Number and their significance.

**Module V: Laminar and Turbulent Flow:(5 Hours)**
Reynold's experiment, critical velocity, transition from laminar to turbulent flow, Boundary layer thickness, steady laminar flow through a circular tube, flow between parallel plates., courses of turbulence, velocity distribution law near a solid boundary, velocity distribution in rough pipes, Hazen – Williams's formula.

**Module VI: Analysis of Pipe Flow:(3 Hours)**
Energy losses, minor losses in pipe lines, concept of equivalent length, siphon.

**Module VII: Industrial Visit**
At least one visit to local industry in the field of Mechanical Engineering.

## Course Outcomes
Upon completion of this course, students will be able to understand the principles of fluid statics and kinematics, mathematically analyze simple flow situations, measurement of flow rates and dimensional analysis of model studies.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:

- R.K. Bansal, "Fluid Mechanics & Hydraulic Machines", Laxmi Publications (P) Ltd., 2002.
- Gupta, S. C., Fluid Mechanics and Hydraulic Machines, Pearson Education, 2007.
- D.S. Kumar, "Fluid Mechanics and Fluid Power Engineering", S.K. Kataria & Sons, 2000.
- F. M. White, Introduction to Fluid Mechanics, McGraw Hill
- I.H. Shames, "Mechanics of Fluids", Tata McGraw Hill
- Douglas, J. F., Gasiorek, J.M. and Swaffield, J., Fluid Mechanics, Pearson Education, 4/e, 2006
- V.L. Streeter and E.B. Wylie, "Fluid Mechanics", Tata McGraw Hill
- Massey B S, Mechanics of Fluids, Van Nostrand Reinhold Co

# HEAT AND MASS TRANSFER

**Course Code: BME 402** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The objective of this course is to build a solid foundation in heat transfer exposing students tothe three basic modes namely conduction, convection and radiation. Rigorous treatment of governing equations and solution procedures for the three modes will be provided, along with solution of practical problems using empirical correlations. The course will also briefly cover boiling and condensation heat transfer, and the analysis and design of heat exchangers.

**Course Contents:**

**Module I: Conduction:(8 Hours)**
Heat transfer - Different Modes, Governing Laws, One-dimensional steady-state conduction through homogeneous and composite plane walls, cylinders and spheres, critical thickness of insulation.

**Module II: Extended Surfaces or Fins: (5 Hours)**
Heat transfer from fins of uniform cross section, Temperature Distribution and Heat Transfer Calculations, Fin Efficiency and Effectiveness, Applications, Numerical Problems.

**Module III: Convection: (4 Hours)**
Concept of hydrodynamic and thermal boundary layers, momentum and energy equation for boundary layers on a flat plate, application of dimensional analysis to free and force convection; important dimensionless number.

**Module IV: Thermal Radiation: (6 Hours)**
Fundamental principles - gray, white, opaque, transparent and black bodies, Spectral emissive power, Planck's laws, Wien's displacement law; Stefan-Boltzmann's relation, Configuration factors; radiant interchange between black and grey surfaces; radiation shielding solar radiation.

**Module V: Heat Exchangers& Mass transfer: (7 Hours)**
Definition,classification, combined heat transfer analysis; overall heat transfer co-efficient; LMTD method, Effectiveness - NTU method, Analytical Methods, Numerical Problems.
Mass transfer: Definition, Examples, Fick's law of diffusion, Fick's law as referred to ideal gases.

## Course Outcomes:

- After completing the course, the students will be able to formulate and analyze a heat transfer problem involving any of the three modes of heat transfer
- The students will be able to obtain exact solutions for the temperature variation using analytical methods where possible or employ approximate methods or empirical correlations to evaluate the rate of heat transfer
- The students will be able to design devices such as heat exchangers and also estimate the insulation needed to reduce heat losses where necessary.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

**Text & References:**

- Incropera, F.P. and DeWitt, D.P. (2002). Fundamentals of Heat and Mass Transfer, John Willy&Sons, New York, NY.
- Nag, P.K. (2002). Heat and Mass Transfer, TMH.
- John R.Howell & Richrd O Buckius, Fundamentals of Engg. Thermodynamics, McGraw Hill International.
- Holman, J.P. (1997). Heat Transfer, 9$^{th}$ edition, McGraw-Hill.
- Mills, A.F. (1999). Basic Heat and Mass Transfer. Prentice-Hall.
- Thirumaleshwar, M. (2006). Fundamentals of Heat and Mass Transfer, Pearson education.
- Ghoshdastidar, P.S. (2004). Heat Transfer. OxfordUniversity Press.
- Arora, Domkundwar, S. and Domkundwar, A. (1988). A Course in Heat & Mass Transfer, Dhanpat Rai & Co.

# KINEMATICS OF MACHINES

**Course Code: BME 403** **Credit Units: 03**
**Total Hours: 30**

**CourseObjectives:**
To expose the students to learn the fundamentals of various laws governing rigid bodies and itsmotions.

**ModuleI:Mechanisms and Machines: (6 Hours)**
Links, Pairs, Chains, Structure, Mechanism, MachineEquivalentlinkage, Degrees of freedom, Gruebler's&Kutzback's criterion, Inversions of four bar chain,Mechanism with lower pairs Pantograph, Straight line motion mechanisms, Davis and Ackermann'ssteering mechanisms, Hooke's joint, Numerical problems based on above topics.

**ModuleII:Motion: (6 Hours)**
Plane motion, Absolute & Relative motion, Displacement, Velocity and Acceleration of apoint, Velocity and Acceleration Analysis by Graphical & Analytical methods, Velocity imageVelocity of rubbing, Kennedy's Theorem, Acceleration image, Acceleration polygon, Coriolisacceleration component, Klein's construction, Velocity and Acceleration Analysis using ComplexAlgebra (Raven's Approach), Numerical problems based on above topics

**Module III:Gears: (6 Hours)**
Classification of gears, Helical, Spiral, Bevel, Worm and Spur Gear, Spur GearTerminology, Law of gearing, Tooth profiles, velocity of sliding, Path of contact, Arc of contact,Contact Ratio, Interference and Undercutting, Conjugate action.Gear Trains:Simple, compound, reverted and epi cyclic gear trains. Velocity ratio and torquecalculation in gear trains

**Module IV:Cams: (6 Hours)**
Classification of Cams and Followers, Radial Cam Terminology, Analysis of Followermotion (uniform, modified uniform, simple harmonic, parabolic, cycloidal), Pressure Angle, Radiusof Curvature, Cam Profile for radial and offset followers Synthesis of Cam Profile by GraphicalApproach, Cams with Specified Contours.

**Module V: Gyroscope: (6 Hours)**
Gyroscopic Action in Machines, Angular Velocity and Acceleration, Gyroscopictorque/ couple, Gyroscopic effect on Naval Ships, Stability of two and four wheel Vehicles, Rigiddisc at an angle fixed to a rotating shaft.

## Course Outcomes:
At the completion of this course, students should be able to know
- Basic mechanisms, velocity and acceleration of simple mechanisms
- Drawing the profile of cams and its analysis
- Gear train calculations, Gyroscopes
- Inertia force analysis and flywheels
- Balancing of rotating and reciprocating masses

**Examination Scheme**

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text &Reference:

- Thomas Bevan; Theory of Machines; Pearson Education
- Rattan SS; Theory of machines; MC Graw Hills
- Ambekar AG; Mechanism and Machine Theory; PHI. Eastern Economy Edition 2015
- Uicker&Shigley, Theory of machines & Mechanism Second Edition Oxford UniversityPress
- Dr.Jagdish Lal; Theory of Machines; Metropolitan Book Co; Delhi
- Rao J S and Dukkipati; Mechanism and Machine Theory; New Age Delhi.
- Abdulla Shariff , Theory of Machines.

# MANUFACTURING MACHINES

**Course Code: BME 404** **Credit Units: 03**
**Total Hours: 30**

### Course Objective:

This is a new developmental graduate course for students interested in learning how to design, analyze and build specialty manufacturing process machines. It anticipated that this course would become part of the new manufacturing emphasis area in mechanical engineering.

### Course Contents:

**Module I: Introduction to Machine Tools: (5 Hours)**
Classification of machine tools, kinds of motion in machine tool operations, definition of cutting speed, feed and depth of cut.

**Module II: Lathe: (5 Hours)**
Classification and various parts of Lathe, specification, Description of important mechanism viz. apron, tail stock, head stock, work holding, devices and operations, e.g. taper, turning, eccentric turning and screw-cutting, Geometry of a single point cutting tool. Calculation of machining time, Capstan and turret lathe

**Module III:Drilling Machine: (5 Hours)**
Geometry and nomenclature of a twist drill, specification and classification of drilling machines, cutting speed, feed, depth of cut and calculation machining time in drilling, tool holding devices, different types of operations performed on a drilling machine.

**Module IV:Milling Machine: (5 Hours)**
Classification, up milling and down milling, dividing Head, different types of operations – simple, compound and differential indexing, slab milling, spiral milling, slot milling, T-slot milling and end milling.

**Module V:Shaper, Slotter & Planner: (5 Hours)**
Principal part of a shaper, classification, Quick Return mechanism, table feed mechanism of a shaper, Operations, e.g. horizontal, vertical and inclined shaping, difference between a shaper, planer and slotter, cutting speed, feed, and depth of cut and calculation of machining time in shaping.

**Module VI:Grinding Machines: (5 Hours)**
Construction and specification of a grinding wheel, wheel turning and dressing, Grinding machines surface, cylindrical and center less grinding.

**Module VII:Special Machines: (5 Hours)**
Horizontal and vertical boring machines, Gear Geometry, Gear generation and hobbing; Lapping, honing and super finishing processes.

## Course Outcomes:

Upon completion of this course, students will be able to understand the different conventional and unconventional manufacturing methods employed for making different products.

### Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- P.N. Rao, "Manufacturing Technology: Metal Cutting & Machine Tools", Tata McGraw Hill, Delhi, 2004.
- B.S. Raghuwanshi, "Workshop Technology", Vol.2, Dhanpat Rai & Sons, 2003.
- Hazra Chandhari S.K., "Elements of Workshop Technology", Vol.2, Media Promoters, 2003.
- P.C. Sharma, "A Text Book of Production. Engineering", S. Chand, New Delhi, 2004.
- Bawa H.S., "Workshop Technology", Vol.2, Tata McGraw Hill, 2004.
- Juneja & Shekhon, "Fundamental of Metal Cutting", New Age Publications
- S.F. Krar Stevan F. and Check A.F., "Technology of M/C Tools", McGraw Hill Book Co., 1986.
- Kibbe Richard et al, "M/c Tool practices", Prentice HallIndia, 2003.
- Bangalore HMT, "Production Technology", Tata McGraw Hill, 1980.
- R.K. Jain, "Production Technology", Khanna Publishers
- Gerling Heinrich, "All about Machine Tools", New Age Publication, 2003.

# STRENGTH OF MATERIAL

**Course Code: BME 405** **CreditUnits: 03**
**Total Hours:30**

**Course Objective:**
The objective of this course is to make the students understand the concept of stress and strain in different types of structure/machine under different loading conditions. The course also covers the simple and compound stresses due to forces, stresses and deflection in beams due to bending, torsion in circular section, strain energy, different theories of failure, stress in thin cylinder thick cylinder and spheres due to external and internal pressure.

**Module I: Simple Stresses and Strains: (5 Hours)**
Stress and Strain- Tension and Compression -Thermal Stresses -pure shear –Young's modulus of elasticity, Poisson's ratio, Modulus of rigidity and Bulk modulus - Relation between elastic constants –Stress -strain diagrams for brittle and ductile materials-working stress Strain energy in tension and compression, stress and strains in bars subjected to axial loading. thermal stress.

**Module II: Compound Stress and Strains: (5 Hours)**
Principal Stresses and Strains: Analysis of Biaxial state of stress with and without shear -Mohr's Circle. Shear Force and Bending Moment: Types of supports-Types of beams –Types of loads –articulated beams -Shear Force and Bending Moment diagrams.

**Module III: Bending Stress: (5 Hours)**
Theory of Simple Bending: Assumptions -Bending stresses in beams - Derivation of formula for Efficiency of various cross sections of beams (rectangular, circular and channel sections). Shear Stress Distribution: Flexural shear stress distribution in different cross sections of beams.

**Module IV: Torsion: (5 Hours)**
Torsion of Circular cross sections: Theory of pure torsion -transmission of Power in Solid and Hollow circular shafts–Combined bending and torsion.

**Module V: Thin Cylinders and Spheres: (3 Hours)**
Thin and Thick Cylinders: Thin and Thick Cylinders – spherical shells subjected to internal fluid pressure

**Module VI: Columns and Struts: (3 Hours)**
Columns and struts: column and failure of columns, Euler's formulas.

**Module VII: Slope and Deflection: (4 Hours)**
Deflection of Beams: Slope and deflection of beams- Double Integration method –Macaulay's method –strain energy method.

## Course Outcomes:

- After completing this course, the students should be able to recognize various types loads applied on machinecomponents of simple geometry and understand the nature of internal stresses that will develop within the components.
- The students will be able to evaluate the strains and deformation that will result due to the elastic stresses developed within the materials for simple types offloading.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;Att: Attendance

## Text & References:


- Jindal U.C., “Strength of Materials”, Galgotia Publication, New Delhi, 1998.
- Ryder G.H., “Strength of Materials”, Macmillan, Delhi, 2003.
- R.K. Bansal, “Strength of Materials”, Laxmi Publication, New Delhi, 2001.
- Sadhu Singh, “Strength of Materials”, Khanna Publishers, New Delhi, 2000.
- Timoshenko S.P., “Elements of Strength of Materials”, East-West affiliated, New Delhi, 2000.
- Hibbler R.C., “Mechanics of Materials”, Prentice Hall, New Delhi, 1994.
- Popov Eger P., “Engg. Mechanics of solids”, Prentice Hall, New Delhi, 1998.
- Fenner, Roger. T, “Mechanics of Solids”, U.K. B.C. Publication, New Delhi, 1990.
- Srinath L.S. et.al., “Strength of Materials”, McMillan, New Delhi,2001

# HEAT AND MASS TRANSFER LAB

**Course Code: BME 422** **Credit Units: 01**
**Total Hours: 20**

**Course Objectives:**
The objective of this course is to understand the principle of conduction, free & forced convection and radiation. To evaluate the thermal conductivity of a metallic bar & insulating powder and the performance evaluation of parallel flow and counter flow heat exchangers.

**List of experiments/demonstrations: [Any 10]**
**Time allocated for experiments is 2 hours each.**

1. To determine the thermal conductivity of a Metal Bar.
2. To determine the convective heat transfer co-efficient for a vertical cylinder by free or natural convection.
3. To determine the convective heat transfer co-efficient for a Horizontal Pipe by forced convection.
4. To determine the value of Stefan – Boltzman constant for radiation heat transfer.
5. To determine the heat transfer coefficient under forced condition using Pin Fin apparatus.
6. To determine the effectiveness & overall heat transfer coefficient for parallel & counter parallel flow heat exchanger.
7. To determine the emissivity of a Grey surface at different temperatures.
8. To determine the overall heat transfer co-efficient for the composite wall and to compare the same with that calculated from the equations.
9. Determination of effectiveness of temperature distribution plotted for the temperature.
10. To determine the effectiveness of temperature distribution of Pin Fin.
11. Determination of thermal effectiveness of insulating Powder.

## Course Outcomes:

- After completion of course student will develop practical understanding and applications of fundamental concept of conduction, convection and radiation.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

# KINEMATIC OF MACHINE LAB

**Course Code: BME 423** **Credit Units: 01**
**Total Hours: 20**

**Course Objectives:**
To understand the kinematics and rigid- body dynamics of kinematically driven machine components.Tounderstand the motion of linked mechanisms in terms of the displacement, velocity and acceleration at any point in a rigidlink.To be able to design some linkage mechanisms and cam systems to generate specified outputmotion. To understand the kinematics of geartrains.

**List of experiments/demonstrations: [Any 10]**
**Time allocated for experiments is 2 hours each.**

## List of Experiments:

1. To study various types of Links, Pairs, Chain and Mechanism
2. To study inversion of Four Bar Mechanism, Single Slider Crank Chain Mechanism and DoubleSlider Crank Chain Mechanism
3. To study velocity diagram for Slider Crank Mechanism.
4. Study of working models of various popular mechanisms like quick return mechanism etc.
5. To Find out velocity & acceleration of slider crank mechanism by Klein's Construction
6. To study Different types of Gears.
7. To find out velocity ratio of various gear trains
8. To study various types of belt drives & find out the velocity ratio of the drive.
9. To draw the cam profile.
10. Study of the mechanisms like Pantograph mechanism, Davis & Ackerman's steering mechanisms etc.
11. To finds out gyroscopic couple.

## Course Outcomes:

- Students who have undergone the course will be able to understand the measurement of mechanical properties of materials and will be able to characterize the dynamic behavior of mechanicalsystems.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

# MANUFACTURING MACHINES LAB

**Course Code:BME 424** **Credit Units: 01**
**Total Hours: 20**

**Course Objective**
To motivate and challenge students to understand and develop an appreciation of the processes in correlation with material properties which change the shape, size and form of the raw materials into the desirable product by conventional or unconventional manufacturing methods

**List of experiments/demonstrations: [Any 10]**
**Time allocated for experimentsis 2 hours each.**

**Course Contents:**

1. Operations on the Lathe Machine.
2. Operations on the Shaper Machine.
3. Operations on the Planner Machine.
4. Operations on the Drilling Machine.
5. Operations on the Grinding Machine.
6. Operations on the Milling Machine.

## Course Outcomes:

- Students who have undergone the course will be able to understand the measurement of Mechanical machines and operations.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# STRENGTH OF MATERIAL & FLUID MECHANICS LAB

**Course Code: BME 425** **Credit Units: 01**
**Total Hours: 20**

**Course Objectives:**
To describe the concepts and principles, understand the theory of elasticity includingstrain/displacement and Hooke's law relationships; and perform calculations, relative tothe strength and stability of structures and mechanical components. To explain the Bernoulli's theorem, flow measurement devices and various losses occurs in the flow.

**List of experiments/demonstrations: [Any 10]**
**Time allocated for experiments is 2 hours each.**

1. Universal Testing Machine
2. Tensile Test (MS)
3. Double Shear Test (MS)
4. Compression Test (CI)
5. Brinell Hardness Number
6. Izod Impact
7. Testing Machine
8. Rockwell Hardness Tester
9. Spring Stiffness (Spring Compression Testing machine)
10. Torsion testing machine
11. Verification of Bernoulli's Theorem
12. Experiment using Venturimeter
13. Determination of coefficient of Discharge $C_d$, $C_c$, $C_!$ Using Circular/triangular/rectangular orifice
14. To find major head losses in a pipe line
15. To find minor head losses in a pipe line (sudden expansion/contraction/bend)

## Course Outcomes:
- Students who have undergone the course will be able to understand the theory of elasticity including strain/displacement and Hooke's law relationships; mechanical properties. Be able to calculate fluid properties and various kinds of losses occur in flow.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

# APPLIED THERMODYNAMICS

**Course Code: BME 501** **Credit Units: 03**
**Total Hours: 30**

**Course Objectives:**

- To learn about of I law for reacting systems and heating value of fuels.
- To learn about gas and vapor cycles and their first law and second law efficiencies.
- To understand about the properties of dry and wet air and the principles of psychrometry
- To learn about gas dynamics of air flow and steam through nozzles.
- To learn the about reciprocating compressors with and without intercooling
- To analyze the performance of steam turbines

**Course Contents:**

**Module I: (6 Hours)**
Introduction to solid, liquid and gaseous fuels– Stoichiometry, exhaust gas analysis- First law analysis of combustion reactions- Heat calculations using enthalpy tables- Adiabatic flame temperature- Chemical equilibrium and equilibrium composition calculationsusing freeenergy.

**Module II: Standard cycles: (8 Hours)**
Vapor power cycles, Rankine cycle with superheat, reheat and regeneration, exergy analysis. Super-critical and ultra super-critical Rankine cycle- Gas power cycles, Air standard Otto, Diesel and Dual cycles-Air standard Brayton cycle,effect of reheat, regeneration andintercooling- Combined gas and vapor power cycles- Vapor compression refrigeration cycles,

**Module III: Nozzle and diffuser: (7 Hours)**
Basicsof compressible flow. Stagnation properties, Isentropic flow of a perfect gas through a nozzle, choked flow, subsonic and supersonic flows- normal shocks- use of ideal gas tablesfor isentropic flow and normal shock flow- Flow of steam and refrigerant throughnozzle, supersaturation- compressible flow in diffusers, efficiency of nozzle and diffuser.

**Module IV: Reciprocating Compressors: (5 Hours)**
Reciprocating compressors, staging of reciprocating compressors, optimal stage pressure ratio, effect of intercooling, minimum work for multistage reciprocating compressors.

**Module V: Steam turbines: (4 Hours)**
Analysis of steam turbines, velocity and pressure compounding of steam turbines.

## Course Outcomes:

- After completing this course, the students will get a good understanding of various practical power cycles and heat pump cycles.
- They will be able to analyze energy conversion in various thermal devices such as combustors, air coolers, nozzles, diffusers, steam turbines and reciprocating compressors
- They will be able to understand phenomena occurring in high speed compressible flows.

**Examination Scheme**

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Sonntag, R. E, Borgnakke, C. and Van Wylen, G. J., 2003, 6th Edition, Fundamentals ofThermodynamics, John Wiley and Sons.
- Moran, M. J. and Shapiro, H. N., 1999, Fundamentals of Engineering Thermodynamics,John Wiley and Sons.
- Nag, P.K, 1995, Engineering Thermodynamics, Tata McGraw-Hill Publishing Co. Ltd
- S M Yahya, Fundamentals of Compressible Flow with Aircraft and Rocket Propulsion, new age nternational publishers
- P. L. Ballany, Thermal Engineering –Khanna Publishers.
- DhomkundwarKothandaraman, “A Course in Thermal Engineering”, Dhanpat Rai Publications.

# DYNAMICS OF MACHINES

**Course Code: BME502** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
- To understand free and forced vibrations of single degree freedom systems.
- To analyze balancing problems in rotating and reciprocating machinery.
- To characterize and design flywheels.
- To analyze and design centrifugal governors.

**Course Contents:**

**Module I: Dynamics of Engine Mechanisms:(04Hours)**
Displacement, velocity and acceleration of pistonturning moment on crankshaft, turning moment diagram; fluctuation of crankshaft speed, analysis of flywheel.

**Module II: Governor Mechanisms: (04 Hours)**
Types of governors, characteristics of centrifugal governors,gravity and spring controlled centrifugal governors, hunting of centrifugal governors, inertiagovernors.

**Module III: Balancing of Inertia Forces and Moments in Machines:(05 Hours)**
Balancing of rotating masses,two plane balancing, determination of balancing masses (graphical and analytical methods),balancing of rotors, balancing of internal combustion engines (single cylinder engines, in-lineengines, V-twin engines, radial engines.

**Module IV: Fundamental Aspects of Vibrations:(07 Hours)**
Vibration, main causes, advantages anddisadvantages; engineering applications of vibration and noise; vector method of representingharmonic motion; characteristics of vibration, harmonic analysis and beats phenomenon, workdone by harmonic forces on harmonic motion; periodic, non-harmonic functions- Fourier seriesanalysis; evaluation of coefficients of Fourier series; elements of vibratory system; lumped anddistributed parameter systems.

**Undamped Free Vibrations:**
Derivation of differential equation of motion: the energy method, the method based on Newton's second law of motion, and Rayleigh's method. Solution ofdifferential equation of motion: Natural frequency of vibration. Systems involving angularoscillations: the compound pendulum.

**Module V: Damped Free Vibrations :(05Hours)**
Viscous damping: coefficient of damping; damping ratio, under damped, over damped and critically damped systems; logarithmic decrement; frequencyof damped free vibration; Coulomb or dry friction damping; frequency, decay rate andcomparison of viscous and Coulomb damping; solid and structural damping; slip or interfacialdamping.

**Module VI:Harmonically excited Vibration:(05 Hours)**
One degree of freedom- forced harmonic vibration, vector representation of forces; excitation due to rotating and reciprocating unbalance; vibration isolation, force and motion transmissibility; absolute and relative motion of mass (SeismicInstruments ).

## Course Outcomes
- Upon completion of this course, students will be able to understand the principles of fluid statics and kinematics, mathematically analyze simple flow situations, measurement of flow rates and dimensional analysis of model studies.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

**Text & References:**


- Ambekar, AG; Mechanism and Machine Theory; PHI
- Rattan SS; Theory of machines; TMH
- Sharma and Purohit; Design of Machine elements; PHI
- Bevan; Theory of Machines;
- Ghosh and Mallik; Theory of Mechanisms and Machines; Affiliated East-West Press, Delhi
- Norton RL; kinematics and dynamics of machinery; TMH
- Ambekar A.G.,' Mechanical Vibrations and Noise Engineering; PHI
- Thomson , W.T., Theory of Vibration with Applications , C.B.S Pub & distributors .
- Singiresu Rao, "Mechanical Vibrations , Pearson Education .
- G.K. Grover, " Mechanical Vibration , Nemchand and Bross , Roorkee

# MACHINE DESIGN – I

**Course Code: BME 503** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The objective of this course is to help students apply concepts learned in the mechanics, structure, material and manufacturing courses. This course offers working knowledge in the use of proper failure theories under steady and variable loading, design of mechanical elements, such as shaft, coupling, power screws, and detachable, permanent and welded connections.

**Course Contents:**

**Module I: Variable stresses in Machine Parts: (5 Hours)**
Fatigue and Endurance Limit, Factor of Safety for Fatigue Loading, Stress concentration, Notch sensitivity, Gerber Method, Goodman Method and Soderberg Method for combination of stresses.

**Module II: Power Screws: (5 Hours)**
Types of screw threads, Torque required to raise and lower the load, Efficiency of square threaded screw, overhauling and self locking screw, stresses in power screw, design of screw jack.

**Module III: Cotter and Knuckle Joints: (5 Hours)**
Types of cotter joints, design of socket and spigot joint, design of sleeve and cotter joint, design of jib and cotter joint, Design procedure of Knuckle joint.

**Module IV: Riveted and Welded Joint: (5 Hours)**
Types of Riveted joint, Lap joint , Butt Joint, Caulking and Fullering, Failure of Riveted joint, Strength of Riveted joint, Efficiency of Riveted joint. Advantages and Disadvantages of welded joint over Riveted joint, Strength of Fillet joint, strength of Butt joints.

**Module V: Keys and Couplings: (5 Hours)**
Types of Keys, Splines, Strength of Sunk Key, types of shaft coupling, Sleeve and muff coupling, Flange coupling, Flexible coupling, Oldham coupling, Universal coupling.

**Module VI: Drives: (5 Hours)**
Types of Belt drives, Flat Belt drives, Velocity ratio, Sleep, Creep of Belt, Length of open Belt, length of cross belt, power transmission by belt, Maximum tension in the belt. Types of V belt and Pulleys, advantages and disadvantages of V belt over Flat Belt, Ratio of Driving tensions for V belt, Rope drives. Chain drives, advantages and disadvantages of Chain drives.

## Course Outcomes:

- Upon completion of this course, students will get an overview of the design methodologies employed for the design of various machine components.

**Examination Scheme:**

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- J.E. Shigley, Mechanical Engineering Design.
- Sadhu Singh, Machine Design
- R.S. Khurmi& J.K. Gupta, Machine design
- D.K. Aggarwal & P.C. Sharma, Machine Design.
- Deutschman, D., Michels, W.J. and Wilson, C.E., Machine Design Theory and Practice, Macmillan,1992.
- Juvinal, R.C., Fundamentals of Machine Component Design, John Wiley,1994.
- Spottes, M.F., Design of Machine elements, Prentice-Hall India,1994.
- R. L. Norton, Mechanical Design – An Integrated Approach, Prentice Hall,1998.

# MEASUREMENT AND CONTROL

**Course Code: BME 504** **Credit Units: 03**
**Total Hours: 30**

## Course Objectives:

- To impart knowledge of architecture of the measurement system.
- To deliver working principle of mechanical measurement system.
- To study concept of mathematical modeling of the control system.
- To analyze control system under different time domain.

**Module I: (06 Hours)**
Significance of Mechanical Measurements, Classification of measuringinstruments, generalized measurement system, types of inputs: Desired,interfering and modifying inputs.Static characteristics: Static calibration, Linearity, Static Sensitivity,Accuracy, Static error, Precision, Reproducibility, Threshold, Resolution,Hysteresis, Drift, Span & Range etc.

**Module II: (07 Hours)**
Displacement Measurement: Transducers for displacement, displacement measurement, potentiometer, LVDT, Capacitance Types, Digital Transducers (optical encoder), Nozzle Flapper Transducer. Measurement of Angular Velocity: Tachometers, Tachogenerators, Digital tachometers and Stroboscopic Methods.Acceleration Measurement, theory of accelerometer and vibrometers, practical accelerometers, strain gauge based and piezoelectric accelerometers.

**Module III: (07 Hours)**
Pressure Measurement: Elastic pressure transducers viz. Bourdon tubes, diaphragm, bellows and piezoelectric pressure sensors, High Pressure Measurements, Bridge man gauge. Vacuum measurement: Vacuum gauges viz. McLeod gauge, Ionization and Thermal Conductivity gauges. Flow Measurement: Bernoullis flowmeters, Ultrasonic Flowmeter, Magnetic flow meter, rotameter. Temperature Measurement: Electrical methods of temperature measurement Resistance thermometers, Thermistors and thermocouples, Pyrometers.

**Module IV: (05 Hours)**
Strain Measurement : Theory of Strain Gauges, gauge factor, temperature Compensation, Bridge circuit, orientation of strain gauges for force and torque, Strain gauge based load cells and torque sensors

**Module V: (05 Hours)**
Introduction to control systems.Classification of control system. Open loop and closed loop systems. Mathematical modeling of control systems, concept of transfer function, Block diagram algebra.

## Course Outcomes

After completing this course, the students will be able to

- Identify and select proper measuring instrument for specific application.
- Illustrate working principle of measuring instruments.
- Explain calibration methodology and error analysis related to measuring instruments.
- Mathematically model and analyze system/process for standard input responses.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- A.K. Sawhney (Author), Puneet Sawhney, A Course in Mechanical Measurements and Instrumentation & Control, Dhanpat Rai Publications.
- Thomas Beckwith, N.Lewis Buck, Roy Marangoni, Mechanical Engineering Measurement - -Narosa Publishing House, Bombay
- R. S. Sirohi, H. C. Radha Krishna, Mechanical Measurements, New Age Publishers, 1991.
- Experimental Methods for Engineers - J. P. Holman.- McGraw Hills Int. Edition.
- Control System Engineering: by Nagrath IJ. and Gopal .M., Wiley EasternLtd.
- Modem Control Engineering: by K.Ogata, Prentice Hall.

# METROLOGY

**Course Code: BME 505** **Credit Units: 03**
**Total Hours: 30**

### Course Objective:
The main objective of this course is to give the student: a basic understanding of the physical loss governing metrology and tolerance design. Gain and appreciation for the capabilities and applications of metrology through hands own experiences.

### Course Contents:

**Module I: Principles of measurement: (08 Hours)**
Definition of metrology, difference between precision and accuracy. Sources of errors: Controllable and Random Errors, Effects of Environment and Temperature, Effects of support, alignment errors.
**Length Standards:** Line standards, end standards and wavelength standards, transfer from line standards to end standards. Numerical based on line standards. Slip gauges – its use and care, methods of building different heights using different sets of slip gauges.
**Limits, fits and tolerances:** Various definitions, different types of fits and methods to provide these fits. Numerical to calculate the limits, fits and tolerances, ISO system of limits and fits; Gauges and its types, limit gauges – plug and ring gauges. Gauge Design – Taylor's Principle, wear allowance on gauges.

**Module II: Comparators:(07 Hours)**
Principles and working of Mechanical, Electrical, Optical and Pneumatic Comparators.
**Angular Measurement:** Sine Bar – different types of sine bars, use of sine bars in conjunction with slip gauges, Use of angle gauges, spirit level, errors in use of sine bars. Numericals.Principle and working of autocollimator.

**Module III: Straightness and flatness: (08 Hours)**
Definition of Straightness and Flatness error.Numericals based on determination of straightness error of straight edge with the help of spirit level and auto collimator
**Screw Thread Measurement:** Errors in threads, Measurement of elements of screw threads –major diameter, minor diameter, pitch, flank angle and effective diameter (Two and three wire methods). Effect of errors in pitch and flank angles
**Gear Measurement:** Measurement of tooth thickness – Gear tooth vernier caliper, Constant chord method, base tangent method and derivation of mathematical formulae for each method.Parkinson Gear Tester.

**Module IV: Machine Tool Alignment: (07 Hours)**
Machine tool tests and alignment tests on lathe. Alignment tests on milling machine. Alignment tests on a radial drilling machine, Interferometry.
**Surface texture:** Introduction, types of irregularities, Elements of surface, Texture, Measurement of surface finish, Examination of surface Roughness.

## Course Outcomes:
- Upon completion of this course, students will be able to the tooling needed formanufacturing, the dimensional accuracy and tolerances of products, assembly of differentcomponents and the application of optimization methods in manufacturing.

### Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

- R.K. Jain, "Engineering Metrology", Khanna Publishers, Delhi
- I.C. Gupta, "Engineering Metrology", Dhanpat Rai Publications, Delhi
- F.W. Galyer & C.R. Shotbolt, "Metrology for Engineers", ELBS edition.

# DYNAMICS OF MACHINE LAB

**Course Code: BME 522** **Credit Units: 01**
**Total Hours: 20**

**Course Objectives:**

- To identify the essential system properties and physically visualize the concepts of frequency and time period of vibrations under free vibration.
- To explain the mechanism of forced vibration to analyze the damping properties.
- Evaluate the mechanism of forced vibration to analyze the different mode shapes and critical speed of shaft.

**List of Experiment: (Any 10):**
**Time allocated for experiments is 2 hours each.**

1. Study of various models of governors.
2. Study of gyroscopic motion and calculation of value of gyroscopic couple.
3. Study of various types of Cams and followers and drawing the cam profile with the help oftest kit.
4. Determination of static and dynamic unbalances.
5. Balancing the apparatus statically and dynamically.
6. Study of various first order vibration systems.
7. To find out frequency of damped free vibration and rate of decay of vibration-amplitude inthe system.
8. To observe the phenomenon of whirl in a horizontal light shaft and to determine the critical speed of the shaft.
9. To demonstrate universal vibration apparatus.
10. To demonstrate natural undammed free vibration on universal vibration apparatus.
11. To demonstrate dammed forced vibration on universal vibration apparatus.

## Laboratory Outcomes:

After completion of course student will develop practical understanding and applications of fundamental concept of frequency and time period of vibrations under free vibration, critical speed of shaft, functioning of governor, cams & followers and gyroscopic couples.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

# MEASUREMENTS AND CONTROLS LAB

**Course Code: BME 524** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**

- To demonstrate the use of different sensors, strain gauges and inclinometers.
- Calibration of measuring sensors and instruments.

**List of Experiments: (Any 10)**
**Time allocated for experiments is 2 hours each.**

1. Measurement of resolution and sensitivity of thermocouple (study of various thermocouples J, K, T, etc.) (Calibration)
2. Measurement of resolution, sensitivity and non linearity of termistor. (termistor instability)
3. Measurement of thickness of LVDT.
4. Measurement of resolution of LVDT (and displacement measurement)
5. Study of proportional control and offset Problems.
6. Study of proportional integral control.
7. Study of proportional integral derivative (PID) control.
8. Vibration measurement by stroboscope (natural frequency of a cantilever)
9. Angular frequency (speed of rotating objects) measurement by stroboscope.
10. Pressure transducer study and calibration.
11. Proving ring (force measurement)
12. Torque cell.
13. Closed loop study of an electric circuit.
14. Young's modulus of a cantilever.
15. Young's modulus and poison's ratio of tensile test piece of M.S.

## Laboratory Outcomes:

Students will be able to select proper measuring instrument and know requirement of calibration, errors in measurement etc. They can perform accurate measurements.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# METROLOGY LAB

**Course Code: BME 525** **Credit Units: 01**
**Total Hours: 20**

**Course Contents:**
Objective of this course is designed for measuring and gauging instruments for inspection of precision linear, geometric forms, angular and surface finish measurements. The student can learn the measurements with and calibration of instruments.

**List of Experiments: (Any 10)**
**Time allocated for experiments is 2 hours each.**

1 Set up a dimension by slip gauges (example 36.936; 14.727…..) Measure this set up by micrometer (least count 0.01) several times and read dimensions. Find statistical mean and record the expected variation between the actual dimension and dimension measured by micrometer.

2 To check the roundness of a circular bar with the help of dial gauge.

3 Mill a component to dimension (23, 57.6,…). Set up a comparator by slip gauge set to this dimension. Check component deviation by the comparator and record the deviation. Measure several times and obtain the mean value.

4 Check the bore in a component by a bore-indicator. Set the bore indicator by micrometer and measure the deviation in the bore. Measure several times and obtain the mean value at three positions along the length of the bore.

5 Set – up a sine bar for measuring the angle of an inclined surface (of a bracket, milling cutter arbor with 7/24 taper, ….). Measure the angle several times and record the mean value. Use height gauge wherever necessary.

6 Check angular dimension of a dovetail guide way by measuring across rollers.
Check the included angle of a V – block (90º, 60º, …) / or a machined groove by measuring over a roller using height gauge and parallel blocks/slip gauges.

7 Measure the straightness of a surface (surface plate; guide way of machine tool) by using straight edge and dial gauge and dial gauge stand. Set up straight edge on jacks such that dial reading at each end coincide. Move the dial stand along the straight edge. Record readings at 50 mm interval and draw a plot. Obtain maximum deviation which is the straightness.

8 Measure straightness using a spirit level. Place spirit level at an initial position and note level reading. Move the level on a straight line and take readings at 50 mm intervals. Plot the difference from the original reading and obtain the straightness value.

9 Draw a trapezoidal and any other profile in AutoCAD to 1:1 scale. On a steel plate make the profile by fitting and filing. Set up the drawing on profile projector. Check the component and note deviations. Correct the profile and recheck. Make the profile as close to the required one.

10 To machine a given surface and study its roughness characteristics

11 To measure the geometry of a screw using profile projector

12 To study the cutting tool geometry using tool makers microscope

## Laboratory Outcomes:
Student will become familiar with the different instruments that are available for linear, angular, roundness and roughness measurements they will be able to select and use the appropriate measuring instrument according to a specific requirement (in terms of accuracy, etc.)

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# INDUSTRIAL PRACTICAL TRAINING – I

**Course Code:NPT 550** **Credit Units: 03**

**Course Objectives:**
This course will enable the students to explore the preferred field of specialization and develop analytical / hardware / software / experimental / observation skills. It will help them to manage the technical content and work. It will also help them to prepare and present technical report.

**Methodology:**
Practical training is based on the theoretical subjects studied by students. It can be arranged within the college or in any related industrial unit. The students are to learn various industrial, technical and administrative processes followed in the industry. In case of on-campus training the students will be given specific task of fabrication/assembly/testing/analysis. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation on same.

**Examination Scheme:**

| | |
|---|---|
| Feedback from industry/work place | 20 |
| Training Report | 40 |
| Viva | 15 |
| Presentation | 25 |
| **Total** | **100** |

## Course Outcome:
After successful completion of the course, the students will be able to
- Explore the preferred field of specialization and develop analytical / hardware / software / experimental / observation skills.
- Manage the technical content and work.
- Learn the various administrative process followed in industry.
- Prepare and present technical report.

# FLUID POWER SYSTEMS

**Course Code: BME 601** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
Fluid power systems cover generation, transmission, and control applications of power by using pressurized fluids. This course imparts the knowledge of different fluid power systems (pneumatic and hydraulic) which are used in industries and hydropower plants.

**Course Contents:**

**Module I: Introduction: (6 Hours)**
Euler turbine equation, theory of rotodynamic machines; various efficiencies, impulse and reaction forces due to fluid systems on stationery and moving system of vanes.

**Module II: WaterTurbines:(7 Hours)**
Classification of water turbines, head and efficiencies, velocity triangles- Axial, radial and mixed flow turbines- Pelton wheel, Francis turbine and Kaplan turbines, working principles, draft tube, performance curves for turbines.

**Module III: Water Pumps:(4 Hours)**
Centrifugal pumps, working principle, velocity triangles, work done by the impeller, reciprocating pumps, working principle, efficiency.

**Module IV: Performance of Fluid Machines:(4 Hours)**
Similarity laws applied to rotodynamic machines; specific speed, unit quantities; characteristic curves; use of models; cavitations and attendant problems in turbo machines; selection of turbines hydroelectric plants.

**Module V: HydraulicPower Transmission:(5 Hours)**
Transmission of hydraulic power through pipe lines; water hammer; precautions against water hammer in turbine and pump installations.

**Module VI: PowerHydraulics:(4 Hours)**
Positive pumps: gear, vane, screw pump, variable delivery valves: solenoid operated valve, hydraulic press, hydraulic ram, fluid coupling and torque converter.

## Course Outcomes:
Upon the completion of this course students will be able to apply basic principles to fluid flow problems and to evaluate performance of hydraulic machines (turbines and pumps).

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

**Text & References:**

- Gupta, S. C., Fluid Mechanics and Hydraulic Machines, Pearson Education, 2007
- R.K. Bansal, “Fluid Mechanics & Hydraulic Machines”, Laxmi Publications (P) Ltd., 2002.
- Dr. D.S. Kumar, “Fluid Mechanics & Fluid Power Engineering”, S.K. Kataria & Sons,2001
- D.R. Malhotra & N.K. Malhotra, “The Fluid Mech. & Hydraulics”, Satya Prakashan, 2001
- V.P. Gupta, Alam Singh, Manish Gupta, “Fluid Mechanics, Fluid Mechanics & Hydraulics”, CBS Publishers; 1999.

# IC ENGINE AND GAS TURBINE

**Course Code: BME 602** **Credit Units: 03**
**TotalHours: 30**

**Course Objective:**

- To familiarize with the terminology associated with IC engines.
- To understand the basics of IC engines.
- To understand combustion, and various parameters and variables affecting it in varioustypes of IC engines.
- To learn about various systems used in IC engines and the type of IC engine required forvarious applications.

**Course Contents:**

**Module I: Fundamentals:(5 Hours)**
Introduction to I. C Engine-Classification-Components- Indicator diagram, comparison of SI and CI engine, two-stroke and four-stroke engine, Valve timing diagram of SI and CI engine.

**Module II: Air Standard Cycle: (6 Hours)**
Assumptions in air standard cycle & fuel-air cycle, fuel-air cycle calculations, factors influencing fuel-air cycle, effects of variable specific heats, dissociation.

**Module III: Fuel and Combustion: (8 Hours)**
Combustion of SI engine, ignition limits, normal combustion, abnormal combustion, effect of engine Variable in ignition lag, spark advance and factors affecting ignition timing, pre-ignition, theory, and factors affecting detonation, PN, HUCR. Combustion in CI engine, fundamentals ofcombustion process in Diesel engine, delay period, diesel knock, and cold starting of CI engine. IC engine Fuel, combustion equations, theoretical air and excess air, stoichiometric air fuel ratio, desirable Properties of good IC engine fuels knock rating of SI engine fuel.

**Module IV: Performance & Testing: (6 Hours)**
Testing and performance of IC engine, performance parameters, basic measurement, engine Performance curve, fuel consumption, load outputs, engine power, heat balance.

**Module V: Gas Turbine: (5 Hours)**
General aspect of gas turbine, Jules cycle, Brayton cycle, classification, merits of gas turbine, open- cycle gas turbine, closed cycle gas turbine, Inter cooling, Reheating, Re-generation in gas turbine.

## Course Outcome:

- Understand working and performance of IC Engines through thermodynamic cycles.
- Understand combustion phenomena in SI and CI engines and factors influencing combustion chamber design.
- Outline emission formation mechanism of IC engines, its effects and the legislation standards.
- Understand working principles of instrumentation used for engine performance and emission parameters.
- Evaluate methods for improving the IC engine performance.
- Understand the latest developments in IC Engines and alternate fuels.

**Examination Scheme**

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Ganesan, V. Internal Combustion Engine, Tata McGraw-Hill.
- J. B Heywood, Internal Combustion Engine Fundamentals, McGraw Hill
- Vladimir Leonidas Maleev. Internal-combustion Engines, Theory and Design. McGraw-Hill.
- Mathur, M.L. and Sharma, R.P. Internal Combustion Engine. Dhanpat Rai Publication
- Lester Clyde Lichty, Robert Leroy Streeter. Internal Combustion Engines, McGraw-Hill
- Wallace Ludwig Lind. Internal-combustion Engines: Their Principles and Applications to Automobile, Aircraft, Ginn
- Edward Frederic Obert, Burgess Hill Jennings, Internal Combustion Engines: Analysis and Practice
- Joseph Albert Polson. Internal Combustion Engines, Chapman & Hall, limited

# MACHINE DESIGN – II

**Course Code: BME 603** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The course aims at developing concepts as to how to analyze mechanical systems and select proper machine elements (bearing, gears, belts, chains). It prepares the students how to design machine element by specifying their type, geometry, material and how to integrate these elements to build a mechanical system.

**Course Contents:**

**Module I: Introduction: (5 Hours)**
Introduction: Different theories of failure and design based on theories. Design for fatigue, design for creep and design for wear and corrosion.

**Module II: Belt and Chain drives: (5 Hours)**
Belt Drives: Types of Belt drives, Flat Belt drives, Velocity ratio, Creep of Belt, Length of open Belt, length of cross belt. Power transmission by belt, Maximum tension in the belt. Types of V belt and Pulleys, advantages and disadvantages of V belt over Flat Belt. Ratio of driving tensions for V belt, Rope drives. Chain drives, advantages and disadvantages of Chain drives.

**Module III: Brakes and Clutches Brakes: (5 Hours)**
Types, Design of shoe brakes, and Design of Band and Disc Brakes. Clutches: Types, Plate clutches –design for uniform pressure and wear.

**Module IV:Bearings: (5 Hours)**
Design of Bearings: Brief overview of bearings, Design of Fluid Film bearings and Rolling contact bearings. Types of sliding bearing. Materials, type of lubrication, design of sliding bearing. Selection and application of rolling bearing, seals.

**Module V: - Gears: (5 Hours)**
Design of Gears: Law of gearing -conjugate action and gear tooth profile-basics Analysis of forces on spur, helical, bevel and worm gears. Design procedure of various gears.

**Module VI: - Engine Parts: (5 Hours)**
Design of Engine parts: Design of cylinder and cylinder head, Design of Piston.

## Course Outcomes:
Upon completing this course, the students will be able to design transmission systems for engines and machines.

**Examination Scheme:**

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text& References:

- Maleeve Hartman and O.P. Grover, “Machine Design”, CBS Publication & Publishers.
- V.B Bhandari, “Machine Design”, Tata McGraw Hill.
- P.C. Sharma and D.K Aggarwal., “Machine Design”, S.K. Kataria& Sons.
- Mahadevan, “Design Data Book”, CBS Publication & Publisher

# MANUFACTURING TECHNOLOGY

**Course Code: BME 604** **Credit Units: 03**
**Total Hours: 30**

## Course Objective:

Metal cutting involves removing metal through machining operations. Machining traditionally takes place on lathes, drill presses, and milling machines with the use of various cutting tools. Successful machining also requires knowledge about the material being cut. This course is designed in such way that it explains all aspects (process and tools) of metal cutting. The course also covers the common tooling setups and operations as well as specialized applications for the more experienced users.

## Course Contents:

**Module I:Introduction: (4 Hours)**
Basic shape of cutting tools, Function of different angles of cutting tools, tool geometry and Nomenclatures-ASA, ORS systems, Conversion of angles, Tool Materials.

**Module II: Mechanism of Chip Formation:(5 Hours)**
Fracture & yielding mechanism, Types of chips, Factors involved in chip formation analysis, shear plane in flat chips, chip formation in drilling and milling.

**Module III: Mechanism of Metal Cutting:(6 Hours)**
Force system during turning, merchant circle diagram, velocity relationship, stress in conventional shear plane, Energy of cutting process, Ernst& merchant angle relationship, Lee-Shafer relationship, measurement of forces, Heat generation and temperature distribution in metal cutting.

**Module IV:Theory of Tool wears: (5 Hours)**
Criteria of wear, machinability and tool life, Flank wear, Crater wear, Taylor's tool life equation, causes and mechanism of tool failure, cutting fluid, Economics of metal machining.

**Module V: Design for Sheet Metal Works: (5 Hours)**
Press working Terminology, press operation, types of dies, clearance, cutting forces, methods of reducing cutting forces, minimum diameter of piercing, center of pressure, Drawing dies-blank diameter, drawing force.

**Module VI: Jigs and Fixture Design: (5 Hours)**
Important considerations in jig and fixture design, Locating and clamping, principles for location purposes, principles for clamping purposes, design principles for jigs and fixtures.

## Course Outcomes:

- Upon completion of this course, students will be able to the tooling needed for manufacturing, assembly of different components and the application of optimization methods in manufacturing.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- A Bhattacharya , "Metal cutting theory& practice", C.B. Publication
- Geoffrey Boothroyd, "Fundamentals of Metal Machining & Machine Tools", Tata McGraw Hill Kogakusha Ltd.
- P.N. Rao, "Manufacturing Technology", Tata McGraw Hill Publication Ltd.
- Dr. P.C. Pandey & C.K. Singh, "Production Engg. Sciences", Standard Publisher. Distributors.
- Dr. B.J. Ranganath, "Metal Cutting & Tool Design" Vikas Publishing House Pvt. Ltd.

# FLUID POWER SYSTEMS LAB

**Course Code: BME 621** **Credit Units: 01**
**Total Hours: 20**

**Course Objectives:**
The objective of this course is to help students in understanding the working principle, construction and performance characteristics of hydraulic turbines and hydraulic pumps, understanding the cavitation phenomenon and frictional losses in a fluid flow.

**List of experiments/demonstrations:**
**Time allocated for experiments is 2 hours each.**

1. To conduct a test on Centrifugal Pump and plot its characteristics
2. To Plot the characteristics of Pelton turbine.
3. To conducts an experiment on Francis turbine.
4. To study the effect of a draft tube on reaction turbines.
5. To find the friction factor for flow through pipes
6. To study the hydraulic controls rig.
7. To conduct an experiment for verifying model laws.
8. To study the cavitation phenomenon in turbines.
9. Study of hydraulic couplings and torque converters.

## Laboratory Outcome:
After the completion of course student will be able to measure the performance of pumps and turbines. Students will be able to understand the cavitation and water hammering.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

# IC ENGINE & GAS TURBINE LAB

**Course Code: BME 622** **Credit Units: 01**
**Total Hours: 20**

**Course Objective**

- To describe the performance and operating characteristics of Internal Combustion Engines.
- To explain the parts and complete knowledge of type of fuels used in IC engines and the fuel supply systems.
- To describe combustion process phenomena in IC engines.
- To explain the different methods of performance analysis of IC engines.
- To explain the effects of exhaust emission on human health and different pollution norms.

**List of Experiments:**
**Time allocated for experiments is 2 hours each.**

1. Load test on Diesel Engine
2. Testing and performance of IC engines using Morse Test.
3. Prepare the heat balance sheet for Diesel Engine test rig.
4. Prepare the heat balance sheet for Petrol Engine test rig.
5. Study of Fuel Injection system in SI Engine.
6. Study of lubricating system in CI Engines.
7. Study of Battery Ignition system and Electronic Ignition System.
8. Study of a Carburetors.
9. Study of Gas Turbine Model.

**Laboratory Outcome**

- Identify the various types of I.C. Engines and Cycles of operation.
- Express the effect of various operating variables on engine performance
- Demonstration of fuel metering and fuel supply systems for different types of engines
- Analyze & Justify the suitability of conventional and non-conventional fuels for IC engines
- Understand the effects of emission formation of IC engines, its effects and the legislation standards.

**Examination Scheme**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# MACHINE DESIGN LAB – II

**Course Code: BME 623** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
It prepares the students how to design machine element by specifying their type, geometry, material and how to integrate these elements to build a mechanical system.

**List of Experiments/demonstrations:**
**Time allocated for experiments is 2 Hours each for the following:**

1. Design and drawing of automotive transmission.
2. Design and drawing of brakes.
3. Design and drawing of clutches.
4. Design and drawing of connecting rod.
5. Design and drawing of I.C. engine piston.
6. Design and drawing of connecting rod.
7. Design and drawing of hydraulic rivet.
8. Design and drawing of mechanical hoist.
9. Design and drawing of Gears.

**Laboratory Outcomes:**
The students will able to design transmission systems for engines and machines.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

# MECHATRONICS

**Course Code: BME 606** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
Mechatronics is basically combination of mechanical and electronics engineering. With growing demands of automation of different mechanical operation this subject full fills the needs. Main objective of this course is to provide knowledge of different combinations of mechanical and electronics processes and various software using in it.

**Course Contents:**

**Module I: Introduction:(6 Hours)**
Measurement systems control systems, Microprocessor-based controllers, Classification, characteristics and calibration of different sensors and transducers, Signal conditioning processes.

**Module II: Actuation Systems:(6 Hours)**
Pneumatic and hydraulic actuation systems, Directional control valves, pressure control valves, process control valves.

**Module III: System Models:(6 Hours)**
Mathematical models, Mechanical system building blocks, modeling dynamic systems, First order systems, second order systems.

**Module IV: Principles of Feedback & Intelligent Control:(6 Hours)**
Control Systems, Open & Closed loop control Systems, Controllers, and Artificial Neural Network.

**Module V:Programmable Logic Controllers:(6 Hours)**
Architecture of Programmable Logic Controllers, input / output modules, programming methods, timers and counters, Master control, Analog input/output.

## Course Outcomes:

- Identify the elements of mechatronics system.
- Select suitable sensors, actuators and controllers to meet specific requirements.
- Demonstrate intelligent mechatronics system for engineering applications.

**Examination Scheme:**

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance.

**Text & References:**


- W. Bolton, “Mechatronics”, Pearson Education Ltd., 2003.
- Mohammad Ali Mazidi Janice Gillispier Mazidi, “The 8051 Microcontroller”, Pearson Education Inc., 2004.
- Gary Dunning, “Introduction to Programmable Logic Controllers”, Thomson Asia P. Ltd., Singapore, 1998.
- Gopal K. Dubey, “Fundamentals of Electrical Drives”, Narosa Publishing House, 2001.
- Charles H. Roth, “Jr. Fundamentals of Logic Design”, Jaico Publishing House, 2001.
- "HMT Mechatronics”, Tata McGraw Hill Publishing Co. Ltd., 2001.
- Devdas Shetty, Richard A. Kolk “Mechatronics System Design”, Thomson Asia Pvt. Ltd., Singapore, 2001.
- A.K. Tayal, “Instrumentation & Mechanical Measurements”, Galgotia Publication Pvt. Ltd., 2003.
- D. Rana Durgaiah, “Fluid Mechanics & Machinery”, New Age Int. Publishers, 2004.
- Nitaigour Premchand Mahalik, “Mechatronics Principles, Concepts & Application”, Tata McGraw Hill Publishing Co.Ltd, 2003.
- Mikell P. Groover, “Automation, Production Systems and Computer-Integrated Manufacturing”, 2$^{nd}$ Edition, Prentice Hall, 2001.

# ARTIFICIAL INTELLIGENCE AND ROBOTICS

**Course Code: BME 607** **Credit Units: 03**
**Total Hours: 30**

## Course Objective:
To develop semantic-based and context-aware systems to acquire, organize process, share and use the knowledge embedded in multimedia content. Research will aim to maximize automation of the complete knowledge lifecycle and achieve semantic interoperability between Web resources and services. The field of Robotics is a multi-disciplinary as robots are amazingly complex system comprising mechanical, electrical, electronic H/W and S/W and issues germane to all these.

## Course Contents:

**Module I: Scope of AI: (5 Hours)**
Games, theorem proving, natural language processing, vision and speech processing, robotics, expert systems, AI techniques- search knowledge, abstraction.
Problem solving
State space search; Production systems, search space control: depth-first, breadth-first search, heuristic search - Hill climbing, best-first search, branch and bound. Problem Reduction, Constraint Satisfaction End, Means-End Analysis

**Module II: Knowledge Representation: (6 Hours)**
Predicate Logic: Unification, modus ponens, resolution, dependency directed backtracking. Rule based Systems: Forward reasoning: conflict resolution, backward reasoning: use of no backtracks.
Structured Knowledge Representation: Semantic Nets: slots, exceptions and default frames, conceptual dependency, scripts.

Expert Systems
Need and justification for expert systems, knowledge acquisition, Case studies: MYCIN, RI.
Learning: Concept of learning, learning automation, genetic algorithm, learning by inductions, neural nets.

**Module III: Manipulator kinematics: (4 Hours)**
Kinematics: Introduction, solvability, algebraic solution by reduction to polynomial, standard frames, repeatability and accuracy, computational considerations.

**Module IV: Manipulator dynamics: (5 Hours)**
Introduction, acceleration of rigid body, mass distribution, Newton's equation, Euler's equation, Iterative Newton-Euler dynamic formulation, closed dynamic equation, Lagrangian formulation of manipulator dynamics, dynamic simulation, computational consideration.

**Module V: Trajectory Generation: (4Hours)**
Introduction, general considerations in path description and generation, joint space schemes, Cartesian space schemes, Path generation in runtime, Planning path using dynamic model.

**Module VI: Linear control of manipulators: (6 Hours)**
Introduction, feedback and closed loop control, second order linear systems, control of second-order systems, Trajectory following control, modeling and control of a single joint, sensor and vision system.
Robot Programming languages & systems: Introduction, the three level of robot programming, requirements of a robot programming language, problems peculiar to robot programming languages.

## Course Outcomes
- Upon completion of this course, students will get an overview of artificial intelligence applicationsand the use of micro-sensors and microprocessors.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- E. Rich and K. Knight, “Artificial intelligence”, TMH, 2nd ed., 1992.
- N.J. Nilsson, “Principles of AI”, Narosa Publ. House, 1990.
- John J. Craig, “Introduction to Robotics”, Addison Wesley publication
- Richard D. Klafter, Thomas A. Chmielewski, Michael Negin, “Robotic Engineering – An integrated approach”, PHI Publication
- Tsuneo Yoshikawa, “Foundations of Robotics”, PHI Publication
- D.W. Patterson, “Introduction to AI and Expert Systems”, PHI, 1992.
- Peter Jackson, “Introduction to Expert Systems”, AWP, M.A., 1992.
- R.J. Schalkoff, “Artificial Intelligence - an Engineering Approach”, McGraw Hill Int. Ed., Singapore, 1992.
- M. Sasikumar, S. Ramani, “Rule Based Expert Systems”, Narosa Publishing House, 1994.

# MECHATRONICS LAB

**Course Code: BME 626** **Credit Units: 01**
**Total Hours: 20**

## Course Objectives:
To provide knowledge on electrical circuits, signal conditioning and to make familiar about control system and power electronics in designing Mechatronics system

**Course Contents:**

**Name of Experiments:**
**Time allocated for experiments is 2 hours each.**

1. To make the sequential operation
   a. $A^+ B^+ A^- B^-$ ; $A^+$, $B^+$, $B^- A^-$ using Pneumatic trainer
2. For the above write a ladder logic giving time delays
3. Design a Pneumatic Circuit for clamping type & operated by PLC
4. To make the sequential operation
   a. $A^+$, $B^+$, $A^-$, $B^-$ ; $A^+$, $B^+$, $B^- A^-$ using Hydraulic trainer kit.
5. For the above write a ladder logic giving time delays
6. Design a Hydraulic Circuit for clamping type & operated by PLC
7. To make the ladder logic for water level control & reaction vessel to detect different levels of water and switch off the water supply.
8. Starter Control & Star Delta Starter for ¼ HP AC. Motor to demonstrate the use of PLC Motor Starting
9. Design Fan operation using PLC
10. Design n a Lift Control
11. Design a pick & Place
12. Design Sequential Switching Motors

## Laboratory Outcomes:
- On successful completion of the course, the student will be able to describe mechatronic systems and overview of control systems & actuators. To differentiate between various sensors, transducers and actuators and their applications. To relate various signal conditioning units, amplifiers, logic gates and their role in programmable logic controllers.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# ARTIFICIAL INTELLIGENCE AND ROBOTICS LAB

**Course Code: BME 627** **Credit Units: 01**
**Total Hours: 20**

**Course Objectives:**
The students will learn to make self-learning/adaptive control systems for robots/intelligent systems. Robotics and Intelligent Systems provides a comprehensive background in both software and hardware to work with the future of robotics and adaptive systems.

## Course Contents:

## Name of Experiments:
**Time allocated for experiments is 2 hours each.**

1. Robot Arm (Model 1055)

2. Write a prolog program to define a relations knowledge base as follows : Assume the following in the kbase :
   Male (person), female (person), husband (person, person0, wife(person, person), father (person, person), mother (person, person). Define the predicates for
   Parent
   Brother
   Sister
   Grandfather
   Ancestor

3. Write a prolog program to simulate a non deterministic finite automation (NFA)

4. A computer system accepts a user's name and password which are stored as facts in the kbase. Validate this information through a predicate login. If not valid, display a suitable message.

5. Write prolog predicates to perform list manipulation as follows :
   List membership relation
   Length of a list
   Concatenate 2 list to produce a third list
   Reverse a list
   Subset of a list
   Appending an element to a list
   Summing the element of a list

6. Write a prolog program to implement Depth first search algorithm.

7. Write a prolog program to simulate the Towers of Hanoi problem.

8. There is a gold treasure hidden inside a cave. The cave is a maze of galleries connecting different rooms in which there are dangerous beings like monsters and robbers. The gold treasure is all in one room. Determine a route by which a person can get to the treasure and escape with it unhurt. Enclosed is a photocopy of the cave lay out. Write the corresponding prolog program.

9. Write a prolog program to simulate the xor logic circuit. In this program make use of the predicate definitions for AND, NOT and OR gate.

10. A hungry monkey finds himself in a room in which a bunch of bananas is hanging from the ceiling. The monkey cannot reach the bananas. In the room there is a chair and a stick. The ceiling is just the right height so that a monkey standing on a chair could knock the bananas down with the stick. The monkey knows how to move around, carry other things around, reach for the bananas and wave a stick in the air. Write prolog predicate that define the monkey's legal moves, the different legal states and enable the monkey to got to the bananas.

11. In the block world problem, assure a sequence of 3 blocks a, b, c on a table. Write prolog predicates to define valid states in the blocks world domain and also to define valid legal moves in the system.

## Course outcomes
- After study this course, students will be able to design robots and machine which are able to

understand human and its working style and strategies.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

# MINOR PROJECT

**Course Code:NMP 660** **Credit Units: 02**

**Course objectives:** The objective of Minor project is to enable the student to take up investigative study in the broad field of Engineering, either fully theoretical/practical or involving both theoretical and practical work to be assigned by the Department on an individual basis or two/three students in a group, under the guidance of a Supervisor.

**Methodology:**

Topics of project are to be based on the latest trends, verifying engineering concepts /principals and should involve elementary research work. The projects may involve design, fabrications, testing, computer modeling, and analysis of any engineering problem. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation on same.

**Examination Scheme:**

| | |
|---|---|
| Literature study/ Fabrication/ Experimentation | 40 |
| Written Report | 20 |
| Viva | 15 |
| Presentation | 25 |
| **Total** | **100** |

## Course Outcomes:

At the end of the course, students will demonstrate the ability to:

- Conceive a problem statement either from rigorous literature survey or from the requirements raised from need analysis.
- Design, implement and test the prototype/algorithm in order to solve the conceived problem.
- Write comprehensive report on mini project work.

# OPERATIONS RESEARCH

**Course Code: BME 701** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
In a rapidly changing environment an understanding is sought which will facilitate the choice and the implementation of more effective solutions, which, typically, may involve complex interactions among people, materials and money. Organizations may seek a very wide range of operational improvements - for example, greater efficiency, better customer service, higher quality or lower cost. Whatever the business, engineering aim, Operation Research can offer the flexibility and adaptability to provide objective help. This course introduces students to the principles of operational research.

## Course Contents:

**Module I: Linear Programming:(5 Hours)**
Formulation of problem.Graphical and simplex method for maximization and minimization.duality theory and sensitivity analysis

**Module II: Transportation Models & Assignment Models:(8 Hours)**
Stepping stone algorithm, MODI method and Vogel’s Approximation Method (VAM) for self balanced/ unbalanced transportation problems and problems of degeneracy and maximization. Assignment model for maximization and traveling salesman problems, Industrial Problems

**Module III: Queuing Theory:(4 Hours)**
Basic structured, Terminology, classification. Birth and death process. Sequencing: Processing in jobs through machines with the same processing order. Processing of 2 jobs through machines with each having different processing order.

**Module IV: Network Models:(5 Hours)**
Introduction to PERT and CPM. Fundamental concept of Network models and construction of network diagrams. PERT activity, time estimate. Critical path and project time duration. Probability of completing the project on or before specified time. Float of a activity.

**Module V: Project Management:(4 Hours)**
Gantt chart, milestone char.Network scheduling terminology. Path enumeration, Activity on node & activity on arc network precedence diagrams. Reliability: Concept of reliability, objectives, applications, area of use, use of reliability in industry.

**Module VI**: **Games Theory:(4 Hours)**
Zero Sum two person competitive games, Minimax and maximini principle Arithmetic, algebraic, matrix algebra method,.Solution by dominance, sub game, Graphical and linear programming method.

**Module VII**: **Industrial Visit**
At least one visit to local industry in the field of Mechanical Engineering.

**Course Outcomes:**
- To familiarize students with the basic concepts, models and statements of the operations research theory.
- Know principles of construction of mathematical models of conflicting situations and mathematical analysis methods of operations research;
- Be able to choose rational options in practical decision-making problems using standard• mathematical models of operations research;
- Have skills in analysis of operations research objectives, mathematical methods and• computer systems.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- HM Wagner, Principles of Operations Research, Prentice Hall
- Heizer, J. & Render B., Operations Management, Pearson Education (8/e), 2006
- PK Gupta and DS Hira, Operations Research, S. Chand & Co.
- Taha, Introduction to Operation Research
- F.S. Hiller and G.I. Libermann, Introduction to Operation Research, Holden Ray.

# COMPUTER AIDED MANUFACTURING

**Course Code: BME 702** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The aim of the course is to impart the students the basic and essential concepts in using Computer Assisted Manufacturing (CAM) and Computer Numerical Control (CNC) machines. Students will learn the basic concepts of manufacturing planning and control. They will be offered hands on experience in using CAM software to design, simulate and write CNC programs.

**Course Contents:**

**Module I:(6 Hours)**
Introduction to Numerical control.Programmed automation. Nomenclature, type and features of NC machines tools. Axes designation. Point to point, straight and continuous control systems**,** Constructional features of CNC machine tools.

**Module II:(6 Hours)**
Machining centre and Turning centre, Automatic tool changer, Machine Tool beds and automated pallet changers.

**Module III:(6 Hours)**
Machine Control Unit, Actuation Systems, open and close loop systems, transducers for NC Systems, revolves encoders and inductosyn.

**Module IV:(6 Hours)**
Manual Part Programming: Processes planning, G&M codes. Interpolation Cycles. Tools compensation, Computed aided part programming - Post processors - APT programming-CNC programming based on CAD Feedback devices - tooling for CNC machine.

**Module V:(6 Hours)**
Tooling and tool presetting.Computer Aided inspection - Contact Inspection (Coordinate Measuring Machine) & Non Contact Inspection.

## Course Outcomes:
- Understand the importance of CAD/CAM principles in the Product development.
- Develop programs related to manufacturing using codes.
- Analyze the importance of networking in manufacturing environment.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance.

## Text & References:

- Mikell P. Groover, “Automation, Production Systems and Computer-Integrated Manufacturing”, 2nd Edition, Pentice Hall, 2001.
- Rao, Kundra & Tiwari, “Computer aided Manufacturing” Tata McGraw Hill, 2007.
- Numerical Control: by Koren, Khanna Publisher.
- Mikell P. Groover, Emory W. Zimmers, “CAD/CAM”, Pearson Education, 2006.
- P.N. Rao, “CAD/CAM Principles and Applications”, Tata McGraw Hill, 2006.

# MANAGEMENT OF MANUFACTURING SYSTEMS

**Course Code: BME 703** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The overall objective of this course is to provide high caliber engineering students with an in-depth understanding of strategic, tactical and operational issues relating to manufacturing industries worldwide. On completion of the course the students will be equipped with the state-of-the-art concepts, methods, techniques and tools to allow them to contribute towards the competitiveness of manufacturing organizations.

**Course Contents:**

**Module I: Introduction**: **(5 Hours)**
Production functions, Plant Organization: Principles of organization, Organization structure-line and staff Organization, Plant Location layout, Process layout product layout and combination layout methods of layout, economics of layout.

**Module II: Production Planning & Control: (5 Hours)**
Types of products, demand, demand forecasting, marketing strategies, scheduling and control of scheduling, production control.

**Module III: Work and Method Study:(5 Hours)**
Definition and concepts, method study procedures, symbols, advantages, Flow process charts, Motion study, micro motion, SIMO charts, system concepts, classification, analysis techniques.

**Module IV: Industrial Maintenance:(5 Hours)**
Definition and concepts of Maintenance, Need of Maintenance Management, Maintenance Policies, Strategies and options in Maintenance management.Types, organization for maintenance department, Breakdown and preventive maintenance.

**Module V: Inventory Control and Replacement Analysis:(5 Hours)**
Purpose of Inventory – Cost related to inventors – Basic EOQ model, Introduction replacement policy and method adopted, ABC Analysis, MRP Analysis.

**Module VI: Management Concepts:(5 Hours)**
Development of management principles, scientific management, human relation aspects.Project Management – CPM and PERT.

## Course Outcomes:
- Conduct market research, demand forecasting and costing
- Demonstrate the knowledge of designing plants and controlling production.
- Optimize the resources of an organization and improve productivity.

**Examination Scheme:**

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance.

## Text & References:

- S.K. Sharma, “Industrial Engg. & Operation Management”, S.K. Kataria & Sons.
- Dr. Ravi Shankar, “Industrial Engg. & Management”, Galgotia Publications
- M. Mahajan, “Industrial Engg. & Production Management”, Dhanpat Rai & Co.
- J Moore, Manufacturing Management, Prentice Hall
- Buffa, Modern production and operations management, E.S. Wiley eastern.
- Joseph S. Martinich, “Production & Operation Management”, John Wiley & Sons.

# OPERATIONS RESEARCH (PROGRAMMING) LAB

**Course Code: BME 721** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
The aims to introduce students to use quantities methods and techniques for effective decisions–making; model formulation and applications that are used in solving business decision problems.

**Course Contents:**
**Time allocated for experiments is 2 hours each.**

1. Program on C or C++ for Linear Programming.
2. Program on C or C++ for Simplex Problem.
3. Program on C or C++ for Assignment Problem.
4. Program on C or C++ for Transportation Problem.
5. Program on C or C++ for PART, CPM Problem.
6. Program on C or C++ for Sequencing Problem.

**Course Outcomes:**
- Solve the problems using special solution algorithms.
- Use CPM and PERT techniques, to plan, schedule, and control project activities.
- Analyse the general nonlinear programming problems.
- Formulate the nonlinear programming models.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# COMPUTER AIDED MANUFACTURING LAB

**Course Code:BME 722** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
To introduce the student to the basic tools of computer aided manufacturing (CAM). To expose the student to contemporary computer design tools for aerospace and mechanical engineers. Prepare the student to be an effective user of a CAM system.

**Course Contents:**

**Name of Experiments:**
**Time allocated for experiments is 2 hours each.**

1. Make a sketch of CNC lathe showing major assemblies and indicate the CNC axes with designations. Make a sketch of the conventional lathe and, if it is considered as a CNC lathe, show the axes with designations.

2. Make a Kinematics diagram of CNC Lathe showing all machine sub-assemblies. Indicate bearing arrangements, ball screw arrangements with sizes, wherever available.

3. Repeat (1) on CNC machining centre and conventional milling machine.

4. Repeat (2) for CNC machining centre.

5. Study the CNC lathe. Prepare a block diagram of controls. Identify location and type of transducers and indicate on an outline of the machine. Describe how they function.

6. Repeat (5) on machining centre.

7. Study the work holding and tool holding devices in the CNC lathe and machining centre and draw up their specifications and capacities.

8. Prepare part programs for 2 specified components for CNC lathe by manual part programming. First write the machining technology in full; then prepare part program and then enter in the machine. Test the program in dry run and by tool path graphic simulation. Machine the component.

9. Do the above work for machining centre.

## Course Outcomes:

- On successful completion of the course, the student will be able to,
- Explain lifecycle of a product and the role of computer-aided Manufacturing (CAM) in product development.
- Describe the concepts of geometric and solid modeling.
- Visualize geometric models through animation and transform them into real world systems.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# AUTOMOTIVE ENGINEERING

**Course Code: BME 704** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
This course emphasizes on constructional details of automotive vehicles which includes – Basic structure, engine, transmission systems, suspension systems, steering system, braking systems and wheels& tyres..

## Course Contents:

**Module I:(6 Hours)**
Introduction, Components of an automobile, basic engine terminology, engine cycles, working of an IC engine.Basic engine design considerations, constructional details of C.I. and S.I. engines.crank shafts, connecting rod, piston, values, cams, manifolds, air cleaners, mufflers, radiators, and oil filters.

**Module II: Transmission System:(6 Hours)**
Description and working of manually operated gearboxes like sliding mesh, constant mesh, synchromesh and epicycle; hydraulic torque convertor and its construction working and performance, sem-automatic and fully automatic transmission, Hydramatic transmission, analysis of differentials, live axles, construction working and requirements of overdrive.

**Module III:Steering System:(6 Hours)**
Introduction, Front axle, wheel alignment, Steering geometry, steering mechanisms, Ackerman steering, center point steering, power steering.

**Module IV: Suspension:(6 Hours)**
Objective, requirement, function, types Shock absorbers, Independent suspension, Stabilizer, air suspension, Hydroelastic suspension, Hydragas interconnected suspension.

**Module V:(6 Hours)**
Principle, braking requirements, brake efficiency, fading of brakes, types of brakes, bleeding of brakes, brake fluid.

## Course Outcomes:

- Upon completion of this course, students will understand the function of each automobile component and also have a clear idea about the overall vehicle performance.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Kirpal Singh, “Automobile Engg.”, Vol. I & II, Standard Publishers, 2004
- N.K. Giri, “Automotive Mechanics”, Khanna Publishers
- Narang G.B.S., “Automobile Engg.”, Khanna Publishers
- Srinivasan, “Automotive Engines”, Tata McGraw Hill
- K.K. Jain & R.B. Asthana, “Automobile Engineering”, Tata McGraw Hill
- James D. Halderman and Chase D. Mitchell Jr., Automotive Engines- Theory and Servicing, Pearson Education, 2007
- Joseph Haitner, “Automotive Mechanics”, C.B.S. Publications

# COMPUTER AIDED DESIGNING

**Course Code: BME 705** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The objective of this course is to impart students an in-depth exposure to methods in geometric modeling and its applications in CAD/CAM. This course introduces integrated approach to CAD including: Overview of CAD, numerical techniques for CAD, Computer graphics and design, Principle and management of design data base system, finite element analysis and CAD, Design optimization. Along with the theoretical presentations, commercial CAD software are also introduced and applied to create Engineering components and assemblies.

## Course Contents:

**Module I:Introduction: (6 Hours)**
Introduction to CAD. Design process, Introduction to solid modeling and aided design of some elements/ components, hardware requirements, concurrent engineering.

**Module II:Projections:(6 Hours)**
Elementary Computer Graphics.Transformations, Mappings, Projections – orthographic, isometric, perspective.

**Module III: Surface modeling:(6 Hours)**
Representation of surfaces. Plane surfaces, Ruled surfaces, Surfaces of revolution, Sweep surfaces, Bezier surface, Bicubic surface patch, Approximation B – spline surface, composite surfaces.

**Module IV: Solid Modeling (6 Hours)**
Set theory, Graph theory, Regularized Boolean operations, B-rep modeling, Sweep representations, Spatial occupancy enumeration.

**Module V: Advanced CAD (6 Hours)**
Mechanical assembly, Geometric property formulation- curve length, surface are calculations, volume calculation, centroid calculation, Tolerances representations, Animation, Simulation, Strategic factors in product design, Robust design for product, Introduction to Finite element modeling and analysis.

## Course Outcomes:
Upon completion of this course, the students can use computer and CAD software for modeling mechanical components.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Ibrahim Zeid, “CAD/CAM Theory and Practice”, Tata McGraw-Hill Publishing Company Limited, 6th Edition 1998.
- David F. Rogers and J. Alan Adams, “Mathematical Elements for Computer GraPrentice Hall Indiacs”, Tata McGraw-Hill, 2nd Edition 2002.
- Ibrahim Zeid, “Mastering CAD/CAM”, Tata McGraw-Hill Publishing Company Limited,

# AUTOMOTIVE ENGINEERING LAB

**Course Code: BME 724** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
To introduce the student to the basic tools of automobiles.To expose the student to contemporary automotive engineering for automobile and mechanical engineers. Prepare the student to be an effective user of a Automotive engineering.

**Course Contents:**

**List of Experiments:**
**Time allocated for experiments is 2 hours each.**

1. Drawing Valve Timing Diagram
2. Determination of Firing Order of engine
3. Specification of engine
4. Study of different parts of engine
5. Study of Clutch
6. Study of Hydraulic Brake System
7. Study of Carburetor
8. Study of various parts of Auxiliary systems
9. Study of Wheel
10. Study of emission system
11. Study of steering system

**Course Outcomes:**
- Ability to dismantle and assemble the automobile components
- Understand different types of frames used in various Automobiles
- Understand the petrol engine fuel system.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

# COMPUTER AIDED DESIGNING LAB

**Course Code: BME 725** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
The objective of this course is to help students in understanding the working principle of Computer aided designing systems and various designing software's.

**Course Contents:**

**List of Experiments:**
**Time allocated for experiments is 2 hours each.**

1. Analysis and design using ANSYS/Pro-E software for:
2. Flange Coupling.
3. Design Shaft.
4. Design for Key.
5. Design for Spur Gear.
6. Design for Helical Gear.
7. Parts of Thin Cylinder Pressure Vessels.

## Course Outcomes:

- To develop different types of surfaces with the help of different curves
- Suggest whether the given component is safe or not for the applied loading conditions
- Select suitable manufacturing method for different mechanical components using CAM software.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

# MARKETING MANAGEMENT

**Course Code: BME706** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The course aims at making students understand concepts, philosophies, process and techniques of managing marketing operations of a firm.

## Course Contents:

**Module I:Introduction to Marketing:(5 Hours)**
Meaning, nature and scope of marketing; Marketing philosophies; Marketing management process; Concept of marketing mix.

**Module II: Market Analysis:(6 Hours)**
Understanding marketing environment; Consumer and industrial buyer behaviour; Market measurement; Market segmentation, selection and positioning.

**Module III: Product Planning and Pricing:(7 Hours)**
Product concept; Types of products; Major product decisions; Brand management; Product life cycle, New product development process; Pricing decisions; Determinants of price; Pricing process, policies and strategies.

**Module IV:Promotion and Distribution decisions:(7 Hours)**
Communication process; Promotion tools – advertising, personal selling, publicity and sales promotion; Distribution channel decisions – types and functions of intermediaries, Selection and management of intermediaries; Logistics decisions – inventory management, warehousing, transportation and insurance.

**Module V: Marketing Organization and Control:(5 Hours)**
Emerging trends and issues in marketing – Consumerism, rural marketing, social marketing; direct and online marketing; green marketing.

## Course Outcomes:

- This course is taught with both strategic and managerial focus.
- Through cases, discussions, exercises and activities, participants would be given opportunities to perform the role of a marketing manager.
- At the end of this course, participants should have acquired analytical skills in solving marketing related problems and challenges and be familiar with the strategic marketing management process.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Baker, Michael J., Marketing: An Introductory Text, McMillan Press Ltd.
- Czinkota, Michael R., Massaki, Kotabe and David Mercer B., Marketing Management: Text and Cases, Blackwell Publishers, Massachusetts.
- Kotler, Philip, Marketing Management: Analysis Planning, Implementation and Control, 9th Ed., Prentice Hall of India Pvt. Ltd. , New Delhi.
- Kotler, Philip and Armstrong, Gary, Principles of Marketing, 6$^{th}$ ed., Prentice Hall of Indi, Pvt. Ltd., New Delhi.
- Mc Carthy, E.Jerome and Pessault, William D. Jr., Basic Marketing, Richard D. Irwin Inc., Homewood, Illinois.
- Saxena, Rajan, Marketing Management, Tata McGraw Hill Publishing Company, New Delhi.
- Stanton, William J., Eizel, Michael J. and Walker Bruce J., Fundamentals of Marketing, 10$^{th}$ ed., McGraw

# SOLAR ENERGY

**Course Code:BME 707** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The objective of this course is to introduce materials relevant to the engineering of solar electric and thermal systems. Students will develop the skills to calculate the amount of incident solar flux, the amount of useful energy collected, the amount stored and the amount ultimately used. Many of these calculations will be based on solar applications in different area. Finally the concepts of engineering economics applied to solar energy will also be introduced.

## Course Contents:

**Module I: Selected topics in Heat Transfer:(6 Hours)**
Heat transfer modes, properties and radiation characteristics of opaque and partially transparent media.

**Module II: Model Solar Radiation:(8 Hours)**
Origin, nature and availability of solar radiation, measurements of solar radiation data and its estimation, effects of receiving surface orientation and motion.

**Module III: Components, Process and System Modes:(10 Hours)**
Design consideration and performance of flat plate and focussing collectors; energy storage components, water storage, packed bed and phase-change energy storage; mathematical models of various solar systems and components.

**Module IV: Application:(6 Hours)**
Solar water heating, solar air heaters, solar space heating and cooling, solar pumps, solar thermal power, solar furnaces and solar distillation.

## Course Outcomes:

Upon completion of the course, students will have:

- Ability to recognize the need of renewable energy technologies and their role in the Greece and world energy demand.
- Ability to distinguish between the sustainable energy sources and fossil energy sources with emphasis on wind and photovoltaic systems.
- Knowledge of the operating principles of renewable energy production from various renewable sources, especially.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- H.P. Garg and J. Prakash, “Solar Energy fundamental and Applications”, Tata McGraw Hill Pulishing Co. Ltd.
- Magal, “Solar Power Engineering”, Tata McGraw Hill Publishing Co. Ltd

# POWER PLANT PRACTICES

**Course Code: BME 708** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The objective of this course is that the students come to know different ways of producing energy such as thermal energy from gas and steam, hydraulic energy nuclear energy, non conventional source of energy from wind, solar and tidal. And their different uses in productive works.

## Course Contents:

**Module I: Steam Generator Plant:(6 Hours)**
Fuel handling systems, Indian coals, combustion of coal in furnaces; fluidized bed combustion; High pressure heavy duty boilers, Super critical and once through boilers influence of operating conditions on layout of evaporator, superheated, reheated and economizer; dust collectors; ash disposal, fans and draft systems.

**Module II: Turbine Plane:(6 Hours)**
Layout of turbine plant room, corrosion in condensers and boilers, feed water treatment; feed heating and de aeration system; cooling water systems and cooling towers.

**Module III: Control:(6 Hours)**
Important instruments on steam generator and turbine; drum water level control, combustion control and super heat temperature control; testing of power plants and heat balance.

**Module IV: Other Power Plant:(6 Hours)**
General layout of I.C. Engines and turbine power plants, types, gas turbine plants, fields of application, Nuclear power plants, power reactors and nuclear steam turbines; handling of nuclear waste and safety measures, peak load power generation methods.

**Module V: Economics:(6 Hours)**
Planning for power generation in India, super thermal power plants, estimation of cost of power generation; choice of plant site.

**Course Outcomes:**
After completion of this course, the students should be able to:
- Discuss the energy resources and energy conversion methods available for the production of electric power in India.
- Determine the efficiency and output of a modern Rankine cycle steam power plant from given data, including superheat, reheat, regeneration, and irreversibility
- Calculate the heat rate, fan power consumption, flame temperature and combustion air requirements of conventional steam generators (boilers).
- Select the heat transfer tubes needed for condensers and feed water heaters
- Explain the blade shapes, and calculate work output of typical turbine stages.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

- Arora & Domkundwar, “A course in Power Plant Engineering”, Dhanpat Rai & Sons
- Black Veatch, “Power Plant Engineering”, CBS Publisher

# COMBUSTION ENGINE EMISSIONS

**Course Code: BME 709** **Credit Units: 03**
**Total Hours:30**

**Course Objective:**
The main objective of this course is to introduce students the fundamentals, Operations and performance of internal combustion engines and their different types; to provide them with the theoretical and experimental ability to operate, analyze and design internal combustion engines; to assess the relation between engine power output to the required power for vehicle propulsion; to make them understand the fuel metering systems and assembling and dismantling internal combustion engines.

## Course Contents:

**Module I: Engine Fundamentals:(5 Hours)**
Cycle analysis, fuels, and types of hydrocarbons, gasoline specifications, effect of engine parameters on performance, carburetion, engine vehicle road performance, road performance and fuel economy.

**Module II: Emission and Air Pollution:(6 Hours)**
Automotive emissions and their role in air pollution, photochemical smog, Chemistry of smog formation, Combustion in homogeneous mixtures, emission formation, Incomplete combustion formation of Hydrocarbons (HC), carbon monoxide and oxides of nitrogen, Aldehyde emissions of unregulated toxic pollutants such as benzene, 1, 3, butadiene etc.

**Module III:(8 Hours)**
Influence of engine design and operating parameters on S.I. engine exhaust emissions. Hydrocarbon Evaporative Emissions, Various sources and method of their control, Canisters for controlling evaporative emissions, emission control system for S.I. engines, Blow by control closed PCV system, Reduction of exhaust emissions / Various methods, fuels system design.

**Module IV: Exhaust Treatment Devices:(5 Hours)**
Air injection into exhaust system, Thermal reactors, Catalytic converters.Stratified charge engines, Honda CVCC engine.
Diesel engine emissions: Source of emissions during combustion, Effect of Air injection timing on performance and formation. D.I. and I.D.I. engines emissions, Diesel smoke, PM and RSPM emission.

**Module V:(6 Hours)**
Methods of reducing emission, Exhaust gas re-circulation smoke emission form diesel engines, Particulate Traps, Continuous regeneration Traps (CRT).
Emission from CNG and LPG engines. Emission Instruments: Non-dispersive infrared analyzer, Gas chromatography, Flame ionization Detector, Chemiluminescent analyser.

## Course Outcomes:

- Differentiate among different internal combustion engine designs
- Recognize and understand reasons for differences among operating characteristics of different engine types and designs
- Given an engine design specification, predict performance and fuel economy trends with good accuracy
- Based on an in-depth analysis of the combustion process, predict concentrations of primary exhaust pollutants
- Exposure to the engineering systems needed to set-up and run engines in controlled laboratory environments
- Develop skills to run engine dynamometer experiments.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- R.P. Sharma and M.L. Mathur, “Internal Combustion Engine”, Dhanpat Rai Publications
- V. Ganeshan, “Internal Combustion Engine”, Tata McGraw Hill
- Angli M Course., “Automotive Engines”, CBS Publications
- Harper, “Fuel Systems Emission Control”, CBS Publications

# INDUSTRIAL PRACTICAL TRAINING – II

## Course Code: NPT 750 Credit Units: 05

**Course objectives:**

1. To expose students to the 'real' working environment and get acquainted with the organization structure, business operations and administrative functions.
2. To have hands-on experience in the students' related field so that they can relate and reinforce what has been taught at the university.
3. To promote cooperation and to develop synergetic collaboration between industry and the university in promoting a knowledgeable society.
4. To set the stage for future recruitment by potential employers.

**Methodology:**

Practical training is based on the theoretical subjects studied by students. It can be arranged within the college or in any related industrial unit. The students are to learn various industrial, technical and administrative processes followed in the industry. In case of on-campus training the students will be given specific task of fabrication/assembly/testing/analysis. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation on same.

**Examination Scheme:**

| | |
|---|---|
| Feedback from industry/work place | 20 |
| Training Report | 40 |
| Viva | 15 |
| Presentation | 25 |
| **Total** | **100** |

**Course Objectives:**

After successful completion of the course, the students will be able to

1. Explore the preferred field of specialization and develop analytical / hardware / software / experimental / observation skills.
2. Manage the technical content and work.
3. Learn the various administrative process followed in industry.
4. Prepare and present technical report.

# MAJOR PROJECT- I

**Course Code:NMP 760** **Credit Units: 06**

**Course Objectives:**
The object of Major Project I is to enable the student to extend further the investigative study taken up under NMP 660, either fully theoretical/ practical or involving both theoretical and practical work, under the guidance of a Supervisor from the Department alone or jointly with a Supervisor drawn from R&D laboratory/Industry. This is expected to provide a good training for the student(s) in R&D work and technical leadership. The aim is to provide students an opportunity to exercise their creative and innovative qualities in a group project environment and to excite the imagination of aspiring engineers, innovators and technopreneurs.

**Methodology:**

Topics of project are to be based on the latest trends, verifying engineering concepts /principals and should involve elementary research work. The projects may involve design, fabrications, testing, computer modeling, and analysis of any engineering problem. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation on same.

## Course Outcomes:

On successful completion of the course students will be able to:
1. Demonstrate a sound technical knowledge of their selected project topic.
2. Undertake problem identification, formulation and solution.
3. Design engineering solutions to complex problems utilising a systems approach.
4. Conduct an engineering project
5. Communicate with engineers and the community at large in written an oral forms.
6. Demonstrate the knowledge, skills and attitudes of a professional engineer.
7. Write comprehensive report on project work.

**Examination Scheme:**

| | |
|---|---|
| Literature study/ Fabrication/ Experimentation | 40 |
| Written Report | 20 |
| Viva | 15 |
| Presentation | 25 |
| **Total** | **100** |

# QUALITY CONTROL AND QUALITY ASSURANCE

**Course Code: BME 801** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
In engineering and manufacturing, **quality control** and **quality assurance** is a set of measures taken to ensure that defective product or services are not produced, and that the design meets performance requirements. Course includes the regulation of the quality of raw materials, assemblies, products and components; services related to production; and management, production, and inspection processes.

## Course Contents:

**Module I:Introduction:(6 Hours)**
Meaning of Quality and quality improvement, need of Quality, Statistical methods for quality control, Process capability.

**Module II:Quality Control: (6 Hours)**
Statistical Quality Control, control charts, Control charts for attributes & variables, Moving average chart.

**Module III:Production Control:(10 Hours)**
Acceptance Sampling, OC curve, Sampling Plan, Producer' risk, Consumer's risk, Average Quality Level, AOQL, Design of Single & double sampling plan.

**Module IV:Quality Assurance:(8 Hours)**
Need of Quality Assurance, Quality Audit, Concept of Zero defect, ISO 9000 quality systems, total quality management.

## Course Outcomes:
To pass this subject the student will be able to:
- Explain the different meanings of the quality concept and its influence.
- Describe, distinguish and use the several techniques and quality management tools.
- Explain and distinguish the normalization, homologation and certification activities.
- Identify the elements that are part of the quality measuring process in the industry.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

- EL Grant & RS Leavenworth, "Statistical Quality Control", McGraw Hill & Co.
- M. Mahajan, "Statistical Quality Control", Dhanpat Rai & Co.
- O.P. Khanna, "Statistical Quality Control", Dhanpat Rai & Co.
- R.C. Gupta, "Statistical Quality Control", Khanna Pulishers
- Amitav Mitra, "Fundamentals of Quality Control", Pearson Education
- Feigenbaum, "Total Quality Control", McGraw Hill & Co.
- Suresh Dalela, "Quality Systems", Standard Publishers & Distributors
- Montgomery DC, "Introduction to Statistical Quality Control", John Wiley & Sons Inc.
- Stephan B. Vardeman, J Marcus Jobe, "Statistical QA Methods for Engineers", John Wiley & Sons Inc.
- Taylor J.R., "Quality Control systems", McGraw Hill Int. Education
- K.C. Arora, "Total Quality Management", S.K. Kataria & Sons.

# REFRIGERATION AND AIR-CONDITIONING

**Course Code: BME 802** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The objective of this course is to familiarize the students with the basic principles of Refrigeration and Air Conditioning, different types of refrigerants, simple mathematical models representing the conditioned space and its components used to control environmental conditions. It includes an understanding of psychometrics, human comfort and air quality, calculation of heating and cooling loads.

**Course Contents:**

**Module I: Introduction: (5 Hours)**
Introduction, Principles and methods of production of low temperature, heat engine, heat pump and refrigerator, unit of refrigeration, coefficient of performance.

**Module II: Vapor Compression Refrigeration System: (8 Hours)**
Vapor Compression Refrigeration system - Carnot vapor compression refrigeration cycle, Working and analysis, Limitations, Standard Vapor Compression Refrigeration system, Working and analysis, Effects of sub cooling and super heating, multiple compression and evaporation system, cascading.

**Module III: Air Refrigeration: (6 Hours)**
Air Refrigeration Cycles - reversed Carnot cycle, Bell-Coleman cycle analysis, Air Refrigeration systems.
Refrigerants: Classification, nomenclature of refrigerants, desirable properties of an ideal refrigerant, Ozone layer depletion and global warming.

**Module IV: Vapor Absorption Systems: (4 Hours)**
Introduction to simple vapor absorption system, working of practical vapor absorption system, electrolux system comparison of VAS and VCR system.

**Module V: Air-conditioning: (7 Hours)**
Psychrometry and psychrometric charts, property calculations of air vapor mixtures, Psychometric processes, air conditioning, comfort air-conditioning, sensible heat factor, human comfort, effective temperature & chart, heat production & regulation of human body, estimation of cooling and heating loads, industrial air conditioning.

## Course Outcomes:

- A student will have a good understanding of the working principles of refrigeration and air-conditioning systems.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:


- CP Arora, Refrigeration and Conditioning, Tata McGraw Hill.
- Manohar Prasad, Refrigeration and Conditioning, Wiley Eastern Limited.
- Jordan and Priester, Refrigeration and Conditioning, Prentice Hall of India.
- WF Stoecker, Refrigeration and Conditioning, McGraw Hill.

# REFRIGERATION AND AIR-CONDITIONING LAB

**Course Code: BME 822** **Credit Units: 01**
**Total Hours: 20**

**Course Objectives:**
The objective of this course is to help students in understanding the working principle of refrigeration and air conditioning systems. It includes the performance evaluation of refrigeration test rig & air conditioning duct.

**List of experiments/demonstrations:**
**Time allocated for experiments No.1-7 is 2 Hours each.**

1. Study of refrigeration testing.
2. Study of Air-Conditioning testing.
3. To calculate the COP of Refrigerator.
4. Study of effect of superheating.
5. To calculate the efficiency of Compressor.
6. To calculate total Heat Load for Air-Conditioning unit.
7. To calculate the COP of Heat Pump.

## Course Outcomes:

- After completion of course student will be able to evaluate the performance of refrigerator and air conditioning system.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

# ADVANCED METHODS OF MANUFACTURING

**Course Code: BME 803** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The aim of the course is to provide the students with the understanding of the basic principles underlying the design, analysis, and synthesis of robotic systems plus machine vision technology in automation. In particular, the course will start from simple problem in transformations, kinematics and inverse kinematics, dynamics and control. Later in the semester more complex problems in sensing, force control, mobile robots and robot programming will be discussed.

## Course Contents:

**Module I: Kinematics Analysis of Robot: (8 Hours)**
Matrix algebra or coordinate transformation, kinematics analysis; geometric and dynamic analysis of robot manipulators.

**Module II: Robot Control: (7 Hours)**
Robot Control, RobotVision, RobotControlled, CNNC, Pathplanning, Obstruction Avoidance

**Module III: Material Handling: (10 Hours)**
Computer aided Materials Management-inventory control, materials requirements planning. Computer Controlled parts handling and equipments.

**Module IV:Automation Protocol: (5 Hours)**
Manufacturing Automation protocol, cross functional implementation Technology for system integration.

## Course Outcomes:

- Student should be able to select appropriate manufacturing processes for advanced components with characterization of work pieces.
- Student should be able to understand Various Advanced manufacturing metal forming Processes Student should be able to understand to select proper Advanced Manufacturing process for welding, casting and forging

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Raghuvanshi, Manufacturing Process.
- P.N. Rao, Manufacturing Technology, TMH publications
- Hazra-Chowdhary , Workshop Technology
- R.K. Jain, Production Engineering

# GEAR TECHNOLOGY

**Course Code: BME 804** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The objective of gear technology is to provide information on gears, gear manufacturing, and the gear industry in general. This course includes information about hobbling, shaping, shaving, broaching and other gear manufacturing processes. It also covers gear design, gear engineering and related topics.

**Course Contents:**

**Module I: Introduction to Gears:(6 Hours)**
Types of gears, Geometric and Kinetics characteristics, Undercutting and interference-correction, Non-Circular gears.

**Module II: Gear Design:(6 Hours)**
Design of tools to make gear teeth, Kinds and cases of gear failures, Special Design Problems; Center distance problem, profile modification.

**Module III: Gear Trains:(6 Hours)**
Gear Trains (Analysis & Synthesis), Problem Combined bending and Torsion of pinions with large length to diameter ratio, high speed gearing.

**Module IV: Gear Set Design:(6 Hours)**
Some example of optimal kinematics system Design; Gear Set design, Design of sub-system consisting of Geneva wheel and elliptical gears for reduction of maximum acceleration of the wheel.

**Module V:** Geneva Mechanisms (Analysis & Synthesis)**:(6 Hours)**

## Course Outcomes:

- Transmission through Gears: mechanism, gear trains, classification and analysis, familiarity with gear standardization.
- Power transmission through gear train, mechanism and materials.
- Gear set design, gear train and gear teeth.

**Examination Scheme:**

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance.

## Text & References:

- D.W. Dudley, “Practical Gear Design”, Tata McGraw Hill Co. Inc.
- S.S. Rattan, “Theory of Machines”, Tata McGraw Hill, 2000
- V.B. Bhandari, “Design of Machine Elements”, Tata McGraw Hill Co. Inc.
- Sadhu Singh, “Design of Machine Elemets”, Khanna Publishers Fifth Edition 2012.
- AGMA (American Gear Manufacturing Association) Standards

# ADVANCED METHODS OF MANUFACTURING LAB

**Course Code: BME 823** **Credit Units: 01**
**Total Hours: 20**

**Course Objective :**
The objective of course is to learn about the advanced method of manufacturing processes and develop recent manufacturing processes.

## Course Contents:
**Time allocated for experiments is 2 hours each.**

1. Practice of part programming and operations of
   i) Turning Center.
   ii) Machining Center.

2. Tool planning and selection for
   i) Turning Center.
   ii) Machining Center.

3. Tool Design for a plastic component.
   i) Core and Cavity Extraction of Industrial switch Knob.
   ii) Gating Design.

4. Assembly of various die components for the above.

5. Pattern design for a casting component
   i) Cope and Drag design of a butterfly valve.
   ii) Gating design.

6. Assembly of various pattern components for the above.

7. Generation of G and M codes for the above assemblies and electrodes.

8. Programming and study of Robots for material handling.

## Course Outcomes:
- Student should be able to understand selection of latest additive manufacturing processes
- Student should be able to understand and select various measurement techniques in micro machining processes

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# GEAR TECHNOLOGY LAB

**Course Code: BME 824** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
Identify the basic relative kinematics relations of two moving gears. Develop analytical equations describing the relative position, velocity and acceleration of all gears and identify all reaction and inertia forces on the gears. Demonstrate familiarity with standards in different gear and machine components.

**Course Contents:**
**Time allocated for experiments is 2 hours each.**

**List of Experiments:**

1. To study the different elements of Worm Gear.
2. To study the different elements of Bevel Gear.
3. To study the different elements of Helical Gear.
4. To study the Differential Gear System.
5. Calculation of train ratio and velocity ratio for compound Gear
6. Calculation of train ratio and velocity ratio for Sun and Planet Gear.

## Course Outcomes:

On successful completion of the course, the student will be able to,

- Explain the basic principles of gears.
- Demonstrate the design process of commonly used gears.
- Recognize the standards used in design of gears.
- Analyze the force acting on the gears.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

# MAJOR PROJECT – II

**Course Code: NMP 860** **Credit Units: 09**

**Course Objectives:**
The objective of Major project is to enable the student to take up investigative study in the broad field of Engineering, either fully theoretical/practical or involving both theoretical and practical work to be assigned by the Department on an individual basis or two/three students in a group, under the guidance of a Supervisor. The aim is to provide students an opportunity to exercise their creative and innovative qualities in a group project environment and to excite the imagination of aspiring engineers, innovators and technopreneurs.

**Methodology:**

Topics of project are to be based on the latest trends, verifying engineering concepts /principals and should involve elementary research work. The projects may involve design, fabrications, testing, computer modeling, and analysis of any engineering problem. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation on same.

## Course Outcomes:
On successful completion of the course students will be able to:
- Apply critical and creative thinking in the design of engineering projects
- Plan and manage time effectively as a team.
- Consider the business context and commercial positioning of designed devices or systems.
- Apply knowledge of the ‘real world’ situations that a professional engineer can encounter.
- Use fundamental knowledge and skills in engineering and apply it effectively on a project.
- Design and develop a functional product prototype while working in a team.
- Use various tools and techniques to study existing systems.
- Achieve precision in uses of the tools related to their experiments/fabrication.
- Timely reflect on peers’ technical and non-technical learning.
- Orally present and demonstrate your product to peers, academics, general and industry community.
- Write comprehensive report on project work.

**Examination Scheme:**

| | |
|---|---|
| Literature study/ Fabrication/ Experimentation | 40 |
| Written Report | 20 |
| Viva | 15 |
| Presentation | 25 |
| **Total** | **100** |

# Bachelor of Technology
# (Mechanical Engineering)

## Programme Code: BME

## Duration – 4 Years Full Time

## OVERALL CREDIT

| Sr. No. | Semester | No. of Credits | No. of Hours |
|---|---|---|---|
| 1 | I | 25 | 29 |
| 2 | II | 26 | 31 |
| 3 | III | 30 | 32 |
| 4 | IV | 27 | 31 |
| 5 | V | 29 | 29 |
| 6 | VI | 26 | 27 |
| 7 | VII | 33 | 25 |
| 8 | VIII | 24 | 17 |
| **Total Credits** | | **220** | **221** |

# Bachelor of Technology
# (Mechanical Engineering)

# BME

# AICTE MODEL
# CURRICULUM

# (2020-24 Batch)

# Bachelor of Technology
# (Mechanical Engineering)

## Programme Code: BME

## Duration – 4 Years Full Time

## Programme Structure
## &
## Curriculum & Scheme of Examination

## 2020-24
## (Based on AICTE)

# AMITY UNIVERSITY
# MADHYA PRADESH

# PREAMBLE

Amity University aims to achieve academic excellence by providing multi-faceted education to students and encourage them to reach the pinnacle of success. The University has designed a system that would provide rigorous academic programme with necessary skills to enable them to excel in their careers.

This booklet contains the Programme Structure, the Detailed Curriculum and the Scheme of Examination. The Programme Structure includes the courses (Core and Elective), arranged semester wise. The importance of each course is defined in terms of credits attached to it. The credit units attached to each course has been further defined in terms of contact Hours i.e. Lecture Hours (L), Tutorial Hours (T), Practical Hours (P). Towards earning credits in terms of contact Hours, 1 Lecture and 1 Tutorial per week are rated as 1 credit each and 2 Practical Hours per week are rated as 1 credit. Thus, for example, an L-T-P structure of 3-0-0 will have 3 credits, 3-1-0 will have 4 credits, and 3-1-2 will have 5 credits.

The Curriculum and Scheme of Examination of each course includes the course objectives, course contents, scheme of examination and the list of text and references. The different codes used for the components of evaluation are given below:-

| **Components** | **Codes** |
|---|---|
| Case Discussion/ Presentation/ Analysis | C |
| Home Assignment | H |
| Project | P |
| Seminar | S |
| Viva | V |
| Quiz | Q |
| Class Test | CT |
| Attendance | A |
| End Semester Examination | ESE |

It is hoped that it will help the students study in a planned and a structured manner and promote effective learning. Wishing you an intellectually stimulating stay at Amity University.

March 2020

## PROGRAM OUTCOMES

**PO1**. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

**PO2. Problem Analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

**PO3. Design/Development of Solutions: Design** solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

**PO4. Conduct Investigations of Complex Problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

**PO5. Modern Tool Usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

**PO6. The Engineer and Society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

**PO7. Environment and Sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**PO8. Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

**PO9. Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**PO10. Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

**PO11. Life-long Learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

**PO12. Project Management and Finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects

## PROGRAM SPECIFIC OUTCOMES

**PSO1.Professional Skills**: An ability to understand the basic concepts in Mechanical Engineering and to apply them to various areas, like Automobile, power plant, Production, Manufacturing etc., in the design and implementation of complex systems.

**PSO2. Problem-solving skills**: An ability to solve complex Mechanical Engineering problems, using latest hardware and software tools, along with analytical skills to arrive cost effective and appropriate solutions.

**PSO3. Successful career and Entrepreneurship**: An understanding of social-awareness & environmental-wisdom along with ethical responsibility to have a successful career and to sustain passion and zeal for real-world applications using optimal resources as an Entrepreneur.

## PROGRAMME STRUCTURE

| FIRST SEMESTER | | | | | | |
|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Lecture (L) Hours Per week** | **Tutorial (T) Hours Per week** | **Practical (P) Hours Per week** | **Total Credits** | **Hours** |
| MAT101 | Applied Mathematics – I (Calculus and Linear Algebra) | 3 | 1 | - | 4 | 40 |
| CHE101 | Applied Chemistry | 3 | 1 | - | 4 | 40 |
| CSE104 | Programming for Problem Solving | 3 | - | - | 3 | 30 |
| BME101 | Engineering Graphics & Design | 1 | - | - | 1 | 10 |
| CIV101 | Basic Civil Engineering & Applied Mechanics | 2 | - | - | 2 | 20 |
| CHE121 | Applied Chemistry Lab | - | - | 2 | 1 | 20 |
| CSE124 | Programming for Problem Solving Lab | - | - | 4 | 2 | 40 |
| BME121 | Engineering Graphics & Design Lab | - | - | 4 | 2 | 40 |
| BCU141 | Communication Skills – I | 1 | | | 1 | 10 |
| EVS142 | Environmental Studies – I | 2 | - | - | 2 | 20 |
| BSU143 | Behavioural Science – I | 1 | - | - | 1 | 10 |
| FLU144 | French –I | 2 | - | - | 2 | 20 |
| **CBCS** | | 3 | - | - | 3 | 30 |
| **TOTAL CREDITS (Including CBCS)** | | | | | **28** | |
| **Total Hours Including CBCS per week** | | | | | **33** | |
| **Total Hours in the Semester** | | | | | **330** | |

| SECOND SEMESTER | | | | | | |
|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Lecture (L) Hours Per week** | **Tutorial (T) Hours Per week** | **Practical (P) Hours Per week** | **Total Credits** | **Hours** |
| MAT201 | Applied Mathematics–II (Ordinary & Partial Differential Equations and Transform) | 3 | 1 | - | 4 | 40 |
| PHY101 | Applied Physics – I | 3 | 1 | - | 4 | 40 |
| ECE101 | Basic Electrical Engineering | 3 | - | - | 3 | 30 |
| CSE204 | Object Oriented Programming Using C++ | 2 | 1 | - | 3 | 30 |
| BME102 | Workshop/ Manufacturing Practices | 1 | - | - | 1 | 10 |
| PHY121 | Applied Physics Lab – I | - | - | 2 | 1 | 20 |
| ECE121 | Basic Electrical Engineering Lab | - | - | 2 | 1 | 20 |
| CSE224 | Object Oriented Programming Using C++ Lab | - | - | 2 | 1 | 20 |
| BME122 | Workshop/ Manufacturing Practices Lab | - | - | 4 | 2 | 40 |
| BCU241 | Communication Skills – II | 1 | - | - | 1 | 10 |
| EVS242 | Environmental Studies – II | 2 | - | - | 2 | 20 |
| BSU243 | Behavioural Science – II | 1 | - | - | 1 | 10 |
| FLU244 | French –II | 2 | - | - | 2 | 20 |
| **CBCS** | | 3 | - | - | 3 | 30 |
| **TOTAL CREDITS (Including CBCS)** | | | | | **29** | |
| **Total Hours Including CBCS per week** | | | | | **34** | |
| **Total Hours in the Semester** | | | | | **340** | |
| TERM PAPER DURING SUMMER BREAK | | | | | | |

| **THIRD SEMESTER** | | | | | | |
|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Lecture (L) Hours Per week** | **Tutorial (T) Hours Per week** | **Practical (P) Hours Per week** | **Total Credits** | **Hours** |
| MAT 301 | Applied Mathematics – III<br>(Probability, Statistics and Numerical Methods) | 3 | - | - | 3 | 30 |
| PHY 303 | Applied Physics – II | 3 | - | - | 3 | 30 |
| BME 301 | Engineering Mechanics | 3 | - | - | 3 | 30 |
| BME 302 | Material Science & Metallurgy | 3 | - | - | 3 | 30 |
| BME 303 | Thermodynamics | 3 | - | - | 3 | 30 |
| ECE 307 | Basic Electronics | 2 | - | - | 2 | 20 |
| PHY 323 | Applied Physics Lab – II | - | - | 2 | 1 | 20 |
| BME 321 | Engineering Mechanics Lab | - | - | 2 | 1 | 20 |
| BME 323 | Thermodynamics lab | - | - | 2 | 1 | 20 |
| ECE 327 | Basic Electronics lab | - | - | 2 | 1 | 20 |
| BCU 341 | Communication Skills – III | 1 | - | - | 1 | 10 |
| BSU 343 | Behavioural Science – III | 1 | - | - | 1 | 10 |
| FLU 344 | French– III | 2 | - | - | 2 | 20 |
| NTP 330 | **Term paper (Evaluation)** | - | - | - | 2 | |
| **CBCS** | | 3 | - | - | 3 | 30 |
| **TOTAL CREDITS (Including CBCS)** | | | | | **30** | |
| **Total Hrs Including CBCS** | | | | | **32** | |
| **Total Hrs in the Semester** | | | | | **320** | |

| **FOURTH SEMESTER** | | | | | | |
|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Lecture (L) Hours Per week** | **Tutorial (T) Hours Per week** | **Practical (P) Hours Per week** | **Total Credits** | **Hours** |
| BME 401 | Fluid Mechanics | 3 | - | - | 3 | 30 |
| BME 402 | Heat and Mass Transfer | 3 | - | - | 3 | 30 |
| BME 403 | Kinematic of Machine | 3 | - | - | 3 | 30 |
| BME 404 | Manufacturing Machine | 3 | - | - | 3 | 30 |
| BME 405 | Strength of Material | 3 | - | - | 3 | 30 |
| BME 422 | Heat and Mass Transfer Lab | - | - | 2 | 1 | 20 |
| BME 423 | Kinematic of Machine Lab | - | - | 2 | 1 | 20 |
| BME 424 | Manufacturing Machine Lab | - | - | 2 | 1 | 20 |
| BME 425 | Strength of Material & Fluid Mechanics Lab | - | - | 2 | 1 | 20 |
| BCU 441 | Communication Skills – IV | 1 | - | - | 1 | 10 |
| BSU 443 | Behavioural Science – IV | 1 | - | - | 1 | 10 |
| FLU 444 | French– IV | 2 | - | - | 2 | 20 |
| **CBCS** | | 3 | 1 | - | 4 | 40 |
| **TOTAL CREDITS (Including CBCS)** | | | | | **27** | |
| **Total Hrs Including CBCS** | | | | | **31** | |
| **Total Hrs in the Semester** | | | | | **310** | |
| INDUSTRIAL PRACTICAL TRAINING – I: 6 – 8 WEEKS | | | | | | |

| **FIFTH SEMESTER** | | | | | | |
|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Lecture (L) Hours Per week** | **Tutorial (T) Hours Per week** | **Practical (P) Hours Per week** | **Total Credits** | **Hours** |
| BME 501 | Applied Thermodynamics | 3 | - | - | 3 | 30 |
| BME 502 | Dynamics of Machines | 3 | - | - | 3 | 30 |
| BME 503 | Machine Design –I | 3 | - | - | 3 | 30 |
| BME 504 | Measurement and Control | 3 | - | - | 3 | 30 |
| BME 505 | Metrology | 3 | - | - | 3 | 30 |
| BME 522 | Dynamics of Machine Lab | - | - | 2 | 1 | 20 |
| BME 524 | Measurement and Control Lab | - | - | 2 | 1 | 20 |
| BME 525 | Metrology lab | - | - | 2 | 1 | 20 |
| BCU 541 | Communication Skills –V | 1 | - | - | 1 | 10 |
| BSU 543 | Behavioural Science – V | 1 | - | - | 1 | 10 |
| FLU 544 | French– V | 2 | - | - | 2 | 20 |
| NPT 550 | **Industrial Practical Training - I (Evaluation)** | - | - | - | 3 | - |
| **CBCS** | | 3 | 1 | - | 4 | 40 |
| **TOTAL CREDITS (Including CBCS )** | | | | | | **29** |
| **Total Hrs Including CBCS** | | | | | | **29** |
| **Total Hrs in the Semester** | | | | | | **290** |

| **SIXTH SEMESTER** | | | | | | |
|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Lecture (L) Hours Per week** | **Tutorial (T) Hours Per week** | **Practical (P) Hours Per week** | **Total Credits** | **Hours** |
| BME 601 | Fluid Power Systems | 3 | - | - | 3 | 30 |
| BME 602 | IC Engine & Gas Turbine | 3 | - | - | 3 | 30 |
| BME 603 | Machine Design – II | 3 | - | - | 3 | 30 |
| BME 604 | Manufacturing Technology | 3 | - | - | 3 | 30 |
| BME 621 | Fluid Power Systems Lab | - | - | 2 | 1 | 20 |
| BME 622 | IC Engine & Gas Turbine Lab | - | - | 2 | 1 | 20 |
| BME 623 | Machine Design Lab – II | - | - | 2 | 1 | 20 |
| **ELECTIVES (Anyone from following with Practical)** | | | | | **4** | **50** |
| BME 606 | Mechatronics | 3 | - | - | | |
| BME 607 | Artificial Intelligence and Robotics | 3 | - | - | | |
| BME 626 | Mechatronics Lab | - | - | 2 | | |
| BME 627 | Artificial Intelligence and Robotics lab | - | - | 2 | | |
| | | | | | | |
| BCU 641 | Communication Skills – VI | 1 | - | - | 1 | 10 |
| BSU 643 | Behavioural Science – VI | 1 | - | - | 1 | 10 |
| FLU 644 | French– VI | 2 | - | - | 2 | 20 |
| NMP 660 | **Minor Project** | - | - | - | 2 | - |
| **CBCS** | | - | - | - | 1 | - |
| **TOTAL CREDITS (Including CBCS )** | | | | | **26** | |
| **Total Hrs Per Week** | | | | | **27** | |
| **Total Hrs in the Semester** | | | | | **270** | |
| INDUSTRIAL PRACTICAL TRAINING –II: 6 – 8 WEEKS | | | | | | |

| SEVENTH SEMESTER | | | | | | |
|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Lecture (L) Hours Per week** | **Tutorial (T) Hours Per week** | **Practical (P) Hours Per week** | **Total Credits** | **Hours** |
| BME 701 | Operations Research | 3 | - | - | 3 | 30 |
| BME 702 | Computer Aided Manufacturing | 3 | - | - | 3 | 30 |
| BME 703 | Management of Manufacturing Systems | 3 | - | - | 3 | 30 |
| BME 721 | Operations Research (Programming) Lab | - | - | 2 | 1 | 20 |
| BME 722 | Computer Aided Manufacturing Lab | - | - | 2 | 1 | 20 |
| **ELECTIVES (Any one from each category)** | | | | | **4** | **50** |
| **A (With Practical)** | | | | | | |
| BME 704 | Automotive Engineering | 3 | - | - | | |
| BME 705 | Computer Aided Designing | 3 | - | - | | |
| BME 724 | Automotive Engineering Lab | - | - | 2 | | |
| BME 725 | Computer Aided Designing Lab | - | - | 2 | | |
| **ELECTIVES (Any one from each category)** | | | | | **3** | **30** |
| **B (Without Practical)** | | | | | | |
| BME 706 | Marketing Management | 3 | - | - | | |
| BME 707 | Solar Energy | 3 | - | - | | |
| BME 708 | Power Plant Practices | 3 | - | - | | |
| BME 709 | Combustion Engine Emissions | 3 | - | - | | |
| | | | | | | |
| BCU 741 | Communication Skills – VII | 1 | - | - | 1 | 10 |
| BSU 743 | Behavioural Science – VII | 1 | - | - | 1 | 10 |
| FLU 744 | French– VII | 2 | - | - | 2 | 20 |
| NPT 750 | **Industrial Practical Training– II (Evaluation)** | - | - | - | 5 | |
| NMP 760 | **Major Project – I** | - | - | - | 6 | |
| **TOTAL CREDITS** | | | | | **33** | |
| **Total Hrs Per Week** | | | | | **25** | |
| **Total Hrs in the Semester** | | | | | **250** | |

| EIGHT SEMESTER | | | | | | |
|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Lecture (L) Hours Per week** | **Tutorial (T) Hours Per week** | **Practical (P) Hours Per week** | **Total Credits** | **Hours** |
| BME 801 | Quality Control & Quality Assurance | 3 | - | - | 3 | 30 |
| BME 802 | Refrigeration & Air-conditioning | 3 | - | - | 3 | 30 |
| BME 822 | Refrigeration & Air-conditioning Lab | - | - | 2 | 1 | 20 |
| **ELECTIVES (Any one from following with Practical)** | | | | | **4** | **50** |
| BME 803 | Advanced Methods of Manufacturing | 3 | - | - | | |
| BME 804 | Gear Technology | 3 | - | - | | |
| BME 823 | Advanced Methods of Manufacturing Lab | - | - | 2 | | |
| BME 824 | Gear Technology Lab | - | - | 2 | | |
| | | | | | | |
| BCU 841 | Communication Skills – VIII | 1 | - | - | 1 | 10 |
| BSU 843 | Behavioural Science – VIII | 1 | - | - | 1 | 10 |
| FLU 844 | French– VIII | 2 | - | - | 2 | 20 |
| NMP 860 | **Major Project – II** | - | - | - | 9 | |
| **TOTAL CREDITS** | | | | | **24** | |
| **Total Hrs Per Week** | | | | | **17** | |
| **Total Hrs in the Semester** | | | | | **170** | |

# Bachelor of Technology
# (Mechanical Engineering)

## Programme Code: BME

## Duration – 4 Years Full Time

## OVERALL CREDIT

| Sr. No. | Semester | No. of Credits | No. of Hours |
|---|---|---|---|
| 1 | I | 28 | 33 |
| 2 | II | 29 | 34 |
| 3 | III | 30 | 32 |
| 4 | IV | 27 | 31 |
| 5 | V | 29 | 29 |
| 6 | VI | 26 | 27 |
| 7 | VII | 33 | 25 |
| 8 | VIII | 24 | 17 |
| **Total Credits** | | **226** | **228** |

# APPLIED MATHEMATICS – I (CALCULUS AND LINEAR ALGEBRA)

**Course Code: MAT 101** **Credit Units: 04**
**Total Hours: 40**

**Course Objective:**
The objective of this course is to familiarize the prospective engineers with techniques in calculus, multivariate analysis and linear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

**Course Contents:**

**Module I: Differential Calculus: (8 Hours)**
Successive differentiation, Leibnitz Theorem, Rolle's theorem, Mean value theorem, Taylor's and Maclaurin's theorems with remainders, Partial Differentiation, Total derivative; Maxima and minima for two variables.

**Module II: Integral Calculus: (8 Hours)**
Evaluation of definite and improper integrals: Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface, areas and volumes of revolutions, Multiple Integration: Double integrals (Cartesian and polar), Triple integrals (Cartesian).

**Module III: Vector Calculus: (7 Hours)**
Scalar and vector field, Gradient, Divergence and Curl, Directional Derivative, Evaluation of a Line Integral, Green's theorem in plane (without proof), Stoke's theorem (without proof) and Gauss Divergence theorem (without proof).

**Module IV: Matrices: (7 Hours)**
Inverse and Rank of a matrix, Linear systems of equations, Consistency of Linear Simultaneous Equations, linear Independence, Gauss elimination and Gauss-Jordan elimination, Eigen values, eigenvectors, Caley-Hamilton theorem, Diagonalization.

**Module V: Linear algebra & Vector spaces: (10 Hours)**
Linear algebra: Group, ring, field (Definition), Vector Space, linear dependence of vectors, basis, dimension; Linear transformations (maps), range and kernel of a linear map, Inverse of a linear transformation, rank- nullity theorem (without proof), composition of linear maps, Matrix associated with a linear map.

## Course Outcomes:

The objective of this course is to familiarize the prospective engineers with techniques in basic calculus and linear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.
The students will learn:

- To apply differential and integral calculus tools to the notions of curvature and to improper integrals. Apart from various applications, they will have a basic understanding of Beta and Gamma functions.
- The mathematical tools needed in evaluating multiple integrals and their usage.
- The essential tools of matrices that are used in various techniques dealing with engineering problems.
- The tools of linear algebra including linear transformations, eigen values, diagonalization.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Suggested Text/Reference Books:


- Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
- B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
- G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
- V. Krishnamurthy, V.P. Mainra and J.L. Arora, An introduction to Linear Algebra, Affiliated East–West press, Reprint 2005.

# APPLIED CHEMISTRY

**Course Code: CHE 101** **Credit Units: 04**
**Total Hours: 40**

**Course Objective:**
Chemistry is essential to develop analytical capabilities of students, so that they can characterize, transform and use materials in engineering and apply knowledge in their field. All engineering fields have unique bonds with chemistry whether it is Aerospace, Mechanical, Environmental and other fields. The makeup of substances is always a key factor, which must be known. The upcoming field of technology like Nanotechnology and Biotechnology depends fully on the knowledge of basic chemistry. With this versatile need in view, course has been designed in such a way so that the student should get an overview of the whole subject starting from the very basic bonding mechanism to the application of materials. To train students practically in basic and applied principles of Chemistry.

**Course Contents:**

**Module I: Chemical Bonding & Chemical Equilibrium: (8 Hours)**
Fajan's rule; Hybridisation. Valence bond and Molecular orbital theory for diatomic molecule. Le Chatelier's Principle; Equilibrium constant from Thermodynamic Constants; pH and pOH, Buffer Solution, Buffer Action.

**Module II: Thermodynamics (Use of free energy in chemical equilibria): (6 Hours)**
Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies. Free energy and emf. Cell potentials, the Nernst equation and applications. Corrosion: Prevention and corrosion control

**Module III: Stereochemistry, Organic Reactions & Mechanism: (6 Hours)**
Symmetry and chirality, Isomerism; diastereomers, enantiomers, optical activity, absolute configurations and conformational analysis.

**Module IV: Polymers: (6 Hours)**
Introduction; Polymerization; Addition and Condensation Polymerization. Thermosetting and Thermoplastic Polymers. Molecular Weight of Polymer; Rubber, Plastic and Fiber; Preparation, Properties and uses of PMMA, Polyester, Epoxy Resins and Bakelite, Silicone Polymers.

**Module V: Water Chemistry: (6 Hours)**
Introduction and specifications of water, Hardness and its determination (EDTA method only), Alkalinity, Caustic embrittlement, Boiler feed water, boiler problems; scale, sludge, Carbonate & phosphate conditioning, colloidal conditioning & calgon treatment, Water softening processes; Lime – soda process, Ion exchange method.
Water for domestic use.

**Module VI: Instrumental Methods of Analysis: (8 Hours)**
Introduction; Principles of spectroscopy; Laws of absorbance,
IR: Principle, Instrumentation, Application
UV: Principle, Instrumentation, Application
NMR: Principle, Instrumentation, Application

## Course Outcomes:
After successful completion of the course students will have the knowledge and skill to:
- Apply the principles chemical of sciences to understand the very basic bonding mechanism and the application to materials in different engineering situations.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Physical Chemistry, by P. W. Atkins
- Engineering Chemistry , by Dr. Sunita Rattan
- Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane
- Organic Spectroscopy, by Jagmohan
- Engineering Chemistry by Jain & Jain
- University chemistry, by B. H. Maha
- Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore.

# PROGRAMMING FOR PROBLEM SOLVING

**Course Code: CSE 104** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The objective of this course module is to acquaint the students with the basics of computers system, its components, data representation inside computer and to get them familiar with various important features of procedure oriented programming language i.e. C.

**Course Contents:**

**Module I: Introduction to Programming: (3 Hours)**
Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.) Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/ Pseudocode with examples. From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code.

**Module II: Programming Essential: (8 Hours)**
Arithmetic expressions and precedence, Conditional Branching and Loop, Writing and evaluation of conditionals and consequent branching , Iteration and loops.

**Module III: Arrays: (4 Hours)**
Arrays (1-D, 2-D), Character arrays and Strings.

**Module IV: Basic Algorithms: (3 Hours)**
Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required)

**Module V: Function: (3 Hours)**
Functions (including using built in libraries), Parameter passing in functions, call by value, Passing arrays to functions: idea of call by reference

**Module VI: Recursion: (3 Hours)**
Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort.

**Module VII: Structure: (2 Hours)**
Structures, Defining structures and Array of Structures.

**Module VIII: Pointers: (2 Hours)**
Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation)

**Module IX: File handling: (2 Hours)**
Basics of file Handling.

## Course Outcomes:
The student will learn

- To formulate simple algorithms for arithmetic and logical problems.
- To translate the algorithms to programs (in C language).
- To test and execute the programs and correct syntax and logical error
- To implement conditional branching, iteration and recursion.
- To decompose a problem into functions and synthesize a complete program using divide and conquer approach.
- To use arrays, pointers and structures to formulate algorithms and programs.
- To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.
- To apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:

- Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
- E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill
- Brian W. Kernighan and Dennis M. Ritchie, the C Programming Language, Prentice Hall of India

# ENGINEERING GRAPHICS & DESIGN

**Course Code: BME 101** **Credit Units: 01**
**Total Hours: 10**

**Except the basic essential concepts, most of the teaching part can happen concurrently in the laboratory itself**

**Course Objective:**
This course will provide students concepts on the drawings of different curves like straight line, parabola, ellipse etc. After completion of this course, students will be able to draw different figures manually and will be capable of using various instruments involved in drawings.

**Course Contents:**
Exercises are based on the course Engineering Graphics & Design (BME 101)

**Module I:** Introduction to Engineering Drawing, Orthographic Projections, Projections of Regular Solids, Sections and Sectional Views of Right Angular Solids: **(3 Hours)**

**Module II:** Sections and Sectional Views of Right Angular Solids, Isometric Projections, Overview of Computer Graphics: **(3 Hours)**

**Module III:** Customization & CAD Drawing, Annotations, layering & other functions, Demonstration of a simple team design project: **(4 Hours)**

## Course Outcomes:

- To prepare students to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- To prepare students to use the techniques, skills, and modern engineering tools necessary for engineering practice
- To prepare for actual work situations through practical training in a new state-of-the-art computer designed CAD laboratory using engineering software.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:


- M.B. Shah & B.C. Rana, Engineering Drawing, Pearson Education, 2007
- PS Gill, Engineering Drawing, Kataria Publication
- ND Bhatt, Engineering Drawing, Charotar publications
- N Sidheshwar, Engineering Drawing, Tata McGraw Hill
- CL Tanta, Mechanical Drawing, “Dhanpat Rai”
- Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication
- Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers
- (Corresponding set of) CAD Software Theory and User Manuals

# BASIC CIVIL ENGINEERING & APPLIED MECHANICS

**Course Code: CIV 101** **Credit Units: 02**
**Total Hours: 20**

**Course Objectives:**
- To understand the utility of various types of building materials.
- To understand the location, construction detail and suitability of various building elements.
- To determine the location of object on ground surface.
- To understand the effects of system of forces on rigid body in static conditions.
- Introduction to smart city and its component.

**Course Contents:**

**Module I: Building Materials: (4 Hours)**
Stones, bricks, cement, timber - types, properties, test & uses, Introduction of concrete properties & Laboratory tests on concrete, curing of concrete and mortar Materials.

**Module II: Surveying & Positioning: (4 Hours)**
Introduction to surveying, Survey stations, Measurement of distances; conventional and EDM methods, Measurement of directions by different methods, Measurement of elevations by different methods, reciprocal levelling.

**Module III: Smart City: (4 Hours)**
Elements of smart city, Role of experts of various discipline of engineering in the development of smart city. Concept of green buildings, including rainwater harvesting, non-conventional sources of energy, Smart transportation and drainage system.

**Module IV: Forces and Equilibrium: (4 Hours)**
Graphical and Analytical Treatment of Concurrent and non-concurrent coplanar forces, free body Diagram, Force Diagram and Bow's notations, Application of Equilibrium Concepts: Analysis of plane Trusses, method of joints, method of Sections.

**Module V: Centre of Gravity and moment of Inertia: (4 Hours)**
Centroid and Centre of Gravity, Moment of Inertia of Composite section. Support Reactions, Shear force and bending moment diagram for cantilever & simply supported beam with concentrated, distributed load and Couple.

## Course Outcomes:
Upon completion of the course, the students will be able to:
- Explain concepts and terminologies of building materials, surveying and mechanics.
- Apply various methods for surveying and mechanics.
- Determine the location, area and volume of objects on ground surface.
- Solve the problems of surveying and mechanics by using various methods.
- Analyse the effects of system of forces on rigid bodies in static conditions.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:

- Surveying, Vol. – 1, Punmia B.C., Laxmi Publications, 17th edition, 2016
- Building Material, B. C. Punmia, Laxmi Publications,2016
- A textbook of Engineering Mechanics, D. S. Kumar, Katsons Publications, 2013
- Basic Civil Engineering, S. Ramamrutam & R. Narayan, Dhanpat Rai Pub., 3rd edition, 2013
- Applied Mechanics, Prasad I.B., Khanna Publication 17th edition, 1996
- Surveying, Duggal, Tata McGraw Hill New Delhi, 4th edition, 2013
- Engineering Mechanics - Statics & Dynamics, R.C. Hibbler, Pearson Publications, 14th edition, 2015
- Engineering Mechanics - statics dynamics, A. Boresi & Schmidt, Cengage learning,1st edition, 2008.
- Applied Mechanics, R.K. Rajput, Laxmi Publications, 3rd edition, 2016

# APPLIED CHEMISTRY LAB

**Course Code: CHE 121** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
Principles of chemistry relevant to the study of science and engineering have clarity of understanding through experiments. Learning process and learning outcomes get enhanced through experiments relevant to and commensurate with theoretical knowledge. The lab course is designed to teach the students the basics and advanced chemical principles through experiments.
Four basic sciences, Physics, Chemistry, Mathematics and Biology are the building blocks in engineering and technology. Chemistry is essential to develop analytical capabilities of students, so that they can characterize, transform and use materials in engineering and apply knowledge in their field. All engineering fields have unique bonds with chemistry whether it is Aerospace, Mechanical, Environmental and other fields the makeup of substances is always a key factor, which must be known. For electronics and computer science engineering, apart from the material, computer modeling and simulation knowledge can be inherited from the molecule designing. The upcoming field of technology like Nanotechnology and Biotechnology depends fully on the knowledge of basic chemistry. With this versatile need in view, course has been designed in such a way so that the student should get an overview of the whole subject starting from the very basic application of principles.

**Course Contents:**

**List of experiments: [Any 10]**
1. Chemical analysis of water for determination of hardness. **(2 Hours)**
2. Chemical analysis of water for determination of Alkalinity. **(2 Hours)**
3. Chemical analysis of water for determination of residual Chlorine. **(2 Hours)**
4. Synthesis of urea - formaldehyde resin. **(2 Hours)**
5. Determination of dissolved oxygen in water. **(2 Hours)**
6. Determination of surface tension of a given liquid. **(2 Hours)**
7. Plant pigments separation by paper chromatography. **(2 Hours)**
8. Conductometric titration. **(2 Hours)**
9. Determination of water modules of crystallization in Mohr's salt. **(2 Hours**)
10. Application of distribution law in the determination of equilibrium constant. **(2 Hours)**
11. Determination of amount of Oxalic acid and Sulphuric acid in one litre of solution. **(2 Hours)**
12. pH metric titration. **(2 Hours)**

## Course Outcome:
The chemistry laboratory course will consist of experiments illustrating the principles of chemistry relevant to the study of science and engineering. The students will learn to measure:
- Molecular/system properties
- Surface tension,
- Viscosity
- Conductance of solutions,
- Redox potentials
- Chloride content of water, etc.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:
- Physical Chemistry, by P. W. Atkins
- Engineering Chemistry, by Dr. Sunita Rattan
- Engineering Chemistry by Jain & Jain

# PROGRAMMING FOR PROBLEM SOLVING LAB

**Course Code:** **Credit Units: 02**
**Total Hours: 40**

**Course Objective:**
The objective of this course module is to acquaint the students with the basics of programming in C.

**Course Contents:**
Lab Experiments are based on the course Programming For Problem Solving (CSE 104)

**List of experiments/demonstrations:**
**Tutorial 1**: Problem solving using computers: **(2 Hours)**
**Lab1**: Familiarization with programming environment

**Tutorial 2**: Variable types and type conversions: **(2 Hours)**
**Lab 2**: Simple computational problems using arithmetic expressions

**Tutorial 3:** Branching and logical expressions: **(4 Hours)**
**Lab 3:** Problems involving if-then-else structures

**Tutorial 4**: Loops, while and for loops: **(4 Hours)**
**Lab 4:** Iterative problems e.g., sum of series

**Tutorial 5**: 1D Arrays: searching, sorting**: (4 Hours)**
**Lab 5**: 1D Array manipulation

**Tutorial 6**: 2D arrays and Strings**: (4 Hours)**
**Lab 6**: Matrix problems, String operations

**Tutorial 7**: Functions, call by value: **(4 Hours)**
**Lab 7**: Simple functions

**Tutorial 8 &9**: Numerical methods (Root finding, numerical differentiation, numerical integration): **(4 Hours)**
**Lab 8 and 9:** Programming for solving Numerical methods problems

**Tutorial 10**: Recursion, structure of recursive calls: **(4 Hours)**
**Lab 10:** Recursive functions

**Tutorial 11**: Pointers, structures and dynamic memory allocation: **(4 Hours)**
**Lab 11**: Pointers and structures

**Tutorial 12**: File handling: **(4 Hours)**
**Lab 12**: File operations

## Laboratory Outcomes:
- To formulate the algorithms for simple problems
- To translate given algorithms to a working and correct program
- To be able to correct syntax errors as reported by the compilers
- To be able to identify and correct logical errors encountered at run time
- To be able to write iterative as well as recursive programs
- To be able to represent data in arrays, strings and structures and manipulate them through a program
- To be able to declare pointers of different types and use them in defining self- referential structures.
- To be able to create, read and write to and from simple text files.

**Examination Scheme:**

| IA | | | EE | | | |
|---|---|---|---|---|---|---|
| **A** | **PR** | **Practical Based Test** | **Major Experiment** | **Minor Experiment** | **LR** | **Viva** |
| 5 | 10 | 15 | 35 | 15 | 10 | 10 |

Note: IA –Internal Assessment, EE- External Exam, A- Attendance, PR- Performance, LR – Lab Record, V – Viva.

# ENGINEERING GRAPHICS & DESIGN LAB

**Course Code: BME 121** **Credit Units: 02**
**Total Hours: 40**

**Course Objective:**

This course will provide students concepts on the drawings of different curves like straight line, parabola, ellipse etc. After completion of this course, students will be able to draw different figures manually and will be capable of using various instruments involved in drawings.

**Course Contents:**

**List of experiments/ demonstrations:**
**Module I: Introduction to Engineering Drawing: (4 Hours)**
Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales – Plain, Diagonal and Vernier Scales

**Module II: Orthographic Projections: (4 Hours)**
Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes; Projections of planes inclined Planes - Auxiliary Planes

**Module III: Projections of Regular Solids: (4 Hours)**
Those inclined to both the Planes- Auxiliary Views; Draw simple annotation, dimensioning and scale. Floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc.

**Module IV: Sections and Sectional Views of Right Angular Solids: (4 Hours)**
Prism, Cylinder, Pyramid, Cone – Auxiliary Views; Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry and dwellings (foundation to slab only)

**Module V: Isometric Projections: (4 Hours)**
Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa,Conventions

**Module VI: Overview of Computer Graphics: (4 Hours)**
Listing the computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.; Isometric Views of lines, Planes, Simple and compound Solids

**Module VII: Customization & CAD Drawing: (4 Hours)**
consisting of set up of the drawing page and the printer, including scale settings, Setting up of units and drawing limits; ISO and ANSI standards for coordinate dimensioning and tolerancing; Orthographic constraints, Snap to objects manually and automatically; Producing drawings by using various coordinate input entry methods to draw straight lines, Applying various ways of drawing circles

**Module VIII: Annotations, layering & other functions: (6 Hours)**
Applying dimensions to objects, applying annotations to drawings; Setting up and use of Layers, layers to create drawings, Create, edit and use customized layers; Changing line lengths through modifying existing lines (extend/lengthen); Printing documents to paper using the print command; orthographic projection techniques; Drawing sectional views of composite right regular geometric solids and project the true shape of the sectioned surface; Drawing annotation, Computer-aided design (CAD) software modeling of parts and assemblies. Parametric and non-parametric solid, surface, and wireframe models. Part editing and two-dimensional documentation of models. Planar projection theory, including sketching of perspective, isometric, multi view, auxiliary, and section views. Spatial visualization exercises. Dimensioning guidelines, tolerancing techniques; dimensioning and scale multi views of dwelling.

**Module IX: Demonstration of a simple team design project: (6 Hours)**
Geometry and topology of engineered components: creation of engineering models and their presentation in standard 2D blueprint form and as 3D wire-frame and shaded solids; meshed topologies for engineering analysis

and tool-path generation for component manufacture; geometric dimensioning and tolerancing; Use of solid-modeling software for creating associative models at the component and assembly levels; floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc. Applying colour coding according to building drawing practice; Drawing sectional elevation showing foundation to ceiling; Introduction to Building Information Modelling (BIM)

**Laboratory Outcomes:**

- Introduction to engineering design and its place in society
- Exposure to the visual aspects of engineering design
- Exposure to engineering graphics standards
- Exposure to solid modeling
- Exposure to computer-aided geometric design
- Exposure to creating working drawings
- Exposure to engineering communication

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

# COMMUNICATION SKILLS-I

**Course Code: BCU 141** **Credit Units: 01**
**Total Hours: 10**

**Course Objective:**
The course is intended to familiarize students with the basics of English language and help them to learn to identify language structures for correct English usage.

**Prerequisites:** NIL

| Course Contents / Syllabus: | | |
|---|---|---|
| **1.** | **Module I Essentials of English Grammar** | **30% Weightage** |
| | • Common Errors<br>• Parts of Speech<br>• Collocations, Relative Pronoun<br>• Subject-Verb Agreement<br>• Articles<br>• Punctuation<br>• Sentence Structure- 'Wh' Questions | |
| **2.** | **Module II Written English Communication** | **30% Weightage** |
| | • Paragraph Writing<br>• Essay Writing | |
| **3.** | **Module III Spoken English Communication** | **30% Weightage** |
| | • Introduction to Phonetics<br>• Syllable-Consonant and Vowel Sounds<br>• Stress and Intonation | |
| **4.** | **Module IV : Prose** | **10% Weightage** |
| | "Friends, Romans, Countrymen, lend me your ears" Speech by Marc Antony in Julius Caesar<br>❖ Comprehension Questions will be set in the End-Semester Exam | |
| **5.** | **Student Learning Outcomes:**<br>The students should be able to :<br>• Identify Common Errors and Rectify Them<br>• Develop and Expand Writing Skills Through Controlled and Guided Activities<br>• To Develop Coherence, Cohesion and Competence in Oral Discourse through Intelligible Pronunciation. | |
| **6.** | **Pedagogy for Course Delivery:**<br>• Workshop<br>• Group Discussions<br>• Presentations<br>• Lectures<br>• Extempore | |

**Assessment/ Examination Scheme:**

| Theory L/T (%) | Lab/Practical/Studio (%) | End Term Examination |
|---|---|---|
| 100% | NA | 70% |

**Theory Assessment (L&T):**

| Components (Drop down) | CIE | Mid Sem | Attendance | End Term Examination |
|---|---|---|---|---|
| **Weightage (%)** | 10% | 15% | 5% | 70% |

**Text:** ***Rosenblum, M. How to Build Better Vocabulary, London: Bloomsbury Publication***
***Verma, Shalini. Word Power made Handy, S. Chand Publications***
***High School English Grammar & Composition by Wren & Martin***
**References:** ***K.K.Sinha , Business Communication, Galgotia Publishing Company.***
**Additional Reading: Newspapers and Journals**

# ENVIRONMENTAL STUDIES – I

**Course Code: EVS 142** **Credit Units: 02**
**Total Hours: 20**

**Course Objective:**
The term environment is used to describe, in the aggregate, all the external forces, influences and conditions, which affect the life, nature, behavior and the growth, development and maturity of living organisms. At present a great number of environmental issues, have grown and complexity day by day, threatening the survival of mankind on earth. Environment study is quite essential in all streams of studies including environmental engineering and industrial management. The objective of environmental studies is to enlighten the masses about the importance of the protection and conservation of our environment and control of human activities which has an adverse effect on the environment.

**Course Contents:**

**Module I: The multidisciplinary nature of environmental studies: (6 Hours)**
Definition, scope and importance

Need for public awareness

**Module II: Natural Resources: (8 Hours)**
Renewable and non-renewable resources:
Natural resources and associated problems

Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.

Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies.

Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.
Role of an individual in conservation of natural resources.

Equitable use of resources for sustainable lifestyles.

**Module III: Ecosystems: (3 Hours)**
Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession

Food chains, food webs and ecological pyramids
Introduction, types, characteristic features, structure and function of the following ecosystem:

**a.** Forest ecosystem
**b.** Grassland ecosystem
**c.** Desert ecosystem
**d.** Aquatic ecosystems (ponds, streams, lakes, rivers, ocean estuaries)

**Module IV: Biodiversity and its conservation: (3 Hours)**
Introduction – Definition: genetic, species and ecosystem diversity
Biogeographical classification of India
Value of biodiversity: consumptive use, productive use, social, ethical aesthetic and option values Biodiversity at global, national and local levels
India as a mega-diversity nation, Hot-spots of biodiversity

Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts, Endangered and endemic species of India

Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity

## Course Outcomes
Upon course completion, students will be able to understand:

- The multidisciplinary nature of environmental studies, including its definition, scope and need for public awareness.
- Our natural resources including renewable and non-renewable resources comprising of forest, water, mineral, food, energy and land resources.
- The ecosystem, their structure and function, energy flow, bio-geochemical cycles, community ecology, ecological succession, ecological pyramids, forest, grassland, aquatic and tundra ecosystem.
- Biodiversity and its conservation.
- Ecosystem diversity, species diversity and genetic diversity.
- Biological classification of India.
- Value of biodiversity.
- Biodiversity at global national and local level.
- Conservation of biodiversity.
- Characteristic of ideal ecosystem.
- Study of an artificial ecosystem.

**Examination Scheme:**

| Components | CT | HA | S/V/Q | A | ESE |
|---|---|---|---|---|---|
| **Weightage (%)** | 15 | 5 | 5 | 5 | 70 |

**Text & References:**


- Chauhan B. S. 2009: Environmental Studies, University Science Press New Delhi.
- Dhameja S.K., 2010; Environmental Studies, Katson Publisher, New Delhi.
- Smriti Srivastava, 2011: Energy Environment Ecology and Society, Katson Publisher, New Delhi.
- Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
- Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad 380 013, India, Email:mapin@icenet.net (R)
- Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p Clark R.S., Marine Pollution, Clanderson Press Oxford (TB)
- Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopaedia, Jaico Publ. House, Mumbai, 1196p
- De A.K., Environmental Chemistry, Wiley Eastern Ltd. Down to Earth, Centre for Science and Environment (R)
- Gleick, H.P. 1993. Water in Crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford Univ. Press. 473p
- Hawkins R.E., Encyclopaedia of Indian Natural History, Bombay Natural History Society, Bombay (R) Heywood, V.H & Waston, R.T. 1995. Global Biodiversity Assessment. Cambridge Univ. Press 1140p.
- Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284 p. McKinney, M.L. & School, R.M. 1996. Environmental Science Systems & Solutions, Web enhanced edition. 639p.
- Mhaskar A.K., Matter Hazardous, Techno-Science Publication (TB) Miller T.G. Jr. Environmental Science, Wadsworth Publishing Co. (TB)
- Odum, E.P. 1971. Fundamentals of Ecology. W.B. Saunders Co. USA, 574p
- Rao M N. & Datta, A.K. 1987. Waste Water treatment. Oxford & IBH Publ. Co. Pvt. Ltd. 345p. Sharma B.K., 2001. Environmental Chemistry. Geol Publ. House, Meerut
- Survey of the Environment, The Hindu (M)
- Townsend C., Harper J, and Michael Begon, Essentials of Ecology, Blackwell Science
- Trivedi R.K., Handbook of Environmental Laws, Rules Guidelines, Compliances and Standards, Vol I and II, Enviro Media (R)
- Trivedi R. K. and P.K. Goel, Introduction to air pollution, Techno-Science Publication (TB) Wanger K.D., 1998 Environmental Management. W.B. Saunders Co. Philadelphia, USA 499p

# BEHAVIOURAL SCIENCE - I

**Course Code: BSU 143** **Credit Units: 01**
**Total Hours: 10**

**Course Objective**:

This course aims at imparting an understanding of:
- Understanding self & process of self exploration
- Learning strategies for development of a healthy self esteem
- Importance of attitudes and its effective on personality
- Building Emotional Competency

**Course Contents:**

**Module I: Self: Core Competency** **(2 Hours)**
- Understanding of Self
- Components of Self – Self identity
- Self concept
- Self confidence
- Self image

**Module II: Techniques of Self Awareness** **(2 Hours)**
- Exploration through Johari Window
- Mapping the key characteristics of self
- Framing a charter for self
- Stages – self awareness, self acceptance and self realization

**Module III: Self Esteem & Effectiveness** **(2 Hours)**
- Meaning
- Importance
- Components of self esteem
- High and low self esteem
- Measuring your self esteem

**Module IV: Building Positive Attitude** **(2 Hours)**
- Meaning and nature of attitude
- Components and Types of attitude
- Importance and relevance of attitude

**Module V: Building Emotional Competence** **(2 Hours)**
- Emotional Intelligence – Meaning, components, Importance and Relevance
- Positive and negative emotions
- Healthy and Unhealthy expression of emotions

## Student learning outcomes
- Student will Develop accurate sense of self
- Student will nurture a deep understanding of personal motivation
- Student will develop thorough understanding of personal and professional responsibility
- Student will able to analyse the emotions of others for better adjustment.

**Examination Scheme:**

| Evaluation Components | Attendance | Journal of Success (JOS) | Social Awareness Program (SAP) SAP Report/SAP Presentation | End Semester Exam | Total |
|---|---|---|---|---|---|
| **Weightage (%)** | **5** | **10** | **15** | **70** | **100** |

## Suggested Readings:

- Organizational Behaviour, Davis, K.
- Hoover, Judhith D. Effective Small Group and Team Communication, 2002,Harcourt College Publishers
- Dick, Mc Cann & Margerison, Charles: Team Management, 1992 Edition, viva books
- Bates, A. P. and Julian, J.: Sociology - Understanding Social Behaviour
- Dressler, David and Cans, Donald: The Study of Human Interaction
- Lapiere, Richard. T – Social Change
- Lindzey, G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology, Addison – Welsley, US.
- Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.
- LaFasto and Larson: When Teams Work Best, 2001, Response Books (Sage), New Delhi
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 2, Group (1996); Pfeiffer & Company
- Smither Robert D.; The Psychology of Work and Human Performance, 1994, Harper Collins College Publishers

# FRENCH - I

**Course Code: FLU144** **Credit Units: 02**
**Total Hours: 20**

**Course Objective:**
To familiarize students with the French language, with its phonetic system and its accents.
To enable students

- to greet someone in French
- to present and describe oneself and people
- to enter in contact, and begin a conversation
- to talk about one's family, tastes and preferences

**Course Contents:**

**Dossiers 1, 2 – pg 5-24**

**Dossier 1 : Toi, moi, nous**
**Actes de Communication :**
S'adresser poliment à quelqu'un, entrer en contact, se présenter, présenter quelqu'un, saluer, poser des questions
simples pour connaître quelqu'un, épeler et compter

**Dossier 2 : En famille**
**Actes de Communication :**
Parler de sa famille, Décrire quelqu'un, exprimer ses goûts, écrire et comprendre un message court, inviter
quelqu'un, exprimer la possession, la négation

**Grammaire :**

1. articles indéfinis, articles définis, masculin et féminin des noms et des adjectifs, pluriel des noms et des adjectifs
2. pronoms sujets et toniques, on, c'est/il est + profession,
3. masculin et féminin des adjectifs de nationalité
4. verbes- être, avoir, aller, 'er' groupe
5. l'interrogation – l'intonation, est-ce que, qui est-ce ? Qu'est-ce que? L'inversion ; où, comment, quand ; quel
6. la négation
7. adjectifs possessifs

**Examination Scheme:**

| Components | INTERNAL | | | | EXTERNAL | GRAND TOTAL |
|---|---|---|---|---|---|---|
| | MID-SEM | VIVA-VOCE | ATTENDANCE | **TOTAL** | **END SEMESTER** | **100** |
| **Weightage (%)** | 15 | 10 | 5 | **30** | **70** | |

## Text & References:

***Text:***
**Le livre à suivre:**

· Andant, Christine et al. A propos A1 Livre de l'élève. Grenoble: Presses universitaires de Grenoble, 2010.
· Andant, Christine et al. A propos A1 Cahier d'exercices. Grenoble: Presses universitaires de Grenoble, 2010.

***Références :***

· Girardeau, Bruno et Nelly Mous. Réussir le DELF A1. Paris: Didier, 2010.

# APPLIED MATHEMATICS – II
## (ORDINARY & PARTIAL DIFFERENTIAL EQUATIONS AND TRANSFORM)

**Course Code: MAT 201** **Credit Units: 04**
**Total Hours: 40**

**Course Objective:**
The objective of this course is to familiarize the prospective engineers with techniques in ordinary and partial differential equations and transforms. It aims to equip the students to deal with advanced level of mathematics and applications that would be essential for their disciplines.

**Course Contents:**

**Module I: First order ordinary differential equations: (6 Hours)**
Equation of first order and first degree, Exact, linear and Bernoulli's equations, Equations of first order and higher degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

**Module II: Ordinary differential equations of higher orders: (09 Hours)**
Higher order linear differential equations with constant coefficients, Second order linear differential equations with variable coefficients, method of variation of parameters, Solution by series method.

**Module III: Partial Differential Equations : (09 Hours)**
Formation of Partial Differential Equations, First order partial differential equations, solutions of first order linear PDEs; Solution to homogenous and non-homogenous linear partial differential equations of second order by complimentary function and particular integral method with constant coefficients. Non linear partial differential equation of first order, Charpit's method.,Separation of variable method for the solution of wave and heat equations.

**Module IV: Laplace Transform: (8 Hours)**
Laplace Transform: Introduction of Laplace Transform, Laplace Transform of elementary functions, properties of Laplace Transform, Change of scale property, second shifting property. Laplace transform of the derivative, inverse Laplace transform and its properties. Convolution theorem. Applications of Laplace Transform to solve the ODEs.

**Module V: Fourier Transform: (8 Hours)**
Fourier series: Introduction of Fourier series, Fourier series for discontinuous functions, Fourier series for even and odd function, Half range series, Fourier Transform: Definition and properties of Fourier Transform, Sine and Cosine transform.

## Course Outcomes:
- Upon completion of this course, students will be able to solve field problems in engineering involving PDEs.
- The effective mathematical tools for the solutions of differential equations that model physical processes.
- The students will be able to use Laplace transform to solve differential equations.
- The student will be able to solve PDEs by using the concept of Fourier series and Fourier transform.

**Examination Scheme**:

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Suggested Text/ Reference Books:


- G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
- Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
- W. E. Boyce and R. C. Di Prima, Elementary Differential Equations and Boundary Value Problems, 9th Edition., Wiley India, 2009.
- S. L. Ross, Differential Equations, 3rd Edition, Wiley India, 1984.
- E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall of India, 1995.
- E. L. Ince, Ordinary Differential Equations, Dover Publications, 1958.
- N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
- B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

# APPLIED PHYSICS - I

**Course Code: PHY 101** **Credit Units: 04**
**Total Hours: 40**

**Course Objective:**
Aim of this course is to introduce the students to fundamentals of graduate level physics, which form the basis of all applied science and engineering

**Course Contents:**

**Module I: Electromagnetics: (10 Hours)**
Scalar and vector fields, gradient of a scalar field, physical significance of gradient, equipotential surface. Line, surface and volume integrals, Divergence and curl of vector field and mathematical analysis physical significance, Electric flux, Gauss' law, Proof and Applications, Gauss divergence and Stokes theorems.
Differential form of Gauss' Law, Amperes' Law, Displacement current, Faradays Law, Maxwell equations in free space & isotropic media (Integral form & differential form), EM wave propagation in free space, Poynting vector.

**Module II: Special Theory of Relativity: (10 Hours)**
Michelson-Morley experiment, Importance of negative result, Inertial & non-inertial frames of reference, Einstein's postulates of Special theory of Relativity, Space-time coordinate system, Relativistic Space Time transformation (Lorentz transformation equation), Transformation of velocity, Addition of velocities, Length contraction and Time dilation, Mass-energy equivalence (Einstein's energy mass relation) & Derivation of Variation of mass with velocity,

**Module III: Wave Mechanics: (10 Hours)**
Wave particle duality, De-Broglie matter waves, phase and group velocity, Heisenberg uncertainty principle, wave function and its physical interpretation, Operators, expectation values. Time dependent & time independent Schrödinger wave equation for free & bound states, square well potential (rigid wall), Step potential.

**Module IV: Semiconductor and Electronic Materials: (10 Hours)**
Band Theory of Solids, Semi-conductors: Intrinsic and Extrinsic,Carreir concentration, Direct and indirect band-gaps, Types of Electronic materials, p-n Junction Diode,Diode Equation, Breakdown in p-n Junction Diode: Avalanche and Zener, Zener Diode and its applications photoconductivity and photovoltaics. Superconductivity, Meissner Effect, Type I and Type II Superconductors

## Course Outcomes:
After successful completion of the course students will have the knowledge and skill to:
- Apply vector calculus to static electric-magnetic fields in different engineering situations.
- Analyze and Apply Maxwell's equation to diverse engineering problems.
- Relate semiconductor material properties to semiconductor devices.

**Examination Scheme:**

| Components | Att. | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

- Physics of waves, W. C. Elmore & M. A. Heald
- Introduction to Electrodynamics, D. J. Griffith
- Engineering Physics, Satya Prakash
- Concept of Modern Physics, A. Beiser
- Solid State Physics, S. O. Pallai

# BASIC ELECTRICAL ENGINEERING

**Course Code: ECE 101** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The objective of the course is to provide a brief knowledge of Electrical Engineering to students of all disciplines. This Course includes some theorems related to electrical, some law's related to flow of current, voltages, basic knowledge of Transformer, basic knowledge of electromagnetism, basic knowledge of electrical network.

**Course Contents:**

**Module I: DC Circuits: (7 hours)**
Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff's current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin's and Norton's Theorems. Time-domain analysis of first-order RL and RC circuits.

**Module II: AC Circuits: (7 hours)**
Representation of sinusoidal waveforms, peak and R.M.S. values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance. Three- phase balanced circuits, voltage and current relations in star and delta connections.

**Module III: Transformers: (6 hours)**
Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.

**Module IV: Electrical Machines: (6 hours)**
Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited dc motor. Construction and working of synchronous generators.

**Module V: Power Converters: (4 hours)**
DC-DC buck and boost converters, duty ratio control. Single-phase and three-phase voltage source inverters; sinusoidal modulation.

## Course Outcomes:

- To understand and analyze basic electric and magnetic circuits.
- To study the working principles of electrical machines and power converters.
- To introduce the components of low voltage electrical installations.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:


- D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering" , Tata McGraw Hill, 2010.
- D. C. Kulshreshtha, " Basic Electrical Engineering", McGraw Hill, 2009.
- L. S. Bobrow, " Fundamentals of Electrical Engineering", Oxford University Press, 2011.
- E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
- V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

# OBJECT ORIENTED PROGRAMMING USING C++

**Course Code: CSE 204** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The objective of this module is to introduce object oriented programming. To explore and implement the various features of OOP such as inheritance, polymorphism, Exceptional handling using programming language C++. After completing this course student can easily identify the basic difference between the programming approaches like procedural and object oriented.

**Course Contents:**

**Module I: Introduction: (6 Hours)**
Review of C, Difference between C and C++, Procedure Oriented and Object Oriented Approach. Basic Concepts:Objects, classes, Principals like Abstraction, Encapsulation, Inheritance and Polymorphism. Dynamic Binding, Message Passing. Characteristics of Object-Oriented Languages. Introduction to Object-Oriented Modeling techniques (Object, Functional and Dynamic Modeling).

**Module II: Classes and Objects: (7 Hours)**
Abstract data types, Object & classes, attributes, methods, C++ class declaration, Local Class and Global Class, State identity and behaviour of an object, Local Object and Global Object, Scope resolution operator, Friend Functions, Inline functions, Constructors and destructors, instantiation of objects, Types of Constructors, Static Class Data, Array of Objects, Constant member functions and Objects, Memory management Operators.

**Module III: Inheritance: (6 Hours)**
Inheritance, Types of Inheritance, access modes – public, private & protected, Abstract Classes, Ambiguity resolution using scope resolution operator and Virtual base class, Aggregation, composition vs classification hierarchies, Overriding inheritance methods, Constructors in derived classes, Nesting of Classes.

**Module IV: Polymorphism: (6 Hours)**
Polymorphism, Type of Polymorphism – Compile time and runtime, Function Overloading, Operator Overloading (Unary and Binary) Polymorphism by parameter, Pointer to objects, this pointer, Virtual Functions, pure virtual functions.

**Module V: Strings, Files and Exception Handling: (5 Hours)**
Manipulating strings, Streams and files handling, formatted and Unformatted Input output. Exception handling, Generic Programming – function template, class Template Standard Template Library: Standard Template Library, Overview of Standard Template Library, Containers, Algorithms, Iterators.

## Course Outcomes:
At the end of this course, students will demonstrate ability to:
- To apply concepts of classes and objects in real world scenarios.
- Understand object-oriented programming features in C++,
- Apply these features to program design and implementation,
- Understand object-oriented concepts and how they are supported by C++,
- Gain some practical experience of C++.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:

**Text:**


- A.R.Venugopal, Rajkumar, T. Ravishanker “Mastering C++”, TMH, 1997
- R. Lafore, “Object Oriented Programming using C++”, BPB Publications, 2004.
- “Object Oriented Programming with C++” By E. Balagurusamy.
- Schildt Herbert, “C++: The Complete Reference”, Wiley DreamTech, 2005.


**References:**


- Parasons, “Object Oriented Programming with C++”, BPB Publication, 1999.
- Steven C. Lawlor, “The Art of Programming Computer Science with C++”, Vikas Publication, 2002.
- Yashwant Kanethkar, “Object Oriented Programming using C++”, BPB, 2004

# WORKSHOP/ MANUFACTURING PRACTICES

**Course Code: BME 102** **Credit Units: 01**
**Total Hours: 10**

**Course Objective:**
The objective of this course is to impart the basic knowledge of Manufacturing methods, CNC machines, materials & their properties and various manufacturing processes to the students of all engineering discipline.

**Course Contents:**

**Module I:** Manufacturing Methods- casting, forming, machining, joining, advanced manufacturing methods: **(3 Hours)**

**Module II:** CNC machining, Additive manufacturing, Fitting operations & power tools: **(2 Hours)**

**Module III:** Electrical &Electronics, Carpentry, Plastic moulding, glass cutting: **(3 Hours)**

**Module IV:** Metal casting, Welding (arc welding & gas welding), brazing: **(2 Hours)**

## Course Outcomes:

- To gain knowledge of the different manufacturing processes which are commonly employed in the industry
- To fabricate components using different materials

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:


- Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., “Elements of Workshop Technology”, Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.
- Kalpakjian S. And Steven S. Schmid, “Manufacturing Engineering and Technology”, 4th edition, Pearson Education India Edition, 2002.
- Gowri P. Hariharan and A. Suresh Babu,” Manufacturing Technology – I” Pearson Education, 2008.
- Roy A. Lindberg, “Processes and Materials of Manufacture”, 4th edition, Prentice Hall India, 1998.
- Rao P.N., “Manufacturing Technology”, Vol. I and Vol. II, Tata McGrawHill House, 2017

# APPLIED PHYSICS LAB - I

**Course Code: PHY 121** **Credit Units: 01**
**Total hours: 20**

**Course Objective:**

To provide detailed introduction to the principal class of semiconductor and electronics components

**Course Contents:**
Time allocated for experiments No.1-10 is 2 hours each.

1. To determine the forbidden band gap energy of a semiconductor.
2. To determine the frequency of AC mains using sonometer.
3. To determine the value of specific charge (ratio of e/m) of an electron by Thomson method.
4. To study the common base characteristics of a PNP junction transistor, by drawing input characteristic curves and output characteristic curves.
5. To study the common emitter characteristics of a NPN junction transistor, by drawing input characteristic curves and output characteristic curves.
6. To study a series /parallel resonant LCR circuit, its resonate frequency and quality factor
7. To study the voltage regulation characteristics of a zener diode.
8. To study the characteristics of a solar cell.
9. To draw V – I characteristics of a photocell and to verify the inverse square law of radiation.
10. To plot graph showing the variation of magnetic field with distance along the axis of a circular coil carrying current, and hence estimate the radius of the coil.

## Course Outcomes:
After completion of course student will develop: Practical understanding and applications of fundamental concept of classical and modern Physics.

**Examination Scheme:**

| Components | Att. | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:
Physics Practical, Gupta and Kumar

# BASIC ELECTRICAL ENGINEERING LAB

**Course Code: ECE 121** **Credit Units: 01**
**Total Hours: 20**

**Course objective:**

To impart basic knowledge of electrical quantities such as current, voltage, power, energy and frequency to understand the impact of technology in a global and societal context. Provide working knowledge for the analysis of basic DC and AC circuits used in electrical and electronic devices. To explain the working principle, construction, applications of DC machines, AC machines & measuring instruments.

**Course Contents:**
**List of experiments/ demonstrations: (2 Hours each)**

1. Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors.
2. To verify KVL & KCL in the given network.
3. To verify Superposition Theorem.
4. To verify Maximum Power Transfer Theorem.
5. Demonstration of cut-out sections of machines: dc machine (commutator-brush arrangement), induction machine (squirrel cage rotor), synchronous machine (field winging - slip ring arrangement) and single-phase induction machine.
6. Torque Speed Characteristic of separately excited dc motor.
7. To determine $R_{Th}$, $V_{Th}$, $R_N$, $I_N$ and verify Thevenin's and Norton's Theorem in a given network.
8. To perform open circuit & short circuit test on a single-phase transformer.
9. To study and draw the voltage vs frequency characteristics of the series and parallel resonance for given RLC Circuit
10. Demonstration of (a) dc-dc converters (b) dc-ac converters – PWM waveform (c) the use of dc-ac converter for speed control of an induction motor.

## Laboratory Outcomes:

- Get an exposure to common electrical components and their ratings.
- Make electrical connections by wires of appropriate ratings.
- Understand the usage of common electrical measuring instruments.
- Understand the basic characteristics of transformers and electrical machines.
- Get an exposure to the working of power electronic converters.

**Examination Scheme:**

| IA | | | EE | | | |
|---|---|---|---|---|---|---|
| **Class Test (Practical Based)** | **Mid Term Viva** | **Attendance** | **Major Experiment** | **Minor Experiment/ Spotting** | **Practical Record** | **Viva** |
| 15 | 10 | 05 | 35 | 15 | 10 | 10 |

Note: IA –Internal Assessment, EE- External Exam

# OBJECT ORIENTED PROGRAMMING USING C++ LAB

**Course Code: CSE 224** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
To perform object oriented programming solution and develop solutions to problems demonstrating usage of control structure, modularity, classes, I/O and the scope of the class members.
SOFTWARE REQUIRED: TURBO C++

**Course Contents:**

**Lab assignment will be based on the following:**

1 [Classes and Objects] Write a program that uses a class where the member functions are defined inside a class. **(1 Hour)**
2 [Classes and Objects] Write a program that uses a class where the member functions are defined outside a class. **(1 Hour)**
3 [Classes and Objects] Write a Program to Demonstrate Inline functions. **(1 Hour)**
4 [Classes and Objects] Write a Program to Demonstrate Friend function, classes and this pointer. **(1 Hour)**
5 [Constructors and Destructors] Write a program to demonstrate the use of zero argument and parameterized constructors. **(2 Hours)**
6 [Operator Overloading] Write a program to demonstrate the overloading of increment and decrement operators. **(2 Hours)**
7 [Inheritance] Write a program to demonstrate the single inheritance. **(1 Hour)**
8 [Inheritance] Write a program to demonstrate the multiple inheritance. **(1 Hour)**
9 [Inheritance] Write a Program to demonstrate use of protected members, public & private protected classes, multilevel inheritance etc. **(1 Hour)**
10 [Polymorphism] Write a program to demonstrate the runtime polymorphism. **(1 Hour)**
11 [Exception Handling] Write a program to demonstrate the exception handling. **(2 Hours)**
12 [Templates and Generic Programming] Write a program to demonstrate the use of function template. **(2 Hours)**
13 [Templates and Generic Programming] Write a program to demonstrate the use of class template. **(2 Hours)**
14 [File Handling] Write a Program to Show how file management is done in C++. **(2 Hours)**

## Course Outcomes:

At the end of this course, students will demonstrate ability to:

- knowledge of the structure and model of the C++ programming language, (knowledge)
- evaluate user requirements for software functionality required to decide whether the C++ programming language can meet user requirements (analysis)
- design the object-oriented programs for real world problems.

**Examination Scheme:**

| IA | | | EE | | | |
|---|---|---|---|---|---|---|
| **A** | **PR** | **Practical Based Test** | **Major Experiment** | **Minor Experiment** | **Practical Record** | **Viva** |
| 5 | 10 | 15 | 35 | 15 | 10 | 10 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

## Text & References:

**Text:**

- A.R.Venugopal, Rajkumar, T. Ravishanker “Mastering C++”, TMH, 1997
- R. Lafore, “Object Oriented Programming using C++”, BPB Publications, 2004.
- “Object Oriented Programming with C++” By E. Balagurusamy.
- Schildt Herbert, “C++: The Complete Reference”, Wiley DreamTech, 2005.

**References:**

- Parasons, “Object Oriented Programming with C++”, BPB Publication, 1999.
- Steven C. Lawlor, “The Art of Programming Computer Science with C++”, Vikas Publication, 2002.
- Yashwant Kanethkar, “Object Oriented Programming using C++”, BPB, 2004

# WORKSHOP/ MANUFACTURING PRACTICES LAB

**Course Code: BME 122** **Credit Units: 02**
**Total Hours: 40**

**Course Objective:**
The objective of this course is to impart the basic knowledge of Manufacturing methods, CNC machines, materials & their properties and various manufacturing processes to the students of all engineering discipline.

**Course Contents:**
**List of experiments/demonstrations:**

1. Machine shop **(4 Hours)**
2. Fitting shop **(4 Hours)**
3. Carpentry **(4 Hours)**
4. Electrical & Electronics **(6 Hours)**
5. Welding shop **(Arc welding 4 Hours + gas welding 4Hours)** **(8 Hours)**
6. Casting **(4 Hours)**
7. Smithy **(4 Hours)**
8. Plastic molding & Glass Cutting) **(6 Hours)**

Examinations could involve the actual fabrication of simple components, utilizing one or more of the techniques covered above.

## Laboratory Outcomes:

- Upon completion of this laboratory course, students will be able to fabricate components with their own hands.
- They will also get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.
- By assembling different components, they will be able to produce small devices of their interest.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

# COMMUNICATION SKILLS-II

**Course Code: BCU 241** **Credit Units: 01**
**Total Hours: 10**

**Course Objective:**

To understand the different aspects of communication using the four macro skills – LSRW (Listening, Speaking, Reading, Writing)

**Prerequisites:** NIL

| Course Contents / Syllabus: | | |
|---|---|---|
| 1. | **Module I Communication** | **35% Weightage** |
| | • Process and Importance<br>• Models of Communication (Linear & Shannon Weaver)<br>• Role and Purpose<br>• Types & Channels<br>• Communication Networks<br>• Principles & Barriers | |
| 2. | **Module II Verbal Communication** | **25% Weightage** |
| | Oral Communication: Forms, Advantages & Disadvantages<br>Written Communication: Forms, Advantages & Disadvantages<br>Introduction of Communication Skills (Listening, Speaking, Reading, Writing) | |
| 3. | **Module III Non-Verbal Communication** | **30% Weightage** |
| | • Principles & Significance of Nonverbal Communication<br>• KOPPACT (Kinesics, Oculesics, Proxemics, Para-Language, Artifacts, Chronemics, Tactilics)<br>• Visible Code | |
| 4. | **Module IV : Prose** | **10% Weightage** |
| | TEXT: APJ Abdul Kalam and Arun Tiwari. *Wings of Fire: An Autobiography*, Universities Press, 2011<br>Comprehension Questions will be set in the End-Semester Exam | |
| 5. | **Student Learning Outcomes:**<br>The students should be able to :<br>• Apply Verbal and Non-Verbal Communication Techniques in the Professional Environment | |
| 6. | **Pedagogy for Course Delivery:**<br>• Extempore<br>• Presentations<br>• Lectures | |
| 7. | **Assessment/ Examination Scheme:** | |

| Theory L/T (%) | Lab/Practical/Studio (%) | End Term Examination |
|---|---|---|
| 100% | NA | 50% |

**Theory Assessment (L&T):**

| Components (Drop down) | CIE | Mid Sem | Attendance | End Term Examination |
|---|---|---|---|---|
| **Weightage (%)** | 10% | 15% | 5% | 70% |

**Text:** ***Rosenblum, M. How to Build Better Vocabulary, London: Bloomsbury Publication.***
***Verma, Shalini. Word Power made Handy, S. Chand Publications.***
***High School English Grammar & Composition by Wren & Martin***
**Reference:** ***K.K.Sinha , Business Communication, Galgotia Publishing Company.***
***Alan Pease : Body Language***
**Additional Reading: Newspapers and Journals**

# ENVIRONMENTAL STUDIES – II

**Course Code: EVS 242** **Credit Units: 02**
**Total Hours: 20**

**Course Objectives:**

- To understand various types of environmental pollution.
- To educate masses, in general and students, about the issues related to degradation of environment and social issues related to environment.
- To understand sustainable development.
- To understand environmental assets, local flora and fauna through field surveys.

**Course Contents:**

**Module I: Environmental Pollution: (7 Hours)**
Definition, causes, effects and control measures of: Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear pollution. Solid waste management: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies. Disaster management: floods, earthquake, cyclone and landslides.

**Module II: Social Issues and the Environment: (7 Hours)**
From unsustainable to sustainable development, Urban problems and related to energy. Water conservation, rain water harvesting, watershed management. Resettlement and rehabilitation of people; its problems and concerns Case studies. Environmental ethics: Issues and possible solutions

Climate change, Global warming, Acid rain, Ozone layer depletion, Nuclear Accidents and Holocaust case studies. Fireworks/Crackers – Introduction, ill effects on environment and humans.
Wasteland reclamation, Consumerism and waste products, Environmental Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act. issues involved in enforcement of environmental legislation Public awareness

**Module III: Human Population and the Environment: (4 Hours)**
Population growth, variation among nations. Population explosion – Family Welfare Programmes

Environment and human health. Human Rights. Value Education. HIV / AIDS. Women and Child Welfare. Role of Information Technology in Environment and Human Health.

Case Studies

**Module IV: Field Work: (2 Hours)**
Visit to a local area to document environmental assets-river / forest/ grassland/ hill/ mountain. Visit to a local polluted site – Urban / Rural / Industrial / Agricultural. Study of common plants, insects, birds. Study of simple ecosystems-pond, river, hill slopes, etc.

## Course Outcomes:

Upon course completion, students will be able to:

- Explain various types of environmental pollutions.
- Understand role of individual in abatement of environmental pollution.
- Explain methods to mitigate disasters.
- Learn various environmental protection laws.
- Learn role of IT in environment and human health.

**Examination Scheme:**

| Components | CT | HA | S/V/Q | A | ESE |
|---|---|---|---|---|---|
| Weightage (%) | 15 | 5 | 5 | 5 | 70 |

## Text & References:


- Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
- Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad 380 013, India, Email:mapin@icenet.net (R)
- Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p Clark R.S., Marine Pollution, Clanderson Press Oxford (TB)
- Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopaedia, Jaico Publ. House, Mumbai, 1196p
- De A.K., Environmental Chemistry, Wiley Eastern Ltd. Down to Earth, Centre for Science and Environment (R)
- Gleick, H.P. 1993. Water in Crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford Univ. Press. 473p
- Hawkins R.E., Encyclopaedia of Indian Natural History, Bombay Natural History Society, Bombay (R) Heywood, V.H & Watson, R.T. 1995. Global Biodiversity Assessment. Cambridge Univ. Press 1140p.
- Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284 p. McKinney, M.L. & School, R.M. 1996. Environmental Science Systems & Solutions, Web enhanced edition. 639p.
- Mhaskar A.K., Matter Hazardous, Techno-Science Publication (TB) Miller T.G. Jr. Environmental Science, Wadsworth Publishing Co. (TB)
- Odum, E.P. 1971. Fundamentals of Ecology. W.B. Saunders Co. USA, 574p
- Rao M N. & Datta, A.K. 1987. Waste Water treatment. Oxford & IBH Publ. Co. Pvt. Ltd. 345p. Sharma B.K., 2001. Environmental Chemistry. Geol Publ. House, Meerut
- Survey of the Environment, The Hindu (M)
- Townsend C., Harper J, and Michael Begon, Essentials of Ecology, Blackwell Science
- Trivedi R.K., Handbook of Environmental Laws, Rules Guidelines, Compliances and Standards, Vol I and II, Enviro Media (R)
- Trivedi R. K. and P.K. Goel, Introduction to air pollution, Techno-Science Publication (TB) Wanger K.D., 1998 Environmental Management. W.B. Saunders Co. Philadelphia, USA 499p

# BEHAVIOURAL SCIENCE - II

**Course Code: BSU 243** **Credit Units: 01**
**Total Hours: 10**

**Course Objective:**
This course aims at enabling students towards:
- Understand the importance of individual differences
- Better understanding of self in relation to society and nation
- Facilitation for a meaningful existence and adjustment in society
- Inculcating patriotism and national pride

**Course Contents:**

**Module I: Individual differences & Personality** **(2 Hours)**
- Personality: Definition& Relevance
- Importance of nature & nurture in Personality Development
- Importance and Recognition of Individual differences in Personality
- Accepting and Managing Individual differences
- Intuition, Judgment, Perception & Sensation (MBTI)
- BIG5 Factors

**Module II: Managing Diversity** **(2 Hours)**
- Defining Diversity
- Affirmation Action and Managing Diversity
- Increasing Diversity in Work Force
- Barriers and Challenges in Managing Diversity

**Module III: Socialization** **(2 Hours)**
- Nature of Socialization
- Social Interaction
- Interaction of Socialization Process
- Contributions to Society and Nation

**Module IV: Patriotism and National Pride** **(2 Hours)**
- Sense of pride and patriotism
- Importance of discipline and hard work
- Integrity and accountability

**Module V: Human Rights, Values and Ethics** **(2 Hours)**
- Meaning and Importance of human rights
- Human rights awareness
- Values and Ethics- Learning based on project work on Scriptures like- Ramayana, Mahabharata, Gita etc.

## Student learning outcomes
- Student will be able to identify, understand, and apply contemporary theories of leadership to a wide range of situations and interactions
- Student will be able to understand and respect individual difference, so to enhance the relationship
- Learn social responsibility and develop a sense of citizenship
- Student will be able to identify and understand the impact of culture on one's leadership style

**Examination Scheme:**

| Evaluation Components | Attendance | Journal of Success (JOS) | Social Awareness Program (SAP) SAP Report/SAP Presentation | End Semester Exam | Total |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 15 | 70 | 100 |

## Suggested Readings:


- Davis, K. Organizational Behaviour,
- Bates, A. P. and Julian, J.: Sociology - Understanding Social Behaviour
- Dressler, David and Cans, Donald: The Study of Human Interaction
- Lapiere, Richard. T – Social Change
- Lindzey, G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology, Addison – Welsley, US.
- Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.
- Robbins O.B.Stephen;. Organizational Behaviour

# FRENCH - II

**Course Code: FLU244** **Credit Units: 02**
**Total Hours: 20**

**Course Objective:**
To furnish the linguistic tools

- to talk about daily activities and sports, to express necessities
- to talk about activities in recent future,
- to have conversations and perform day to day life tasks like enquiring about time, take an appointment
- to enquire about products and place orders in a shop/ restaurant

**Course Contents:**

**Dossiers 3,4 – pg 25-44**

**Dossier 3 : Quelle journée ! Actes de Communication :**
Parler de ses activités quotidiennes, se situer dans le temps, demander l'heure et la date, parler des sports et des
loisirs, exprimer la fréquence

**Dossier 4 : Vous désirez ? Actes de Communication :**
Exprimer la quantité, demander et donner le prix, exprimer la nécessité, la volonté et la capacité, comparer et
exprimer ses préférences, s'exprimer au futur proche, prendre rendez-vous, s'exprimer au restaurant/dans les magasins

**Grammaire :**
1. l'expression du temps
2. les articles contractés, les quantités indéterminées et déterminées
3. les adverbes de fréquences
4. verbes- faire, prendre, venir, pouvoir, vouloir, les verbes pronominaux
5. la comparaison de l'adjectif
6. la négation (suite)
7. le future proche

**Examination Scheme:**

| | INTERNAL | | | | EXTERNAL | GRAND TOTAL |
|---|---|---|---|---|---|---|
| **Components** | MID-SEM | VIVA-VOCE | ATTENDANCE | **TOTAL** | **END SEMESTER** | |
| **Weightage (%)** | 15 | 10 | 5 | **30** | **70** | **100** |

## Text & References:

***Text:***
**Le livre à suivre:**

· Andant, Christine et al. A propos A1 Livre de l'élève. Grenoble: Presses universitaires de Grenoble, 2010.

· Andant, Christine et al. A propos A1 Cahier d'exercices. Grenoble: Presses universitaires de Grenoble, 2010.

***Références :***

· Girardeau, Bruno et Nelly Mous. Réussir le DELF A1. Paris: Didier, 2010.

# APPLIED MATHEMATICS - III
# PROBABILITY, STATISTICS AND NUMERICAL METHODS

**Course Code : MAT 301** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The objective of this course is to familiarize the students with statistical techniques, Probability distribution and numerical techniques. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling various problems in the discipline.

**Course Contents:**

**Module I : Basic Statistics : (8 Hours)**
Measures of Central tendency: Moments, skewness and Kurtosis, Correlation and regression – Rank correlation.
**Applied Statistics :** Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves.

**Module II : Basic Probability and expectation : (4 Hours)**
Discrete and Continuous random variables and their properties, Dependent and Independent random variables. Probability spaces, conditional probability, the multinomial distribution, Poisson approximation to the binomial distribution, infinite sequences of Bernoulli trials, sums of independent random variables.
Expectation of Discrete Random Variables; Moments, Variance of a sum, Correlation coefficient.

**Module III: Probability distributions and probability density function (p. d. f.) for discrete and continuous variable: (6 Hours)**

**Probability distributions and probability density function for discrete variable**: For Binomial and Poisson's distribution and evaluation of statistical parameters.

**Probability distributions and probability density function for continuous variable**: For Normal distribution and evaluation of its statistical parameters.

**Module IV : Test of significance for Small and large samples : (4 Hours)**
Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations.
Test for single mean, difference of means and correlation coefficients, test for ratio of variances - Chi-square test for goodness of fit and independence of attributes.

**Module V Numerical Methods (8 Hours)**
Solution of simultaneous linear equations by numerical techniques; Jacobi's and Gauss-Seidel method. Solution of algebraic and transcendental equations – Bi-section method, Newton-Raphson method and Regula-Falsi method.

**Interpolation** : Finite differences, Relation between operators, Interpolation using Newton's forward and backward difference formula.

**Interpolation for unequal intervals**: Newton's divided difference and Lagrange's formulae. **Numerical differentiation and integration**: Picard's method, Trapezoidal rule and Simpson's 1/3rd and 3/8 rules.
**Solution of Ordinary differential equation** : Taylor's series, Euler's and modified Euler's methods, Runge-Kutta method of fourth order, Milne's and Adam's predicator-corrector methods.

## Course Outcome:

- The objective of this course is to familiarize the students with statistical techniques. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling various problems in the discipline.
- The students will learn: The ideas of probability and random variables and various discrete and continuous probability distributions and their properties.
- The basic ideas of statistics including measures of central tendency, correlation and regression.
- The statistical methods of studying data samples.
- Numerical techniques to solve simultaneous linear equations, interpolation and extrapolation.
- Numerical techniques of differential and integral.
- Solution of ordinary differential equation by numerical techniques.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

**Suggested Text/Reference Books**

- Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
- P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003 (Reprint).
- S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.
- (iv) W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Ed.,Wiley, 1968.
- N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
- B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
- Veerarajan T., Engineering Mathematics (for semester III), Tata McGraw-Hill, New Delhi, 2010.

# APPLIED PHYSICS – II

**Course Code: PHY 303** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**

The aim is to provide the basic understanding of oscillations, waves, optics and related day to day phenomenon.

**Course Contents:**

**Module I: Simple Harmonic Motion, Damped and Forced Simple Harmonic Oscillator:(6 Hours)**
Mechanical and electrical simple harmonic oscillators, complex number notation and phasor representation of simple harmonic motion, damped harmonic oscillator – heavy, critical and light damping, energy decay in a damped harmonic oscillator, quality factor, forced mechanical and electrical oscillators, electrical and mechanical impedance, steady state motion of forced damped harmonic oscillator, power absorbed by oscillator

**Module II: Non-Dispersive Transverse and Longitudinal Waves in One Dimension and Introduction to dispersion: (6 Hours)**
Transverse wave on a string, the wave equation on a string, Harmonic waves, reflection and transmission of waves at a boundary, impedance matching, standing waves and their eigenfrequencies, longitudinal waves and the wave equation for them, acoustics waves and speed of sound, standing sound waves.
Waves with dispersion, water waves, superposition of waves and Fourier method, wave groups and group velocity.
**Module III: The Propagation of Light and Geometric Optics: (6 Hours)**
Fermat's principle of stationary time and its applications e.g. in explaining mirage effect, laws of reflection and refraction, Light as an electromagnetic wave and Fresnel equations, reflectance and transmittance, Brewster's angle, total internal reflection, and evan escent wave.
Mirrors and lenses and optical instruments based on them, transfer formula and the matrix method

**Module IV: Wave Optics: (6 Hours)**
Huygens' principle, superposition of waves and interference of light by wave front splitting and amplitude splitting; Young's double slit experiment, Newton's rings, Michelson interferometer, Mach-Zehnder interferometer.
Farunhofer diffraction from a single slit and a circular aperture, the Rayleigh criterion for limit of resolution and its application to vision; Diffraction gratings and their resolving power

**Module V: Lasers: (6 Hours)**
Einstein's theory of matter radiation interaction and A and B coefficients; amplification of light by population inversion, different types of lasers: gas lasers ( He-Ne, $CO_2$), solid-state lasers(ruby Neodymium), dye lasers; Properties of laser beams: mono-chromaticity, coherence, directionality and brightness, laser speckles, applications of lasers in science, engineering and medicine.

## Course Outcomes:
After studying through lectures and assignments, students will be able to:
Solve related Engineering problems and apply the concepts while designing a project.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination;

## Reference books:

- Ian G. Main, Oscillations and waves in physics
- H.J. Pain, The physics of vibrations and waves
- E. Hecht, Optics
- A. Ghatak, Optics
- O. Svelto, Principles of Lasers

# ENGINEERING MECHANICS

**Course Code: BME 301** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**

Objective of this course is to provide fundamental knowledge of force system and its effect on the behaviour of the bodies that may be in dynamic or in static state. It includes the equilibrium of different structures like beams, frames, truss etc and the force transfer mechanism in the different components of a body under given loading condition.

**Course Contents:**

**Module I: Force System & Structure: (7 Hours)**
Free body diagram, Resultant and equilibrium of concurrent, parallel and non-concurrent co-planar force system, General numerical applications, Vector Mechanics.

**Module II: Plane Truss: (6 Hours)**
Plane truss, perfect and imperfect truss, assumption in the truss analysis, analysis of perfect plane trusses by the method of joints, method of section.

**Module III: Friction: (6 Hours)**
Static and Kinetic friction, laws of dry friction, co-efficient of friction, angle of friction, angle of repose, cone of friction, friction lock, efficiency of screw jack, transmission of power through belt.

**Module IV: Distributed Force: (6 Hours)**
Determination of center of gravity, center of mass and centroid by direct integration and by the method of composite bodies, mass moment of inertia and area moment of inertia by direct integration and composite bodies method, radius of gyration, parallel axis theorem, polar moment of inertia.

**Module V: Work –Energy: (5 Hours)**
Work energy equation, conservation of energy, Virtual work, impulse, momentum conservation, impact of bodies, co-efficient of restitution, loss of energy during impact, D'alembert principle.

## Course Outcomes:

- Use scalar and vector analytical techniques for analyzing forces in statically determinate structures.
- Apply fundamental concepts of kinematics and kinetics of particles to the analysis of simple, practical problems.
- Apply basic knowledge of math's and physics to solve real-world problems.
- Understand measurement error, and propagation of error in processed data.
- Understand basic kinematics concepts – displacement, velocity and acceleration (and their angular counterparts).
- Understand basic dynamics concepts – force, momentum, work and energy.
- Understand and be able to apply Newton's laws of motion.

**Examination Scheme:**

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- S.S. Bhavikatti, Engineering Mechanics, New Age International Ltd
- Timoshenko, Engineering Mechanics, McGraw Hill.
- R. S. Khurmi, Engineering Mechanics, S. Chand Publication.
- H. Shames & G. K. M. Rao, Engineering Mechanics, Pearson Education, 2006.
- Egor P. Popov, Engineering Mechanics of Solids, Prentice Hall of India, New Delhi,2001.
- R. Subramanian, Strength of Materials, Oxford University Press,2007.

# MATERIAL SCIENCE & METALLURGY

**Course Code: BME 302** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**

Metallurgy and Materials deal with the structure and properties of all materials, which have engineering applications. Metallurgists and Materials Engineers are responsible for designing, producing, examining and testing materials as diverse as metallic engineering alloys, semiconductors and superconductors, ceramics, plastics and composites. This course will help students understand the properties of different types of materials and their applications.

**Course Contents:**

**Module I: Crystal Geometry: (10 Hours)**
Atomic structure of metals crystal structure, crystal lattice of (i) Body centered cubic (ii) face centered cubic (iii) closed packed hexagonal, crystallographic notation of atomic planes, polymorphism and allotropy, solidification of crystallization (i) nuclear formation (crystal growth) (ii) crystal imperfection Elementary treatment of theories of plastic deformation, phenomenon of slip twinning, dislocation, identification of crystallographic possible slip planes and direction in FCC, BCC, C.P., recovery, re-crystallization, preferred orientation causes and effects on the property of metals.

**Module II: Mechanical Properties: (5 Hours)**
Introduction to Engineering materials, their mechanical behaviour, testing and manufacturing properties of materials, physical properties of materials, classification of engineering materials.

**Module III: Steels and Cast Irons: (8 Hours)**
General principles of phase transformation in alloys, phase rule and equilibrium diagrams, Equilibrium diagrams of Binary system in which the components form a mechanical mixture of crystals in the solid state and are completely mutually soluble in both liquid state. Equilibrium diagrams of a systems whose components have complete mutual solubility in the liquid state and limited solubility in the solid state in which the solid state solubility deceases with temperature. Equilibrium diagram of alloys whose components have complete mutual solubility in the liquid state and limited solubility in solid state (Alloy with a peritectic transformation) Equilibrium diagrams of a system whose components are subject to allotropic change. Iron carbon equilibrium diagram. Phase transformation in the iron carbon diagram (i) Formation of Austenite (ii) Transformation of austenite into pearlite (iii) Martensite transformation in steel, time temperature transformation curves.

**Module IV: Heat treatment: (7 Hours)**
Principles and applications of heat treatment processes viz. annealing, normalizing hardening, tempering; harden ability & its measurement, surface hardening processes. Defects in heat treatment and their remedies; effects produced by alloying elements on the structures and properties of steel. Distribution of alloying elements (Si, Mn. Ni. Cr. Mo. TL. Al) in steel.

**Module V: Industrial Visit**
At least one day visit to local industry in the field of Mechanical Engineering.

## Course Outcome:
After completing this course, the students will be able to understand metallic engineering alloys, semiconductors and superconductors, ceramics, plastics and composites.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- V. Raghavan, "Material Science & Engineering", Prentice Hall India Ltd., 2001.
- Shackelford, J.F. and Muralidhara, M.K., Introduction to Material Science for Engineers (6/e), Pearson Education, 2007
- S.K. Hazra Chaudhuri, "Material Science & Processes", Indian Book Publishers, Calcutta, 1983.
- R.B. Gupta, "Material Science Processes", Satya Prakashan, New Delhi, 2000.
- Degarmo E. Paul et.al, "Materials & Processes in Manufacture", Prentice Hall India, New Delhi, 2001.
- Raymond A Higgim., "Engineering Metallurgy Part 1", Prentice Hall India, New Delhi, 1998.
- L. Krishna Reddi, "Principles of Engineering Metallurgy", New Age Publication, New Delhi, 2001.
- Buduisky et al, "Engineering Materials & Properties", Prentice Hall India, New Delhi, 2004.
- Peter Haasten, "Physical Metallurgy", Cambridge Univ. Press, 1996.

# THERMODYNAMICS

**Course Code: BME 303** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
Objective of this course is to impart in depth understanding of the principles of thermodynamics and heat transfer. This course also helps students understand the application of basic fluid mechanics, thermodynamic, and heat transfer principles and techniques, including the use of empirical data, to the analysis of representative fluid and thermal energy components and systems encountered in the practice of electrical, electronic, industrial, and related disciplines of engineering.

**Course Contents:**

**Module I: Basic Concepts: (6 Hours)**
Thermodynamic system, intensive and extensive properties, cyclic process, Zeroth Law of Thermodynamics, Heat and Work, Flow work

**Module II: First Law of Thermodynamics: (5 Hours)**
Mechanical equivalent of heat, internal energy, Analysis of non-flow system, flow process and control volume, steady flow, energy equation, flow processes

**Module III: Second Law of Thermodynamics and Entropy: (7 Hours)**
Heat Engine, heat pump, Kelvin Planck and Clausius statement of Second Law of Thermodynamics, Perpetual motion machine, Reversible cycle- Carnot Cycle, Clausius inequality, entropy, Principle of entropy increase, concepts of availability, irreversibility.

**Module IV: Air-Cycles: (6 Hours)**
Carnot cycle, Otto cycle, Diesel cycle, Dual cycle, Stirling cycle, Erricsson cycle, Brayton cycle; Reversed Carnot cycle.

**Module V: Properties of Steam: (6 Hours)**
Definition of Pure substance, Definitions of saturated states; P-v-T surface; Use of steam tables and R134a tables; Saturation tables; Superheated tables; Identification of states & determination of properties, Mollier’s chart.

## Course Outcomes:

- After completing this course, the students will be able to apply energy balance to systems and control volumes, in situations involving heat and work interactions.
- Students can evaluate changes in thermodynamic properties of substances.
- The students will be able to evaluate the performance of energy conversion devices
- The students will be able to differentiate between high grade and low-grade energies.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text Books & References:

Cengel& Boles, “Thermodynamics”, Tata McGraw Hill.

- Nag, P.K, 1995, Engineering Thermodynamics, Tata McGraw-Hill Publishing Co. Ltd.
- V. Wylen and Sonntag, Fundamentals of Classical Thermodynamics, John Wiley.
- Y.V.C. Rao, Engineering Thermodynamics, Khanna Publications
- DhomkundwarKothandaraman, “A Course in Thermal Engineering”, Dhanpat Rai Publications.
- P. L. Ballany, *Thermal Engineering* –Khanna Publishers.

# BASIC ELECTRONICS

**Course Code: ECE 307** **Credit Units: 02**
**Total Hours: 20**

**Course Objective:**

The objective of this Course is to provide the students with an introductory and broad treatment of the field of Electronics Engineering to facilitate better understanding of the devices, instruments and sensors used in Civil & Mechanical Engineering applications. Lab should be taken concurrently. This course emphasizes more on the laboratory/practical use of the knowledge gained from the course lectures.

**Course Contents:**

**Module I: Diodes and Applications: (5 Hours)**
Semiconductor Diode - Ideal versus Practical, Diode Equivalent Circuits, Load Line Analysis; Diode as a Switch, Diode as a Rectifier, Half Wave and Full Wave Rectifiers; Breakdown Mechanisms, Zener Diode – Operation and Applications; Opto-Electronic Devices – LEDs, Clipper and clampers.

**Module II: Transistor Characteristics: (5 Hours)**
Bipolar Junction Transistor (BJT) –Construction, Operation, Amplifying Action, Common Base, Common Emitter and Common Collector Configurations, Operating Point, Voltage Divider Bias Configuration.
Introduction to FET, Feedback Amplifiers – Principle, Advantages of Negative Feedback, Topologies, Current Series and Voltage Series Feedback Amplifiers.

**Module III: Operational Amplifiers and Applications: (5 Hours)**
Introduction to Op-Amp, Differential Amplifier Configurations, CMRR, PSRR, Slew Rate; Block Diagram, Pin Configuration of 741 Op-Amp, Characteristics of Ideal Op-Amp, Concept of Virtual Ground; inverting and non-inverting amplifier applications: summing and difference amplifier, unity gain buffer, comparator, integrator and differentiator.

**Module IV: Digital Electronics Fundamentals: (5 Hours)**
Difference between analog and digital signals, Boolean algebra, Basic and Universal Gates, Symbols, Truth tables, logic expressions, Logic simplification using K- map, Logic ICs, half and full adder/subtractor, multiplexers, de- multiplexers

## Course Outcomes:

- Know broadly the concepts and functionalities of the electronic devices, tools and instruments
- Understand use, general specifications and deploy abilities of the electronic devices, and assemblies
- Confidence in handling and usage of electronic devices, tools and instruments in engineering applications

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Suggested Text/Reference Books:


- David. A. Bell (2003), Laboratory Manual for Electronic Devices and Circuits, Prentice Hall, India
- SantiramKal (2002), Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall, India
- Thomas L. Floyd and R. P. Jain (2009), Digital Fundamentals by Pearson Education,
- Paul B. Zbar, A.P. Malvino and M.A. Miller (2009), Basic Electronics – A Text-Lab. Manual, TMH
- R. T. Paynter (2009), Introductory Electronic Devices & Circuits, Conventional Flow Version, Pearson

# APPLIED PHYSICS LAB – II

**Course Code: PHY 323** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**

To develop understanding of various laws associated with oscillations, waves and optics and associated phenomena.

**Course Contents:**

**List of Experiments:**
**Time allocated for experiments is 2 Hours each.**

1. To determine the wavelength of sodium light by Newton's rings method.
2. To determine the dispersive power of the material of prism with the help of a spectrometer.
3. To determine the specific rotation of sugar by Bi-quartz or Laurent half shade polarimeter.
4. To determine the speed of ultrasonic waves in liquid by diffraction method.
5. To determine the width of a narrow slit using diffraction phenomena.
6. To determine the density of material of the given wire with the help of sonometer.
7. To determine the value of acceleration due to gravity ('g') in the laboratory using bar pendulum.
8. To determine the moment of inertia of a flywheel about its own axis of rotation.
9. To determine the frequency of an electrically maintained tunning fork by Melde's method.
10. To determine the frequency of AC mains using sonometer

## Course Outcomes:

After completion of course student will develop

- Practical understanding and applications of oscillations and optics.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

# ENGINEERING MECHANICS LAB

**Course Code: BME 321** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
To understand the measurement of force system and its effect on the behaviour of the bodies that may be in dynamic or in static state. It includes the equilibrium of different structures like beams, frames, truss etc and the force transfer mechanism in the different components of a body under given loading condition.

**Course Contents:**

**List of Experiments/demonstrations: [Any 10]**
**Time allocated for experiments No. 1 -12 is 2 Hours each**

1. To verify the law of Force Polygon
2. To verify the law of Moments using Parallel Force apparatus. (Simply supported type)
3. To determine the co-efficient of friction between wood and various surface (like Leather, Wood, Aluminum) on an inclined plane.
4. To find the forces in the members of Jib Crane.
5. To determine the mechanical advantage, Velocity ratio and efficiency of a screw jack.
6. To determine the mechanical advantage, Velocity ratio and Mechanical efficiency of the
7. Wheel and Axle
8. To determine the MA, VR, η of Worm Wheel (2-start)
9. Verification of force transmitted by members of given truss.
10. To verify the law of moments using Bell crank lever
11. To find CG and moment of Inertia of an irregular body using Computation method.

## Course Outcomes:

- Understand and be able to apply Newton’s laws of motion.
- Understand basic dynamics concepts – force, momentum, work and energy.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# THERMODYNAMICS LAB

**Course Code: BME 323** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
To understand the theory and applications of classical thermodynamics, thermodynamic properties, equations of state, methods used to describe and predict phase equilibrium.

**Course Contents:**

**List of Experiments:**
**Time allocated for experiments is 2 Hours each.**

1. To study of various types of boilers.
2. To study various types of Boiler mountings and accessories.
3. To study the working of two stroke petrol Engine.
4. To study the working of four stroke petrol Engine.
5. To study the working of two stroke Diesel Engine.
6. To study the working of four stroke Diesel Engine.
7. To study of Velocity & Pressure compounded steam turbine.
8. To study of Impulse & Reaction turbine.
9. To study of steam Engine model.
10. To study of Gas Turbine Model.

## Course Outcomes:

- Ability to apply fundamental concepts of thermodynamics to engineering applications.
- Ability to estimate thermodynamic properties of substances in gas and liquid state.
- Capability to determine thermodynamic efficiency of various energy related processes.

**Examination Scheme**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# BASIC ELECTRONICS LAB

**Course Code: ECE 327** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**

To understand the theory and applications of diode & transistors.

**Course Contents:**

**List of Experiments: [Any 10]**
**Time allocated for experiments is 2 Hours each.**

1. To study and verify the VI characteristic of a diode.
2. To study the Zener diode in breakdown region.
3. To study diode as a half wave rectifier.
4. To study diode as a full wave rectifier.
5. To study the characteristics of a CE Transistor.
6. To study the VI characteristic of CB &CC Transistor.
7. To study transistor as an amplifier.
8. To study OP Amp. As inverting and non-inverting Amp.
9. To study OP Amp in open loop and close loop.
10. To study OP Amp. As summer and differentiator Amp.
11. To study the Truth Table of Universal gates.
12. Verification of truth table of Half adder and full adder.
13. Verification of MUX and DEMUX.

## Course Outcomes:

- Know broadly the concepts and functionalities of the electronic devices, tools and instruments
- Understand use, general specifications and deploy abilities of the electronic devices, and assemblies
- Confidence in handling and usage of electronic devices, tools and instruments in engineering applications

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# COMMUNICATION SKILLS – III

**Course Code: BCU 341** **Credit Units: 01**

**Total Hours: 10**

**Course Objective:**

To emphasize the essential aspects of effective written communication necessary for professional success.

**Prerequisites:** NIL

| **Course Contents / Syllabus:** | | |
|---|---|---|
| **1.** | **Module I Principles of Effective Writing** | **35% Weightage** |
| | • Spellings-100 Most Misspelled Words in English<br>• Web Based Writing<br>• Note Taking: Process & Techniques | |
| **2.** | **Module II Formal Letter Writing** | **35% Weightage** |
| | • Block Format<br>• Types of Letters<br>• E-mail<br>• Netiquette | |
| **3.** | **Module III Business Memos**<br>• Format & Characteristics | **20% Weightage** |
| **4.** | **Module IV Short Stories** | **10% Weightage** |
| | • Stench of Kerosene-Amrita Pritam<br>• A Flowering Tree-A.K. Ramanujan<br>• The Gift of the Magi- O. Henry<br>• A Fly in Buttermilk-James Baldwin | |
| **5.** | **Student Learning Outcomes:**<br>The students should be able to write correctly and properly with special reference to Letter writing. | |
| **6.** | **Pedagogy for Course Delivery:**<br>• Workshop<br>• Group Discussions<br>• Presentations<br>• Lectures | |
| **7.** | **Assessment/ Examination Scheme:** (see below) | |

**Assessment/ Examination Scheme:**

| **Theory L/T (%)** | **Lab/Practical/Studio (%)** | **End Term Examination** |
|---|---|---|
| 100% | NA | 70% |

**Theory Assessment (L&T):**

| **Components (Drop down)** | ClE | Mid Sem | Attendance | **End Term Examination** |
|---|---|---|---|---|
| **Weightage (%)** | 10% | 15% | 5% | 70% |

**Text:** ***Rai, Urmila & S.M. Rai. Business Communication, Mumbai: Himalaya Publishing House, 2002.***

***K.K.Sinha, Business Communication, Galgotia Publishing Company.***

**Reference:** ***Sanjay Kumar & Pushp Lata, Communication Skills, Oxford University Press.***

**Additional Reading: Newspapers and Journals**

# BEHAVIOURAL SCIENCE – III

**Course Code: BSU 343** **Credit Units: 01**
**Total Hours: 10**

**Course Objective:**
To enable the students:
- Understand the process of problem solving and creative thinking.
- Facilitation and enhancement of skills required for decision-making.

**Course Contents:**
**Module I: Thinking as a tool for Problem Solving** **(02 Hours)**
- What is thinking: The Mind/Brain/Behavior
- Critical Thinking and Learning:
  - Making Predictions and Reasoning
  - Memory and Critical Thinking
  - Emotions and Critical Thinking
- Thinking skills

**Module II: Hindrances to Problem Solving Process** **(02 Hours)**
- Perception
- Expression
- Emotion
- Intellect
- Work environment

**Module III: Problem Solving** **(02 Hours)**
- Recognizing and Defining a problem
- Analyzing the problem (potential causes)
- Developing possible alternatives
- Evaluating Solutions
- Resolution of problem
- Implementation
- Barriers to problem solving:
  - Perception
  - Expression
  - Emotion
  - Intellect
  - Work environment

**Module IV: Plan of Action** **(02 Hour)**
- Construction of POA
- Monitoring
- Reviewing and analyzing the outcome

**Module V: Creative Thinking** **(02 Hours)**
- Definition and meaning of creativity
- The nature of creative thinking
  - Convergent and Divergent thinking
  - Idea generation and evaluation (Brain Storming)
  - Image generation and evaluation
  - Debating
- The six-phase model of Creative Thinking: ICEDIP model

**Student learning outcomes**

- Student will be able to understand and solve the problems effectively in their personal and professional life.
- Students will outline multiple divergent solutions to a problem,
- Student will able to create and explore risky or controversial ideas, and synthesize ideas/expertise to generate innovations.

**Examination Scheme:**

| Evaluation Components | Attendance | Journal of Success (JOS) | Social Awareness Program (SAP) SAP Report/SAP Presentation | End Semester Exam | Total |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 15 | 70 | 100 |

**Suggested Readings:**

- Michael Steven: How to be a better problem solver, Kogan Page, New Delhi, 1999
- Geoff Petty: How to be better at creativity; Kogan Page, New Delhi, 1999
- Richard Y. Chang and P. Keith, Kelly: Wheeler Publishing, New Delhi, 1998.
- Phil Lowe Koge Page: Creativity and Problem Solving, New Delhi, 1996
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 3, Management (1996); Pfeiffer & Company
- Bensley, Alan D.: Critical Thinking in Psychology – A Unified Skills Approach, (1998), Brooks/Cole Publishing Company.

# FRENCH – III

**Course Code: FLU 344** **Credit Units: 02**
**Total Hours: 20**

**Course Objective:**
To enable the students

- to talk about the qualities and defects of people.
- to ask/give directions, to enquire about a lodging.
- to ask and give informations about a certain place.
- to describe events in past tense.

**Course Contents:**

**Dossiers5,6–pg45-64**

**Dossier5:Ici etlà**

**Actesde Communication:**
Exprimer l'obligationetl'interdiction,parler desqualitésetdesdéfautsdequelqu'un,demander son chemin, indiquerunitinéraire,se situerdansl'espace,serenseignersurunlogement.

**Dossier6:Ailleurs**
**Actesde Communication:**
S'exprimeraupassécomposé, raconterunvoyage, sesituerdanslemonde,exprimerletemps(avecindicateursdetemps–ilya,depuis),serenseignersurunhébergement,exprimerla satisfactionet l'insatisfaction.

**Grammaire :**
1. lesadjectifsdémonstratifs
2. lesverbes:'irgroupe'devoir,falloir
3. lesprépositionsdelieu,depays
4. l'impératif,lepassé composé,forme et accordduparticipe passé,lanégationaupassécomposé
5. les indicateursdetemps(il ya,depuis)

**Examination Scheme:**

| | **INTERNAL** | | | | **EXTERNAL** | **GRAND TOTAL** |
|---|---|---|---|---|---|---|
| **Components** | MID-SEM | VIVA-VOCE | ATTENDANCE | **TOTAL** | **END SEMESTER** | |
| **Weightage (%)** | 15 | 10 | 5 | **30** | **70** | **100** |

## Text &References:


***Text:***
**Le livre àsuivre:**
· Andant,Christineet al.A proposA1Livre del'élève.Grenoble:Pressesuniversitairesde Grenoble,2010.
· Andant,Christineet al.A proposA1Cahierd'exercices.Grenoble:Pressesuniversitairesde Grenoble,2010.
***Références:***
· Girardeau,Brunoet NellyMous.Réussirle DELFA1.Paris: Didier,2010.

# TERM PAPER

**Course Code: NTP 330** **Credit Units: 02**

**Course Objective:**
A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject. The objective of this course to make a student to carry out intense study on a specific topic related to current development in their field of specialization and Develop skills of presentation and report writing.

**METHODOLOGY:** The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

**GUIDELINES FOR TERM PAPER**
The procedure for writing a term paper may consist of the following steps:
1. Choosing a subject
2. Finding sources of materials
3. Collecting the notes
4. Outlining the paper
5. Writing the first draft
6. Editing & preparing the final paper

**1. Choosing a Subject**
The subject chosen should not be too general.

**2. Finding Sources of Materials**
  a) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
  b) Begin by making a list of subject-headings under which you might expect the subject to be listed.
  c) The sources could be books and magazine articles, news stories, periodicals, scientific journals etc.

**3. Collecting the notes**
Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.
  a) Get facts, not just opinions. Compare the facts with author's conclusion.
  b) In research studies, notice the methods and procedures, results & conclusions.
  c) Check cross references.

**4. Outlining the paper**
  a) Review notes to find main sub-divisions of the subject.
  b) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

**5. Writing the first draft**
Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:
  a) statement of purpose
  b) main body of the paper
  c) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main idea.

**6. Editing & Preparing the final Paper**
  a) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.
  b) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
  c) Check for proper spelling, phrasing and sentence construction.
  d) Check for proper form on footnotes, quotes, and punctuation.
  e) Check to see that quotations serve one of the following purposes:

(i) Show evidence of what an author has said.
(ii) Avoid misrepresentation through restatement.

(iii) Save unnecessary writing when ideas have been well expressed by the original author.

f) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

1) Title page
2) Table of contents
3) Introduction
4) Review
5) Discussion &Conclusion
6) References
7) Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

**Discussion**
The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

**Conclusion**
The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

a) summary of question posed
b) summary of findings
c) summary of main limitations of the study at hand
d) details of possibilities for related future research

**Reference**
From the very beginning of a research project, you should be careful to note all details of articles gathered. The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.
The key to a good bibliography is consistency. Choose a particular convention and stick to this.

**Conventions**
Monographs
Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

**Edited volumes**
Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.
[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hoursg.) for Herausgeber].

**Edited articles**
Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

**Journal articles**
McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

**Electronic book**
Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] from the World Wide Web, http://www.aber.ac.uk/media/Documents/S4B/.

**Electronic journal articles**
Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document].German as a Foreign Language Journal [online] 1.Retrieved [12.09.'00] from the World Wide Web, http://www.gfl-journal.com/.

**Other websites**

Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document].Retrieved [13.10.'01] from the World Wide Web, http://olaf.hiof.no/~sverrev/eng.html.

**Unpublished papers**

Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

**Unpublished theses/ dissertations**

Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg.
Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

**Appendix**

The appendix should be used for data collected (e.g. questionnaires, transcripts, ...) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

**Assessment Scheme:**

**Continuous Evaluation:** **40%**
(Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)

**Final Evaluation:** **60%**

(Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/ presented, outcomes vs. objectives, presentation/ viva etc.)

**Course Outcomes:**

After successful completion of this course, students will be able to

1. Carry out intense study on a specific topic related to current development in their field of specialization
2. Collect, interpret and analyze the information
3. Compare and evaluate the existing solutions for a specific cases study
4. Develop skills of presentation and report writing.

# FLUID MECHANICS

**Course Code: BME 401** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The objective of this subject is to familiarize the students with the properties of fluids, application of pressure measurement devices, application of mass and momentum conservation laws for fluid flows, importance of dimension and model analysis, laminar and turbulent flow, flow measurement devices and to obtain velocity and pressure variations in various types of simple flow.

**Course Contents:**

**Module I: Fluid Properties and Fluid Statics: (8 Hours)**
Definition of fluid, Newton's Law of viscosity, Properties of fluids, mass density, specific volume, specific gravity, viscosity, compressibility and surface tension. Pressure at a point, manometers, Forces on plane surfaces, forces on curved surfaces, buoyant forces, and stability of floating bodies, metacentre and metacentric height.

**Module II: Kinematics of Fluid Motion: (5 Hours)**
Steady and unsteady flow; uniform and non-uniform flow; Laminar and turbulent flow; streamline, path line and streak line; continuity equation, irrotational and rotational flow, velocity potential and stream function, vortex flow, free and forced vortex.

**Module III: Dynamics of Fluid Flow: (5 Hours)**
Euler's equation of motion and its integration to yield Bernoulli's equation, its practical applications – Pitot tube, Venturi meter, Orificemeter; steady flow momentum equation, force exerted on a pipe bend.

**Module IV: Dimensional Analysis and Principles of Similarity: (4 Hours)**
Dimensional analysis, Dimensional homogeneity, Buckingham π-Theorem and its applications, Geometric, Kinematics and Dynamic similarity; Dimensionless numbers-Reynolds, Froude, Euler, Mach, Weber Number and their significance.

**Module V: Laminar and Turbulent Flow: (5 Hours)**
Reynold's experiment, critical velocity, transition from laminar to turbulent flow, Boundary layer thickness, steady laminar flow through a circular tube, flow between parallel plates., courses of turbulence, velocity distribution law near a solid boundary, velocity distribution in rough pipes, Hazen – Williams's formula.

**Module VI: Analysis of Pipe Flow: (3 Hours)**
Energy losses, minor losses in pipe lines, concept of equivalent length, siphon.

## Course Outcome:
Upon completion of this course, students will be able to understand the principles of fluid statics and kinematics, mathematically analyze simple flow situations, measurement of flow rates and dimensional analysis of model studies.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:

- R.K. Bansal, "Fluid Mechanics & Hydraulic Machines", Laxmi Publications (P) Ltd., 2002.
- Gupta, S. C., Fluid Mechanics and Hydraulic Machines, Pearson Education, 2007.
- D.S. Kumar, "Fluid Mechanics and Fluid Power Engineering", S.K. Kataria & Sons, 2000.
- F. M. White, Introduction to Fluid Mechanics, McGraw Hill
- I.H. Shames, "Mechanics of Fluids", Tata McGraw Hill
- Douglas, J. F., Gasiorek, J.M. and Swaffield, J., Fluid Mechanics, Pearson Education, 4/e, 2006
- V.L. Streeter and E.B. Wylie, "Fluid Mechanics", Tata McGraw Hill
- Massey B S, Mechanics of Fluids, Van Nostrand Reinhold Co

# HEAT AND MASS TRANSFER

**Course Code: BME 402** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The objective of this course is to build a solid foundation in heat transfer exposing students tothe three basic modes namely conduction, convection and radiation. Rigorous treatment of governing equations and solution procedures for the three modes will be provided, along with solution of practical problems using empirical correlations. The course will also briefly cover boiling and condensation heat transfer, and the analysis and design of heat exchangers.

**Course Contents:**

**Module I: Conduction: (8 Hours)**
Heat transfer - Different Modes, Governing Laws, One-dimensional steady-state conduction through homogeneous and composite plane walls, cylinders and spheres, critical thickness of insulation.

**Module II: Extended Surfaces or Fins: (5 Hours)**
Heat transfer from fins of uniform cross section, Temperature Distribution and Heat Transfer Calculations, Fin Efficiency and Effectiveness, Applications, Numerical Problems.

**Module III: Convection: (4 Hours)**
Concept of hydrodynamic and thermal boundary layers, momentum and energy equation for boundary layers on a flat plate, application of dimensional analysis to free and force convection; important dimensionless number.

**Module IV: Thermal Radiation: (6 Hours)**
Fundamental principles - gray, white, opaque, transparent and black bodies, Spectral emissive power, Planck's laws, Wien's displacement law; Stefan-Boltzmann's relation, Configuration factors; radiant interchange between black and grey surfaces; radiation shielding solar radiation.

**Module V: Heat Exchangers& Mass transfer: (7 Hours)**
Definition, classification, combined heat transfer analysis; overall heat transfer co-efficient; LMTD method, Effectiveness - NTU method, Analytical Methods, Numerical Problems.
Mass transfer: Definition, Examples, Fick's law of diffusion, Fick's law as referred to ideal gases.

## Course Outcomes:

- After completing the course, the students will be able to formulate and analyze a heat transfer problem involving any of the three modes of heat transfer
- The students will be able to obtain exact solutions for the temperature variation using analytical methods where possible or employ approximate methods or empirical correlations to evaluate the rate of heat transfer
- The students will be able to design devices such as heat exchangers and also estimate the insulation needed to reduce heat losses where necessary.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Incropera, F.P. and DeWitt, D.P. (2002). Fundamentals of Heat and Mass Transfer, John Willy&Sons, New York, NY.
- Nag, P.K. (2002). Heat and Mass Transfer, TMH.
- John R.Howell & Richrd O Buckius, Fundamentals of Engg. Thermodynamics, McGraw Hill International.
- Holman, J.P. (1997). Heat Transfer, 9th edition, McGraw-Hill.
- Mills, A.F. (1999). Basic Heat and Mass Transfer. Prentice-Hall.
- Thirumaleshwar, M. (2006). Fundamentals of Heat and Mass Transfer, Pearson education.
- Ghoshdastidar, P.S. (2004). Heat Transfer. OxfordUniversity Press.
- Arora, Domkundwar, S. and Domkundwar, A. (1988). A Course in Heat & Mass Transfer, Dhanpat Rai & Co.

# KINEMATIC OF MACHINE

**Course Code: BME 403** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
To expose the students to learn the fundamentals of various laws governing rigid bodies and its motions.

**Course Contents:**

**Module I: Mechanisms and Machines: (6 Hours)**
Links, Pairs, Chains, Structure, Mechanism, MachineEquivalentlinkage, Degrees of freedom, Gruebler's&Kutzback's criterion, Inversions of four bar chain,Mechanism with lower pairs Pantograph, Straight line motion mechanisms, Davis and Ackermann'ssteering mechanisms, Hooke's joint, Numerical problems based on above topics.

**Module II: Motion: (6 Hours)**
Plane motion, Absolute & Relative motion, Displacement, Velocity and Acceleration of apoint, Velocity and Acceleration Analysis by Graphical & Analytical methods, Velocity image Velocity of rubbing, Kennedy's Theorem, Acceleration image, Acceleration polygon, Coriolis acceleration component, Klein's construction, Velocity and Acceleration Analysis using Complex Algebra (Raven's Approach), Numerical problems based on above topics

**Module III: Gears: (6 Hours)**
Classification of gears, Helical, Spiral, Bevel, Worm and Spur Gear, Spur Gear Terminology, Law of gearing, Tooth profiles, velocity of sliding, Path of contact, Arc of contact, Contact Ratio, Interference and Undercutting, Conjugate action. Gear Trains: Simple, compound, reverted and epi cyclic gear trains. Velocity ratio and torque calculation in gear trains

**Module IV: Cams: (6 Hours)**
Classification of Cams and Followers, Radial Cam Terminology, Analysis of Follower motion (uniform, modified uniform, simple harmonic, parabolic, cycloidal), Pressure Angle, Radiusof Curvature, Cam Profile for radial and offset followers Synthesis of Cam Profile by Graphical Approach, Cams with Specified Contours.

**Module V: Gyroscope: (6 Hours)**
Gyroscopic Action in Machines, Angular Velocity and Acceleration, Gyroscopictorque/ couple, Gyroscopic effect on Naval Ships, Stability of two and four wheel Vehicles, Rigiddisc at an angle fixed to a rotating shaft.

## Course Outcomes:
At the completion of this course, students should be able to know
- Basic mechanisms, velocity and acceleration of simple mechanisms
- Drawing the profile of cams and its analysis
- Gear train calculations, Gyroscopes
- Inertia force analysis and flywheels
- Balancing of rotating and reciprocating masses

**Examination Scheme:**

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text &References:

- Thomas Bevan; Theory of Machines; Pearson Education
- Rattan SS; Theory of machines; MC Graw Hills
- Ambekar AG; Mechanism and Machine Theory; PHI. Eastern Economy Edition 2015
- Uicker&Shigley, Theory of machines & Mechanism Second Edition Oxford University Press
- Dr.Jagdish Lal; Theory of Machines; Metropolitan Book Co; Delhi
- Rao J S and Dukkipati; Mechanism and Machine Theory; New Age Delhi.
- Abdulla Shariff, Theory of Machines.

# MANUFACTURING MACHINE

**Course Code: BME 404** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
This is a new developmental graduate course for students interested in learning how to design, analyze and build specialty manufacturing process machines. It anticipated that this course would become part of the new manufacturing emphasis area in mechanical engineering.

**Course Contents:**

**Module I: Introduction to Machine Tools: (4 Hours)**
Classification of machine tools, kinds of motion in machine tool operations, definition of cutting speed, feed and depth of cut.

**Module II: Lathe: (4 Hours)**
Classification and various parts of Lathe, specification, Description of important mechanism viz. apron, tail stock, head stock, work holding, devices and operations, e.g. taper, turning, eccentric turning and screw-cutting, Geometry of a single point cutting tool. Calculation of machining time, Capstan and turret lathe

**Module III: Drilling Machine: (4 Hours)**
Geometry and nomenclature of a twist drill, specification and classification of drilling machines, cutting speed, feed, depth of cut and calculation machining time in drilling, tool holding devices, different types of operations performed on a drilling machine.

**Module IV: Milling Machine: (4 Hours)**
Classification, up milling and down milling, dividing Head, different types of operations – simple, compound and differential indexing, slab milling, spiral milling, slot milling, T-slot milling and end milling.

**Module V: Shaper, Slotter & Planner: (4 Hours)**
Principal part of a shaper, classification, Quick Return mechanism, table feed mechanism of a shaper, Operations, e.g. horizontal, vertical and inclined shaping, difference between a shaper, planer and slotter, cutting speed, feed, and depth of cut and calculation of machining time in shaping.

**Module VI: Grinding Machines: (5 Hours)**
Construction and specification of a grinding wheel, wheel turning and dressing, Grinding machines surface, cylindrical and center less grinding.

**Module VII: Special Machines: (5 Hours)**
Horizontal and vertical boring machines, Gear Geometry, Gear generation and hobbing; Lapping, honing and super finishing processes.

## Course Outcome:
Upon completion of this course, students will be able to understand the different conventional and unconventional manufacturing methods employed for making different products.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- P.N. Rao, "Manufacturing Technology: Metal Cutting & Machine Tools", Tata McGraw Hill, Delhi, 2004.
- B.S. Raghuwanshi, "Workshop Technology", Vol.2, Dhanpat Rai & Sons, 2003.
- Hazra Chandhari S.K., "Elements of Workshop Technology", Vol.2, Media Promoters, 2003.
- P.C. Sharma, "A Text Book of Production. Engineering", S. Chand, New Delhi, 2004.
- Bawa H.S., "Workshop Technology", Vol.2, Tata McGraw Hill, 2004.
- Juneja & Shekhon, "Fundamental of Metal Cutting", New Age Publications
- S.F. Krar Stevan F. and Check A.F., "Technology of M/C Tools", McGraw Hill Book Co., 1986.
- Kibbe Richard et al, "M/c Tool practices", Prentice HallIndia, 2003.
- Bangalore HMT, "Production Technology", Tata McGraw Hill, 1980.
- R.K. Jain, "Production Technology", Khanna Publishers
- Gerling Heinrich, "All about Machine Tools", New Age Publication, 2003.

# STRENGTH OF MATERIAL

**Course Code: BME 405** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The objective of this course is to make the students understand the concept of stress and strain in different types of structure/machine under different loading conditions. The course also covers the simple and compound stresses due to forces, stresses and deflection in beams due to bending, torsion in circular section, strain energy, different theories of failure, stress in thin cylinder thick cylinder and spheres due to external and internal pressure.

**Course Contents:**

**Module I: Simple Stresses and Strains: (5 Hours)**
Stress and Strain- Tension and Compression -Thermal Stresses -pure shear –Young’s modulus of elasticity, Poisson’s ratio, Modulus of rigidity and Bulk modulus - Relation between elastic constants –Stress -strain diagrams for brittle and ductile materials-working stress Strain energy in tension and compression, stress and strains in bars subjected to axial loading. thermal stress.

**Module II: Compound Stress and Strains: (5 Hours)**
Principal Stresses and Strains: Analysis of Biaxial state of stress with and without shear -Mohr's Circle. Shear Force and Bending Moment: Types of supports-Types of beams –Types of loads –articulated beams -Shear Force and Bending Moment diagrams.

**Module III: Bending Stress: (5 Hours)**
Theory of Simple Bending: Assumptions -Bending stresses in beams - Derivation of formula for Efficiency of various cross sections of beams (rectangular, circular and channel sections). Shear Stress Distribution: Flexural shear stress distribution in different cross sections of beams.

**Module IV: Torsion: (5 Hours)**
Torsion of Circular cross sections: Theory of pure torsion -transmission of Power in Solid and Hollow circular shafts–Combined bending and torsion.

**Module V: Thin Cylinders and Spheres: (3 Hours)**
Thin and Thick Cylinders: Thin and Thick Cylinders – spherical shells subjected to internal fluid pressure

**Module VI: Columns and Struts: (3 Hours)**
Columns and struts: column and failure of columns, Euler’s formulas.

**Module VII: Slope and Deflection: (4 Hours)**
Deflection of Beams: Slope and deflection of beams- Double Integration method –Macaulay’s method –strain energy method.

## Course Outcomes:

- After completing this course, the students should be able to recognize various types loads applied on machinecomponents of simple geometry and understand the nature of internal stresses that will develop within the components.
- The students will be able to evaluate the strains and deformation that will result due to the elastic stresses developed within the materials for simple types offloading.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;Att: Attendance

## Text & References:


- Jindal U.C., "Strength of Materials", Galgotia Publication, New Delhi, 1998.
- Ryder G.H., "Strength of Materials", Macmillan, Delhi, 2003.
- R.K. Bansal, "Strength of Materials", Laxmi Publication, New Delhi, 2001.
- Sadhu Singh, "Strength of Materials", Khanna Publishers, New Delhi, 2000.
- Timoshenko S.P., "Elements of Strength of Materials", East-West affiliated, New Delhi, 2000.
- Hibbler R.C., "Mechanics of Materials", Prentice Hall, New Delhi, 1994.
- Popov Eger P., "Engg. Mechanics of solids", Prentice Hall, New Delhi, 1998.
- Fenner, Roger. T, "Mechanics of Solids", U.K. B.C. Publication, New Delhi, 1990.
- Srinath L.S. et.al., "Strength of Materials", McMillan, New Delhi,2001

# HEAT AND MASS TRANSFER LAB

**Course Code: BME 422** **Credit Units: 01**
**Total Hours: 20**

**Course Objectives:**

The objective of this course is to understand the principle of conduction, free & forced convection and radiation. To evaluate the thermal conductivity of a metallic bar & insulating powder and the performance evaluation of parallel flow and counter flow heat exchangers.

**Course Contents:**

**List of experiments/demonstrations: [Any 10]**
**Time allocated for experiments is 2 Hours each.**

1. To determine the thermal conductivity of a Metal Bar.
2. To determine the convective heat transfer co-efficient for a vertical cylinder by free or natural convection.
3. To determine the convective heat transfer co-efficient for a Horizontal Pipe by forced convection.
4. To determine the value of Stefan – Boltzman constant for radiation heat transfer.
5. To determine the heat transfer coefficient under forced condition using Pin Fin apparatus.
6. To determine the effectiveness & overall heat transfer coefficient for parallel & counter parallel flow heat exchanger.
7. To determine the emissivity of a Grey surface at different temperatures.
8. To determine the overall heat transfer co-efficient for the composite wall and to compare the same with that calculated from the equations.
9. Determination of effectiveness of temperature distribution plotted for the temperature.
10. To determine the effectiveness of temperature distribution of Pin Fin.
11. Determination of thermal effectiveness of insulating Powder.

## Course Outcome:

After completion of course student will develop practical understanding and applications of fundamental concept of conduction, convection and radiation.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

# KINEMATIC OF MACHINE LAB

**Course Code: BME 423** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
To understand the kinematics and rigid- body dynamics of kinematically driven machine components. Tounderstand the motion of linked mechanisms in terms of the displacement, velocity and acceleration at any point in a rigidlink.To be able to design some linkage mechanisms and cam systems to generate specified outputmotion. To understand the kinematics of geartrains.

**Course Contents:**

**List of experiments/demonstrations: [Any 10]**
**Time allocated for experiments is 2 Hours each.**

**List of Experiments:**
1. To study various types of Links, Pairs, Chain and Mechanism
2. To study inversion of Four Bar Mechanism, Single Slider Crank Chain Mechanism and Double Slider Crank Chain Mechanism
3. To study velocity diagram for Slider Crank Mechanism.
4. Study of working models of various popular mechanisms like quick return mechanism etc.
5. To Find out velocity & acceleration of slider crank mechanism by Klein's Construction
6. To study Different types of Gears.
7. To find out velocity ratio of various gear trains
8. To study various types of belt drives & find out the velocity ratio of the drive.
9. To draw the cam profile.
10. Study of the mechanisms like Pantograph mechanism, Davis & Ackerman's steering mechanisms etc.
11. To finds out gyroscopic couple.

## Course Outcome:

Students who have undergone the course will be able to understand the measurement of mechanical properties of materials and will be able to characterize the dynamic behavior of mechanicalsystems.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

# MANUFACTURING MACHINE LAB

**Course Code: BME 424** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
To motivate and challenge students to understand and develop an appreciation of the processes in correlation with material properties which change the shape, size and form of the raw materials into the desirable product by conventional or unconventional manufacturing methods

**Course Contents:**
**List of experiments/demonstrations**

1. Operations on the Lathe Machine.**: (5 Hours)**
2. Operations on the Shaper Machine.**: (3 Hours)**
3. Operations on the Planner Machine.**: (3 Hours)**
4. Operations on the Drilling Machine.**: (3 Hours)**
5. Operations on the Grinding Machine.**: (3 Hours)**
6. Operations on the Milling Machine.**: (3 Hours)**

## Course Outcome:

Students who have undergone the course will be able to understand the measurement of Mechanical machines and operations.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# STRENGTH OF MATERIAL & FLUID MECHANICS LAB

**Course Code: BME 425** **Credit Units: 01**
**Total Hours: 20**

**Course Objectives:**
To describe the concepts and principles, understand the theory of elasticity includingstrain/displacement and Hooke's law relationships; and perform calculations, relative tothe strength and stability of structures and mechanical components. To explain the Bernoulli's theorem, flow measurement devices and various losses occurs in the flow.

**Course Contents:**

**List of experiments/demonstrations: [Any 10]**
**Time allocated for experiments is 2 Hours each.**

1. Universal Testing Machine
2. Tensile Test (MS)
3. Double Shear Test (MS)
4. Compression Test (CI)
5. Brinell Hardness Number
6. Izod Impact
7. Testing Machine
8. Rockwell Hardness Tester
9. Spring Stiffness (Spring Compression Testing machine)
10. Torsion testing machine
11. Verification of Bernoulli's Theorem
12. Experiment using Venturimeter
13. Determination of coefficient of Discharge $C_d$, $C_c$, $C_!$ Using Circular/triangular/rectangular orifice
14. To find major head losses in a pipe line
15. To find minor head losses in a pipe line (sudden expansion/contraction/bend)

## Course Outcome:
Students who have undergone the course will be able to understand the theory of elasticity including strain/displacement and Hooke's law relationships; mechanical properties. Be able to calculate fluid properties and various kinds of losses occur in flow.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

# COMMUNICATION SKILLS – IV

**Course Code: BCU 441** **Credit Units: 01**
**Total Hours: 10**

**Course Objective:**

This course is designed to develop the skills of the students in preparing job search artifacts and negotiating their use in GDs and interviews.

**Prerequisites:** NIL

| **Course Contents / Syllabus:** | | |
|---|---|---|
| **1.** | **Module I Employment-Related Correspondence**<br>• Resume Writing<br>• Covering Letters<br>• Follow Up Letters | **35% Weightage** |
| **2.** | **Module II Dynamics of Group Discussion**<br>• Significance of GD<br>• Methodology & Guidelines | **35% Weightage** |
| **3.** | **Module III Interviews**<br>• Types & Styles of Interviews<br>• Fundamentals of facing Interviews<br>• Interview-Frequently Asked Questions | **20% Weightage** |
| **4.** | **Module IV Short Stories**<br>• Proof of the Pudding - O. Henry<br>• "The Lottery" 1948 – Shirley Jackson<br>• The Eyes Have it- Ruskin Bond<br>• Kallu- Ismat Chughtai<br>All the four stories will be discussed in one class.<br>One Long Question will be set in the Exam from the Text. | **10% Weightage** |
| **5.** | **Student Learning Outcomes:**<br>• Develop a resume for oneself<br>• Ability to handle the interview process confidently<br>• Learn the subtle nuances of an effective group discussion | |
| **6.** | **Pedagogy for Course Delivery:**<br>• Workshop<br>• Group Discussions<br>• Presentations<br>• Lectures | |
| **7.** | **Assessment/ Examination Scheme:** | |

| **Theory L/T (%)** | **Lab/Practical/Studio (%)** | **End Term Examination** |
|---|---|---|
| 100% | NA | 70% |

**Theory Assessment (L&T):**

| **Components (Drop down)** | CIE | Mid Sem | Attendance | **End Term Examination** |
|---|---|---|---|---|
| **Weightage (%)** | 10% | 15% | 5% | 70% |

**Text:** ***Sharma, R.C. & Krishna Mohan. Business Correspondence and Report Writing: A Practical approach to Business & Technical Communication, New Delhi: Tata McGraw Hill & Co. Ltd., 2002.***

***Rai, Urmila & S.M. Rai. Business Communication, Mumbai: Himalaya Publishing House, 2002.***

***Rizvi, M.Ashraf. Effective Technical Communication, New Delhi: Tata McGraw Hill, 2007.***

**Reference:** ***Brusaw, Charles T., Gerald J. Alred & Walter E. Oliu. The Business Writer's Companion, Bedford: St. Martin's Press, 2010.***

***Lewis, Norman. How to Read Better and Faster. New Delhi: Binny Publishing House.***

- **Additional Reading: Newspapers and Journals**

# BEHAVIOURAL SCIENCE - IV

**Course Code: BSU 443** **Credit Units: 01**
**Total Hours: 10**

**Course Objective:**
This course aims at imparting an understanding of Values, Ethics & Morality among students for making a balanced choice between personal & professional development.

**Course Contents:**

**Module I: Introduction to Values & Ethics** **(2 Hours)**

Meaning & its type
Relationship between Values and Ethics
Its implication in one's life

**Module II: Values Clarification & Acceptance** **(2 Hours)**

Core Values-Respect, Responsibility, Integrity, Resilience, Care, & Harmony
Its process-Self Exploration
Nurturing Good values

**Module III: Morality** **(2 Hours)**
Difference between morality, ethics &values
Significance of moral values

**Module IV: Ethical Practice** **(2 Hours)**

Ethical Decision making
Challenges in its implementation
Prevention of Corruption &Crime

**Module V: Personal & Professional Values** **(2 Hours)**
Personal values-Empathy, honesty, courage, commitment
Professional Values-Work ethics, respect for others
Its role in personality development
Character building-"New Self awareness"

**Student learning outcomes**
- Able to answer the question: What do I stand for?
- Ability to apply a coherent set of moral principles within professional and specialized contexts
- Willing to make unpopular but right decision
- Committed to working for justice and peace locally and globally

**Examination Scheme:**

| Evaluation Components | Attendance | Journal of Success (JOS) | Social Awareness Program (SAP) SAP Report/SAP Presentation | End Semester Exam | Total |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 15 | 70 | 100 |

## Text & References:


- Cassuto Rothman, J. (1998). From the Front Lines, Student Cases in Social Work Ethics. Needham Heights, MA: Allyn and Bacon.
- Gambrill, E. & Pruger, R. (Eds). (1996). Controversial Issues in Social Work Ethics, Values, & Obligations. Needham Heights, MA: Allyn and Bacon, Inc.

# FRENCH – IV

**Course Code: FLU 444** **Credit Unit: 02**
**Total Hours: 20**

**Course Objective:**
To strengthen the language of the students in both oral and written
To revise the grammar in application and the communication tasks related to topics covered already
To get acquainted with the current social communication skills, oral (dialogue, telephone conversations, etc.) and written and perform simple communication tasks such as

- Talking about personal habits
- Narrating events in the past, marking the stages, using appropriate connectors
- Holding conversations on telephone
- Asking for/giving advices

**Course Contents:**

**Dossier7–pg65-74,**
**Dossiers1,2and3(révision)**
**Dossier7:auboulot**
**ActesdeCommunication:**
Parlerdeshabitudesetdécrireunesituationàl'imparfait,comparer(nometverbe),qualifier(qui,que)s'exprimer autéléphone,demanderet donnerunavis.

**Dossiers1,2,3–Révision**
Exercicesd'écoute,productionorale et écrite.

**Grammaire :**
1. l'imparfait,
2. lacomparaisonduverbe/dunom ; mieux/meilleur
3. lespronomsrelatifs

**Examination Scheme:**

| Components | INTERNAL | | | | EXTERNAL | GRAND TOTAL |
|---|---|---|---|---|---|---|
| | MID-SEM | VIVA-VOCE | ATTENDANCE | TOTAL | END SEMESTER | 100 |
| Weightage (%) | 15 | 10 | 5 | 30 | 70 | |

## Text &References:

**Le livre àsuivre:**


- Andant,Christineet al.A proposA1Livre del'élève.Grenoble:Pressesuniversitairesde Grenoble,2010.
- Andant,Christineet al.A proposA1Cahierd'exercices.Grenoble:Pressesuniversitairesde Grenoble,2010.
- Girardeau,Brunoet NellyMous.Réussirle DELFA1.Paris: Didier,2010.

# APPLIED THERMODYNAMICS

**Course Code: BME 501** **Credit Units: 03**
**Total Hours: 30**

**Course Objectives:**

- To learn about of I law for reacting systems and heating value of fuels.
- To learn about gas and vapor cycles and their first law and second law efficiencies.
- To understand about the properties of dry and wet air and the principles of psychrometry
- To learn about gas dynamics of air flow and steam through nozzles.
- To learn the about reciprocating compressors with and without intercooling
- To analyze the performance of steam turbines

**Course Contents:**

**Module I: (6 Hours)**
Introduction to solid, liquid and gaseous fuels– Stoichiometry, exhaust gas analysis- First law analysis of combustion reactions- Heat calculations using enthalpy tables- Adiabatic flame temperature- Chemical equilibrium and equilibrium composition calculations using free energy.

**Module II: Standard Cycles: (8 Hours)**
Vapor power cycles, Rankine cycle with superheat, reheat and regeneration, exergy analysis. Super-critical and ultra super-critical Rankine cycle- Gas power cycles, Air standard Otto, Diesel and Dual cycles-Air standard Brayton cycle, effect of reheat, regeneration and intercooling- Combined gas and vapor power cycles- Vapor compression refrigeration cycles,

**Module III: Nozzle and Diffuser: (7 Hours)**
Basics of compressible flow. Stagnation properties, Isentropic flow of a perfect gas through a nozzle, choked flow, subsonic and supersonic flows- normal shocks- use of ideal gas tables for isentropic flow and normal shock flow- Flow of steam and refrigerant through nozzle, supersaturation- compressible flow in diffusers, efficiency of nozzle and diffuser.

**Module IV: Reciprocating Compressors: (5 Hours)**
Reciprocating compressors, staging of reciprocating compressors, optimal stage pressure ratio, effect of intercooling, minimum work for multistage reciprocating compressors.

**Module V: Steam turbines: (4 Hours)**
Analysis of steam turbines, velocity and pressure compounding of steam turbines.

**Module VI: Industrial Visit**
At least one visit up to Two days to industry in the field ofMechanical Engineering.

## Course Outcomes:

- After completing this course, the students will get a good understanding of various practical power cycles and heat pump cycles.
- They will be able to analyze energy conversion in various thermal devices such as combustors, air coolers, nozzles, diffusers, steam turbines and reciprocating compressors
- They will be able to understand phenomena occurring in high speed compressible flows.

**Examination Scheme**

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Sonntag, R. E, Borgnakke, C. and Van Wylen, G. J., 2003, 6th Edition, Fundamentals ofThermodynamics, John Wiley and Sons.
- Moran, M. J. and Shapiro, H. N., 1999, Fundamentals of Engineering Thermodynamics,John Wiley and Sons.
- Nag, P.K, 1995, Engineering Thermodynamics, Tata McGraw-Hill Publishing Co. Ltd
- S M Yahya, Fundamentals of Compressible Flow with Aircraft and Rocket Propulsion, new age nternational publishers
- P. L. Ballany, Thermal Engineering –Khanna Publishers.
- DhomkundwarKothandaraman, “A Course in Thermal Engineering”, Dhanpat Rai Publications.

# DYNAMICS OF MACHINES

**Course Code: BME 502** **Credit Units: 03**
**Total Hours: 30**

**Course Objectives:**
- To understand free and forced vibrations of single degree freedom systems.
- To analyze balancing problems in rotating and reciprocating machinery.
- To characterize and design flywheels.
- To analyze and design centrifugal governors.

**Course Contents:**

**Module I: Dynamics of Engine Mechanisms: (4 Hours)**
Displacement, velocity and acceleration of pistonturning moment on crankshaft, turning moment diagram; fluctuation of crankshaft speed, analysis of flywheel.

**Module II: Governor Mechanisms: (4 Hours)**
Types of governors, characteristics of centrifugal governors,gravity and spring controlled centrifugal governors, hunting of centrifugal governors, inertiagovernors.

**Module III: Balancing of Inertia Forces and Moments in Machines: (5 Hours)**
Balancing of rotating masses,two plane balancing, determination of balancing masses (graphical and analytical methods),balancing of rotors, balancing of internal combustion engines (single cylinder engines, in-lineengines, V-twin engines, radial engines.

**Module IV: Fundamental Aspects of Vibrations: (7 Hours)**
Vibration, main causes, advantages anddisadvantages; engineering applications of vibration and noise; vector method of representingharmonic motion; characteristics of vibration, harmonic analysis and beats phenomenon, workdone by harmonic forces on harmonic motion; periodic, non-harmonic functions- Fourier seriesanalysis; evaluation of coefficients of Fourier series; elements of vibratory system; lumped anddistributed parameter systems.

**Undamped Free Vibrations:**
Derivation of differential equation of motion: the energy method, the method based on Newton's second law of motion, and Rayleigh's method. Solution ofdifferential equation of motion: Natural frequency of vibration. Systems involving angularoscillations: the compound pendulum.

**Module V: Damped Free Vibrations: (5 Hours)**
Viscous damping: coefficient of damping; damping ratio, under damped, over damped and critically damped systems; logarithmic decrement; frequencyof damped free vibration; Coulomb or dry friction damping; frequency, decay rate andcomparison of viscous and Coulomb damping; solid and structural damping; slip or interfacialdamping.

**Module VI: Harmonically excited Vibration: (5 Hours)**
One degree of freedom- forced harmonic vibration, vector representation of forces; excitation due to rotating and reciprocating unbalance; vibration isolation, force and motion transmissibility; absolute and relative motion of mass (SeismicInstruments ).

## Course Outcome:
Upon completion of this course, students will be able to understand the principles of fluid statics and kinematics, mathematically analyze simple flow situations, measurement of flow rates and dimensional analysis of model studies.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:


- Ambekar, AG; Mechanism and Machine Theory; PHI
- Rattan SS; Theory of machines; TMH
- Sharma and Purohit; Design of Machine elements; PHI
- Bevan; Theory of Machines;
- Ghosh and Mallik; Theory of Mechanisms and Machines; Affiliated East-West Press, Delhi
- Norton RL; kinematics and dynamics of machinery; TMH
- Ambekar A.G.,' Mechanical Vibrations and Noise Engineering; PHI
- Thomson , W.T., Theory of Vibration with Applications , C.B.S Pub & distributors .
- Singiresu Rao, "Mechanical Vibrations , Pearson Education .
- G.K. Grover, " Mechanical Vibration , Nemchand and Bross , Roorkee

# MACHINE DESIGN – I

**Course Code: BME 503** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The objective of this course is to help students apply concepts learned in the mechanics, structure, material and manufacturing courses. This course offers working knowledge in the use of proper failure theories under steady and variable loading, design of mechanical elements, such as shaft, coupling, power screws, and detachable, permanent and welded connections.

**Course Contents:**

**Module I: Variable stresses in Machine Parts: (5 Hours)**
Fatigue and Endurance Limit, Factor of Safety for Fatigue Loading, Stress concentration, Notch sensitivity, Gerber Method, Goodman Method and Soderberg Method for combination of stresses.

**Module II: Power Screws: (5 Hours)**
Types of screw threads, Torque required to raise and lower the load, Efficiency of square threaded screw, overhauling and self locking screw, stresses in power screw, design of screw jack.

**Module III: Cotter and Knuckle Joints: (5 Hours)**
Types of cotter joints, design of socket and spigot joint, design of sleeve and cotter joint, design of jib and cotter joint, Design procedure of Knuckle joint.

**Module IV: Riveted and Welded Joint: (5 Hours)**
Types of Riveted joint, Lap joint , Butt Joint, Caulking and Fullering, Failure of Riveted joint, Strength of Riveted joint, Efficiency of Riveted joint. Advantages and Disadvantages of welded joint over Riveted joint, Strength of Fillet joint, strength of Butt joints.

**Module V: Keys and Couplings: (5 Hours)**
Types of Keys, Splines, Strength of Sunk Key, types of shaft coupling, Sleeve and muff coupling, Flange coupling, Flexible coupling, Oldham coupling, Universal coupling.

**Module VI: Drives: (5 Hours)**
Types of Belt drives, Flat Belt drives, Velocity ratio, Sleep, Creep of Belt, Length of open Belt, length of cross belt, power transmission by belt, Maximum tension in the belt. Types of V belt and Pulleys, advantages and disadvantages of V belt over Flat Belt, Ratio of Driving tensions for V belt, Rope drives. Chain drives, advantages and disadvantages of Chain drives.

## Course Outcome:
Upon completion of this course, students will get an overview of the design methodologies employed for the design of various machine components.

**Examination Scheme:**

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

- J.E. Shigley, Mechanical Engineering Design.
- Sadhu Singh, Machine Design
- R.S. Khurmi& J.K. Gupta, Machine design
- D.K. Aggarwal & P.C. Sharma, Machine Design.
- Deutschman, D., Michels, W.J. and Wilson, C.E., Machine Design Theory and Practice, Macmillan,1992.
- Juvinal, R.C., Fundamentals of Machine Component Design, John Wiley,1994.
- Spottes, M.F., Design of Machine elements, Prentice-Hall India,1994.
- R. L. Norton, Mechanical Design – An Integrated Approach, Prentice Hall,1998.

# MEASUREMENT AND CONTROL

**Course Code: BME 504** **Credit Units: 03**
**Total Hours: 30**

## Course Objectives:

- To impart knowledge of architecture of the measurement system.
- To deliver working principle of mechanical measurement system.
- To study concept of mathematical modeling of the control system.
- To analyze control system under different time domain.

**Course Contents:**

**Module I: (6 Hours)**
Significance of Mechanical Measurements, Classification of measuring instruments, generalized measurement system, types of inputs: Desired, interfering and modifying inputs. Static characteristics: Static calibration, Linearity, Static Sensitivity, Accuracy, Static error, Precision, Reproducibility, Threshold, Resolution, Hysteresis, Drift, Span & Range etc.

**Module II: (7 Hours)**
Displacement Measurement: Transducers for displacement, displacement measurement, potentiometer, LVDT, Capacitance Types, Digital Transducers (optical encoder), Nozzle Flapper Transducer. Measurement of Angular Velocity: Tachometers, Tachogenerators, Digital tachometers and Stroboscopic Methods.Acceleration Measurement, theory of accelerometer and vibrometers, practical accelerometers, strain gauge based and piezoelectric accelerometers.

**Module III: (7 Hours)**
Pressure Measurement: Elastic pressure transducers viz. Bourdon tubes, diaphragm, bellows and piezoelectric pressure sensors, High Pressure Measurements, Bridge man gauge. Vacuum measurement: Vacuum gauges viz. McLeod gauge, Ionization and Thermal Conductivity gauges. Flow Measurement: Bernoullis flowmeters, Ultrasonic Flowmeter, Magnetic flow meter, rotameter. Temperature Measurement: Electrical methods of temperature measurement Resistance thermometers, Thermistors and thermocouples, Pyrometers.

**Module IV: (5 Hours)**
Strain Measurement: Theory of Strain Gauges, gauge factor, temperature Compensation, Bridge circuit, orientation of strain gauges for force and torque, Strain gauge based load cells and torque sensors

**Module V: (5 Hours)**
Introduction to control systems.Classification of control system. Open loop and closed loop systems. Mathematical modeling of control systems, concept of transfer function, Block diagram algebra.

## Course Outcomes:

After completing this course, the students will be able to

- Identify and select proper measuring instrument for specific application.
- Illustrate working principle of measuring instruments.
- Explain calibration methodology and error analysis related to measuring instruments.
- Mathematically model and analyze system/process for standard input responses.

**Examination Scheme:**

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- A.K. Sawhney (Author), Puneet Sawhney, A Course in Mechanical Measurements and Instrumentation & Control, Dhanpat Rai Publications.
- Thomas Beckwith, N.Lewis Buck, Roy Marangoni, Mechanical Engineering Measurement - -Narosa Publishing House, Bombay
- R. S. Sirohi, H. C. Radha Krishna, Mechanical Measurements, New Age Publishers, 1991.
- Experimental Methods for Engineers - J. P. Holman.- McGraw Hills Int. Edition.
- Control System Engineering: by Nagrath IJ. and Gopal .M., Wiley EasternLtd.
- Modem Control Engineering: by K.Ogata, Prentice Hall.

# METROLOGY

**Course Code: BME 505** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The main objective of this course is to give the student: a basic understanding of the physical loss governing metrology and tolerance design. Gain and appreciation for the capabilities and applications of metrology through hands own experiences.

**Course Contents:**

**Module I: Principles of Measurement: (8 Hours)**
Definition of metrology, difference between precision and accuracy. Sources of errors: Controllable and Random Errors, Effects of Environment and Temperature, Effects of support, alignment errors.
**Length Standards:** Line standards, end standards and wavelength standards, transfer from line standards to end standards. Numerical based on line standards. Slip gauges – its use and care, methods of building different heights using different sets of slip gauges.
**Limits, fits and tolerances:** Various definitions, different types of fits and methods to provide these fits. Numerical to calculate the limits, fits and tolerances, ISO system of limits and fits; Gauges and its types, limit gauges – plug and ring gauges. Gauge Design – Taylor's Principle, wear allowance on gauges.

**Module II: Comparators: (7 Hours)**
Principles and working of Mechanical, Electrical, Optical and Pneumatic Comparators.
**Angular Measurement:** Sine Bar – different types of sine bars, use of sine bars in conjunction with slip gauges, Use of angle gauges, spirit level, errors in use of sine bars. Numericals.Principle and working of autocollimator.

**Module III: Straightness and flatness: (8 Hours)**
Definition of Straightness and Flatness error.Numericals based on determination of straightness error of straight edge with the help of spirit level and auto collimator
**Screw Thread Measurement:** Errors in threads, Measurement of elements of screw threads –major diameter, minor diameter, pitch, flank angle and effective diameter (Two and three wire methods). Effect of errors in pitch and flank angles
**Gear Measurement:** Measurement of tooth thickness – Gear tooth vernier caliper, Constant chord method, base tangent method and derivation of mathematical formulae for each method.Parkinson Gear Tester.

**Module IV: Machine Tool Alignment: (7 Hours)**
Machine tool tests and alignment tests on lathe. Alignment tests on milling machine. Alignment tests on a radial drilling machine, Interferometry.
**Surface texture:** Introduction, types of irregularities, Elements of surface, Texture, Measurement of surface finish, Examination of surface Roughness.

## Course Outcome:
Upon completion of this course, students will be able to the tooling needed formanufacturing, the dimensional accuracy and tolerances of products, assembly of differentcomponents and the application of optimization methods in manufacturing.

**Examination Scheme:**

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

- R.K. Jain, "Engineering Metrology", Khanna Publishers, Delhi
- I.C. Gupta, "Engineering Metrology", Dhanpat Rai Publications, Delhi
- F.W. Galyer & C.R. Shotbolt, "Metrology for Engineers", ELBS edition.

# DYNAMICS OF MACHINE LAB

**Course Code: BME 522** **Credit Units: 01**
**Total Hours: 20**

**Course Objectives:**

- To identify the essential system properties and physically visualize the concepts of frequency and time period of vibrations under free vibration.
- To explain the mechanism of forced vibration to analyze the damping properties.
- Evaluate the mechanism of forced vibration to analyze the different mode shapes and critical speed of shaft.

**Course Contents:**

**List of Experiment: (Any 10):**
**Time allocated for experiments is 2 Hours each.**

1. Study of various models of governors.
2. Study of gyroscopic motion and calculation of value of gyroscopic couple.
3. Study of various types of Cams and followers and drawing the cam profile with the help oftest kit.
4. Determination of static and dynamic unbalances.
5. Balancing the apparatus statically and dynamically.
6. Study of various first order vibration systems.
7. To find out frequency of damped free vibration and rate of decay of vibration-amplitude inthe system.
8. To observe the phenomenon of whirl in a horizontal light shaft and to determine the critical speed of the shaft.
9. To demonstrate universal vibration apparatus.
10. To demonstrate natural undammed free vibration on universal vibration apparatus.
11. To demonstrate dammed forced vibration on universal vibration apparatus.

## Laboratory Outcome:

After completion of course student will develop practical understanding and applications of fundamental concept of frequency and time period of vibrations under free vibration, critical speed of shaft, functioning of governor, cams & followers and gyroscopic couples.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

# MEASUREMENT AND CONTROL LAB

**Course Code: BME 524** **Credit Units: 01**
**Total Hours: 20**

**Course Objectives:**

- To demonstrate the use of different sensors, strain gauges and inclinometers.
- Calibration of measuring sensors and instruments.

**Course Contents:**

**List of Experiments: (Any 10)**
**Time allocated for experiments is 2 Hours each.**

1. Measurement of resolution and sensitivity of thermocouple (study of various thermocouples J, K, T, etc.) (Calibration)
2. Measurement of resolution, sensitivity and non linearity of termistor. (termistor instability)
3. Measurement of thickness of LVDT.
4. Measurement of resolution of LVDT (and displacement measurement)
5. Study of proportional control and offset Problems.
6. Study of proportional integral control.
7. Study of proportional integral derivative (PID) control.
8. Vibration measurement by stroboscope (natural frequency of a cantilever)
9. Angular frequency (speed of rotating objects) measurement by stroboscope.
10. Pressure transducer study and calibration.
11. Proving ring (force measurement)
12. Torque cell.
13. Closed loop study of an electric circuit.
14. Young's modulus of a cantilever.
15. Young's modulus and poison's ratio of tensile test piece of M.S.

## Laboratory Outcome:

Students will be able to select proper measuring instrument and know requirement of calibration, errors in measurement etc. They can perform accurate measurements.

### Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| A | PR | LR | V | PR | V |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# METROLOGY LAB

**Course Code: BME 525** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
Objective of this course is designed for measuring and gauging instruments for inspection of precision linear, geometric forms, angular and surface finish measurements. The student can learn the measurements with and calibration of instruments.

**Course Contents:**

**List of Experiments: (Any 10)**
**Time allocated for experiments is 2 Hours each.**

1 Set up a dimension by slip gauges (example 36.936; 14.727…..) Measure this set up by micrometer (least count 0.01) several times and read dimensions. Find statistical mean and record the expected variation between the actual dimension and dimension measured by micrometer.

2 To check the roundness of a circular bar with the help of dial gauge.

3 Mill a component to dimension (23, 57.6,…). Set up a comparator by slip gauge set to this dimension. Check component deviation by the comparator and record the deviation. Measure several times and obtain the mean value.

4 Check the bore in a component by a bore-indicator. Set the bore indicator by micrometer and measure the deviation in the bore. Measure several times and obtain the mean value at three positions along the length of the bore.

5 Set – up a sine bar for measuring the angle of an inclined surface (of a bracket, milling cutter arbor with 7/24 taper, ….). Measure the angle several times and record the mean value. Use height gauge wherever necessary.

6 Check angular dimension of a dovetail guide way by measuring across rollers.
Check the included angle of a V – block (90º, 60º, …) / or a machined groove by measuring over a roller using height gauge and parallel blocks/slip gauges.

7 Measure the straightness of a surface (surface plate; guide way of machine tool) by using straight edge and dial gauge and dial gauge stand. Set up straight edge on jacks such that dial reading at each end coincide. Move the dial stand along the straight edge. Record readings at 50 mm interval and draw a plot. Obtain maximum deviation which is the straightness.

8 Measure straightness using a spirit level. Place spirit level at an initial position and note level reading. Move the level on a straight line and take readings at 50 mm intervals. Plot the difference from the original reading and obtain the straightness value.

9 Draw a trapezoidal and any other profile in AutoCAD to 1:1 scale. On a steel plate make the profile by fitting and filing. Set up the drawing on profile projector. Check the component and note deviations. Correct the profile and recheck. Make the profile as close to the required one.

10 To machine a given surface and study its roughness characteristics

11 To measure the geometry of a screw using profile projector

12 To study the cutting tool geometry using tool makers microscope

## Laboratory Outcomes:
Student will become familiar with the different instruments that are available for linear, angular, roundness and roughness measurements they will be able to select and use the appropriate measuring instrument according to a specific requirement (in terms of accuracy, etc.)

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# COMMUNICATION SKILLS – V

**Course Code: BCU 541** **Credit Units: 01**
**Total Hours: 10**

**Course Objective:**

- To enable the students to adopt strategies for effective reading and writing skills.
- The course would enhance student's vocabulary, language and fluency. It would also teach the students to deliver professional presentations.

**Prerequisites:** NIL

| **Course Contents / Syllabus:** | | |
|---|---|---|
| **1.** | **Module I Vocabulary**<br>• Define Vocabulary<br>• Significance of Vocabulary<br>• One Word Substitution, Synonyms & Antonyms and Idioms & Phrases<br>• Define and Differentiate Homonyms, Homophones and Homographs<br>• Vocabulary Drills<br>• Foreign Words | **35% Weightage** |
| **2.** | **Module II Comprehension Skills**<br>• Reading Comprehension-SQ3R Reading Techniques<br>• Summarising and Paraphrasing<br>• Précis Writing<br>• Listening Comprehension | **25% Weightage** |
| **3.** | **Module III Presentation Skills**<br>• Discussing the Significance of Audio-visual Aids, Audience and Feedback in Presentation Skills<br>• Analyzing the Significance of Non-Verbal Communication | **30% Weightage** |
| **4.** | **Module IV Prose**<br>• How Far is the River-Ruskin Bond<br>• My Wood-E.M.Forster<br>• I have a Dream-Martin Luther King<br>• Spoken English and Broken English-G.B. Shaw | **10% Weightage** |
| **5.** | **Student Learning Outcomes:**<br>• Communicate fluently and sustain comprehension of an extended discourse.<br>• Demonstrate ability to interpret texts and observe the rules of good writing.<br>• Prepare and present effective presentations aided by ICT tools. | |
| 6. | **Pedagogy for Course Delivery:** Workshop<br>• Group Discussions<br>• Presentations<br>• Lectures | |
| **7.** | **Assessment/ Examination Scheme:** (see tables below) | |

**Assessment/ Examination Scheme:**

| **Theory L/T (%)** | **Lab/Practical/Studio (%)** | **End Term Examination** |
|---|---|---|
| 100% | NA | 70% |

**Theory Assessment (L&T):**

| **Components (Drop down)** | CIE | Mid Sem | Attendance | **End Term Examination** |
|---|---|---|---|---|
| **Weightage (%)** | 10% | 15% | 5% | 70% |

**Text:Jaffe, C.I. Public Speaking: Concepts and Skills for a Diverse Society, 4th ed. Belmont, CA: Wadsworth, 2004.**
**Effective English for Engineering Students, B Cauveri, Macmillan India**
***Creative English for Communication*, Krishnaswamy N, Macmillan**
**Reference: *A Textbook of English Phonetics*, Balasubramanian T, Macmillan**

**Additional Reading: Newspapers and Journals**

# BEHAVIOURAL SCIENCE – V

**Course Code: BSU 543** **Credit Units: 01**
**Total Hours: 10**

**Course Objective:**
- To inculcate in the students an elementary level of understanding of group/team functions
- To develop team spirit and to know the importance of working in teams

**Course Contents:**

**Module I: Group formation: (02 Hours)**
- Definition and Characteristics
- Importance of groups
- Classification of groups
- Stages of group formation
- Benefits of group formation

**Module II: Group Functions: (02 Hours)**
- External Conditions affecting group functioning: Authority, Structure, Org. Resources, Organizational policies etc.
- Internal conditions affecting group functioning: Roles, Norms, Conformity, Status, Cohesiveness, Size, Inter group conflict.
- Group Cohesiveness and Group Conflict
- Adjustment in Groups

**Module III: Teams: (02 Hours)**
- Meaning and nature of teams
- External and internal factors effecting team
- Building Effective Teams
- Consensus Building
- Collaboration

**Module IV:Leadership: (02 Hours)**
- Meaning, Nature and Functions
- Self leadership
- Leadership styles in organization
- Leadership in Teams

**Module V: Power to empower: Individual and Teams: (02 Hours)**
- Meaning and Nature
- Types of power
- Relevance in organization and Society

## Student learning outcomes
- Students will Develop critical and reflective thinking abilities
- Students will Demonstrate an understanding of group dynamics and effective teamwork
- Student will develop a range of leadership skills and abilities such as effectively leading change, resolving conflict, and motivating others
- Student will Gain knowledge and understanding of organization resources, policies, and involvement opportunities.
- Student will Develop strategies to recruit, retain, and continually motivate contributing members to the organization

**Examination Scheme:**

| Evaluation Components | Attendance | Journal of Success (JOS) | Social Awareness Program (SAP) SAP Report/SAP Presentation | End Semester Exam | Total |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 15 | 70 | 100 |

## Suggested Readings:


- Organizational Behaviour, Davis, K.
- Hoover, Judhith D. Effective Small Group and Team Communication, 2002, Harcourt College Publishers
- Dick, Mc Cann & Margerison, Charles: Team Management, 1992 Edition, viva books
- Bates, A. P. and Julian, J.: Sociology - Understanding Social Behaviour
- Dressers, David and Cans, Donald: The Study of Human Interaction
- Lapiere, Richard. T – Social Change
- Lindzey, G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology, Addison – Welsley, US.
- Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.
- LaFasto and Larson: When Teams Work Best, 2001, Response Books (Sage), New Delhi
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 2, Group (1996); Pfeiffer & Company
- Smither Robert D.; The Psychology of Work and Human Performance, 1994, Harper Collins College Publishers.

# FRENCH – V

**Course Code: FLU 544** **Credit Units: 02**
**Total Hours: 20**

**Course Objective:**
To strengthen the language of the students in both oral and written
To revise the grammar in application and the communication tasks related to topics covered already
To get acquainted with the current social communication skills, oral (dialogue, telephone conversations, etc.) and written and perform simple communication tasks such as

- narrating events in the past, marking the stages, using appropriate connectors
- expressing causes and consequences, using appropriate logical connectors
- present in gabiography

**Course Contents:**
**Dossier8–Pg75-84Dossiers4,5and6(révision) Dossier8:Vivre ensemble**
**Actesde Communication:**
Exprimerlacause,l'opposition,laconséquence,décrirelesétapesd'uneaction,s'exprimersurl'environnement, l'écologie, identifieret décrirelesdifférencesde comportement, décrire le fonctionnementd'une association, fairela biographied'une personne.

**Dossiers4, 5,6–Révision**
Exercicesd'écoute,productionorale et écrite.

**Grammaire :**
1. le présent (révision),lepassé composé(révision)
2. lespronomscomplémentsdirects,lespronomscompléments indirects
3. lesmarqueurschronologiques
4. lesarticulateurslogiques

**ExaminationScheme:**

| | INTERNAL | | | | EXTERNAL | GRAND TOTAL |
|---|---|---|---|---|---|---|
| **Components** | MID-SEM | VIVA-VOCE | ATTENDANCE | **TOTAL** | **END SEMESTER** | |
| **Weightage (%)** | 15 | 10 | 5 | **30** | **70** | **100** |

## Text &References:

***Text:***
**Le livre àsuivre:**
· Andant,Christineet al.A proposA1Livre del'élève.Grenoble:Pressesuniversitairesde Grenoble,2010.
· Andant,Christineet al.A proposA1Cahierd'exercices.Grenoble:Pressesuniversitairesde Grenoble,2010.

***Références:***
· Girardeau,Brunoet NellyMous.Réussirle DELFA1.Paris:Didier,2010.

# INDUSTRIAL PRACTICAL TRAINING – I

**Course Code: NPT 550** **Credit Units: 03**

**Course Objective:**

This course will enable the students to explore the preferred field of specialization and develop analytical / hardware / software / experimental / observation skills. It will help them to manage the technical content and work. It will also help them to prepare and present technical report.

**Methodology:**

Practical training is based on the theoretical subjects studied by students. It can be arranged within the college or in any related industrial unit. The students are to learn various industrial, technical and administrative processes followed in the industry. In case of on-campus training the students will be given specific task of fabrication/assembly/testing/analysis. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation on same.

**Examination Scheme:**

| | |
|---|---|
| Feedback from industry/work place | 20 |
| Training Report | 40 |
| Viva | 15 |
| Presentation | 25 |
| **Total** | **100** |

## Course Outcome:

After successful completion of the course, the students will be able to

- Explore the preferred field of specialization and develop analytical / hardware / software / experimental / observation skills.
- Manage the technical content and work.
- Learn the various administrative process followed in industry.
- Prepare and present technical report.

# FLUID POWER SYSTEMS

**Course Code: BME 601** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
Fluid power systems cover generation, transmission, and control applications of power by using pressurized fluids. This course imparts the knowledge of different fluid power systems (pneumatic and hydraulic) which are used in industries and hydropower plants.

**Course Contents:**

**Module I: Introduction: (6 Hours)**
Euler turbine equation, theory of rotodynamic machines; various efficiencies, impulse and reaction forces due to fluid systems on stationery and moving system of vanes.

**Module II: WaterTurbines: (7 Hours)**
Classification of water turbines, head and efficiencies, velocity triangles- Axial, radial and mixed flow turbines-Pelton wheel, Francis turbine and Kaplan turbines, working principles, draft tube, performance curves for turbines.

**Module III: Water Pumps: (4 Hours)**
Centrifugal pumps, working principle, velocity triangles, work done by the impeller, reciprocating pumps, working principle, efficiency.

**Module IV: Performance of Fluid Machines: (4 Hours)**
Similarity laws applied to rotodynamic machines; specific speed, unit quantities; characteristic curves; use of models; cavitations and attendant problems in turbo machines; selection of turbines hydroelectric plants.

**Module V: HydraulicPower Transmission: (5 Hours)**
Transmission of hydraulic power through pipe lines; water hammer; precautions against water hammer in turbine and pump installations.

**Module VI: PowerHydraulics: (4 Hours)**
Positive pumps: gear, vane, screw pump, variable delivery valves: solenoid operated valve, hydraulic press, hydraulic ram, fluid coupling and torque converter.

## Course Outcome:
Upon the completion of this course students will be able to apply basic principles to fluid flow problems and to evaluate performance of hydraulic machines (turbines and pumps).

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:

- Gupta, S. C., Fluid Mechanics and Hydraulic Machines, Pearson Education, 2007
- R.K. Bansal, “Fluid Mechanics & Hydraulic Machines”, Laxmi Publications (P) Ltd., 2002.
- Dr. D.S. Kumar, “Fluid Mechanics & Fluid Power Engineering”, S.K. Kataria & Sons,2001
- D.R. Malhotra & N.K. Malhotra, “The Fluid Mech. & Hydraulics”, Satya Prakashan, 2001
- V.P. Gupta, Alam Singh, Manish Gupta, “Fluid Mechanics, Fluid Mechanics & Hydraulics”, CBS Publishers; 1999.

# IC ENGINE &GAS TURBINE

**Course Code: BME 602** **Credit Units: 03**
**Total Hours: 30**

**Course Objectives:**

- To familiarize with the terminology associated with IC engines.
- To understand the basics of IC engines.
- To understand combustion, and various parameters and variables affecting it in varioustypes of IC engines.
- To learn about various systems used in IC engines and the type of IC engine required forvarious applications.

**Course Contents:**

**Module I: Fundamentals: (5 Hours)**
Introduction to I. C Engine-Classification-Components- Indicator diagram, comparison of SI and CI engine, two-stroke and four-stroke engine, Valve timing diagram of SI and CI engine.

**Module II: Air Standard Cycle: (6 Hours)**
Assumptions in air standard cycle & fuel-air cycle, fuel-air cycle calculations, factors influencing fuel-air cycle, effects of variable specific heats, dissociation.

**Module III: Fuel and Combustion: (8 Hours)**
Combustion of SI engine, ignition limits, normal combustion, abnormal combustion, effect of engine Variable in ignition lag, spark advance and factors affecting ignition timing, pre-ignition, theory, and factors affecting detonation, PN, HUCR. Combustion in CI engine, fundamentals ofcombustion process in Diesel engine, delay period, diesel knock, and cold starting of CI engine. IC engine Fuel, combustion equations, theoretical air and excess air, stoichiometric air fuel ratio, desirable Properties of good IC engine fuels knock rating of SI engine fuel.

**Module IV: Performance & Testing: (6 Hours)**
Testing and performance of IC engine, performance parameters, basic measurement, engine Performance curve, fuel consumption, load outputs, engine power, heat balance.

**Module V: Gas Turbine: (5 Hours)**
General aspect of gas turbine, Jules cycle, Brayton cycle, classification, merits of gas turbine, open- cycle gas turbine, closed cycle gas turbine, Inter cooling, Reheating, Re-generation in gas turbine.

## Course Outcomes:

- Understand working and performance of IC Engines through thermodynamic cycles.
- Understand combustion phenomena in SI and CI engines and factors influencing combustion chamber design.
- Outline emission formation mechanism of IC engines, its effects and the legislation standards.
- Understand working principles of instrumentation used for engine performance and emission parameters.
- Evaluate methods for improving the IC engine performance.
- Understand the latest developments in IC Engines and alternate fuels.

**Examination Scheme:**

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Ganesan, V. Internal Combustion Engine, Tata McGraw-Hill.
- J. B Heywood, Internal Combustion Engine Fundamentals, McGraw Hill
- Vladimir Leonidas Maleev. Internal-combustion Engines, Theory and Design. McGraw-Hill.
- Mathur, M.L. and Sharma, R.P. Internal Combustion Engine. Dhanpat Rai Publication
- Lester Clyde Lichty, Robert Leroy Streeter. Internal Combustion Engines, McGraw-Hill
- Wallace Ludwig Lind. Internal-combustion Engines: Their Principles and Applications to Automobile, Aircraft, Ginn
- Edward Frederic Obert, Burgess Hill Jennings, Internal Combustion Engines: Analysis and Practice
- Joseph Albert Polson. Internal Combustion Engines, Chapman & Hall, limited

# MACHINE DESIGN – II

**Course Code: BME 603** | **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The course aims at developing concepts as to how to analyze mechanical systems and select proper machine elements (bearing, gears, belts, chains). It prepares the students how to design machine element by specifying their type, geometry, material and how to integrate these elements to build a mechanical system.

**Course Contents:**

**Module I: Introduction: (5 Hours)**
Introduction: Different theories of failure and design based on theories. Design for fatigue, design for creep and design for wear and corrosion.

**Module II: Belt and Chain drives: (5 Hours)**
Belt Drives: Types of Belt drives, Flat Belt drives, Velocity ratio, Creep of Belt, Length of open Belt, length of cross belt. Power transmission by belt, Maximum tension in the belt. Types of V belt and Pulleys, advantages and disadvantages of V belt over Flat Belt. Ratio of driving tensions for V belt, Rope drives. Chain drives, advantages and disadvantages of Chain drives.

**Module III: Brakes and Clutches Brakes: (5 Hours)**
Types, Design of shoe brakes, and Design of Band and Disc Brakes. Clutches: Types, Plate clutches –design for uniform pressure and wear.

**Module IV: Bearings: (5 Hours)**
Design of Bearings: Brief overview of bearings, Design of Fluid Film bearings and Rolling contact bearings. Types of sliding bearing. Materials, type of lubrication, design of sliding bearing. Selection and application of rolling bearing, seals.

**Module V: - Gears: (5 Hours)**
Design of Gears: Law of gearing -conjugate action and gear tooth profile-basics Analysis of forces on spur, helical, bevel and worm gears. Design procedure of various gears.

**Module VI: - Engine Parts: (5 Hours)**
Design of Engine parts: Design of cylinder and cylinder head, Design of Piston.

## Course Outcome:
Upon completing this course, the students will be able to design transmission systems for engines and machines.

**Examination Scheme:**

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text& References:

- Maleeve Hartman and O.P. Grover, “Machine Design”, CBS Publication & Publishers.
- V.B Bhandari, “Machine Design”, Tata McGraw Hill.
- P.C. Sharma and D.K Aggarwal., “Machine Design”, S.K. Kataria& Sons.
- Mahadevan, “Design Data Book”, CBS Publication & Publisher

# MANUFACTURING TECHNOLOGY

**Course Code: BME 604** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
Metal cutting involves removing metal through machining operations. Machining traditionally takes place on lathes, drill presses, and milling machines with the use of various cutting tools. Successful machining also requires knowledge about the material being cut. This course is designed in such way that it explains all aspects (process and tools) of metal cutting. The course also covers the common tooling setups and operations as well as specialized applications for the more experienced users.

**Course Contents:**

**Module I: Introduction: (4 Hours)**
Basic shape of cutting tools, Function of different angles of cutting tools, tool geometry and Nomenclatures-ASA, ORS systems, Conversion of angles, Tool Materials.

**Module II: Mechanism of Chip Formation: (5 Hours)**
Fracture & yielding mechanism, Types of chips, Factors involved in chip formation analysis, shear plane in flat chips, chip formation in drilling and milling.

**Module III: Mechanism of Metal Cutting: (6 Hours)**
Force system during turning, merchant circle diagram, velocity relationship, stress in conventional shear plane, Energy of cutting process, Ernst& merchant angle relationship, Lee-Shafer relationship, measurement of forces, Heat generation and temperature distribution in metal cutting.

**Module IV: Theory of Tool Wears: (5 Hours)**
Criteria of wear, machinability and tool life, Flank wear, Crater wear, Taylor's tool life equation, causes and mechanism of tool failure, cutting fluid, Economics of metal machining.

**Module V: Design for Sheet Metal Works: (5 Hours)**
Press working Terminology, press operation, types of dies, clearance, cutting forces, methods of reducing cutting forces, minimum diameter of piercing, center of pressure, Drawing dies-blank diameter, drawing force.

**Module VI: Jigs and Fixture Design: (5 Hours)**
Important considerations in jig and fixture design, Locating and clamping, principles for location purposes, principles for clamping purposes, design principles for jigs and fixtures.

## Course Outcome:
Upon completion of this course, students will be able to the tooling needed for manufacturing, assembly of different components and the application of optimization methods in manufacturing.

### Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

- A Bhattacharya , "Metal cutting theory& practice", C.B. Publication
- Geoffrey Boothroyd, "Fundamentals of Metal Machining & Machine Tools", Tata McGraw Hill Kogakusha Ltd.
- P.N. Rao, "Manufacturing Technology", Tata McGraw Hill Publication Ltd.
- Dr. P.C. Pandey & C.K. Singh, "Production Engg. Sciences", Standard Publisher. Distributors.
- Dr. B.J. Ranganath, "Metal Cutting & Tool Design" Vikas Publishing House Pvt. Ltd.

# FLUID POWER SYSTEMS LAB

**Course Code: BME 621** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
The objective of this course is to help students in understanding the working principle, construction and performance characteristics of hydraulic turbines and hydraulic pumps, understanding the cavitation phenomenon and frictional losses in a fluid flow.

**Course Contents:**

**List of experiments/demonstrations:**

1. To conduct a test on Centrifugal Pump and plot its characteristics**: (3 Hours)**
2. To Plot the characteristics of Pelton turbine**: (3 Hours)**
3. To conducts an experiment on Francis turbine**: (2 Hours)**
4. To study the effect of a draft tube on reaction turbines**: (2 Hours)**
5. To find the friction factor for flow through pipes**: (2 Hours)**
6. To study the hydraulic controls rig**: (2 Hours)**
7. To conduct an experiment for verifying model laws**: (2 Hours)**
8. To study the cavitation phenomenon in turbines**: (2Hours)**
9. Study of hydraulic couplings and torque converters**: (2 Hours)**

## Laboratory Outcome:
After the completion of course student will be able to measure the performance of pumps and turbines. Students will be able to understand the cavitation and water hammering.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

# IC ENGINE & GAS TURBINE LAB

**Course Code: BME 622** **Credit Units: 01**
**Total Hours: 20**

**Course Objectives:**
- To describe the performance and operating characteristics of Internal Combustion Engines.
- To explain the parts and complete knowledge of type of fuels used in IC engines and the fuel supply systems.
- To describe combustion process phenomena in IC engines.
- To explain the different methods of performance analysis of IC engines.
- To explain the effects of exhaust emission on human health and different pollution norms.

**Course Contents:**

**List of Experiments:**

1. Load test on Diesel Engine**: (3 Hours)**
2. Testing and performance of IC engines using Morse Test**: (3 Hours)**
3. Prepare the heat balance sheet for Diesel Engine test rig**: (2 Hours)**
4. Prepare the heat balance sheet for Petrol Engine test rig**: (2 Hours)**
5. Study of Fuel Injection system in SI Engine**: (2 Hours)**
6. Study of lubricating system in CI Engines**: (2 Hours)**
7. Study of Battery Ignition system and Electronic Ignition System**: (2 Hours)**
8. Study of a Carburetors**: (2 Hours)**
9. Study of Gas Turbine Model**: (2 Hours)**

## Laboratory Outcomes:
- Identify the various types of I.C. Engines and Cycles of operation.
- Express the effect of various operating variables on engine performance
- Demonstration of fuel metering and fuel supply systems for different types of engines
- Analyze & Justify the suitability of conventional and non-conventional fuels for IC engines
- Understand the effects of emission formation of IC engines, its effects and the legislation standards.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# MACHINE DESIGN LAB – II

**Course Code: BME 623** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**

It prepares the students how to design machine element by specifying their type, geometry, material and how to integrate these elements to build a mechanical system.

**Course Contents:**

**List of Experiments/demonstrations:**

1. Design and drawing of automotive transmission**: (3 Hours)**
2. Design and drawing of brakes**: (3 Hours)**
3. Design and drawing of clutches**: (2 Hours)**
4. Design and drawing of connecting rod**: (2 Hours)**
5. Design and drawing of I.C. engine piston**: (2 Hours)**
6. Design and drawing of connecting rod**: (2 Hours)**
7. Design and drawing of hydraulic rivet**: (2 Hours)**
8. Design and drawing of mechanical hoist**: (2 Hours)**
9. Design and drawing of Gears**: (2 Hours)**

## Laboratory Outcome:

The students will able to design transmission systems for engines and machines.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

# MECHATRONICS

**Course Code: BME 606** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
Mechatronics is basically combination of mechanical and electronics engineering. With growing demands of automation of different mechanical operation this subject full fills the needs. Main objective of this course is to provide knowledge of different combinations of mechanical and electronics processes and various software using in it.

**Course Contents:**

**Module I: Introduction: (6 Hours)**
Measurement systems control systems, Microprocessor-based controllers, Classification, characteristics and calibration of different sensors and transducers, Signal conditioning processes.

**Module II: Actuation Systems: (6 Hours)**
Pneumatic and hydraulic actuation systems, Directional control valves, pressure control valves, process control valves.

**Module III: System Models: (6 Hours)**
Mathematical models, Mechanical system building blocks, modeling dynamic systems, First order systems, second order systems.

**Module IV: Principles of Feedback & Intelligent Control: (6 Hours)**
Control Systems, Open & Closed loop control Systems, Controllers, and Artificial Neural Network.

**Module V: Programmable Logic Controllers: (6 Hours)**
Architecture of Programmable Logic Controllers, input / output modules, programming methods, timers and counters, Master control, Analog input/output.

## Course Outcomes:

- Identify the elements of mechatronics system.
- Select suitable sensors, actuators and controllers to meet specific requirements.
- Demonstrate intelligent mechatronics system for engineering applications.

**Examination Scheme:**

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance.

## Text & References:


- W. Bolton, “Mechatronics”, Pearson Education Ltd., 2003.
- Mohammad Ali Mazidi Janice Gillispier Mazidi, “The 8051 Microcontroller”, Pearson Education Inc., 2004.
- Gary Dunning, “Introduction to Programmable Logic Controllers”, Thomson Asia P. Ltd., Singapore, 1998.
- Gopal K. Dubey, “Fundamentals of Electrical Drives”, Narosa Publishing House, 2001.
- Charles H. Roth, “Jr. Fundamentals of Logic Design”, Jaico Publishing House, 2001.
- "HMT Mechatronics”, Tata McGraw Hill Publishing Co. Ltd., 2001.
- Devdas Shetty, Richard A. Kolk “Mechatronics System Design”, Thomson Asia Pvt. Ltd., Singapore, 2001.
- A.K. Tayal, “Instrumentation & Mechanical Measurements”, Galgotia Publication Pvt. Ltd., 2003.
- D. Rana Durgaiah, “Fluid Mechanics & Machinery”, New Age Int. Publishers, 2004.
- Nitaigour Premchand Mahalik, “Mechatronics Principles, Concepts & Application”, Tata McGraw Hill Publishing Co.Ltd, 2003.
- Mikell P. Groover, “Automation, Production Systems and Computer-Integrated Manufacturing”, 2$^{nd}$ Edition, Prentice Hall, 2001.

# ARTIFICIAL INTELLIGENCE AND ROBOTICS

**Course Code: BME 607** **Credit Units: 03**
**Total Hours: 30**

## Course Objective:

To develop semantic-based and context-aware systems to acquire, organize process, share and use the knowledge embedded in multimedia content. Research will aim to maximize automation of the complete knowledge lifecycle and achieve semantic interoperability between Web resources and services. The field of Robotics is a multi-disciplinary as robots are amazingly complex system comprising mechanical, electrical, electronic H/W and S/W and issues germane to all these.

**Course Contents:**

**Module I: Scope of AI: (5 Hours)**
Games, theorem proving, natural language processing, vision and speech processing, robotics, expert systems, AI techniques- search knowledge, abstraction.
Problem solving
State space search; Production systems, search space control: depth-first, breadth-first search, heuristic search - Hill climbing, best-first search, branch and bound. Problem Reduction, Constraint Satisfaction End, Means-End Analysis

**Module II: Knowledge Representation: (6 Hours)**
Predicate Logic: Unification, modus ponens, resolution, dependency directed backtracking. Rule based Systems: Forward reasoning: conflict resolution, backward reasoning: use of no backtracks.
Structured Knowledge Representation: Semantic Nets: slots, exceptions and default frames, conceptual dependency, scripts.
Expert Systems
Need and justification for expert systems, knowledge acquisition, Case studies: MYCIN, RI.
Learning: Concept of learning, learning automation, genetic algorithm, learning by inductions, neural nets.

**Module III: Manipulator kinematics**: **(4 Hours)**
Kinematics: Introduction, solvability, algebraic solution by reduction to polynomial, standard frames, repeatability and accuracy, computational considerations.

**Module IV: Manipulator dynamics: (5 Hours)**
Introduction, acceleration of rigid body, mass distribution, Newton’s equation, Euler’s equation, Iterative Newton-Euler dynamic formulation, closed dynamic equation, Lagrangian formulation of manipulator dynamics, dynamic simulation, computational consideration.

**Module V: Trajectory Generation: (4 Hours)**
Introduction, general considerations in path description and generation, joint space schemes, Cartesian space schemes, Path generation in runtime, Planning path using dynamic model.

**Module VI: Linear control of manipulators: (6 Hours)**
Introduction, feedback and closed loop control, second order linear systems, control of second-order systems, Trajectory following control, modeling and control of a single joint, sensor and vision system.
Robot Programming languages & systems: Introduction, the three level of robot programming, requirements of a robot programming language, problems peculiar to robot programming languages.

## Course Outcome:

Upon completion of this course, students will get an overview of artificial intelligence applicationsand the use of micro-sensors and microprocessors.

**Examination Scheme:**

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- E. Rich and K. Knight, “Artificial intelligence”, TMH, 2nd ed., 1992.
- N.J. Nilsson, “Principles of AI”, Narosa Publ. House, 1990.
- John J. Craig, “Introduction to Robotics”, Addison Wesley publication
- Richard D. Klafter, Thomas A. Chmielewski, Michael Negin, “Robotic Engineering – An integrated approach”, PHI Publication
- Tsuneo Yoshikawa, “Foundations of Robotics”, PHI Publication
- D.W. Patterson, “Introduction to AI and Expert Systems”, PHI, 1992.
- Peter Jackson, “Introduction to Expert Systems”, AWP, M.A., 1992.
- R.J. Schalkoff, “Artificial Intelligence - an Engineering Approach”, McGraw Hill Int. Ed., Singapore, 1992.
- M. Sasikumar, S. Ramani, “Rule Based Expert Systems”, Narosa Publishing House, 1994.

# MECHATRONICS LAB

**Course Code: BME 626** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**

To provide knowledge on electrical circuits, signal conditioning and to make familiar about control system and power electronics in designing Mechatronics system

**Course Contents:**

**Name of Experiments: (Any 10)**
**Time allocated for experiments is 2 Hours each.**

1. To make the sequential operation
   a. $A^+ B^+ A^- B^-$ ; $A^+, B^+, B^- A^-$ using Pneumatic trainer
2. For the above write a ladder logic giving time delays
3. Design a Pneumatic Circuit for clamping type & operated by PLC
4. To make the sequential operation
   a. $A^+, B^+, A^-, B^-$ ; $A^+, B^+, B^- A^-$ using Hydraulic trainer kit.
5. For the above write a ladder logic giving time delays
6. Design a Hydraulic Circuit for clamping type & operated by PLC
7. To make the ladder logic for water level control & reaction vessel to detect different levels of water and switch off the water supply.
8. Starter Control & Star Delta Starter for ¼ HP AC. Motor to demonstrate the use of PLC Motor Starting
9. Design Fan operation using PLC
10. Design n a Lift Control
11. Design a pick & Place
12. Design Sequential Switching Motors

## Laboratory Outcome:

On successful completion of the course, the student will be able to describe mechatronic systems andoverview of control systems & actuators. To differentiate between various sensors, transducers and actuators and their applications. To relate various signal conditioning units, amplifiers, logic gates and their role in programmable logic controllers.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# ARTIFICIAL INTELLIGENCE AND ROBOTICS LAB

**Course Code: BME 627** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
The students will learn to make self-learning/adaptive control systems for robots/intelligent systems. Robotics and Intelligent Systems provides a comprehensive background in both software and hardware to work with the future of robotics and adaptive systems.

**Course Contents:**

**Name of Experiments:**
**Time allocated for experiments is 2 Hours each.**

1. Robot Arm (Model 1055)

2. Write a prolog program to define a relations knowledge base as follows : Assume the following in the kbase :
   Male (person), female (person), husband (person, person0, wife(person, person), father (person, person), mother (person, person). Define the predicates for
   Parent
   Brother
   Sister
   Grandfather
   Ancestor

3. Write a prolog program to simulate a non deterministic finite automation (NFA)

4. A computer system accepts a user's name and password which are stored as facts in the kbase. Validate this information through a predicate login. If not valid, display a suitable message.

5. Write prolog predicates to perform list manipulation as follows :
   List membership relation
   Length of a list
   Concatenate 2 list to produce a third list
   Reverse a list
   Subset of a list
   Appending an element to a list
   Summing the element of a list

6. Write a prolog program to implement Depth first search algorithm.

7. Write a prolog program to simulate the Towers of Hanoi problem.

8. There is a gold treasure hidden inside a cave. The cave is a maze of galleries connecting different rooms in which there are dangerous beings like monsters and robbers. The gold treasure is all in one room. Determine a route by which a person can get to the treasure and escape with it unhurt. Enclosed is a photocopy of the cave lay out. Write the corresponding prolog program.

9. Write a prolog program to simulate the xor logic circuit. In this program make use of the predicate definitions for AND, NOT and OR gate.

10. A hungry monkey finds himself in a room in which a bunch of bananas is hanging from the ceiling. The monkey cannot reach the bananas. In the room there is a chair and a stick. The ceiling is just the right height so that a monkey standing on a chair could knock the bananas down with the stick. The monkey knows how to move around, carry other things around, reach for the bananas and wave a stick in the air. Write prolog predicate that define the monkey's legal moves, the different legal states and enable the monkey to got to the bananas.

## Course outcome:
After study this course, students will be able to design robots and machine which are able to understand human and its working style and strategies.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

# COMMUNICATION SKILLS – VI

**Course Code: BCU 641** **Credit Units: 01**
**Total Hours: 10**

**Course Objective:** The main emphasis of this course is to enable students to learn the dynamics of social communication and to demonstrate the ability to learn the nuances of informal communication.
**Prerequisites:** NIL

<table>
<tr><td colspan="3">Course Contents / Syllabus:</td></tr>
<tr><td>1.</td><td>Module I:Social Communication Essentials<br>• Small talk/Building rapport<br>• Expand social and Corporate Associations<br>• Informal Communication: Grapevine, Chat</td><td>30% Weightage</td></tr>
<tr><td>2.</td><td>Module II: Workplace Interpersonal Skills<br>• Understanding Social Communication in Workplace environment.<br>• Employee feedback: Assess employee performance and satisfaction.<br>• Simulation<br>➢ Humour in Communication-Use of ‘Puns’<br>➢ Entertainment and Communication (Infotainment)<br>• Infotainment and Social Media<br>• Entertainment in Journalism<br>➢ Social Networking</td><td>25% Weightage</td></tr>
<tr><td>3.</td><td>Module III: Verbal Ability<br>• Comprehension<br>• Antonyms, Synonyms<br>• Idioms & Phrases<br>• Analogy<br>• Sentence Order<br>• Active and Passive Voice<br>• Error Sorting</td><td>35% Weightage</td></tr>
<tr><td>4.</td><td>Module IV: Prose<br>• Secret of Socrates - Dale Carnegie<br>• My Financial Career-Stephen Leacock<br>• The Luncheon - W. Somerset Maugham<br>• The National Flag - Jawahar Lal Nehru<br>All the four stories will be discussed in one class<br>One Long Question will be set in the Exam from the Text</td><td>10% Weightage</td></tr>
<tr><td>5.</td><td>Student Learning Outcomes:<br>• To communicate contextually in specific personal and professional situations with courtesy.<br>• To inject humour in their regular interactions.<br>• To strengthen their creative learning process through individual expression and collaborative peer activities.</td><td></td></tr>
<tr><td>6.</td><td>Pedagogy for Course Delivery:<br>• Workshop<br>• Group Discussions<br>• Presentations<br>• Lectures</td><td></td></tr>
<tr><td>7.</td><td>Assessment/ Examination Scheme:<br><table><tr><th>Theory L/T (%)</th><th>Lab/Practical/Studio (%)</th><th>End Term Examination</th></tr><tr><td>100%</td><td>NA</td><td>70%</td></tr></table><br>Theory Assessment (L&T):<br><table><tr><th>Components (Drop down)</th><th>CIE</th><th>Mid Sem</th><th>Attendance</th><th>End Term Examination</th></tr><tr><td>Weightage (%)</td><td>10%</td><td>15%</td><td>5%</td><td>70%</td></tr></table></td><td></td></tr>
</table>

**Text:*Krizan, Merrier, Logan & Williams. Effective Business Communication, New Delhi: Cengage, 2011***
- ***Communication and Organizational Culture*. Keyton. Joann. Sage Publications**
- ***Social Communication (Frontiers of Social Psychology)*.Fiedler, Klaus. Psychology Press**

**Reference: *Cypherpunks: Freedom and the Future of the* Internet.** Assange, Julian Assange. **OR Books.**
- **Additional Reading: Newspapers and Journals**

# BEHAVIOURAL SCIENCE - VI

**Course Code: BSU 643** | **Credit Units: 01**
**Total Hours: 10**

**Course Objective:**
- To develop an understanding the concept of stress its causes, symptoms and consequences.
- To develop an understanding the consequences of the stress on one's wellness, health, and work performance.

**Course Contents:**

**Module I: Stress** **(02 Hours)**
- Meaning & Nature
- Characteristics
- Types of stress

**Module II: Stages and Models of Stress** **(02 Hours)**
- Stages of stress
- The physiology of stress
- Stimulus-oriented approach.
- Response-oriented approach.
- The transactional and interact ional model.
- Pressure – environment fit model of stress.

**Module III: Causes and symptoms of stress** **(02 Hours)**
- Personal
- Organizational
- Environmental

**Module IV: Consequences of stress** **(02 Hours)**
- Effect on behavior and personality
- Effect of stress on performance
- Individual and Organizational consequences with special focus on health

**Module V: Strategies for stress management** **(02 Hours)**
- Importance of stress management
- Healthy and Unhealthy strategies
- Peer group and social support
- Happiness and well-being

## Student Learning Outcomes:
- Student will able demonstrate thorough understanding of stress and its effects
- Student will able to learn various coping strategies to deal stress effectively so to overcome the consequences and impact of stress on their health and wellbeing, ultimately it will enhance their performance.

**Examination Scheme:**

| Evaluation Components | Attendance | Journal of Success (JOS) | Social Awareness Program (SAP) SAP Report/SAP Presentation | End Semester Exam | Total |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 15 | 70 | 100 |

## Suggested Readings:
- Blonna, Richard; Coping with Stress in a Changing World: Second edition
- Pestonjee, D.M, Pareek, Udai, Agarwal Rita; Studies in Stress And its Management
- Pestonjee, D.M.; Stress and Coping: The Indian Experience

# FRENCH – VI

**Course Code: FLU 644** **Credit Units: 02**
**Total Hours: 20**

**Course Objective:**
To provide the students with the linguistic tools to enhance social communication skills and be able
- To approve or disapprove a behavior
- To congratulate somebody
- To express possession

**Course Contents:**

**Dossier1–pg7-16,**
**Dossier1:Aufil dutemps**
**Actesde Communication:**
Approuveroudésapprouverl'attitudede quelqu'un(désapprouverle comportementdesparents)
Féliciterquelqu'un(féliciterunparticipant dansle courrierdeslecteurs) Parlerde sasanté(exprimerlesproblèmesde santéchez lemédecin) Accueillir/Interpeller(conversationentrel'invitéet l'hôte)

**Thèmesabordés:**
Lestrentenaires(diresi l'onpartage lesvaleursetlesattentesdestrentenaires)
Le sport(sportet famille,dusportpourtouslesgoûts)
Laprofession: Lespsychologues(débats-pouroucontrelebesoind'unpsy,la télé-confession)

**Grammaire :**
1. Le présent (révision)
2. Lesprépositionset lesverbes
3. Lespronomspossessifs
4. Lesverbesréciproques

**ExaminationScheme:**

| | INTERNAL | | | | EXTERNAL | GRAND TOTAL |
|---|---|---|---|---|---|---|
| **Components** | MID-SEM | VIVA-VOCE | ATTENDANCE | **TOTAL** | **END SEMESTER** | **100** |
| **Weightage (%)** | 15 | 10 | 5 | **30** | **70** | |

## Text &References:

***Text:***

**Le livre àsuivre:**
- Carenzi-Vialaneix,Christelle et al. A proposA2Livre de l'élève.Grenoble:PressesuniversitairesdeGrenoble,2010.
- Carenzi-Vialaneix,Christelle et al. A proposA2Cahierd'exercices.Grenoble:PressesuniversitairesdeGrenoble,2010.

***Références:***
- Girardeau,Brunoet Mous,Nelly.Réussir leDELFA1.Paris:LesÉditionsDidier,2010.

# MINOR PROJECT

**Course Code: NMP 660** **Credit Units: 02**

**Course objectives:**
The objective of Minor project is to enable the student to take up investigative study in the broad field of Engineering, either fully theoretical/practical or involving both theoretical and practical work to be assigned by the Department on an individual basis or two/three students in a group, under the guidance of a Supervisor.

**Methodology:**

Topics of project are to be based on the latest trends, verifying engineering concepts /principals and should involve elementary research work. The projects may involve design, fabrications, testing, computer modeling, and analysis of any engineering problem. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation on same.

**Examination Scheme:**

| | |
|---|---|
| Literature study/ Fabrication/ Experimentation | 40 |
| Written Report | 20 |
| Viva | 15 |
| Presentation | 25 |
| **Total** | **100** |

## Course Outcomes:
At the end of the course, students will demonstrate the ability to:
- Conceive a problem statement either from rigorous literature survey or from the requirements raised from need analysis.
- Design, implement and test the prototype/algorithm in order to solve the conceived problem.
- Write comprehensive report on mini project work.

# OPERATIONS RESEARCH

**Course Code: BME 701** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
In a rapidly changing environment an understanding is sought which will facilitate the choice and the implementation of more effective solutions, which, typically, may involve complex interactions among people, materials and money. Organizations may seek a very wide range of operational improvements - for example, greater efficiency, better customer service, higher quality or lower cost. Whatever the business, engineering aim, Operation Research can offer the flexibility and adaptability to provide objective help. This course introduces students to the principles of operational research.

**Course Contents:**

**Module I: Linear Programming: (5 Hours)**
Formulation of problem.Graphical and simplex method for maximization and minimization.duality theory and sensitivity analysis

**Module II: Transportation Models & Assignment Models: (8 Hours)**
Stepping stone algorithm, MODI method and Vogel's Approximation Method (VAM) for self balanced/ unbalanced transportation problems and problems of degeneracy and maximization. Assignment model for maximization and traveling salesman problems, Industrial Problems

**Module III: Queuing Theory: (4 Hours)**
Basic structured, Terminology, classification. Birth and death process. Sequencing: Processing in jobs through machines with the same processing order. Processing of 2 jobs through machines with each having different processing order.

**Module IV: Network Models: (5 Hours)**
Introduction to PERT and CPM. Fundamental concept of Network models and construction of network diagrams. PERT activity, time estimate. Critical path and project time duration. Probability of completing the project on or before specified time. Float of a activity.

**Module V: Project Management: (4 Hours)**
Gantt chart, milestone char.Network scheduling terminology. Path enumeration, Activity on node & activity on arc network precedence diagrams. Reliability: Concept of reliability, objectives, applications, area of use, use of reliability in industry.

**Module VI**: **Games Theory: (4 Hours)**
Zero Sum two person competitive games, Minimax and maximini principle Arithmetic, algebraic, matrix algebra method,.Solution by dominance, sub game, Graphical and linear programming method.

**Module VII**: **Industrial Visit**
At least one visit up to Three days to industry in the field of Mechanical Engineering.

## Course Outcomes:

- To familiarize students with the basic concepts, models and statements of the operations research theory.
- Know principles of construction of mathematical models of conflicting situations and mathematical analysis methods of operations research;
- Be able to choose rational options in practical decision-making problems using standard• mathematical models of operations research;
- Have skills in analysis of operations research objectives, mathematical methods and• computer systems.

**Examination Scheme:**

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- HM Wagner, Principles of Operations Research, Prentice Hall
- Heizer, J. & Render B., Operations Management, Pearson Education (8/e), 2006
- PK Gupta and DS Hira, Operations Research, S. Chand & Co.
- Taha, Introduction to Operation Research
- F.S. Hiller and G.I. Libermann, Introduction to Operation Research, Holden Ray.

# COMPUTER AIDED MANUFACTURING

**Course Code: BME 702** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The aim of the course is to impart the students the basic and essential concepts in using Computer Assisted Manufacturing (CAM) and Computer Numerical Control (CNC) machines. Students will learn the basic concepts of manufacturing planning and control. They will be offered hands on experience in using CAM software to design, simulate and write CNC programs.

**Course Contents:**

**Module I: (6 Hours)**
Introduction to Numerical control.Programmed automation. Nomenclature, type and features of NC machines tools. Axes designation. Point to point, straight and continuous control systems**,** Constructional features of CNC machine tools.

**Module II: (6 Hours)**
Machining centre and Turning centre, Automatic tool changer, Machine Tool beds and automated pallet changers.

**Module III: (6 Hours)**
Machine Control Unit, Actuation Systems, open and close loop systems, transducers for NC Systems, revolves encoders and inductosyn.

**Module IV: (6 Hours)**
Manual Part Programming: Processes planning, G&M codes. Interpolation Cycles. Tools compensation, Computed aided part programming - Post processors - APT programming-CNC programming based on CAD Feedback devices - tooling for CNC machine.

**Module V: (6 Hours)**
Tooling and tool presetting.Computer Aided inspection - Contact Inspection (Coordinate Measuring Machine) & Non Contact Inspection.

## Course Outcomes:

- Understand the importance of CAD/CAM principles in the Product development.
- Develop programs related to manufacturing using codes.
- Analyze the importance of networking in manufacturing environment.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance.

## Text & References:


- Mikell P. Groover, "Automation, Production Systems and Computer-Integrated Manufacturing", 2nd Edition, Pentice Hall, 2001.
- Rao, Kundra & Tiwari, "Computer aided Manufacturing" Tata McGraw Hill, 2007.
- Numerical Control: by Koren, Khanna Publisher.
- Mikell P. Groover, Emory W. Zimmers, "CAD/CAM", Pearson Education, 2006.
- P.N. Rao, "CAD/CAM Principles and Applications", Tata McGraw Hill, 2006.

# MANAGEMENT OF MANUFACTURING SYSTEMS

**Course Code: BME 703** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The overall objective of this course is to provide high caliber engineering students with an in-depth understanding of strategic, tactical and operational issues relating to manufacturing industries worldwide. On completion of the course the students will be equipped with the state-of-the-art concepts, methods, techniques and tools to allow them to contribute towards the competitiveness of manufacturing organizations.

**Course Contents:**

**Module I: Introduction: (5 Hours)**
Production functions, Plant Organization: Principles of organization, Organization structure-line and staff Organization, Plant Location layout, Process layout product layout and combination layout methods of layout, economics of layout.

**Module II: Production Planning & Control: (5 Hours)**
Types of products, demand, demand forecasting, marketing strategies, scheduling and control of scheduling, production control.

**Module III: Work and Method Study: (5 Hours)**
Definition and concepts, method study procedures, symbols, advantages, Flow process charts, Motion study, micro motion, SIMO charts, system concepts, classification, analysis techniques.

**Module IV: Industrial Maintenance: (5 Hours)**
Definition and concepts of Maintenance, Need of Maintenance Management, Maintenance Policies, Strategies and options in Maintenance management.Types, organization for maintenance department, Breakdown and preventive maintenance.

**Module V: Inventory Control and Replacement Analysis: (5 Hours)**
Purpose of Inventory – Cost related to inventors – Basic EOQ model, Introduction replacement policy and method adopted, ABC Analysis, MRP Analysis.

**Module VI: Management Concepts: (5 Hours)**
Development of management principles, scientific management, human relation aspects.Project Management – CPM and PERT.

## Course Outcomes:
- Conduct market research, demand forecasting and costing
- Demonstrate the knowledge of designing plants and controlling production.
- Optimize the resources of an organization and improve productivity.

**Examination Scheme:**

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance.

## Text & References:

- S.K. Sharma, “Industrial Engg. & Operation Management”, S.K. Kataria & Sons.
- Dr. Ravi Shankar, “Industrial Engg. & Management”, Galgotia Publications
- M. Mahajan, “Industrial Engg. & Production Management”, Dhanpat Rai & Co.
- J Moore, Manufacturing Management, Prentice Hall
- Buffa, Modern production and operations management, E.S. Wiley eastern.
- Joseph S. Martinich, “Production & Operation Management”, John Wiley & Sons.

# OPERATIONS RESEARCH (PROGRAMMING) LAB

**Course Code: BME 721** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
The aims to introduce students to use quantities methods and techniques for effective decisions–making; model formulation and applications that are used in solving business decision problems.

**Course Contents:**

1. Program on C or C++ for Linear Programming**: (4 Hours)**
2. Program on C or C++ for Simplex Problem**: (4 Hours)**
3. Program on C or C++ for Assignment Problem**: (3 Hours)**
4. Program on C or C++ for Transportation Problem**: (3 Hours)**
5. Program on C or C++ for PART, CPM Problem**: (3 Hours)**
6. Program on C or C++ for Sequencing Problem**: (3 Hours)**

## Course Outcomes:

- Solve the problems using special solution algorithms.
- Use CPM and PERT techniques, to plan, schedule, and control project activities.
- Analyse the general nonlinear programming problems.
- Formulate the nonlinear programming models.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# COMPUTER AIDED MANUFACTURING LAB

**Course Code: BME 722** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
To introduce the student to the basic tools of computer aided manufacturing (CAM). To expose the student to contemporary computer design tools for aerospace and mechanical engineers. Prepare the student to be an effective user of a CAM system.

**Course Contents:**

**Name of Experiments:**

1. Make a sketch of CNC lathe showing major assemblies and indicate the CNC axes with designations. Make a sketch of the conventional lathe and, if it is considered as a CNC lathe, show the axes with designations.**: (3 Hours)**
2. Make a Kinematics diagram of CNC Lathe showing all machine sub-assemblies. Indicate bearing arrangements, ball screw arrangements with sizes, wherever available**: (3 Hours)**
3. Repeat (1) on CNC machining centre and conventional milling machine**: (2 Hours)**
4. Repeat (2) for CNC machining centre**: (2 Hours)**
5. Study the CNC lathe. Prepare a block diagram of controls. Identify location and type of transducers and indicate on an outline of the machine. Describe how they function**: (2 Hours)**
6. Repeat (5) on machining centre**: (2 Hours)**
7. Study the work holding and tool holding devices in the CNC lathe and machining centre and draw up their specifications and capacities**: (2 Hours)**
8. Prepare part programs for 2 specified components for CNC lathe by manual part programming. First write the machining technology in full; then prepare part program and then enter in the machine. Test the program in dry run and by tool path graphic simulation. Machine the component**: (2 Hours)**
9. Do the above work for machining centre**: (2 Hours)**

## Course Outcomes:

- On successful completion of the course, the student will be able to,
- Explain lifecycle of a product and the role of computer-aided Manufacturing (CAM) in product development.
- Describe the concepts of geometric and solid modeling.
- Visualize geometric models through animation and transform them into real world systems.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# AUTOMOTIVE ENGINEERING

**Course Code: BME 704** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
This course emphasizes on constructional details of automotive vehicles which includes – Basic structure, engine, transmission systems, suspension systems, steering system, braking systems and wheels & tyres.

**Course Contents:**

**Module I: (6 Hours)**
Introduction, Components of an automobile, basic engine terminology, engine cycles, working of an IC engine.Basic engine design considerations, constructional details of C.I. and S.I. engines.crank shafts, connecting rod, piston, values, cams, manifolds, air cleaners, mufflers, radiators, and oil filters.

**Module II: Transmission System: (6 Hours)**
Description and working of manually operated gearboxes like sliding mesh, constant mesh, synchromesh and epicycle; hydraulic torque convertor and its construction working and performance, sem-automatic and fully automatic transmission, Hydramatic transmission, analysis of differentials, live axles, construction working and requirements of overdrive.

**Module III: Steering System: (6 Hours)**
Introduction, Front axle, wheel alignment, Steering geometry, steering mechanisms, Ackerman steering, center point steering, power steering.

**Module IV: Suspension: (6 Hours)**
Objective, requirement, function, types Shock absorbers, Independent suspension, Stabilizer, air suspension, Hydroelastic suspension, Hydragas interconnected suspension.

**Module V: (6 Hours)**
Principle, braking requirements, brake efficiency, fading of brakes, types of brakes, bleeding of brakes, brake fluid.

## Course Outcome:
Upon completion of this course, students will understand the function of each automobile component and also have a clear idea about the overall vehicle performance.

### Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

- Kirpal Singh, “Automobile Engg.”, Vol. I & II, Standard Publishers, 2004
- N.K. Giri, “Automotive Mechanics”, Khanna Publishers
- Narang G.B.S., “Automobile Engg.”, Khanna Publishers
- Srinivasan, “Automotive Engines”, Tata McGraw Hill
- K.K. Jain & R.B. Asthana, “Automobile Engineering”, Tata McGraw Hill
- James D. Halderman and Chase D. Mitchell Jr., Automotive Engines- Theory and Servicing, Pearson Education, 2007
- Joseph Haitner, “Automotive Mechanics”, C.B.S. Publications

# COMPUTER AIDED DESIGNING

**Course Code: BME 705** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The objective of this course is to impart students an in-depth exposure to methods in geometric modeling and its applications in CAD/CAM. This course introduces integrated approach to CAD including: Overview of CAD, numerical techniques for CAD, Computer graphics and design, Principle and management of design data base system, finite element analysis and CAD, Design optimization. Along with the theoretical presentations, commercial CAD software are also introduced and applied to create Engineering components and assemblies.

**Course Contents:**

**Module I: Introduction: (6 Hours)**
Introduction to CAD. Design process, Introduction to solid modeling and aided design of some elements/ components, hardware requirements, concurrent engineering.

**Module II: Projections: (6 Hours)**
Elementary Computer Graphics. Transformations, Mappings, Projections – orthographic, isometric, perspective.

**Module III: Surface Modeling: (6 Hours)**
Representation of surfaces. Plane surfaces, Ruled surfaces, Surfaces of revolution, Sweep surfaces, Bezier surface, Bicubic surface patch, Approximation B – spline surface, composite surfaces.

**Module IV: Solid Modeling: (6 Hours)**
Set theory, Graph theory, Regularized Boolean operations, B-rep modeling, Sweep representations, Spatial occupancy enumeration.

**Module V: Advanced CAD: (6 Hours)**
Mechanical assembly, Geometric property formulation- curve length, surface are calculations, volume calculation, centroid calculation, Tolerances representations, Animation, Simulation, Strategic factors in product design, Robust design for product, Introduction to Finite element modeling and analysis.

## Course Outcome:
Upon completion of this course, the students can use computer and CAD software for modeling mechanical components.

**Examination Scheme:**

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

- Ibrahim Zeid, “CAD/CAM Theory and Practice”, Tata McGraw-Hill Publishing Company Limited, 6th Edition 1998.
- David F. Rogers and J. Alan Adams, “Mathematical Elements for Computer GraPrentice Hall Indiacs”, Tata McGraw-Hill, 2nd Edition 2002.
- Ibrahim Zeid, “Mastering CAD/CAM”, Tata McGraw-Hill Publishing Company Limited,

# AUTOMOTIVE ENGINEERING LAB

**Course Code: BME 724** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
To introduce the student to the basic tools of automobiles. To expose the student to contemporary automotive engineering for automobile and mechanical engineers. Prepare the student to be an effective user of a Automotive engineering.

**Course Contents:**

**List of Experiments:**
**Time allocated for experiments is 2 Hours each.**

1. Drawing Valve Timing Diagram
2. Determination of Firing Order of engine
3. Specification of engine
4. Study of different parts of engine
5. Study of Clutch
6. Study of Hydraulic Brake System
7. Study of Carburetor
8. Study of various parts of Auxiliary systems
9. Study of Wheel
10. Study of emission system

## Course Outcomes:

- Ability to dismantle and assemble the automobile components
- Understand different types of frames used in various Automobiles
- Understand the petrol engine fuel system.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

# COMPUTER AIDED DESIGNING LAB

**Course Code: BME 725** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
The objective of this course is to help students in understanding the working principle of Computer aided designing systems and various designing software's.

**Course Contents:**

**List of Experiments:**

1. Analysis and design using ANSYS/Pro-E software for**: (3 Hours)**
2. Flange Coupling**: (3 Hours)**
3. Design Shaft**: (3 Hours)**
4. Design for Key**: (3 Hours)**
5. Design for Spur Gear**: (3 Hours)**
6. Design for Helical Gear**: (3 Hours)**
7. Parts of Thin Cylinder Pressure Vessels**: (2 Hours)**

## Course Outcomes:

- To develop different types of surfaces with the help of different curves
- Suggest whether the given component is safe or not for the applied loading conditions
- Select suitable manufacturing method for different mechanical components using CAM software.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

# MARKETING MANAGEMENT

**Course Code: BME 706** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The course aims at making students understand concepts, philosophies, process and techniques of managing marketing operations of a firm.

**Course Contents:**

**Module I: Introduction to Marketing: (5 Hours)**
Meaning, nature and scope of marketing; Marketing philosophies; Marketing management process; Concept of marketing mix.

**Module II: Market Analysis: (6 Hours)**
Understanding marketing environment; Consumer and industrial buyer behaviour; Market measurement; Market segmentation, selection and positioning.

**Module III: Product Planning and Pricing: (7 Hours)**
Product concept; Types of products; Major product decisions; Brand management; Product life cycle, New product development process; Pricing decisions; Determinants of price; Pricing process, policies and strategies.

**Module IV: Promotion and Distribution Decisions: (7 Hours)**
Communication process; Promotion tools – advertising, personal selling, publicity and sales promotion; Distribution channel decisions – types and functions of intermediaries, Selection and management of intermediaries; Logistics decisions – inventory management, warehousing, transportation and insurance.

**Module V: Marketing Organization and Control: (5 Hours)**
Emerging trends and issues in marketing – Consumerism, rural marketing, social marketing; direct and online marketing; green marketing.

## Course Outcomes:
- This course is taught with both strategic and managerial focus.
- Through cases, discussions, exercises and activities, participants would be given opportunities to perform the role of a marketing manager.
- At the end of this course, participants should have acquired analytical skills in solving marketing related problems and challenges and be familiar with the strategic marketing management process.

**Examination Scheme:**

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

- Baker, Michael J., Marketing: An Introductory Text, McMillan Press Ltd.
- Czinkota, Michael R., Massaki, Kotabe and David Mercer B., Marketing Management: Text and Cases, Blackwell Publishers, Massachusetts.
- Kotler, Philip, Marketing Management: Analysis Planning, Implementation and Control, 9th Ed., Prentice Hall of India Pvt. Ltd. , New Delhi.
- Kotler, Philip and Armstrong, Gary, Principles of Marketing, 6$^{th}$ ed., Prentice Hall of Indi, Pvt. Ltd., New Delhi.
- Mc Carthy, E.Jerome and Pessault, William D. Jr., Basic Marketing, Richard D. Irwin Inc., Homewood, Illinois.
- Saxena, Rajan, Marketing Management, Tata McGraw Hill Publishing Company, New Delhi.
- Stanton, William J., Eizel, Michael J. and Walker Bruce J., Fundamentals of Marketing, 10$^{th}$ ed., McGraw

# SOLAR ENERGY

**Course Code: BME 707** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The objective of this course is to introduce materials relevant to the engineering of solar electric and thermal systems. Students will develop the skills to calculate the amount of incident solar flux, the amount of useful energy collected, the amount stored and the amount ultimately used. Many of these calculations will be based on solar applications in different area. Finally the concepts of engineering economics applied to solar energy will also be introduced.

**Course Contents:**

**Module I: Selected topics in Heat Transfer: (6 Hours)**
Heat transfer modes, properties and radiation characteristics of opaque and partially transparent media.

**Module II: Model Solar Radiation: (8 Hours)**
Origin, nature and availability of solar radiation, measurements of solar radiation data and its estimation, effects of receiving surface orientation and motion.

**Module III: Components, Process and System Modes: (10 Hours)**
Design consideration and performance of flat plate and focussing collectors; energy storage components, water storage, packed bed and phase-change energy storage; mathematical models of various solar systems and components.

**Module IV: Application: (6 Hours)**
Solar water heating, solar air heaters, solar space heating and cooling, solar pumps, solar thermal power, solar furnaces and solar distillation.

## Course Outcomes:

Upon completion of the course, students will have:

- Ability to recognize the need of renewable energy technologies and their role in the Greece and world energy demand.
- Ability to distinguish between the sustainable energy sources and fossil energy sources with emphasis on wind and photovoltaic systems.
- Knowledge of the operating principles of renewable energy production from various renewable sources, especially.

**Examination Scheme:**

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- H.P. Garg and J. Prakash, "Solar Energy fundamental and Applications", Tata McGraw Hill Pulishing Co. Ltd.
- Magal, "Solar Power Engineering", Tata McGraw Hill Publishing Co. Ltd

# POWER PLANT PRACTICES

**Course Code: BME 708** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The objective of this course is that the students come to know different ways of producing energy such as thermal energy from gas and steam, hydraulic energy nuclear energy, non conventional source of energy from wind, solar and tidal. And their different uses in productive works.

**Course Contents:**

**Module I: Steam Generator Plant: (6 Hours)**
Fuel handling systems, Indian coals, combustion of coal in furnaces; fluidized bed combustion; High pressure heavy duty boilers, Super critical and once through boilers influence of operating conditions on layout of evaporator, superheated, reheated and economizer; dust collectors; ash disposal, fans and draft systems.

**Module II: Turbine Plane: (6 Hours)**
Layout of turbine plant room, corrosion in condensers and boilers, feed water treatment; feed heating and de aeration system; cooling water systems and cooling towers.

**Module III: Control: (6 Hours)**
Important instruments on steam generator and turbine; drum water level control, combustion control and super heat temperature control; testing of power plants and heat balance.

**Module IV: Other Power Plant: (6 Hours)**
General layout of I.C. Engines and turbine power plants, types, gas turbine plants, fields of application, Nuclear power plants, power reactors and nuclear steam turbines; handling of nuclear waste and safety measures, peak load power generation methods.

**Module V: Economics: (6 Hours)**
Planning for power generation in India, super thermal power plants, estimation of cost of power generation; choice of plant site.

## Course Outcomes:

After completion of this course, the students should be able to:

- Discuss the energy resources and energy conversion methods available for the production of electric power in India.
- Determine the efficiency and output of a modern Rankine cycle steam power plant from given data, including superheat, reheat, regeneration, and irreversibility
- Calculate the heat rate, fan power consumption, flame temperature and combustion air requirements of conventional steam generators (boilers).
- Select the heat transfer tubes needed for condensers and feed water heaters
- Explain the blade shapes, and calculate work output of typical turbine stages.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Arora & Domkundwar, “A course in Power Plant Engineering”, Dhanpat Rai & Sons
- Black Veatch, “Power Plant Engineering”, CBS Publisher

# COMBUSTION ENGINE EMISSIONS

**Course Code: BME 709** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The main objective of this course is to introduce students the fundamentals, Operations and performance of internal combustion engines and their different types; to provide them with the theoretical and experimental ability to operate, analyze and design internal combustion engines; to assess the relation between engine power output to the required power for vehicle propulsion; to make them understand the fuel metering systems and assembling and dismantling internal combustion engines.

**Course Contents:**

**Module I: Engine Fundamentals: (5 Hours)**
Cycle analysis, fuels, and types of hydrocarbons, gasoline specifications, effect of engine parameters on performance, carburetion, engine vehicle road performance, road performance and fuel economy.

**Module II: Emission and Air Pollution: (6 Hours)**
Automotive emissions and their role in air pollution, photochemical smog, Chemistry of smog formation, Combustion in homogeneous mixtures, emission formation, Incomplete combustion formation of Hydrocarbons (HC), carbon monoxide and oxides of nitrogen, Aldehyde emissions of unregulated toxic pollutants such as benzene, 1, 3, butadiene etc.

**Module III: (8 Hours)**
Influence of engine design and operating parameters on S.I. engine exhaust emissions. Hydrocarbon Evaporative Emissions, Various sources and method of their control, Canisters for controlling evaporative emissions, emission control system for S.I. engines, Blow by control closed PCV system, Reduction of exhaust emissions / Various methods, fuels system design.

**Module IV: Exhaust Treatment Devices: (5 Hours)**
Air injection into exhaust system, Thermal reactors, Catalytic converters.Stratified charge engines, Honda CVCC engine.
Diesel engine emissions: Source of emissions during combustion, Effect of Air injection timing on performance and formation. D.I. and I.D.I. engines emissions, Diesel smoke, PM and RSPM emission.

**Module V: (6 Hours)**
Methods of reducing emission, Exhaust gas re-circulation smoke emission form diesel engines, Particulate Traps, Continuous regeneration Traps (CRT).
Emission from CNG and LPG engines. Emission Instruments: Non-dispersive infrared analyzer, Gas chromatography, Flame ionization Detector, Chemiluminescent analyser.

## Course Outcomes:

- Differentiate among different internal combustion engine designs
- Recognize and understand reasons for differences among operating characteristics of different engine types and designs
- Given an engine design specification, predict performance and fuel economy trends with good accuracy
- Based on an in-depth analysis of the combustion process, predict concentrations of primary exhaust pollutants
- Exposure to the engineering systems needed to set-up and run engines in controlled laboratory environments
- Develop skills to run engine dynamometer experiments.

## Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- R.P. Sharma and M.L. Mathur, "Internal Combustion Engine", Dhanpat Rai Publications
- V. Ganeshan, "Internal Combustion Engine", Tata McGraw Hill
- Angli M Course., "Automotive Engines", CBS Publications
- Harper, "Fuel Systems Emission Control", CBS Publications

# COMMUNICATION SKILLS – VII

**Course Code: BCU 741** **Credit Units: 01**
**Total Hours: 10**

**Course Objective:**

The course is designed to empower students to carry out day to day communication at the work place by adequate understanding of various types of communication to facilitate efficient interpersonal communication.

**Prerequisites:** NIL

<table>
<tr><td colspan="3">Course Contents / Syllabus:</td></tr>
<tr><td>1.</td><td>Module I Meetings</td><td>30% Weightage</td></tr>
<tr><td></td><td>• Notices<br>• Circulars<br>• Agenda<br>• Minutes</td><td></td></tr>
<tr><td>2.</td><td>Module II Report Writing & Telephony Skills</td><td>25% Weightage</td></tr>
<tr><td></td><td>➢ Report Writing<br>• Purpose/Significance<br>• Types<br>• Format<br>➢ Telephony Skills<br>• Call Receiving/ Handling/ Concluding Etiquette<br>• Voice Modulation<br>• Effective Listening<br>• Dos and Don’ts of Telephony Skills</td><td></td></tr>
<tr><td>3.</td><td>Module III Negotiation Skills<br>• Definition/Concept<br>• Purpose/ Significance<br>• Checklist- Good & Bad Practices</td><td>35% Weightage</td></tr>
<tr><td>4.</td><td>Module IV Prose</td><td>10% Weightage</td></tr>
<tr><td></td><td>• The Great Trial-Robert Payne<br>• The Home Coming - Rabindra Nath Tagore<br>• How Much Land does a Man Need? - Leo Tolstoy<br>• Valiant Vicky, The Brave Weaver - Flora Anne Steel<br>All the four stories will be discussed in one class<br>One Long Question will be set in the Exam from the Text</td><td></td></tr>
<tr><td colspan="3">5. Student Learning Outcomes:<br>• Conduct all business activities related to the workplace with technical efficiency.<br>• Contribute positively to the overall growth of the organization.</td></tr>
<tr><td>6.</td><td colspan="2">Pedagogy for Course Delivery:<br>• Workshop<br>• Group Discussions<br>• Presentations<br>• Lectures</td></tr>
<tr><td>7.</td><td colspan="2">Assessment/ Examination Scheme:
<table>
<tr><th>Theory L/T (%)</th><th>Lab/Practical/Studio (%)</th><th>End Term Examination</th></tr>
<tr><td>100%</td><td>NA</td><td>70%</td></tr>
</table>
Theory Assessment (L&T):
<table>
<tr><th>Components (Drop down)</th><th>CIE</th><th>Mid Sem</th><th>Attendance</th><th>End Term Examination</th></tr>
<tr><td>Weightage (%)</td><td>10%</td><td>15%</td><td>5%</td><td>70%</td></tr>
</table></td></tr>
</table>

**Text:** ***Penrose, Rasberry & Myers. Business Communication for Managers: An Advanced Approach, New Delhi: Cengage, 2012.***

***T.N Chabbra , Business Communication , Sun India Publication.***

***Sanjay Kumar &Pushplata , Communication skills , Oxford University Press.***

**Reference:** ***Jones, Working in English, First Edition, Cambridge, CUP, 2001.***

**Additional Reading: Newspapers and Journals**

# BEHAVIOURAL SCIENCE – VII

**Course Code: BSU 743** **Credit Units: 01**
**Total Hours: 10**

**Course Objective:**
This course will help the students to:
- Explore interest and attitude
- Explore career opportunities
- Set career goals
- Developing attributes that employers value

**Course Contents:**

**Module I: Career Planning: (02 Hours)**
- Importance of Career Planning & Development
- Career Development Plan
- Assessment of Career Development

**Module II: Career Success: Interest, Aptitude & Attitude (Personality): (02 Hours)**
- Interest, Aptitude & Attitude
- Knowing and assessing one's Interest
- Knowing and assessing one's Aptitude

**Module III: Explore Career for Growth: (02 Hours)**
- Selecting from available resources
- Career selection (Jobs)
- Career planning and development

**Module IV: Self Reliance and Employability skills: (02 Hours)**
- Self awareness, Self promotion and Presentation, Self confidence
- Action planning, Networking, Negotiation
- Political awareness, Coping with uncertainty,
- Developing positive attributes at work place (personal and professional)
- Time Management as Self Management

**Module V: Impression Management for Career Enhancement: (02 Hours)**
- Meaning & Components of Impression Management
- Impression Management Techniques(Influencing Tactics)
- Impactof Impression Management on Career Planning and Development

## Student learning outcomes
- Students develop the ability to identify suitable career options and to create a suitable career plan based on the utilization of the counseling process, assessment tools, and other resources.
- Students will know how to assess their skills, interests and values.
- Students will know how to make informed career choices based on their self- assessment.
- Students will know how to explore relevant career options and build skills pertinent to those of greatest interest.

**Examination Scheme:**

| Evaluation Components | Attendance | Journal of Success (JOS) | Social Awareness Program (SAP) SAP Report/SAP Presentation | End Semester Exam | Total |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 15 | 70 | 100 |

## Suggested Readings:

- Organizational Behaviour, Davis, K.
- Hoover, Judhith D. Effective Small Group and Team Communication, 2002,Harcourt College Publishers
- Dick, Mc Cann & Margerison, Charles: Team Management, 1992 Edition, viva books
- Bates, A. P. and Julian, J.: Sociology - Understanding Social Behaviour
- Dressers, David and Cans, Donald: The Study of Human Interaction

- Lapiere, Richard. T – Social Change
- Lindzey, G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology, Addison – Welsley, US.
- Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.
- LaFasto and Larson: When Teams Work Best, 2001, Response Books (Sage), New Delhi
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 2, Group (1996); Pfeiffer & Company
- Smither Robert D.; The Psychology of Work and Human Performance, 1994, Harper Collins College Publishers

# FRENCH – VII

**Course Code: FLU 744** **Credit Units: 02**
**Total Hours: 20**

**Course Objective:**
To provide the students with the linguistic tools to enhance social communication skills and be able

- To describe an object, compare objects and evaluate
- To ask for information, precision
- To make claims

**Course Contents:**

**Dossier2–pg17-28,**

**Dossier2:64millionsde consommateurs**
**ActesdeCommunication:**
Décrireunobjet(unbijouunique,unvoyageextraordinaire,unnouvelappareil photo)
Évaluerune chose (acheteruncadeau,discuterleprix)
Ouvriruncompteà la banque (demanderdesrenseignementsaubanquierafind'ouvriruncompte) Demanderdes informations/précisions(précisionssurunproblème danslerelevéde compte)
Faire uneréclamation(s'adresserauservice après-vente pouréchangerunproduit défectueux)

**Thèmesabordés:**
S'habillerbonmarché (commentvoushabillez-vousbonmarché ?)
Le e-commerce (le portrait del'e-acheteurde votre pays) Lesproduitscontrefaits(parlerdesproduitscontrefaits)
Laprofession:Lesmaraîchers(débats:commentéviterlegaspillage?lamodedeviedesdécroissants,privilégie-t- onla qualité oule prixlorsd'unachat?)

**Grammaire :**

1. Le pronom <<en>>
2. Laplace de l'adjectif
3. Le présent progressif
4. Le passé récent
5. Le futurproche(révision)
6. Le comparatifet le superlatif

**ExaminationScheme:**

| | **INTERNAL** | | | | **EXTERNAL** | **GRAND TOTAL** |
|---|---|---|---|---|---|---|
| **Components** | MID-SEM | VIVA-VOCE | ATTENDANCE | **TOTAL** | **END SEMESTER** | |
| **Weightage (%)** | 15 | 10 | 5 | **30** | **70** | **100** |

## Text &References:

***Text:***

**Le livre àsuivre:**

- Carenzi-Vialaneix,Christelle et al. A proposA2Livre de l'élève.Grenoble:PressesuniversitairesdeGrenoble,2010.
- Carenzi-Vialaneix,Christelle et al. A proposA2Cahierd'exercices.Grenoble:PressesuniversitairesdeGrenoble,2010.

***Références:***

- Girardeau,Brunoet Mous,Nelly.Réussir leDELFA1.Paris:LesÉditionsDidier,2010.

# INDUSTRIAL PRACTICAL TRAINING – II

**Course Code: NPT 750** **Credit Units: 05**

**Course objectives:**

1. To expose students to the 'real' working environment and get acquainted with the organization structure, business operations and administrative functions.
2. To have hands-on experience in the students' related field so that they can relate and reinforce what has been taught at the university.
3. To promote cooperation and to develop synergetic collaboration between industry and the university in promoting a knowledgeable society.
4. To set the stage for future recruitment by potential employers.

**Methodology:**

Practical training is based on the theoretical subjects studied by students. It can be arranged within the college or in any related industrial unit. The students are to learn various industrial, technical and administrative processes followed in the industry. In case of on-campus training the students will be given specific task of fabrication/assembly/testing/analysis. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation on same.

**Examination Scheme:**

| | |
|---|---|
| Feedback from industry/work place | 20 |
| Training Report | 40 |
| Viva | 15 |
| Presentation | 25 |
| **Total** | **100** |

## Course Outcomes:

After successful completion of the course, the students will be able to

1. Explore the preferred field of specialization and develop analytical / hardware / software / experimental / observation skills.
2. Manage the technical content and work.
3. Learn the various administrative process followed in industry.
4. Prepare and present technical report.

# MAJOR PROJECT- I

**Course Code: NMP 760** **Credit Units: 06**

**Course Objectives:**

The object of Major Project I is to enable the student to extend further the investigative study taken up under NMP 660, either fully theoretical/ practical or involving both theoretical and practical work, under the guidance of a Supervisor from the Department alone or jointly with a Supervisor drawn from R&D laboratory/Industry. This is expected to provide a good training for the student(s) in R&D work and technical leadership. The aim is to provide students an opportunity to exercise their creative and innovative qualities in a group project environment and to excite the imagination of aspiring engineers, innovators and technopreneurs.

**Methodology:**

Topics of project are to be based on the latest trends, verifying engineering concepts /principals and should involve elementary research work. The projects may involve design, fabrications, testing, computer modeling, and analysis of any engineering problem. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation on same.

## Course Outcomes:

On successful completion of the course students will be able to:

1. Demonstrate a sound technical knowledge of their selected project topic.
2. Undertake problem identification, formulation and solution.
3. Design engineering solutions to complex problems utilising a systems approach.
4. Conduct an engineering project
5. Communicate with engineers and the community at large in written an oral forms.
6. Demonstrate the knowledge, skills and attitudes of a professional engineer.
7. Write comprehensive report on project work.

**Examination Scheme:**

| | |
|---|---|
| Literature study/ Fabrication/ Experimentation | 40 |
| Written Report | 20 |
| Viva | 15 |
| Presentation | 25 |
| **Total** | **100** |

# QUALITY CONTROL & QUALITY ASSURANCE

**Course Code: BME 801** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
In engineering and manufacturing, **quality control** & **quality assurance** is a set of measures taken to ensure that defective product or services are not produced, and that the design meets performance requirements. Course includes the regulation of the quality of raw materials, assemblies, products and components; services related to production; and management, production, and inspection processes.

**Course Contents:**

**Module I: Introduction:(6 Hours)**
Meaning of Quality and quality improvement, need of Quality, Statistical methods for quality control, Process capability.

**Module II: Quality Control: (6 Hours)**
Statistical Quality Control, control charts, Control charts for attributes & variables, Moving average chart.

**Module III: Production Control: (10 Hours)**
Acceptance Sampling, OC curve, Sampling Plan, Producer' risk, Consumer's risk, Average Quality Level, AOQL, Design of Single & double sampling plan.

**Module IV: Quality Assurance: (8 Hours)**
Need of Quality Assurance, Quality Audit, Concept of Zero defect, ISO 9000 quality systems, total quality management.

## Course Outcomes:
To pass this subject the student will be able to:
- Explain the different meanings of the quality concept and its influence.
- Describe, distinguish and use the several techniques and quality management tools.
- Explain and distinguish the normalization, homologation and certification activities.
- Identify the elements that are part of the quality measuring process in the industry.

**Examination Scheme:**

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

- EL Grant & RS Leavenworth, "Statistical Quality Control", McGraw Hill & Co.
- M. Mahajan, "Statistical Quality Control", Dhanpat Rai & Co.
- O.P. Khanna, "Statistical Quality Control", Dhanpat Rai & Co.
- R.C. Gupta, "Statistical Quality Control", Khanna Pulishers
- Amitav Mitra, "Fundamentals of Quality Control", Pearson Education
- Feigenbaum, "Total Quality Control", McGraw Hill & Co.
- Suresh Dalela, "Quality Systems", Standard Publishers & Distributors
- Montgomery DC, "Introduction to Statistical Quality Control", John Wiley & Sons Inc.
- Stephan B. Vardeman, J Marcus Jobe, "Statistical QA Methods for Engineers", John Wiley & Sons Inc.
- Taylor J.R., "Quality Control systems", McGraw Hill Int. Education
- K.C. Arora, "Total Quality Management", S.K. Kataria & Sons.

# REFRIGERATION & AIR-CONDITIONING

**Course Code: BME 802** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The objective of this course is to familiarize the students with the basic principles of Refrigeration and Air Conditioning, different types of refrigerants, simple mathematical models representing the conditioned space and its components used to control environmental conditions. It includes an understanding of psychometrics, human comfort and air quality, calculation of heating and cooling loads.

**Course Contents:**

**Module I: Introduction: (5 Hours)**
Introduction, Principles and methods of production of low temperature, heat engine, heat pump and refrigerator, unit of refrigeration, coefficient of performance.

**Module II**: **Vapor Compression Refrigeration System: (8 Hours)**
Vapor Compression Refrigeration system - Carnot vapor compression refrigeration cycle, Working and analysis, Limitations, Standard Vapor Compression Refrigeration system, Working and analysis, Effects of sub cooling and super heating, multiple compression and evaporation system, cascading.

**Module III: Air Refrigeration: (6 Hours)**
Air Refrigeration Cycles - reversed Carnot cycle, Bell-Coleman cycle analysis, Air Refrigeration systems.
Refrigerants: Classification, nomenclature of refrigerants, desirable properties of an ideal refrigerant, Ozone layer depletion and global warming.

**Module IV: Vapor Absorption Systems: (4 Hours)**
Introduction to simple vapor absorption system, working of practical vapor absorption system, electrolux system comparison of VAS and VCR system.

**Module V: Air-conditioning: (7 Hours)**
Psychrometry and psychrometric charts, property calculations of air vapor mixtures, Psychometric processes, air conditioning, comfort air-conditioning, sensible heat factor, human comfort, effective temperature & chart, heat production & regulation of human body, estimation of cooling and heating loads, industrial air conditioning.

## Course Outcome:
A student will have a good understanding of the working principles of refrigeration and air-conditioning systems.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:

- CP Arora, Refrigeration and Conditioning, Tata McGraw Hill.
- Manohar Prasad, Refrigeration and Conditioning, Wiley Eastern Limited.
- Jordan and Priester, Refrigeration and Conditioning, Prentice Hall of India.
- WF Stoecker, Refrigeration and Conditioning, McGraw Hill.

# REFRIGERATION & AIR-CONDITIONING LAB

**Course Code: BME 822** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
The objective of this course is to help students in understanding the working principle of refrigeration and air conditioning systems. It includes the performance evaluation of refrigeration test rig & air conditioning duct.

**List of experiments/demonstrations:**

1. Study of refrigeration testing.**: (3 Hours)**
2. Study of Air-Conditioning testing**: (3 Hours)**
3. To calculate the COP of Refrigerator**: (3 Hours)**
4. Study of effect of superheating**: (3 Hours)**
5. To calculate the efficiency of Compressor**: (3 Hours)**
6. To calculate total Heat Load for Air-Conditioning unit**: (3 Hours)**
7. To calculate the COP of Heat Pump**: (2 Hours)**

## Course Outcome:
After completion of course student will be able to evaluate the performance of refrigerator and air conditioning system.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

# ADVANCED METHODS OF MANUFACTURING

**Course Code: BME 803** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The aim of the course is to provide the students with the understanding of the basic principles underlying the design, analysis, and synthesis of robotic systems plus machine vision technology in automation. In particular, the course will start from simple problem in transformations, kinematics and inverse kinematics, dynamics and control. Later in the semester more complex problems in sensing, force control, mobile robots and robot programming will be discussed.

**Course Contents:**

**Module I: Kinematics Analysis of Robot: (8 Hours)**
Matrix algebra or coordinate transformation, kinematics analysis; geometric and dynamic analysis of robot manipulators.

**Module II: Robot Control: (7 Hours)**
Robot Control, Robot Vision, Robot Controlled, CNNC, Path planning, Obstruction Avoidance

**Module III: Material Handling: (10 Hours)**
Computer aided Materials Management-inventory control, materials requirements planning. Computer Controlled parts handling and equipments.

**Module IV:Automation Protocol: (5 Hours)**
Manufacturing Automation protocol, cross functional implementation Technology for system integration.

## Course Outcomes:

- Student should be able to select appropriate manufacturing processes for advanced components with characterization of work pieces.
- Student should be able to understand Various Advanced manufacturing metal forming Processes Student should be able to understand to select proper Advanced Manufacturing process for welding, casting and forging

**Examination Scheme:**

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Raghuvanshi, Manufacturing Process.
- P.N. Rao, Manufacturing Technology, TMH publications
- Hazra-Chowdhary , Workshop Technology
- R.K. Jain, Production Engineering

# GEAR TECHNOLOGY

**Course Code: BME 804** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The objective of gear technology is to provide information on gears, gear manufacturing, and the gear industry in general. This course includes information about hobbling, shaping, shaving, broaching and other gear manufacturing processes. It also covers gear design, gear engineering and related topics.

**Course Contents:**

**Module I: Introduction to Gears: (6 Hours)**
Types of gears, Geometric and Kinetics characteristics, Undercutting and interference-correction, Non-Circular gears.

**Module II: Gear Design: (6 Hours)**
Design of tools to make gear teeth, Kinds and cases of gear failures, Special Design Problems; Center distance problem, profile modification.

**Module III: Gear Trains: (6 Hours)**
Gear Trains (Analysis & Synthesis), Problem Combined bending and Torsion of pinions with large length to diameter ratio, high speed gearing.

**Module IV: Gear Set Design: (6 Hours)**
Some example of optimal kinematics system Design; Gear Set design, Design of sub-system consisting of Geneva wheel and elliptical gears for reduction of maximum acceleration of the wheel.

**Module V:** Geneva Mechanisms (Analysis & Synthesis)**: (6 Hours)**

## Course Outcomes:

- Transmission through Gears: mechanism, gear trains, classification and analysis, familiarity with gear standardization.
- Power transmission through gear train, mechanism and materials.
- Gear set design, gear train and gear teeth.

**Examination Scheme:**

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance.

## Text & References:


- D.W. Dudley, “Practical Gear Design”, Tata McGraw Hill Co. Inc.
- S.S. Rattan, “Theory of Machines”, Tata McGraw Hill, 2000
- V.B. Bhandari, “Design of Machine Elements”, Tata McGraw Hill Co. Inc.
- Sadhu Singh, “Design of Machine Elemets”, Khanna Publishers Fifth Edition 2012.
- AGMA (American Gear Manufacturing Association) Standards

# ADVANCED METHODS OF MANUFACTURING LAB

**Course Code: BME 823** **Credit Units: 01**
**Total Hours: 20**

**Course Objective :**
The objective of course is to learn about the advanced method of manufacturing processes and develop recent manufacturing processes.

**Course Contents:**

1. Practice of part programming and operations of**: (3 Hours)**
   i) Turning Center.
   ii) Machining Center.

2. Tool planning and selection for**: (3 Hours)**
   i) Turning Center.
   ii) Machining Center.

3. Tool Design for a plastic component**: (3 Hours)**
   i) Core and Cavity Extraction of Industrial switch Knob.
   ii) Gating Design.

4. Assembly of various die components for the above**: (3 Hours)**

5. Pattern design for a casting component**: (2 Hours)**
   i) Cope and Drag design of a butterfly valve.
   ii) Gating design.

6. Assembly of various pattern components for the above**: (2 Hours)**

7. Generation of G and M codes for the above assemblies and electrodes**: (2 Hours)**

8. Programming and study of Robots for material handling**: (2 Hours)**

## Course Outcomes:

- Student should be able to understand selection of latest additive manufacturing processes
- Student should be able to understand and select various measurement techniques in micro machining processes

### Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# GEAR TECHNOLOGY LAB

**Course Code: BME 824** **Credit Units: 01**

**Total Hours: 20**

**Course Objective:**

Identify the basic relative kinematics relations of two moving gears. Develop analytical equations describing the relative position, velocity and acceleration of all gears and identify all reaction and inertia forces on the gears. Demonstrate familiarity with standards in different gear and machine components.

**Course Contents:**

**List of Experiments:**

1. To study the different elements of Worm Gear**: (4 Hours)**
2. To study the different elements of Bevel Gear**: (4 Hours)**
3. To study the different elements of Helical Gear**: (3 Hours)**
4. To study the Differential Gear System**: (3 Hours)**
5. Calculation of train ratio and velocity ratio for compound Gear**: (3 Hours)**
6. Calculation of train ratio and velocity ratio for Sun and Planet Gear**: (3 Hours)**

## Course Outcomes:

On successful completion of the course, the student will be able to,

- Explain the basic principles of gears.
- Demonstrate the design process of commonly used gears.
- Recognize the standards used in design of gears.
- Analyze the force acting on the gears.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

# COMMUNICATION SKILLS – VIII

**Course Code: BCU 841** **Credit Units: 01**
**Total Hours: 10**

**Course Objective:**
This course is designed to hone the creative minds of students to develop knowledge of diverse ethnic groups and cultures and to increase self-awareness for cultural competence and sensitivity.

**Prerequisites:** NIL

| **Course Contents / Syllabus:** | | |
|---|---|---|
| **1.** | **Module I Speaking in Public**<br>• Essentials in Public Speaking<br>• Parameters of Public Speaking | **45% Weightage** |
| **2.** | **Module II Cross Cultural Communication**<br>• Culture and Context<br>• Awareness & Significance of Understanding Culture<br>• Ethnocentrism, Stereotyping and Cultural Relativism<br>• Cultural Shock and Social Change | **45% Weightage** |
| **3.** | **Module III Prose** | **10% Weightage** |
| 4. | • India Cinema: Tradition & Change-Chidananda Das Gupta<br>• Kabuliwala-Rabindranath Tagore<br>• The Duchess and the Jewelller -Virginia Woolf<br>• The Park- James Mathews<br>All the four stories will be discussed in one class<br>One Long Question will be set in the Exam from the Text | |
| | **Student Learning Outcomes:**<br>• Students will be able to navigate cross cultural encounters in a global economy.<br>• Facilitate students to develop learning to construct and deliver messages that incorporate the appropriate use of organizing content, language, vocabulary, kinesics, eye contact, appearance, visual aids, and time constraints. | |
| **5.** | **Pedagogy for Course Delivery:**<br>• Workshop<br>• Group Discussions<br>• Presentations<br>• Lectures | |
| **6.** | **Assessment/ Examination Scheme:** | |

| **Theory L/T (%)** | **Lab/Practical/Studio (%)** | **End Term Examination** |
|---|---|---|
| 100% | NA | 70% |

**Theory Assessment (L&T):**

| **Components (Drop down)** | CIE | Mid Sem | Attendance | **End Term Examinatio** |
|---|---|---|---|---|
| **Weightage (%)** | 10% | 15% | 5% | 70% |

**Text:***Penrose, Rasberry & Myers. Business Communication for Managers: An Advanced Approach, New Delhi: Cengage, 2012.*
*Raman, Meenakshi. Business Communication, Oxford*
*Krizan, Merrier, Logan & Williams. Effective Business Communication, New Delhi: Cengage, 2011*
**References:**
*Beamer, Linda. Intercultural Communication in the Global Workplace, Irwin/McGraw-Hill, 2005.*
*Reynolds, Sana & Deborah Valentine. Guide to Cross-cultural Communication, Prentice Hall, 2003.*
**Additional Reading: Newspapers and Journals**

# BEHAVIOURAL SCIENCE – VIII

**Course Code: BSU 843** | **Credit Units: 01**
**Total Hours: 10**

**Course Objective:**
- To have a great deal of insight into one's character.
- Understanding of positive emotions
- To explore the dimensions of happiness, well-being, Optimism and hope
- Quick understanding of different situations and grasp new concepts.

**Course Contents:**

**Module I: Positivity in personality: (02 Hours)**
- Importance of Positivity in personality
- Positivity Vs. Negativity
- Introspection and personal growth

**Module II: Positive Emotions:(02 Hours)**
- Understanding positive emotions
- Importance of Positive emotion
- Types and identification of positive emotions (Love, happiness, Contentment, Resilience, etc.)

**Module III: Hope, Optimism and Resilience: (02 Hours)**
- Positive approach towards future
- Benefits of Positive approach
- Resilience during challenge and loss

**Module IV: Application of Positive Emotions: (02 Hours)**
- Application of positive emotions in relationships, and organizations
- Creating healthy organizational climate
- Positive emotions enhances performance

**Module V: Happiness and Well Being: (02 Hours)**
- Concept of Happiness & Well-Being
- Secret of happy mind and healthy life
- Work life balance

## Course outcome:
- Students develop the ability to identify and regulate positive emotions for personal and professional excellence.
- Students will know how to develop resilience.
- Students will know how to role of happiness to attain wellbeing.
- Students will know how to nurture personality by positivity.

**Examination Scheme:**

| Evaluation Components | Attendance | Journal of Success (JOS) | Social Awareness Program (SAP) SAP Report/SAP Presentation | End Semester Exam | Total |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 15 | 70 | 100 |

## Suggested Readings:

- Raman, A.T. (2003) Knowledge Management: A Resource Book. Excel Books, Delhi.
- Kamalavijayan D. (2005). Information and Knowledge Management Macmillan India Ltd. Delhi

# FRENCH – VIII

**Course Code: FLU 844** **Credit Units: 02**
**Total Hours: 20**

**Course Objective:**
To provide the students with the linguistic tools to enhance social communication skills and be able
- To express an intention, announce a news, enquire about an event
- To speak about the future
- To discuss the media

**Course Contents:**
**Dossier3–pg29-40,Dossiers1&2(révision). Dossier3:Médias.fr**
**ActesdeCommunication:**
Parlerdel'avenir(lesavantageset lesinconvénientsdesréseauxsociaux)
Exprimeruneintention(poserdesquestionssurunforum) Parlerdesmédias
Engager/ terminerune conversation(demanderpourquoionn'a pasréponduaumèl)
Interrogersurunévénement (vol,accident) Annoncerunenouvelle (celle de démission)

**Thèmesabordés:**
LesFrançaiset la presse (débat: Croyez-vousauxlégendesurbaines?)
LesFrançaisetInternet(débat:lesinformationsdelapresseécritesontplusfiablesquelesinformationssurInternet ?)
LatélévisiondesFrançais
Laprofession: Lesanimateursradio(débat : pouroucontre le téléchargement illégal de la musique oudesfilms)

**Grammaire :**
1. Le futursimple
2. L'hypothèse surlefutur
3. Lesformesde la négation
4. Lespronomscomplémentsdirectset indirects(révision)

**ExaminationScheme:**

| | **INTERNAL** | | | | **EXTERNAL** | **GRAND TOTAL** |
|---|---|---|---|---|---|---|
| **Components** | MID-SEM | VIVA-VOCE | ATTENDANCE | **TOTAL** | **END SEMESTER** | |
| **Weightage (%)** | 15 | 10 | 5 | **30** | **70** | **100** |

## Text &References:

*Text:*
**Le livre àsuivre:**
- Carenzi-Vialaneix,Christelle et al. A proposA2Livre de l'élève.Grenoble:PressesuniversitairesdeGrenoble, 2010.
- Carenzi-Vialaneix,Christelle et al. A proposA2Cahierd'exercices.Grenoble:PressesuniversitairesdeGrenoble, 2010.

*Références:*
- Girardeau,Brunoet Mous,Nelly.Réussir leDELFA1.Paris:LesÉditionsDidier,2010.

# MAJOR PROJECT – II

**Course Code: NMP 860** **Credit Units: 09**

**Course Objectives:**
The objective of Major project is to enable the student to take up investigative study in the broad field of Engineering, either fully theoretical/practical or involving both theoretical and practical work to be assigned by the Department on an individual basis or two/three students in a group, under the guidance of a Supervisor. The aim is to provide students an opportunity to exercise their creative and innovative qualities in a group project environment and to excite the imagination of aspiring engineers, innovators and technopreneurs.

**Methodology:**

Topics of project are to be based on the latest trends, verifying engineering concepts /principals and should involve elementary research work. The projects may involve design, fabrications, testing, computer modeling, and analysis of any engineering problem. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation on same.

## Course Outcomes:

On successful completion of the course students will be able to:

- Apply critical and creative thinking in the design of engineering projects
- Plan and manage time effectively as a team.
- Consider the business context and commercial positioning of designed devices or systems.
- Apply knowledge of the 'real world' situations that a professional engineer can encounter.
- Use fundamental knowledge and skills in engineering and apply it effectively on a project.
- Design and develop a functional product prototype while working in a team.
- Use various tools and techniques to study existing systems.
- Achieve precision in uses of the tools related to their experiments/fabrication.
- Timely reflect on peers' technical and non-technical learning.
- Orally present and demonstrate your product to peers, academics, general and industry community.
- Write comprehensive report on project work.

**Examination Scheme:**

| | |
|---|---|
| Literature study/ Fabrication/ Experimentation | 40 |
| Written Report | 20 |
| Viva | 15 |
| Presentation | 25 |
| **Total** | **100** |

# Bachelor of Technology
# (Mechanical Engineering)

# BME

AICTE MODEL

CURRICULUM

(2021-25 Batch)

# Bachelor of Technology
# (Mechanical Engineering)

## Programme Code: BME

## Duration – 4 Years Full Time

## Programme Structure
## &
## Curriculum & Scheme of Examination

## 2021-25
## (Based on AICTE)

# AMITY UNIVERSITY
# MADHYA PRADESH

**PREAMBLE**

Amity University aims to achieve academic excellence by providing multi-faceted education to students and encourage them to reach the pinnacle of success. The University has designed a system that would provide rigorous academic programme with necessary skills to enable them to excel in their careers.

This booklet contains the Programme Structure, the Detailed Curriculum and the Scheme of Examination. The Programme Structure includes the courses (Core and Elective), arranged semester wise. The importance of each course is defined in terms of credits attached to it. The credit units attached to each course has been further defined in terms of contact Hours i.e. Lecture Hours (L), Tutorial Hours (T), Practical Hours (P). Towards earning credits in terms of contact Hours, 1 Lecture and 1 Tutorial per week are rated as 1 credit each and 2 Practical Hours per week are rated as 1 credit. Thus, for example, an L-T-P structure of 3-0-0 will have 3 credits, 3-1-0 will have 4 credits, and 3-1-2 will have 5 credits.

The Curriculum and Scheme of Examination of each course includes the course objectives, course contents, scheme of examination and the list of text and references. The different codes used for the components of evaluation are given below:-

| **Components** | **Codes** |
|---|---|
| Case Discussion/ Presentation/ Analysis | C |
| Home Assignment | H |
| Project | P |
| Seminar | S |
| Viva | V |
| Quiz | Q |
| Class Test | CT |
| Attendance | A |
| End Semester Examination | ESE |

It is hoped that it will help the students study in a planned and a structured manner and promote effective learning. Wishing you an intellectually stimulating stay at Amity University.

March 2020

## PROGRAM OUTCOMES

**PO1**. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

**PO2. Problem Analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

**PO3. Design/Development of Solutions: Design** solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

**PO4. Conduct Investigations of Complex Problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

**PO5. Modern Tool Usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

**PO6. The Engineer and Society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

**PO7. Environment and Sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**PO8. Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

**PO9. Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**PO10. Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

**PO11. Life-long Learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

**PO12. Project Management and Finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

## PROGRAM SPECIFIC OUTCOMES

**PSO1.Professional Skills**: An ability to understand the basic concepts in Mechanical Engineering and to apply them to various areas, like Automobile, power plant, Production, Manufacturing etc., in the design and implementation of complex systems.

**PSO2. Problem-solving skills**: An ability to solve complex Mechanical Engineering problems, using latest hardware and software tools, along with analytical skills to arrive cost effective and appropriate solutions.

**PSO3. Successful career and Entrepreneurship**: An understanding of social-awareness & environmental-wisdom along with ethical responsibility to have a successful career and to sustain passion and zeal for real-world applications using optimal resources as an Entrepreneur.

# PROGRAMME STRUCTURE

| **FIRST SEMESTER** | | | | | | |
|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Lecture (L) Hours Per week** | **Tutorial (T) Hours Per week** | **Practical (P) Hours Per week** | **Total Credits** | **Hours** |
| MAT101 | Applied Mathematics – I (Calculus and Linear Algebra) | 3 | 1 | - | 4 | 40 |
| CHE101 | Applied Chemistry | 3 | 1 | - | 4 | 40 |
| CSE104 | Programming for Problem Solving | 3 | - | - | 3 | 30 |
| BME101 | Engineering Graphics & Design | 1 | - | - | 1 | 10 |
| CIV101 | Basic Civil Engineering & Applied Mechanics | 2 | - | - | 2 | 20 |
| CHE121 | Applied Chemistry Lab | - | - | 2 | 1 | 20 |
| CSE124 | Programming for Problem Solving Lab | - | - | 4 | 2 | 40 |
| BME121 | Engineering Graphics & Design Lab | - | - | 4 | 2 | 40 |
| BCU141 | Communication Skills – I | 1 | | | 1 | 10 |
| EVS142 | Environmental Studies – I | 2 | - | - | 2 | 20 |
| BSU143 | Behavioural Science – I | 1 | - | - | 1 | 10 |
| FLU144 | French –I | 2 | - | - | 2 | 20 |
| **CBCS** | | 3 | - | - | 3 | 30 |
| **TOTAL CREDITS (Including CBCS)** | | | | | **28** | |
| **Total Hours Including CBCS per week** | | | | | **33** | |
| **Total Hours in the Semester** | | | | | **330** | |

| **SECOND SEMESTER** | | | | | | |
|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Lecture (L) Hours Per week** | **Tutorial (T) Hours Per week** | **Practical (P) Hours Per week** | **Total Credits** | **Hours** |
| MAT201 | Applied Mathematics–II (Ordinary & Partial Differential Equations and Transform) | 3 | 1 | - | 4 | 40 |
| PHY101 | Applied Physics – I | 3 | 1 | - | 4 | 40 |
| ECE101 | Basic Electrical Engineering | 3 | - | - | 3 | 30 |
| CSE204 | Object Oriented Programming Using C++ | 2 | 1 | - | 3 | 30 |
| BME102 | Workshop/ Manufacturing Practices | 1 | - | - | 1 | 10 |
| PHY121 | Applied Physics Lab – I | - | - | 2 | 1 | 20 |
| ECE121 | Basic Electrical Engineering Lab | - | - | 2 | 1 | 20 |
| CSE224 | Object Oriented Programming Using C++ Lab | - | - | 2 | 1 | 20 |
| BME122 | Workshop/ Manufacturing Practices Lab | - | - | 4 | 2 | 40 |
| BCU241 | Communication Skills – II | 1 | - | - | 1 | 10 |
| EVS242 | Environmental Studies – II | 2 | - | - | 2 | 20 |
| BSU243 | Behavioural Science – II | 1 | - | - | 1 | 10 |
| FLU244 | French –II | 2 | - | - | 2 | 20 |
| **CBCS** | | 3 | - | - | 3 | 30 |
| **TOTAL CREDITS (Including CBCS)** | | | | | **29** | |
| **Total Hours Including CBCS per week** | | | | | **34** | |
| **Total Hours in the Semester** | | | | | **340** | |
| TERM PAPER DURING SUMMER BREAK | | | | | | |

| **THIRD SEMESTER** | | | | | | |
|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Lecture (L) Hours Per week** | **Tutorial (T) Hours Per week** | **Practical (P) Hours Per week** | **Total Credits** | **Hours** |
| MAT 301 | Applied Mathematics – III (Probability, Statistics and Numerical Methods) | 3 | - | - | 3 | 30 |
| PHY 303 | Applied Physics – II | 3 | - | - | 3 | 30 |
| BME 301 | Engineering Mechanics | 3 | - | - | 3 | 30 |
| BME 302 | Material Science & Metallurgy | 3 | - | - | 3 | 30 |
| BME 303 | Thermodynamics | 3 | - | - | 3 | 30 |
| ECE 307 | Basic Electronics | 2 | - | - | 2 | 20 |
| PHY 323 | Applied Physics Lab – II | - | - | 2 | 1 | 20 |
| BME 321 | Engineering Mechanics Lab | - | - | 2 | 1 | 20 |
| BME 323 | Thermodynamics lab | - | - | 2 | 1 | 20 |
| ECE 327 | Basic Electronics lab | - | - | 2 | 1 | 20 |
| BCU 341 | Communication Skills – III | 1 | - | - | 1 | 10 |
| BSU 343 | Behavioural Science – III | 1 | - | - | 1 | 10 |
| FLU 344 | French– III | 2 | - | - | 2 | 20 |
| NTP 330 | **Term paper (Evaluation)** | - | - | - | 2 | |
| **CBCS** | | 3 | - | - | 3 | 30 |
| **TOTAL CREDITS (Including CBCS)** | | | | | **30** | |
| **Total Hrs Including CBCS** | | | | | **32** | |
| **Total Hrs in the Semester** | | | | | **320** | |

| FOURTH SEMESTER | | | | | | |
|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Lecture (L) Hours Per week** | **Tutorial (T) Hours Per week** | **Practical (P) Hours Per week** | **Total Credits** | **Hours** |
| BME 401 | Fluid Mechanics | 3 | - | - | 3 | 30 |
| BME 402 | Heat and Mass Transfer | 3 | - | - | 3 | 30 |
| BME 403 | Kinematic of Machine | 3 | - | - | 3 | 30 |
| BME 404 | Manufacturing Machine | 3 | - | - | 3 | 30 |
| BME 405 | Strength of Material | 3 | - | - | 3 | 30 |
| BME 422 | Heat and Mass Transfer Lab | - | - | 2 | 1 | 20 |
| BME 423 | Kinematic of Machine Lab | - | - | 2 | 1 | 20 |
| BME 424 | Manufacturing Machine Lab | - | - | 2 | 1 | 20 |
| BME 425 | Strength of Material & Fluid Mechanics Lab | - | - | 2 | 1 | 20 |
| BCU 441 | Communication Skills – IV | 1 | - | - | 1 | 10 |
| BSU 443 | Behavioural Science – IV | 1 | - | - | 1 | 10 |
| FLU 444 | French– IV | 2 | - | - | 2 | 20 |
| **CBCS** | | 3 | 1 | - | 4 | 40 |
| **TOTAL CREDITS (Including CBCS)** | | | | | **27** | |
| **Total Hrs Including CBCS** | | | | | **31** | |
| **Total Hrs in the Semester** | | | | | **310** | |
| INDUSTRIAL PRACTICAL TRAINING – I: 6 – 8 WEEKS | | | | | | |

| FIFTH SEMESTER | | | | | | |
|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Lecture (L) Hours Per week** | **Tutorial (T) Hours Per week** | **Practical (P) Hours Per week** | **Total Credits** | **Hours** |
| BME 501 | Applied Thermodynamics | 3 | - | - | 3 | 30 |
| BME 502 | Dynamics of Machines | 3 | - | - | 3 | 30 |
| BME 503 | Machine Design –I | 3 | - | - | 3 | 30 |
| BME 504 | Measurement and Control | 3 | - | - | 3 | 30 |
| BME 505 | Metrology | 3 | - | - | 3 | 30 |
| BME 522 | Dynamics of Machine Lab | - | - | 2 | 1 | 20 |
| BME 524 | Measurement and Control Lab | - | - | 2 | 1 | 20 |
| BME 525 | Metrology lab | - | - | 2 | 1 | 20 |
| BCU 541 | Communication Skills –V | 1 | - | - | 1 | 10 |
| BSU 543 | Behavioural Science – V | 1 | - | - | 1 | 10 |
| FLU 544 | French– V | 2 | - | - | 2 | 20 |
| NPT 550 | **Industrial Practical Training - I (Evaluation)** | - | - | - | 3 | - |
| **CBCS** | | 3 | 1 | - | 4 | 40 |
| **TOTAL CREDITS (Including CBCS )** | | | | | | **29** |
| **Total Hrs Including CBCS** | | | | | | **29** |
| **Total Hrs in the Semester** | | | | | | **290** |

| **SIXTH SEMESTER** | | | | | | |
|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Lecture (L) Hours Per week** | **Tutorial (T) Hours Per week** | **Practical (P) Hours Per week** | **Total Credits** | **Hours** |
| BME 601 | Fluid Power Systems | 3 | - | - | 3 | 30 |
| BME 602 | IC Engine & Gas Turbine | 3 | - | - | 3 | 30 |
| BME 603 | Machine Design – II | 3 | - | - | 3 | 30 |
| BME 604 | Manufacturing Technology | 3 | - | - | 3 | 30 |
| BME 621 | Fluid Power Systems Lab | - | - | 2 | 1 | 20 |
| BME 622 | IC Engine & Gas Turbine Lab | - | - | 2 | 1 | 20 |
| BME 623 | Machine Design Lab – II | - | - | 2 | 1 | 20 |
| **ELECTIVES (Anyone from following with Practical)** | | | | | **4** | **50** |
| BME 606 | Mechatronics | 3 | - | - | | |
| BME 607 | Artificial Intelligence and Robotics | 3 | - | - | | |
| BME 626 | Mechatronics Lab | - | - | 2 | | |
| BME 627 | Artificial Intelligence and Robotics lab | - | - | 2 | | |
| | | | | | | |
| BCU 641 | Communication Skills – VI | 1 | - | - | 1 | 10 |
| BSU 643 | Behavioural Science – VI | 1 | - | - | 1 | 10 |
| FLU 644 | French– VI | 2 | - | - | 2 | 20 |
| NMP 660 | **Minor Project** | - | - | - | 2 | - |
| **CBCS** | | - | - | - | 1 | - |
| **TOTAL CREDITS (Including CBCS )** | | | | | **26** | |
| **Total Hrs Per Week** | | | | | **27** | |
| **Total Hrs in the Semester** | | | | | **270** | |
| INDUSTRIAL PRACTICAL TRAINING –II: 6 – 8 WEEKS | | | | | | |

| SEVENTH SEMESTER | | | | | | |
|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Lecture (L) Hours Per week** | **Tutorial (T) Hours Per week** | **Practical (P) Hours Per week** | **Total Credits** | **Hours** |
| BME 701 | Operations Research | 3 | - | - | 3 | 30 |
| BME 702 | Computer Aided Manufacturing | 3 | - | - | 3 | 30 |
| BME 703 | Management of Manufacturing Systems | 3 | - | - | 3 | 30 |
| BME 721 | Operations Research (Programming) Lab | - | - | 2 | 1 | 20 |
| BME 722 | Computer Aided Manufacturing Lab | - | - | 2 | 1 | 20 |
| **ELECTIVES (Any one from each category)** | | | | | **4** | **50** |
| **A (With Practical)** | | | | | | |
| BME 704 | Automotive Engineering | 3 | - | - | | |
| BME 705 | Computer Aided Designing | 3 | - | - | | |
| BME 724 | Automotive Engineering Lab | - | - | 2 | | |
| BME 725 | Computer Aided Designing Lab | - | - | 2 | | |
| **ELECTIVES (Any one from each category)** | | | | | **3** | **30** |
| **B (Without Practical)** | | | | | | |
| BME 706 | Marketing Management | 3 | - | - | | |
| BME 707 | Solar Energy | 3 | - | - | | |
| BME 708 | Power Plant Practices | 3 | - | - | | |
| BME 709 | Combustion Engine Emissions | 3 | - | - | | |
| BME 710 | Green Vehicle Technology | 3 | - | - | | |
| | | | | | | |
| BCU 741 | Communication Skills – VII | 1 | - | - | 1 | 10 |
| BSU 743 | Behavioural Science – VII | 1 | - | - | 1 | 10 |
| FLU 744 | French– VII | 2 | - | - | 2 | 20 |
| NPT 750 | **Industrial Practical Training– II (Evaluation)** | - | - | - | 5 | |
| NMP 760 | **Major Project – I** | - | - | - | 6 | |
| **TOTAL CREDITS** | | | | | **33** | |
| **Total Hrs Per Week** | | | | | **25** | |
| **Total Hrs in the Semester** | | | | | **250** | |

| EIGHT SEMESTER | | | | | | |
|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Lecture (L) Hours Per week** | **Tutorial (T) Hours Per week** | **Practical (P) Hours Per week** | **Total Credits** | **Hours** |
| BME 801 | Quality Control & Quality Assurance | 3 | - | - | 3 | 30 |
| BME 802 | Refrigeration & Air-conditioning | 3 | - | - | 3 | 30 |
| BME 822 | Refrigeration & Air-conditioning Lab | - | - | 2 | 1 | 20 |
| **ELECTIVES (Any one from following with Practical)** | | | | | **4** | **50** |
| BME 803 | Advanced Methods of Manufacturing | 3 | - | - | | |
| BME 804 | Gear Technology | 3 | - | - | | |
| BME 823 | Advanced Methods of Manufacturing Lab | - | - | 2 | | |
| BME 824 | Gear Technology Lab | - | - | 2 | | |
| | | | | | | |
| BCU 841 | Communication Skills – VIII | 1 | - | - | 1 | 10 |
| BSU 843 | Behavioural Science – VIII | 1 | - | - | 1 | 10 |
| FLU 844 | French– VIII | 2 | - | - | 2 | 20 |
| NMP 860 | **Major Project – II** | - | - | - | 9 | |
| **TOTAL CREDITS** | | | | | **24** | |
| **Total Hrs Per Week** | | | | | **17** | |
| **Total Hrs in the Semester** | | | | | **170** | |

# Bachelor of Technology
# (Mechanical Engineering)

## Programme Code: BME

## Duration – 4 Years Full Time

## OVERALL CREDIT

| Sr. No. | Semester | No. of Credits | No. of Hours |
|---|---|---|---|
| 1 | I | 28 | 33 |
| 2 | II | 29 | 34 |
| 3 | III | 30 | 32 |
| 4 | IV | 27 | 31 |
| 5 | V | 29 | 29 |
| 6 | VI | 26 | 27 |
| 7 | VII | 33 | 25 |
| 8 | VIII | 24 | 17 |
| **Total Credits** | | **226** | **228** |

# APPLIED MATHEMATICS – I (CALCULUS AND LINEAR ALGEBRA)

**Course Code: MAT 101** **Credit Units: 04**
**Total Hours: 40**

**Course Objective:**
The objective of this course is to familiarize the prospective engineers with techniques in calculus, multivariate analysis and linear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

**Course Contents:**

**Module I: Differential Calculus: (8 Hours)**
Successive differentiation, Leibnitz Theorem, Rolle's theorem, Mean value theorem, Taylor's and Maclaurin's theorems with remainders, Partial Differentiation, Total derivative; Maxima and minima for two variables.

**Module II: Integral Calculus: (8 Hours)**
Evaluation of definite and improper integrals: Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface, areas and volumes of revolutions, Multiple Integration: Double integrals (Cartesian and polar), Triple integrals (Cartesian).

**Module III: Vector Calculus: (7 Hours)**
Scalar and vector field, Gradient, Divergence and Curl, Directional Derivative, Evaluation of a Line Integral, Green's theorem in plane (without proof), Stoke's theorem (without proof) and Gauss Divergence theorem (without proof).

**Module IV: Matrices: (7 Hours)**
Inverse and Rank of a matrix, Linear systems of equations, Consistency of Linear Simultaneous Equations, linear Independence, Gauss elimination and Gauss-Jordan elimination, Eigen values, eigenvectors, Caley-Hamilton theorem, Diagonalization.

**Module V: Linear algebra & Vector spaces: (10 Hours)**
Linear algebra: Group, ring, field (Definition), Vector Space, linear dependence of vectors, basis, dimension; Linear transformations (maps), range and kernel of a linear map, Inverse of a linear transformation, rank- nullity theorem (without proof), composition of linear maps, Matrix associated with a linear map.

## Course Outcomes:

The objective of this course is to familiarize the prospective engineers with techniques in basic calculus and linear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.
The students will learn:

- To apply differential and integral calculus tools to the notions of curvature and to improper integrals. Apart from various applications, they will have a basic understanding of Beta and Gamma functions.
- The mathematical tools needed in evaluating multiple integrals and their usage.
- The essential tools of matrices that are used in various techniques dealing with engineering problems.
- The tools of linear algebra including linear transformations, eigen values, diagonalization.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Suggested Text/Reference Books:


- Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
- B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
- G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
- V. Krishnamurthy, V.P. Mainra and J.L. Arora, An introduction to Linear Algebra, Affiliated East–West press, Reprint 2005.

# APPLIED CHEMISTRY

**Course Code: CHE 101** **Credit Units: 04**
**Total Hours: 40**

**Course Objective:**
Chemistry is essential to develop analytical capabilities of students, so that they can characterize, transform and use materials in engineering and apply knowledge in their field. All engineering fields have unique bonds with chemistry whether it is Aerospace, Mechanical, Environmental and other fields. The makeup of substances is always a key factor, which must be known. The upcoming field of technology like Nanotechnology and Biotechnology depends fully on the knowledge of basic chemistry. With this versatile need in view, course has been designed in such a way so that the student should get an overview of the whole subject starting from the very basic bonding mechanism to the application of materials. To train students practically in basic and applied principles of Chemistry.

**Course Contents:**

**Module I: Chemical Bonding & Chemical Equilibrium: (8 Hours)**
Fajan's rule; Hybridisation. Valence bond and Molecular orbital theory for diatomic molecule. Le Chatelier's Principle; Equilibrium constant from Thermodynamic Constants; pH and pOH, Buffer Solution, Buffer Action.

**Module II: Thermodynamics (Use of free energy in chemical equilibria): (6 Hours)**
Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies. Free energy and emf. Cell potentials, the Nernst equation and applications. Corrosion: Prevention and corrosion control

**Module III: Stereochemistry, Organic Reactions & Mechanism: (6 Hours)**
Symmetry and chirality, Isomerism; diastereomers, enantiomers, optical activity, absolute configurations and conformational analysis.

**Module IV: Polymers: (6 Hours)**
Introduction; Polymerization; Addition and Condensation Polymerization. Thermosetting and Thermoplastic Polymers. Molecular Weight of Polymer; Rubber, Plastic and Fiber; Preparation, Properties and uses of PMMA, Polyester, Epoxy Resins and Bakelite, Silicone Polymers.

**Module V: Water Chemistry: (6 Hours)**
Introduction and specifications of water, Hardness and its determination (EDTA method only), Alkalinity, Caustic embrittlement, Boiler feed water, boiler problems; scale, sludge, Carbonate & phosphate conditioning, colloidal conditioning & calgon treatment, Water softening processes; Lime – soda process, Ion exchange method.
Water for domestic use.

**Module VI: Instrumental Methods of Analysis: (8 Hours)**
Introduction; Principles of spectroscopy; Laws of absorbance,
IR: Principle, Instrumentation, Application
UV: Principle, Instrumentation, Application
NMR: Principle, Instrumentation, Application

## Course Outcomes:
After successful completion of the course students will have the knowledge and skill to:

- Apply the principles chemical of sciences to understand the very basic bonding mechanism and the application to materials in different engineering situations.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Physical Chemistry, by P. W. Atkins
- Engineering Chemistry , by Dr. Sunita Rattan
- Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane
- Organic Spectroscopy, by Jagmohan
- Engineering Chemistry by Jain & Jain
- University chemistry, by B. H. Maha
- Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore.

# PROGRAMMING FOR PROBLEM SOLVING

**Course Code: CSE 104** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The objective of this course module is to acquaint the students with the basics of computers system, its components, data representation inside computer and to get them familiar with various important features of procedure oriented programming language i.e. C.

**Course Contents:**

**Module I: Introduction to Programming: (3 Hours)**
Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.) Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/ Pseudocode with examples. From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code.

**Module II: Programming Essential: (8 Hours)**
Arithmetic expressions and precedence, Conditional Branching and Loop, Writing and evaluation of conditionals and consequent branching , Iteration and loops.

**Module III: Arrays: (4 Hours)**
Arrays (1-D, 2-D), Character arrays and Strings.

**Module IV: Basic Algorithms: (3 Hours)**
Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required)

**Module V: Function: (3 Hours)**
Functions (including using built in libraries), Parameter passing in functions, call by value, Passing arrays to functions: idea of call by reference

**Module VI: Recursion: (3 Hours)**
Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort.

**Module VII: Structure: (2 Hours)**
Structures, Defining structures and Array of Structures.

**Module VIII: Pointers: (2 Hours)**
Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation)

**Module IX: File handling: (2 Hours)**
Basics of file Handling.

## Course Outcomes:
The student will learn

- To formulate simple algorithms for arithmetic and logical problems.
- To translate the algorithms to programs (in C language).
- To test and execute the programs and correct syntax and logical error
- To implement conditional branching, iteration and recursion.
- To decompose a problem into functions and synthesize a complete program using divide and conquer approach.
- To use arrays, pointers and structures to formulate algorithms and programs.
- To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.
- To apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:


- Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
- E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill
- Brian W. Kernighan and Dennis M. Ritchie, the C Programming Language, Prentice Hall of India

# ENGINEERING GRAPHICS & DESIGN

**Course Code: BME 101** **Credit Units: 01**
**Total Hours: 10**

**Except the basic essential concepts, most of the teaching part can happen concurrently in the laboratory itself**

**Course Objective:**
This course will provide students concepts on the drawings of different curves like straight line, parabola, ellipse etc. After completion of this course, students will be able to draw different figures manually and will be capable of using various instruments involved in drawings.

**Course Contents:**
Exercises are based on the course Engineering Graphics & Design (BME 101)

**Module I:** Introduction to Engineering Drawing, Orthographic Projections, Projections of Regular Solids, Sections and Sectional Views of Right Angular Solids: **(3 Hours)**

**Module II:** Sections and Sectional Views of Right Angular Solids, Isometric Projections, Overview of Computer Graphics: **(3 Hours)**

**Module III:** Customization & CAD Drawing, Annotations, layering & other functions, Demonstration of a simple team design project: **(4 Hours)**

## Course Outcomes:

- To prepare students to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- To prepare students to use the techniques, skills, and modern engineering tools necessary for engineering practice
- To prepare for actual work situations through practical training in a new state-of-the-art computer designed CAD laboratory using engineering software.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:


- M.B. Shah & B.C. Rana, Engineering Drawing, Pearson Education, 2007
- PS Gill, Engineering Drawing, Kataria Publication
- ND Bhatt, Engineering Drawing, Charotar publications
- N Sidheshwar, Engineering Drawing, Tata McGraw Hill
- CL Tanta, Mechanical Drawing, “Dhanpat Rai”
- Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication
- Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers
- (Corresponding set of) CAD Software Theory and User Manuals

# BASIC CIVIL ENGINEERING & APPLIED MECHANICS

**Course Code: CIV 101** **Credit Units: 02**
**Total Hours: 20**

**Course Objectives:**

- To understand the utility of various types of building materials.
- To understand the location, construction detail and suitability of various building elements.
- To determine the location of object on ground surface.
- To understand the effects of system of forces on rigid body in static conditions.
- Introduction to smart city and its component.

**Course Contents:**

**Module I: Building Materials: (4 Hours)**
Stones, bricks, cement, timber - types, properties, test & uses, Introduction of concrete properties & Laboratory tests on concrete, curing of concrete and mortar Materials.

**Module II: Surveying & Positioning: (4 Hours)**
Introduction to surveying, Survey stations, Measurement of distances; conventional and EDM methods, Measurement of directions by different methods, Measurement of elevations by different methods, reciprocal levelling.

**Module III: Smart City: (4 Hours)**
Elements of smart city, Role of experts of various discipline of engineering in the development of smart city. Concept of green buildings, including rainwater harvesting, non-conventional sources of energy, Smart transportation and drainage system.

**Module IV: Forces and Equilibrium: (4 Hours)**
Graphical and Analytical Treatment of Concurrent and non-concurrent coplanar forces, free body Diagram, Force Diagram and Bow's notations, Application of Equilibrium Concepts: Analysis of plane Trusses, method of joints, method of Sections.

**Module V: Centre of Gravity and moment of Inertia: (4 Hours)**
Centroid and Centre of Gravity, Moment of Inertia of Composite section. Support Reactions, Shear force and bending moment diagram for cantilever & simply supported beam with concentrated, distributed load and Couple.

## Course Outcomes:

Upon completion of the course, the students will be able to:

- Explain concepts and terminologies of building materials, surveying and mechanics.
- Apply various methods for surveying and mechanics.
- Determine the location, area and volume of objects on ground surface.
- Solve the problems of surveying and mechanics by using various methods.
- Analyse the effects of system of forces on rigid bodies in static conditions.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:


- Surveying, Vol. – 1, Punmia B.C., Laxmi Publications, 17th edition, 2016
- Building Material, B. C. Punmia, Laxmi Publications,2016
- A textbook of Engineering Mechanics, D. S. Kumar, Katsons Publications, 2013
- Basic Civil Engineering, S. Ramamrutam & R. Narayan, Dhanpat Rai Pub., 3rd edition, 2013
- Applied Mechanics, Prasad I.B., Khanna Publication 17th edition, 1996
- Surveying, Duggal, Tata McGraw Hill New Delhi, 4th edition, 2013
- Engineering Mechanics - Statics & Dynamics, R.C. Hibbler, Pearson Publications, 14th edition, 2015
- Engineering Mechanics - statics dynamics, A. Boresi & Schmidt, Cengage learning,1st edition, 2008.
- Applied Mechanics, R.K. Rajput, Laxmi Publications, 3rd edition, 2016

# APPLIED CHEMISTRY LAB

**Course Code: CHE 121** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
Principles of chemistry relevant to the study of science and engineering have clarity of understanding through experiments. Learning process and learning outcomes get enhanced through experiments relevant to and commensurate with theoretical knowledge. The lab course is designed to teach the students the basics and advanced chemical principles through experiments.
Four basic sciences, Physics, Chemistry, Mathematics and Biology are the building blocks in engineering and technology. Chemistry is essential to develop analytical capabilities of students, so that they can characterize, transform and use materials in engineering and apply knowledge in their field. All engineering fields have unique bonds with chemistry whether it is Aerospace, Mechanical, Environmental and other fields the makeup of substances is always a key factor, which must be known. For electronics and computer science engineering, apart from the material, computer modeling and simulation knowledge can be inherited from the molecule designing. The upcoming field of technology like Nanotechnology and Biotechnology depends fully on the knowledge of basic chemistry. With this versatile need in view, course has been designed in such a way so that the student should get an overview of the whole subject starting from the very basic application of principles.

**Course Contents:**

**List of experiments: [Any 10]**
1. Chemical analysis of water for determination of hardness. **(2 Hours)**
2. Chemical analysis of water for determination of Alkalinity. **(2 Hours)**
3. Chemical analysis of water for determination of residual Chlorine. **(2 Hours)**
4. Synthesis of urea - formaldehyde resin. **(2 Hours)**
5. Determination of dissolved oxygen in water. **(2 Hours)**
6. Determination of surface tension of a given liquid. **(2 Hours)**
7. Plant pigments separation by paper chromatography. **(2 Hours)**
8. Conductometric titration. **(2 Hours)**
9. Determination of water modules of crystallization in Mohr's salt. **(2 Hours**)
10. Application of distribution law in the determination of equilibrium constant. **(2 Hours)**
11. Determination of amount of Oxalic acid and Sulphuric acid in one litre of solution. **(2 Hours)**
12. pH metric titration. **(2 Hours)**

## Course Outcome:
The chemistry laboratory course will consist of experiments illustrating the principles of chemistry relevant to the study of science and engineering. The students will learn to measure:
- Molecular/system properties
- Surface tension,
- Viscosity
- Conductance of solutions,
- Redox potentials
- Chloride content of water, etc.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:

- Physical Chemistry, by P. W. Atkins
- Engineering Chemistry, by Dr. Sunita Rattan
- Engineering Chemistry by Jain & Jain

# PROGRAMMING FOR PROBLEM SOLVING LAB

**Course Code:** **Credit Units: 02**
**Total Hours: 40**

**Course Objective:**
The objective of this course module is to acquaint the students with the basics of programming in C.

**Course Contents:**
Lab Experiments are based on the course Programming For Problem Solving (CSE 104)

**List of experiments/demonstrations:**
**Tutorial 1**: Problem solving using computers: **(2 Hours)**
**Lab1**: Familiarization with programming environment

**Tutorial 2**: Variable types and type conversions: **(2 Hours)**
**Lab 2**: Simple computational problems using arithmetic expressions

**Tutorial 3:** Branching and logical expressions: **(4 Hours)**
**Lab 3:** Problems involving if-then-else structures

**Tutorial 4**: Loops, while and for loops: **(4 Hours)**
**Lab 4:** Iterative problems e.g., sum of series

**Tutorial 5**: 1D Arrays: searching, sorting**: (4 Hours)**
**Lab 5**: 1D Array manipulation

**Tutorial 6**: 2D arrays and Strings**: (4 Hours)**
**Lab 6**: Matrix problems, String operations

**Tutorial 7**: Functions, call by value: **(4 Hours)**
**Lab 7**: Simple functions

**Tutorial 8 &9**: Numerical methods (Root finding, numerical differentiation, numerical integration): **(4 Hours)**
**Lab 8 and 9:** Programming for solving Numerical methods problems

**Tutorial 10**: Recursion, structure of recursive calls: **(4 Hours)**
**Lab 10:** Recursive functions

**Tutorial 11**: Pointers, structures and dynamic memory allocation: **(4 Hours)**
**Lab 11**: Pointers and structures

**Tutorial 12**: File handling: **(4 Hours)**
**Lab 12**: File operations

## Laboratory Outcomes:

- To formulate the algorithms for simple problems
- To translate given algorithms to a working and correct program
- To be able to correct syntax errors as reported by the compilers
- To be able to identify and correct logical errors encountered at run time
- To be able to write iterative as well as recursive programs
- To be able to represent data in arrays, strings and structures and manipulate them through a program
- To be able to declare pointers of different types and use them in defining self- referential structures.
- To be able to create, read and write to and from simple text files.

**Examination Scheme:**

| IA | | | EE | | | |
|---|---|---|---|---|---|---|
| **A** | **PR** | **Practical Based Test** | **Major Experiment** | **Minor Experiment** | **LR** | **Viva** |
| 5 | 10 | 15 | 35 | 15 | 10 | 10 |

Note: IA –Internal Assessment, EE- External Exam, A- Attendance, PR- Performance, LR – Lab Record, V – Viva.

# ENGINEERING GRAPHICS & DESIGN LAB

**Course Code: BME 121** **Credit Units: 02**
**Total Hours: 40**

**Course Objective:**

This course will provide students concepts on the drawings of different curves like straight line, parabola, ellipse etc. After completion of this course, students will be able to draw different figures manually and will be capable of using various instruments involved in drawings.

**Course Contents:**

**List of experiments/ demonstrations:**
**Module I: Introduction to Engineering Drawing: (4 Hours)**
Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales – Plain, Diagonal and Vernier Scales

**Module II: Orthographic Projections: (4 Hours)**
Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes; Projections of planes inclined Planes - Auxiliary Planes

**Module III: Projections of Regular Solids: (4 Hours)**
Those inclined to both the Planes- Auxiliary Views; Draw simple annotation, dimensioning and scale. Floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc.

**Module IV: Sections and Sectional Views of Right Angular Solids: (4 Hours)**
Prism, Cylinder, Pyramid, Cone – Auxiliary Views; Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry and dwellings (foundation to slab only)

**Module V: Isometric Projections: (4 Hours)**
Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa,Conventions

**Module VI: Overview of Computer Graphics: (4 Hours)**
Listing the computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.; Isometric Views of lines, Planes, Simple and compound Solids

**Module VII: Customization & CAD Drawing: (4 Hours)**
consisting of set up of the drawing page and the printer, including scale settings, Setting up of units and drawing limits; ISO and ANSI standards for coordinate dimensioning and tolerancing; Orthographic constraints, Snap to objects manually and automatically; Producing drawings by using various coordinate input entry methods to draw straight lines, Applying various ways of drawing circles

**Module VIII: Annotations, layering & other functions: (6 Hours)**
Applying dimensions to objects, applying annotations to drawings; Setting up and use of Layers, layers to create drawings, Create, edit and use customized layers; Changing line lengths through modifying existing lines (extend/lengthen); Printing documents to paper using the print command; orthographic projection techniques; Drawing sectional views of composite right regular geometric solids and project the true shape of the sectioned surface; Drawing annotation, Computer-aided design (CAD) software modeling of parts and assemblies. Parametric and non-parametric solid, surface, and wireframe models. Part editing and two-dimensional documentation of models. Planar projection theory, including sketching of perspective, isometric, multi view, auxiliary, and section views. Spatial visualization exercises. Dimensioning guidelines, tolerancing techniques; dimensioning and scale multi views of dwelling.

**Module IX: Demonstration of a simple team design project: (6 Hours)**
Geometry and topology of engineered components: creation of engineering models and their presentation in standard 2D blueprint form and as 3D wire-frame and shaded solids; meshed topologies for engineering analysis

and tool-path generation for component manufacture; geometric dimensioning and tolerancing; Use of solid-modeling software for creating associative models at the component and assembly levels; floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc. Applying colour coding according to building drawing practice; Drawing sectional elevation showing foundation to ceiling; Introduction to Building Information Modelling (BIM)

**Laboratory Outcomes:**

- Introduction to engineering design and its place in society
- Exposure to the visual aspects of engineering design
- Exposure to engineering graphics standards
- Exposure to solid modeling
- Exposure to computer-aided geometric design
- Exposure to creating working drawings
- Exposure to engineering communication

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

# COMMUNICATION SKILLS-I

**Course Code: BCU 141** **Credit Units: 01**
**Total Hours: 10**

**Course Objective:**
The course is intended to familiarize students with the basics of English language and help them to learn to identify language structures for correct English usage.
**Prerequisites:** NIL

| Course Contents / Syllabus: | | |
|---|---|---|
| **1.** | **Module I Essentials of English Grammar** | **30% Weightage** |
| | • Common Errors<br>• Parts of Speech<br>• Collocations, Relative Pronoun<br>• Subject-Verb Agreement<br>• Articles<br>• Punctuation<br>• Sentence Structure- 'Wh' Questions | |
| **2.** | **Module II Written English Communication** | **30% Weightage** |
| | • Paragraph Writing<br>• Essay Writing | |
| **3.** | **Module III Spoken English Communication** | **30% Weightage** |
| | • Introduction to Phonetics<br>• Syllable-Consonant and Vowel Sounds<br>• Stress and Intonation | |
| **4.** | **Module IV : Prose** | **10% Weightage** |
| | "Friends, Romans, Countrymen, lend me your ears" Speech by Marc Antony in Julius Caesar<br>❖ Comprehension Questions will be set in the End-Semester Exam | |
| **5.** | **Student Learning Outcomes:**<br>The students should be able to :<br>• Identify Common Errors and Rectify Them<br>• Develop and Expand Writing Skills Through Controlled and Guided Activities<br>• To Develop Coherence, Cohesion and Competence in Oral Discourse through Intelligible Pronunciation. | |
| **6.** | **Pedagogy for Course Delivery:**<br>• Workshop<br>• Group Discussions<br>• Presentations<br>• Lectures<br>• Extempore | |
| | **Assessment/ Examination Scheme:** | |

| Theory L/T (%) | Lab/Practical/Studio (%) | End Term Examination |
|---|---|---|
| 100% | NA | 70% |

**Theory Assessment (L&T):**

| Components (Drop down) | CIE | Mid Sem | Attendance | End Term Examination |
|---|---|---|---|---|
| **Weightage (%)** | 10% | 15% | 5% | 70% |

**Text:** ***Rosenblum, M. How to Build Better Vocabulary, London: Bloomsbury Publication***
***Verma, Shalini. Word Power made Handy, S. Chand Publications***
***High School English Grammar & Composition by Wren & Martin***
**References:** ***K.K.Sinha , Business Communication, Galgotia Publishing Company.***
**Additional Reading: Newspapers and Journals**

# ENVIRONMENTAL STUDIES – I

**Course Code: EVS 142** **Credit Units: 02**
**Total Hours: 20**

**Course Objective:**
The term environment is used to describe, in the aggregate, all the external forces, influences and conditions, which affect the life, nature, behavior and the growth, development and maturity of living organisms. At present a great number of environmental issues, have grown and complexity day by day, threatening the survival of mankind on earth. Environment study is quite essential in all streams of studies including environmental engineering and industrial management. The objective of environmental studies is to enlighten the masses about the importance of the protection and conservation of our environment and control of human activities which has an adverse effect on the environment.

**Course Contents:**

**Module I: The multidisciplinary nature of environmental studies: (6 Hours)**
Definition, scope and importance

Need for public awareness

**Module II: Natural Resources: (8 Hours)**
Renewable and non-renewable resources:
Natural resources and associated problems

Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.

Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies.

Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.
Role of an individual in conservation of natural resources.

Equitable use of resources for sustainable lifestyles.

**Module III: Ecosystems: (3 Hours)**
Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession

Food chains, food webs and ecological pyramids
Introduction, types, characteristic features, structure and function of the following ecosystem:

- **a.** Forest ecosystem
- **b.** Grassland ecosystem
- **c.** Desert ecosystem
- **d.** Aquatic ecosystems (ponds, streams, lakes, rivers, ocean estuaries)

**Module IV: Biodiversity and its conservation: (3 Hours)**
Introduction – Definition: genetic, species and ecosystem diversity
Biogeographical classification of India
Value of biodiversity: consumptive use, productive use, social, ethical aesthetic and option values Biodiversity at global, national and local levels
India as a mega-diversity nation, Hot-spots of biodiversity

Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts, Endangered and endemic species of India

Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity

## Course Outcomes

Upon course completion, students will be able to understand:

- The multidisciplinary nature of environmental studies, including its definition, scope and need for public awareness.
- Our natural resources including renewable and non-renewable resources comprising of forest, water, mineral, food, energy and land resources.
- The ecosystem, their structure and function, energy flow, bio-geochemical cycles, community ecology, ecological succession, ecological pyramids, forest, grassland, aquatic and tundra ecosystem.
- Biodiversity and its conservation.
- Ecosystem diversity, species diversity and genetic diversity.
- Biological classification of India.
- Value of biodiversity.
- Biodiversity at global national and local level.
- Conservation of biodiversity.
- Characteristic of ideal ecosystem.
- Study of an artificial ecosystem.

**Examination Scheme:**

| Components | CT | HA | S/V/Q | A | ESE |
|---|---|---|---|---|---|
| Weightage (%) | 15 | 5 | 5 | 5 | 70 |

**Text & References:**


- Chauhan B. S. 2009: Environmental Studies, University Science Press New Delhi.
- Dhameja S.K., 2010; Environmental Studies, Katson Publisher, New Delhi.
- Smriti Srivastava, 2011: Energy Environment Ecology and Society, Katson Publisher, New Delhi.
- Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
- Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad 380 013, India, Email:mapin@icenet.net (R)
- Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p Clark R.S., Marine Pollution, Clanderson Press Oxford (TB)
- Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopaedia, Jaico Publ. House, Mumbai, 1196p
- De A.K., Environmental Chemistry, Wiley Eastern Ltd. Down to Earth, Centre for Science and Environment (R)
- Gleick, H.P. 1993. Water in Crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford Univ. Press. 473p
- Hawkins R.E., Encyclopaedia of Indian Natural History, Bombay Natural History Society, Bombay (R) Heywood, V.H & Waston, R.T. 1995. Global Biodiversity Assessment. Cambridge Univ. Press 1140p.
- Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284 p. McKinney, M.L. & School, R.M. 1996. Environmental Science Systems & Solutions, Web enhanced edition. 639p.
- Mhaskar A.K., Matter Hazardous, Techno-Science Publication (TB) Miller T.G. Jr. Environmental Science, Wadsworth Publishing Co. (TB)
- Odum, E.P. 1971. Fundamentals of Ecology. W.B. Saunders Co. USA, 574p
- Rao M N. & Datta, A.K. 1987. Waste Water treatment. Oxford & IBH Publ. Co. Pvt. Ltd. 345p. Sharma B.K., 2001. Environmental Chemistry. Geol Publ. House, Meerut
- Survey of the Environment, The Hindu (M)
- Townsend C., Harper J, and Michael Begon, Essentials of Ecology, Blackwell Science
- Trivedi R.K., Handbook of Environmental Laws, Rules Guidelines, Compliances and Standards, Vol I and II, Enviro Media (R)
- Trivedi R. K. and P.K. Goel, Introduction to air pollution, Techno-Science Publication (TB) Wanger K.D., 1998 Environmental Management. W.B. Saunders Co. Philadelphia, USA 499p

# BEHAVIOURAL SCIENCE - I

**Course Code: BSU 143** **Credit Units: 01**
**Total Hours: 10**

**Course Objective**:

This course aims at imparting an understanding of:
- Understanding self & process of self exploration
- Learning strategies for development of a healthy self esteem
- Importance of attitudes and its effective on personality
- Building Emotional Competency

**Course Contents:**

**Module I: Self: Core Competency** **(2 Hours)**
- Understanding of Self
- Components of Self – Self identity
- Self concept
- Self confidence
- Self image

**Module II: Techniques of Self Awareness** **(2 Hours)**
- Exploration through Johari Window
- Mapping the key characteristics of self
- Framing a charter for self
- Stages – self awareness, self acceptance and self realization

**Module III: Self Esteem & Effectiveness** **(2 Hours)**
- Meaning
- Importance
- Components of self esteem
- High and low self esteem
- Measuring your self esteem

**Module IV: Building Positive Attitude** **(2 Hours)**
- Meaning and nature of attitude
- Components and Types of attitude
- Importance and relevance of attitude

**Module V: Building Emotional Competence** **(2 Hours)**
- Emotional Intelligence – Meaning, components, Importance and Relevance
- Positive and negative emotions
- Healthy and Unhealthy expression of emotions

## Student learning outcomes
- Student will Develop accurate sense of self
- Student will nurture a deep understanding of personal motivation
- Student will develop thorough understanding of personal and professional responsibility
- Student will able to analyse the emotions of others for better adjustment.

**Examination Scheme:**

| Evaluation Components | Attendance | Journal of Success (JOS) | Social Awareness Program (SAP) SAP Report/SAP Presentation | End Semester Exam | Total |
|---|---|---|---|---|---|
| **Weightage (%)** | **5** | **10** | **15** | **70** | **100** |

## Suggested Readings:


- Organizational Behaviour, Davis, K.
- Hoover, Judhith D. Effective Small Group and Team Communication, 2002,Harcourt College Publishers
- Dick, Mc Cann & Margerison, Charles: Team Management, 1992 Edition, viva books
- Bates, A. P. and Julian, J.: Sociology - Understanding Social Behaviour
- Dressler, David and Cans, Donald: The Study of Human Interaction
- Lapiere, Richard. T – Social Change
- Lindzey, G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology, Addison – Welsley, US.
- Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.
- LaFasto and Larson: When Teams Work Best, 2001, Response Books (Sage), New Delhi
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 2, Group (1996); Pfeiffer & Company
- Smither Robert D.; The Psychology of Work and Human Performance, 1994, Harper Collins College Publishers

# FRENCH - I

**Course Code: FLU144** **Credit Units: 02**
**Total Hours: 20**

**Course Objective:**
To familiarize students with the French language, with its phonetic system and its accents.
To enable students

- to greet someone in French
- to present and describe oneself and people
- to enter in contact, and begin a conversation
- to talk about one's family, tastes and preferences

**Course Contents:**

**Dossiers 1, 2 – pg 5-24**

**Dossier 1 : Toi, moi, nous**
**Actes de Communication :**
S'adresser poliment à quelqu'un, entrer en contact, se présenter, présenter quelqu'un, saluer, poser des questions
simples pour connaître quelqu'un, épeler et compter

**Dossier 2 : En famille**
**Actes de Communication :**
Parler de sa famille, Décrire quelqu'un, exprimer ses goûts, écrire et comprendre un message court, inviter
quelqu'un, exprimer la possession, la négation

**Grammaire :**

1. articles indéfinis, articles définis, masculin et féminin des noms et des adjectifs, pluriel des noms et des adjectifs
2. pronoms sujets et toniques, on, c'est/il est + profession,
3. masculin et féminin des adjectifs de nationalité
4. verbes- être, avoir, aller, 'er' groupe
5. l'interrogation – l'intonation, est-ce que, qui est-ce ? Qu'est-ce que? L'inversion ; où, comment, quand ; quel
6. la négation
7. adjectifs possessifs

**Examination Scheme:**

| Components | INTERNAL | | | | EXTERNAL | GRAND TOTAL |
|---|---|---|---|---|---|---|
| | MID-SEM | VIVA-VOCE | ATTENDANCE | **TOTAL** | **END SEMESTER** | |
| **Weightage (%)** | 15 | 10 | 5 | **30** | **70** | **100** |

## Text & References:

***Text:***
**Le livre à suivre:**

· Andant, Christine et al. A propos A1 Livre de l'élève. Grenoble: Presses universitaires de Grenoble, 2010.
· Andant, Christine et al. A propos A1 Cahier d'exercices. Grenoble: Presses universitaires de Grenoble, 2010.

***Références :***

· Girardeau, Bruno et Nelly Mous. Réussir le DELF A1. Paris: Didier, 2010.

# APPLIED MATHEMATICS – II
## (ORDINARY & PARTIAL DIFFERENTIAL EQUATIONS AND TRANSFORM)

**Course Code: MAT 201** **Credit Units: 04**
**Total Hours: 40**

**Course Objective:**
The objective of this course is to familiarize the prospective engineers with techniques in ordinary and partial differential equations and transforms. It aims to equip the students to deal with advanced level of mathematics and applications that would be essential for their disciplines.

**Course Contents:**

**Module I: First order ordinary differential equations: (6 Hours)**
Equation of first order and first degree, Exact, linear and Bernoulli's equations, Equations of first order and higher degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

**Module II: Ordinary differential equations of higher orders: (09 Hours)**
Higher order linear differential equations with constant coefficients, Second order linear differential equations with variable coefficients, method of variation of parameters, Solution by series method.

**Module III: Partial Differential Equations : (09 Hours)**
Formation of Partial Differential Equations, First order partial differential equations, solutions of first order linear PDEs; Solution to homogenous and non-homogenous linear partial differential equations of second order by complimentary function and particular integral method with constant coefficients. Non linear partial differential equation of first order, Charpit's method.,Separation of variable method for the solution of wave and heat equations.

**Module IV: Laplace Transform: (8 Hours)**
Laplace Transform: Introduction of Laplace Transform, Laplace Transform of elementary functions, properties of Laplace Transform, Change of scale property, second shifting property. Laplace transform of the derivative, inverse Laplace transform and its properties. Convolution theorem. Applications of Laplace Transform to solve the ODEs.

**Module V: Fourier Transform: (8 Hours)**
Fourier series: Introduction of Fourier series, Fourier series for discontinuous functions, Fourier series for even and odd function, Half range series, Fourier Transform: Definition and properties of Fourier Transform, Sine and Cosine transform.

## Course Outcomes:
- Upon completion of this course, students will be able to solve field problems in engineering involving PDEs.
- The effective mathematical tools for the solutions of differential equations that model physical processes.
- The students will be able to use Laplace transform to solve differential equations.
- The student will be able to solve PDEs by using the concept of Fourier series and Fourier transform.

**Examination Scheme**:

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Suggested Text/ Reference Books:


- G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
- Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
- W. E. Boyce and R. C. Di Prima, Elementary Differential Equations and Boundary Value Problems, 9th Edition., Wiley India, 2009.
- S. L. Ross, Differential Equations, 3rd Edition, Wiley India, 1984.
- E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall of India, 1995.
- E. L. Ince, Ordinary Differential Equations, Dover Publications, 1958.
- N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
- B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

# APPLIED PHYSICS - I

**Course Code: PHY 101** **Credit Units: 04**
**Total Hours: 40**

**Course Objective:**
Aim of this course is to introduce the students to fundamentals of graduate level physics, which form the basis of all applied science and engineering

**Course Contents:**

**Module I: Electromagnetics: (10 Hours)**
Scalar and vector fields, gradient of a scalar field, physical significance of gradient, equipotential surface. Line, surface and volume integrals, Divergence and curl of vector field and mathematical analysis physical significance, Electric flux, Gauss' law, Proof and Applications, Gauss divergence and Stokes theorems.
Differential form of Gauss' Law, Amperes' Law, Displacement current, Faradays Law, Maxwell equations in free space & isotropic media (Integral form & differential form), EM wave propagation in free space, Poynting vector.

**Module II: Special Theory of Relativity: (10 Hours)**
Michelson-Morley experiment, Importance of negative result, Inertial & non-inertial frames of reference, Einstein's postulates of Special theory of Relativity, Space-time coordinate system, Relativistic Space Time transformation (Lorentz transformation equation), Transformation of velocity, Addition of velocities, Length contraction and Time dilation, Mass-energy equivalence (Einstein's energy mass relation) & Derivation of Variation of mass with velocity,

**Module III: Wave Mechanics: (10 Hours)**
Wave particle duality, De-Broglie matter waves, phase and group velocity, Heisenberg uncertainty principle, wave function and its physical interpretation, Operators, expectation values. Time dependent & time independent Schrödinger wave equation for free & bound states, square well potential (rigid wall), Step potential.

**Module IV: Semiconductor and Electronic Materials: (10 Hours)**
Band Theory of Solids, Semi-conductors: Intrinsic and Extrinsic,Carreir concentration, Direct and indirect band-gaps, Types of Electronic materials, p-n Junction Diode,Diode Equation, Breakdown in p-n Junction Diode: Avalanche and Zener, Zener Diode and its applications photoconductivity and photovoltaics. Superconductivity, Meissner Effect, Type I and Type II Superconductors

## Course Outcomes:
After successful completion of the course students will have the knowledge and skill to:
- Apply vector calculus to static electric-magnetic fields in different engineering situations.
- Analyze and Apply Maxwell's equation to diverse engineering problems.
- Relate semiconductor material properties to semiconductor devices.

**Examination Scheme:**

| Components | Att. | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

- Physics of waves, W. C. Elmore & M. A. Heald
- Introduction to Electrodynamics, D. J. Griffith
- Engineering Physics, Satya Prakash
- Concept of Modern Physics, A. Beiser
- Solid State Physics, S. O. Pallai

# BASIC ELECTRICAL ENGINEERING

**Course Code: ECE 101** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The objective of the course is to provide a brief knowledge of Electrical Engineering to students of all disciplines. This Course includes some theorems related to electrical, some law's related to flow of current, voltages, basic knowledge of Transformer, basic knowledge of electromagnetism, basic knowledge of electrical network.

**Course Contents:**

**Module I: DC Circuits: (7 hours)**
Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff's current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin's and Norton's Theorems. Time-domain analysis of first-order RL and RC circuits.

**Module II: AC Circuits: (7 hours)**
Representation of sinusoidal waveforms, peak and R.M.S. values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance. Three- phase balanced circuits, voltage and current relations in star and delta connections.

**Module III: Transformers: (6 hours)**
Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.

**Module IV: Electrical Machines: (6 hours)**
Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited dc motor. Construction and working of synchronous generators.

**Module V: Power Converters: (4 hours)**
DC-DC buck and boost converters, duty ratio control. Single-phase and three-phase voltage source inverters; sinusoidal modulation.

## Course Outcomes:

- To understand and analyze basic electric and magnetic circuits.
- To study the working principles of electrical machines and power converters.
- To introduce the components of low voltage electrical installations.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:


- D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering" , Tata McGraw Hill, 2010.
- D. C. Kulshreshtha, " Basic Electrical Engineering", McGraw Hill, 2009.
- L. S. Bobrow, " Fundamentals of Electrical Engineering", Oxford University Press, 2011.
- E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
- V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

# OBJECT ORIENTED PROGRAMMING USING C++

**Course Code: CSE 204** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The objective of this module is to introduce object oriented programming. To explore and implement the various features of OOP such as inheritance, polymorphism, Exceptional handling using programming language C++. After completing this course student can easily identify the basic difference between the programming approaches like procedural and object oriented.

**Course Contents:**

**Module I: Introduction: (6 Hours)**
Review of C, Difference between C and C++, Procedure Oriented and Object Oriented Approach. Basic Concepts:Objects, classes, Principals like Abstraction, Encapsulation, Inheritance and Polymorphism. Dynamic Binding, Message Passing. Characteristics of Object-Oriented Languages. Introduction to Object-Oriented Modeling techniques (Object, Functional and Dynamic Modeling).

**Module II: Classes and Objects: (7 Hours)**
Abstract data types, Object & classes, attributes, methods, C++ class declaration, Local Class and Global Class, State identity and behaviour of an object, Local Object and Global Object, Scope resolution operator, Friend Functions, Inline functions, Constructors and destructors, instantiation of objects, Types of Constructors, Static Class Data, Array of Objects, Constant member functions and Objects, Memory management Operators.

**Module III: Inheritance: (6 Hours)**
Inheritance, Types of Inheritance, access modes – public, private & protected, Abstract Classes, Ambiguity resolution using scope resolution operator and Virtual base class, Aggregation, composition vs classification hierarchies, Overriding inheritance methods, Constructors in derived classes, Nesting of Classes.

**Module IV: Polymorphism: (6 Hours)**
Polymorphism, Type of Polymorphism – Compile time and runtime, Function Overloading, Operator Overloading (Unary and Binary) Polymorphism by parameter, Pointer to objects, this pointer, Virtual Functions, pure virtual functions.

**Module V: Strings, Files and Exception Handling: (5 Hours)**
Manipulating strings, Streams and files handling, formatted and Unformatted Input output. Exception handling, Generic Programming – function template, class Template Standard Template Library: Standard Template Library, Overview of Standard Template Library, Containers, Algorithms, Iterators.

## Course Outcomes:
At the end of this course, students will demonstrate ability to:
- To apply concepts of classes and objects in real world scenarios.
- Understand object-oriented programming features in C++,
- Apply these features to program design and implementation,
- Understand object-oriented concepts and how they are supported by C++,
- Gain some practical experience of C++.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:

**Text:**

- A.R.Venugopal, Rajkumar, T. Ravishanker "Mastering C++", TMH, 1997
- R. Lafore, "Object Oriented Programming using C++", BPB Publications, 2004.
- "Object Oriented Programming with C++" By E. Balagurusamy.
- Schildt Herbert, "C++: The Complete Reference", Wiley DreamTech, 2005.

**References:**

- Parasons, "Object Oriented Programming with C++", BPB Publication, 1999.
- Steven C. Lawlor, "The Art of Programming Computer Science with C++", Vikas Publication, 2002.
- Yashwant Kanethkar, "Object Oriented Programming using C++", BPB, 2004

# WORKSHOP/ MANUFACTURING PRACTICES

**Course Code: BME 102** **Credit Units: 01**
**Total Hours: 10**

**Course Objective:**
The objective of this course is to impart the basic knowledge of Manufacturing methods, CNC machines, materials & their properties and various manufacturing processes to the students of all engineering discipline.

**Course Contents:**

**Module I:** Manufacturing Methods- casting, forming, machining, joining, advanced manufacturing methods: **(3 Hours)**

**Module II:** CNC machining, Additive manufacturing, Fitting operations & power tools: **(2 Hours)**

**Module III:** Electrical &Electronics, Carpentry, Plastic moulding, glass cutting: **(3 Hours)**

**Module IV:** Metal casting, Welding (arc welding & gas welding), brazing: **(2 Hours)**

## Course Outcomes:

- To gain knowledge of the different manufacturing processes which are commonly employed in the industry
- To fabricate components using different materials

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:


- Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., “Elements of Workshop Technology”, Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.
- Kalpakjian S. And Steven S. Schmid, “Manufacturing Engineering and Technology”, 4th edition, Pearson Education India Edition, 2002.
- Gowri P. Hariharan and A. Suresh Babu,” Manufacturing Technology – I” Pearson Education, 2008.
- Roy A. Lindberg, “Processes and Materials of Manufacture”, 4th edition, Prentice Hall India, 1998.
- Rao P.N., “Manufacturing Technology”, Vol. I and Vol. II, Tata McGrawHill House, 2017

# APPLIED PHYSICS LAB - I

**Course Code: PHY 121** **Credit Units: 01**
**Total hours: 20**

**Course Objective:**

To provide detailed introduction to the principal class of semiconductor and electronics components

**Course Contents:**
Time allocated for experiments No.1-10 is 2 hours each.

1. To determine the forbidden band gap energy of a semiconductor.
2. To determine the frequency of AC mains using sonometer.
3. To determine the value of specific charge (ratio of e/m) of an electron by Thomson method.
4. To study the common base characteristics of a PNP junction transistor, by drawing input characteristic curves and output characteristic curves.
5. To study the common emitter characteristics of a NPN junction transistor, by drawing input characteristic curves and output characteristic curves.
6. To study a series /parallel resonant LCR circuit, its resonate frequency and quality factor
7. To study the voltage regulation characteristics of a zener diode.
8. To study the characteristics of a solar cell.
9. To draw V – I characteristics of a photocell and to verify the inverse square law of radiation.
10. To plot graph showing the variation of magnetic field with distance along the axis of a circular coil carrying current, and hence estimate the radius of the coil.

## Course Outcomes:
After completion of course student will develop: Practical understanding and applications of fundamental concept of classical and modern Physics.

**Examination Scheme:**

| **Components** | **Att.** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:
Physics Practical, Gupta and Kumar

# BASIC ELECTRICAL ENGINEERING LAB

**Course Code: ECE 121** **Credit Units: 01**
**Total Hours: 20**

**Course objective:**
To impart basic knowledge of electrical quantities such as current, voltage, power, energy and frequency to understand the impact of technology in a global and societal context. Provide working knowledge for the analysis of basic DC and AC circuits used in electrical and electronic devices. To explain the working principle, construction, applications of DC machines, AC machines & measuring instruments.

**Course Contents:**
**List of experiments/ demonstrations: (2 Hours each)**

1. Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors.
2. To verify KVL & KCL in the given network.
3. To verify Superposition Theorem.
4. To verify Maximum Power Transfer Theorem.
5. Demonstration of cut-out sections of machines: dc machine (commutator-brush arrangement), induction machine (squirrel cage rotor), synchronous machine (field winging - slip ring arrangement) and single-phase induction machine.
6. Torque Speed Characteristic of separately excited dc motor.
7. To determine $R_{Th}$, $V_{Th}$, $R_N$, $I_N$ and verify Thevenin's and Norton's Theorem in a given network.
8. To perform open circuit & short circuit test on a single-phase transformer.
9. To study and draw the voltage vs frequency characteristics of the series and parallel resonance for given RLC Circuit
10. Demonstration of (a) dc-dc converters (b) dc-ac converters – PWM waveform (c) the use of dc-ac converter for speed control of an induction motor.

## Laboratory Outcomes:

- Get an exposure to common electrical components and their ratings.
- Make electrical connections by wires of appropriate ratings.
- Understand the usage of common electrical measuring instruments.
- Understand the basic characteristics of transformers and electrical machines.
- Get an exposure to the working of power electronic converters.

**Examination Scheme:**

| IA | | | EE | | | |
|---|---|---|---|---|---|---|
| **Class Test (Practical Based)** | **Mid Term Viva** | **Attendance** | **Major Experiment** | **Minor Experiment/ Spotting** | **Practical Record** | **Viva** |
| 15 | 10 | 05 | 35 | 15 | 10 | 10 |

Note: IA –Internal Assessment, EE- External Exam

# OBJECT ORIENTED PROGRAMMING USING C++ LAB

**Course Code: CSE 224** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
To perform object oriented programming solution and develop solutions to problems demonstrating usage of control structure, modularity, classes, I/O and the scope of the class members.
SOFTWARE REQUIRED: TURBO C++

**Course Contents:**

**Lab assignment will be based on the following:**

1 [Classes and Objects] Write a program that uses a class where the member functions are defined inside a class. **(1 Hour)**
2 [Classes and Objects] Write a program that uses a class where the member functions are defined outside a class. **(1 Hour)**
3 [Classes and Objects] Write a Program to Demonstrate Inline functions. **(1 Hour)**
4 [Classes and Objects] Write a Program to Demonstrate Friend function, classes and this pointer. **(1 Hour)**
5 [Constructors and Destructors] Write a program to demonstrate the use of zero argument and parameterized constructors. **(2 Hours)**
6 [Operator Overloading] Write a program to demonstrate the overloading of increment and decrement operators. **(2 Hours)**
7 [Inheritance] Write a program to demonstrate the single inheritance. **(1 Hour)**
8 [Inheritance] Write a program to demonstrate the multiple inheritance. **(1 Hour)**
9 [Inheritance] Write a Program to demonstrate use of protected members, public & private protected classes, multilevel inheritance etc. **(1 Hour)**
10 [Polymorphism] Write a program to demonstrate the runtime polymorphism. **(1 Hour)**
11 [Exception Handling] Write a program to demonstrate the exception handling. **(2 Hours)**
12 [Templates and Generic Programming] Write a program to demonstrate the use of function template. **(2 Hours)**
13 [Templates and Generic Programming] Write a program to demonstrate the use of class template. **(2 Hours)**
14 [File Handling] Write a Program to Show how file management is done in C++. **(2 Hours)**

## Course Outcomes:

At the end of this course, students will demonstrate ability to:

- knowledge of the structure and model of the C++ programming language, (knowledge)
- evaluate user requirements for software functionality required to decide whether the C++ programming language can meet user requirements (analysis)
- design the object-oriented programs for real world problems.

**Examination Scheme:**

| IA | | | EE | | | |
|---|---|---|---|---|---|---|
| **A** | **PR** | **Practical Based Test** | **Major Experiment** | **Minor Experiment** | **Practical Record** | **Viva** |
| 5 | 10 | 15 | 35 | 15 | 10 | 10 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

## Text & References:

**Text:**

- A.R.Venugopal, Rajkumar, T. Ravishanker "Mastering C++", TMH, 1997
- R. Lafore, "Object Oriented Programming using C++", BPB Publications, 2004.
- "Object Oriented Programming with C++" By E. Balagurusamy.
- Schildt Herbert, "C++: The Complete Reference", Wiley DreamTech, 2005.

**References:**

- Parasons, "Object Oriented Programming with C++", BPB Publication, 1999.
- Steven C. Lawlor, "The Art of Programming Computer Science with C++", Vikas Publication, 2002.
- Yashwant Kanethkar, "Object Oriented Programming using C++", BPB, 2004

# WORKSHOP/ MANUFACTURING PRACTICES LAB

**Course Code: BME 122** **Credit Units: 02**
**Total Hours: 40**

**Course Objective:**
The objective of this course is to impart the basic knowledge of Manufacturing methods, CNC machines, materials & their properties and various manufacturing processes to the students of all engineering discipline.

**Course Contents:**
**List of experiments/demonstrations:**

1. Machine shop **(4 Hours)**
2. Fitting shop **(4 Hours)**
3. Carpentry **(4 Hours)**
4. Electrical & Electronics **(6 Hours)**
5. Welding shop **(Arc welding 4 Hours + gas welding 4Hours)** **(8 Hours)**
6. Casting **(4 Hours)**
7. Smithy **(4 Hours)**
8. Plastic molding & Glass Cutting) **(6 Hours)**

Examinations could involve the actual fabrication of simple components, utilizing one or more of the techniques covered above.

## Laboratory Outcomes:

- Upon completion of this laboratory course, students will be able to fabricate components with their own hands.
- They will also get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.
- By assembling different components, they will be able to produce small devices of their interest.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

# COMMUNICATION SKILLS-II

**Course Code: BCU 241** **Credit Units: 01**
**Total Hours: 10**

**Course Objective:**

To understand the different aspects of communication using the four macro skills – LSRW (Listening, Speaking, Reading, Writing)

**Prerequisites:** NIL

| **Course Contents / Syllabus:** | | |
|---|---|---|
| **1.** | **Module I Communication** | **35% Weightage** |
| | • Process and Importance<br>• Models of Communication (Linear & Shannon Weaver)<br>• Role and Purpose<br>• Types & Channels<br>• Communication Networks<br>• Principles & Barriers | |
| **2.** | **Module II Verbal Communication** | **25% Weightage** |
| | Oral Communication: Forms, Advantages & Disadvantages<br>Written Communication: Forms, Advantages & Disadvantages<br>Introduction of Communication Skills (Listening, Speaking, Reading, Writing) | |
| **3.** | **Module III Non-Verbal Communication** | **30% Weightage** |
| | • Principles & Significance of Nonverbal Communication<br>• KOPPACT (Kinesics, Oculesics, Proxemics, Para-Language, Artifacts, Chronemics, Tactilics)<br>• Visible Code | |
| **4.** | **Module IV : Prose** | **10% Weightage** |
| | TEXT: APJ Abdul Kalam and Arun Tiwari. *Wings of Fire: An Autobiography*, Universities Press, 2011<br>Comprehension Questions will be set in the End-Semester Exam | |
| **5.** | **Student Learning Outcomes:**<br>The students should be able to :<br>• Apply Verbal and Non-Verbal Communication Techniques in the Professional Environment | |
| **6.** | **Pedagogy for Course Delivery:**<br>• Extempore<br>• Presentations<br>• Lectures | |
| **7.** | **Assessment/ Examination Scheme:** | |

| Theory L/T (%) | Lab/Practical/Studio (%) | End Term Examination |
|---|---|---|
| 100% | NA | 50% |

**Theory Assessment (L&T):**

| Components (Drop down) | CIE | Mid Sem | Attendance | End Term Examination |
|---|---|---|---|---|
| **Weightage (%)** | 10% | 15% | 5% | 70% |

**Text:** ***Rosenblum, M. How to Build Better Vocabulary, London: Bloomsbury Publication.***
***Verma, Shalini. Word Power made Handy, S. Chand Publications.***
***High School English Grammar & Composition by Wren & Martin***
**Reference:** ***K.K.Sinha , Business Communication, Galgotia Publishing Company.***
***Alan Pease : Body Language***
**Additional Reading: Newspapers and Journals**

# ENVIRONMENTAL STUDIES – II

**Course Code: EVS 242** **Credit Units: 02**
**Total Hours: 20**

**Course Objectives:**

- To understand various types of environmental pollution.
- To educate masses, in general and students, about the issues related to degradation of environment and social issues related to environment.
- To understand sustainable development.
- To understand environmental assets, local flora and fauna through field surveys.

**Course Contents:**

**Module I: Environmental Pollution: (7 Hours)**
Definition, causes, effects and control measures of: Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear pollution. Solid waste management: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies. Disaster management: floods, earthquake, cyclone and landslides.

**Module II: Social Issues and the Environment: (7 Hours)**
From unsustainable to sustainable development, Urban problems and related to energy. Water conservation, rain water harvesting, watershed management. Resettlement and rehabilitation of people; its problems and concerns Case studies. Environmental ethics: Issues and possible solutions

Climate change, Global warming, Acid rain, Ozone layer depletion, Nuclear Accidents and Holocaust case studies. Fireworks/Crackers – Introduction, ill effects on environment and humans.
Wasteland reclamation, Consumerism and waste products, Environmental Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act. issues involved in enforcement of environmental legislation Public awareness

**Module III: Human Population and the Environment: (4 Hours)**
Population growth, variation among nations. Population explosion – Family Welfare Programmes

Environment and human health. Human Rights. Value Education. HIV / AIDS. Women and Child Welfare. Role of Information Technology in Environment and Human Health.

Case Studies

**Module IV: Field Work: (2 Hours)**
Visit to a local area to document environmental assets-river / forest/ grassland/ hill/ mountain. Visit to a local polluted site – Urban / Rural / Industrial / Agricultural. Study of common plants, insects, birds. Study of simple ecosystems-pond, river, hill slopes, etc.

## Course Outcomes:

Upon course completion, students will be able to:

- Explain various types of environmental pollutions.
- Understand role of individual in abatement of environmental pollution.
- Explain methods to mitigate disasters.
- Learn various environmental protection laws.
- Learn role of IT in environment and human health.

**Examination Scheme:**

| Components | CT | HA | S/V/Q | A | ESE |
|---|---|---|---|---|---|
| Weightage (%) | 15 | 5 | 5 | 5 | 70 |

## Text & References:


- Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
- Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad 380 013, India, Email:mapin@icenet.net (R)
- Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p Clark R.S., Marine Pollution, Clanderson Press Oxford (TB)
- Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopaedia, Jaico Publ. House, Mumbai, 1196p
- De A.K., Environmental Chemistry, Wiley Eastern Ltd. Down to Earth, Centre for Science and Environment (R)
- Gleick, H.P. 1993. Water in Crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford Univ. Press. 473p
- Hawkins R.E., Encyclopaedia of Indian Natural History, Bombay Natural History Society, Bombay (R) Heywood, V.H & Watson, R.T. 1995. Global Biodiversity Assessment. Cambridge Univ. Press 1140p.
- Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284 p. McKinney, M.L. & School, R.M. 1996. Environmental Science Systems & Solutions, Web enhanced edition. 639p.
- Mhaskar A.K., Matter Hazardous, Techno-Science Publication (TB) Miller T.G. Jr. Environmental Science, Wadsworth Publishing Co. (TB)
- Odum, E.P. 1971. Fundamentals of Ecology. W.B. Saunders Co. USA, 574p
- Rao M N. & Datta, A.K. 1987. Waste Water treatment. Oxford & IBH Publ. Co. Pvt. Ltd. 345p. Sharma B.K., 2001. Environmental Chemistry. Geol Publ. House, Meerut
- Survey of the Environment, The Hindu (M)
- Townsend C., Harper J, and Michael Begon, Essentials of Ecology, Blackwell Science
- Trivedi R.K., Handbook of Environmental Laws, Rules Guidelines, Compliances and Standards, Vol I and II, Enviro Media (R)
- Trivedi R. K. and P.K. Goel, Introduction to air pollution, Techno-Science Publication (TB) Wanger K.D., 1998 Environmental Management. W.B. Saunders Co. Philadelphia, USA 499p

# BEHAVIOURAL SCIENCE - II

**Course Code: BSU 243** **Credit Units: 01**
**Total Hours: 10**

**Course Objective:**
This course aims at enabling students towards:

- Understand the importance of individual differences
- Better understanding of self in relation to society and nation
- Facilitation for a meaningful existence and adjustment in society
- Inculcating patriotism and national pride

**Course Contents:**

**Module I: Individual differences & Personality** **(2 Hours)**

- Personality: Definition& Relevance
- Importance of nature & nurture in Personality Development
- Importance and Recognition of Individual differences in Personality
- Accepting and Managing Individual differences
- Intuition, Judgment, Perception & Sensation (MBTI)
- BIG5 Factors

**Module II: Managing Diversity** **(2 Hours)**

- Defining Diversity
- Affirmation Action and Managing Diversity
- Increasing Diversity in Work Force
- Barriers and Challenges in Managing Diversity

**Module III: Socialization** **(2 Hours)**

- Nature of Socialization
- Social Interaction
- Interaction of Socialization Process
- Contributions to Society and Nation

**Module IV: Patriotism and National Pride** **(2 Hours)**

- Sense of pride and patriotism
- Importance of discipline and hard work
- Integrity and accountability

**Module V: Human Rights, Values and Ethics** **(2 Hours)**

- Meaning and Importance of human rights
- Human rights awareness
- Values and Ethics- Learning based on project work on Scriptures like- Ramayana, Mahabharata, Gita etc.

## Student learning outcomes

- Student will be able to identify, understand, and apply contemporary theories of leadership to a wide range of situations and interactions
- Student will be able to understand and respect individual difference, so to enhance the relationship
- Learn social responsibility and develop a sense of citizenship
- Student will be able to identify and understand the impact of culture on one's leadership style

**Examination Scheme:**

| Evaluation Components | Attendance | Journal of Success (JOS) | Social Awareness Program (SAP) SAP Report/SAP Presentation | End Semester Exam | Total |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 15 | 70 | 100 |

## Suggested Readings:


- Davis, K. Organizational Behaviour,
- Bates, A. P. and Julian, J.: Sociology - Understanding Social Behaviour
- Dressler, David and Cans, Donald: The Study of Human Interaction
- Lapiere, Richard. T – Social Change
- Lindzey, G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology, Addison – Welsley, US.
- Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.
- Robbins O.B.Stephen;. Organizational Behaviour

# FRENCH - II

**Course Code: FLU244** **Credit Units: 02**
**Total Hours: 20**

**Course Objective:**
To furnish the linguistic tools

- to talk about daily activities and sports, to express necessities
- to talk about activities in recent future,
- to have conversations and perform day to day life tasks like enquiring about time, take an appointment
- to enquire about products and place orders in a shop/ restaurant

**Course Contents:**

**Dossiers 3,4 – pg 25-44**

**Dossier 3 : Quelle journée ! Actes de Communication :**
Parler de ses activités quotidiennes, se situer dans le temps, demander l'heure et la date, parler des sports et des
loisirs, exprimer la fréquence

**Dossier 4 : Vous désirez ? Actes de Communication :**
Exprimer la quantité, demander et donner le prix, exprimer la nécessité, la volonté et la capacité, comparer et
exprimer ses préférences, s'exprimer au futur proche, prendre rendez-vous, s'exprimer au restaurant/dans les magasins

**Grammaire :**
1. l'expression du temps
2. les articles contractés, les quantités indéterminées et déterminées
3. les adverbes de fréquences
4. verbes- faire, prendre, venir, pouvoir, vouloir, les verbes pronominaux
5. la comparaison de l'adjectif
6. la négation (suite)
7. le future proche

**Examination Scheme:**

| | INTERNAL | | | | EXTERNAL | GRAND TOTAL |
|---|---|---|---|---|---|---|
| **Components** | MID-SEM | VIVA-VOCE | ATTENDANCE | **TOTAL** | **END SEMESTER** | |
| **Weightage (%)** | 15 | 10 | 5 | **30** | **70** | **100** |

## Text & References:

***Text:***
**Le livre à suivre:**

· Andant, Christine et al. A propos A1 Livre de l'élève. Grenoble: Presses universitaires de Grenoble, 2010.
· Andant, Christine et al. A propos A1 Cahier d'exercices. Grenoble: Presses universitaires de Grenoble, 2010.

***Références :***

· Girardeau, Bruno et Nelly Mous. Réussir le DELF A1. Paris: Didier, 2010.

# APPLIED MATHEMATICS - III
# PROBABILITY, STATISTICS AND NUMERICAL METHODS

**Course Code : MAT 301** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The objective of this course is to familiarize the students with statistical techniques, Probability distribution and numerical techniques. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling various problems in the discipline.

**Course Contents:**

**Module I : Basic Statistics : (8 Hours)**
Measures of Central tendency: Moments, skewness and Kurtosis, Correlation and regression – Rank correlation.
**Applied Statistics :** Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves.

**Module II : Basic Probability and expectation : (4 Hours)**
Discrete and Continuous random variables and their properties, Dependent and Independent random variables. Probability spaces, conditional probability, the multinomial distribution, Poisson approximation to the binomial distribution, infinite sequences of Bernoulli trials, sums of independent random variables.
Expectation of Discrete Random Variables; Moments, Variance of a sum, Correlation coefficient.

**Module III: Probability distributions and probability density function (p. d. f.) for discrete and continuous variable: (6 Hours)**

**Probability distributions and probability density function for discrete variable**: For Binomial and Poisson's distribution and evaluation of statistical parameters.

**Probability distributions and probability density function for continuous variable**: For Normal distribution and evaluation of its statistical parameters.

**Module IV : Test of significance for Small and large samples : (4 Hours)**
Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations.
Test for single mean, difference of means and correlation coefficients, test for ratio of variances - Chi-square test for goodness of fit and independence of attributes.

**Module V Numerical Methods (8 Hours)**
Solution of simultaneous linear equations by numerical techniques; Jacobi's and Gauss-Seidel method. Solution of algebraic and transcendental equations – Bi-section method, Newton-Raphson method and Regula-Falsi method.

**Interpolation** : Finite differences, Relation between operators, Interpolation using Newton's forward and backward difference formula.

**Interpolation for unequal intervals**: Newton's divided difference and Lagrange's formulae. **Numerical differentiation and integration**: Picard's method, Trapezoidal rule and Simpson's 1/3rd and 3/8 rules.
**Solution of Ordinary differential equation** : Taylor's series, Euler's and modified Euler's methods, Runge-Kutta method of fourth order, Milne's and Adam's predicator-corrector methods.

## Course Outcome:
- The objective of this course is to familiarize the students with statistical techniques. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling various problems in the discipline.
- The students will learn: The ideas of probability and random variables and various discrete and continuous probability distributions and their properties.
- The basic ideas of statistics including measures of central tendency, correlation and regression.
- The statistical methods of studying data samples.
- Numerical techniques to solve simultaneous linear equations, interpolation and extrapolation.
- Numerical techniques of differential and integral.

- Solution of ordinary differential equation by numerical techniques.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

**Suggested Text/Reference Books**


- Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
- P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003 (Reprint).
- S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.
- (iv) W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Ed.,Wiley, 1968.
- N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
- B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
- Veerarajan T., Engineering Mathematics (for semester III), Tata McGraw-Hill, New Delhi, 2010.

# APPLIED PHYSICS – II

**Course Code: PHY 303** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**

The aim is to provide the basic understanding of oscillations, waves, optics and related day to day phenomenon.

**Course Contents:**

**Module I: Simple Harmonic Motion, Damped and Forced Simple Harmonic Oscillator:(6 Hours)**
Mechanical and electrical simple harmonic oscillators, complex number notation and phasor representation of simple harmonic motion, damped harmonic oscillator – heavy, critical and light damping, energy decay in a damped harmonic oscillator, quality factor, forced mechanical and electrical oscillators, electrical and mechanical impedance, steady state motion of forced damped harmonic oscillator, power absorbed by oscillator

**Module II: Non-Dispersive Transverse and Longitudinal Waves in One Dimension and Introduction to dispersion: (6 Hours)**
Transverse wave on a string, the wave equation on a string, Harmonic waves, reflection and transmission of waves at a boundary, impedance matching, standing waves and their eigenfrequencies, longitudinal waves and the wave equation for them, acoustics waves and speed of sound, standing sound waves.
Waves with dispersion, water waves, superposition of waves and Fourier method, wave groups and group velocity.
**Module III: The Propagation of Light and Geometric Optics: (6 Hours)**
Fermat's principle of stationary time and its applications e.g. in explaining mirage effect, laws of reflection and refraction, Light as an electromagnetic wave and Fresnel equations, reflectance and transmittance, Brewster's angle, total internal reflection, and evan escent wave.
Mirrors and lenses and optical instruments based on them, transfer formula and the matrix method

**Module IV: Wave Optics: (6 Hours)**
Huygens' principle, superposition of waves and interference of light by wave front splitting and amplitude splitting; Young's double slit experiment, Newton's rings, Michelson interferometer, Mach-Zehnder interferometer.
Farunhofer diffraction from a single slit and a circular aperture, the Rayleigh criterion for limit of resolution and its application to vision; Diffraction gratings and their resolving power

**Module V: Lasers: (6 Hours)**
Einstein's theory of matter radiation interaction and A and B coefficients; amplification of light by population inversion, different types of lasers: gas lasers ( He-Ne, $CO_2$), solid-state lasers(ruby Neodymium), dye lasers; Properties of laser beams: mono-chromaticity, coherence, directionality and brightness, laser speckles, applications of lasers in science, engineering and medicine.

## Course Outcomes:
After studying through lectures and assignments, students will be able to:
Solve related Engineering problems and apply the concepts while designing a project.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination;

## Reference books:

- Ian G. Main, Oscillations and waves in physics
- H.J. Pain, The physics of vibrations and waves
- E. Hecht, Optics
- A. Ghatak, Optics
- O. Svelto, Principles of Lasers

# ENGINEERING MECHANICS

**Course Code: BME 301** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**

Objective of this course is to provide fundamental knowledge of force system and its effect on the behaviour of the bodies that may be in dynamic or in static state. It includes the equilibrium of different structures like beams, frames, truss etc and the force transfer mechanism in the different components of a body under given loading condition.

**Course Contents:**

**Module I: Force System & Structure: (7 Hours)**
Free body diagram, Resultant and equilibrium of concurrent, parallel and non-concurrent co-planar force system, General numerical applications, Vector Mechanics.

**Module II: Plane Truss: (6 Hours)**
Plane truss, perfect and imperfect truss, assumption in the truss analysis, analysis of perfect plane trusses by the method of joints, method of section.

**Module III: Friction: (6 Hours)**
Static and Kinetic friction, laws of dry friction, co-efficient of friction, angle of friction, angle of repose, cone of friction, friction lock, efficiency of screw jack, transmission of power through belt.

**Module IV: Distributed Force: (6 Hours)**
Determination of center of gravity, center of mass and centroid by direct integration and by the method of composite bodies, mass moment of inertia and area moment of inertia by direct integration and composite bodies method, radius of gyration, parallel axis theorem, polar moment of inertia.

**Module V: Work –Energy: (5 Hours)**
Work energy equation, conservation of energy, Virtual work, impulse, momentum conservation, impact of bodies, co-efficient of restitution, loss of energy during impact, D'alembert principle.

## Course Outcomes:

- Use scalar and vector analytical techniques for analyzing forces in statically determinate structures.
- Apply fundamental concepts of kinematics and kinetics of particles to the analysis of simple, practical problems.
- Apply basic knowledge of math's and physics to solve real-world problems.
- Understand measurement error, and propagation of error in processed data.
- Understand basic kinematics concepts – displacement, velocity and acceleration (and their angular counterparts).
- Understand basic dynamics concepts – force, momentum, work and energy.
- Understand and be able to apply Newton's laws of motion.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- S.S. Bhavikatti, Engineering Mechanics, New Age International Ltd
- Timoshenko, Engineering Mechanics, McGraw Hill.
- R. S. Khurmi, Engineering Mechanics, S. Chand Publication.
- H. Shames & G. K. M. Rao, Engineering Mechanics, Pearson Education, 2006.
- Egor P. Popov, Engineering Mechanics of Solids, Prentice Hall of India, New Delhi,2001.
- R. Subramanian, Strength of Materials, Oxford University Press,2007.

# MATERIAL SCIENCE & METALLURGY

**Course Code: BME 302** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**

Metallurgy and Materials deal with the structure and properties of all materials, which have engineering applications. Metallurgists and Materials Engineers are responsible for designing, producing, examining and testing materials as diverse as metallic engineering alloys, semiconductors and superconductors, ceramics, plastics and composites. This course will help students understand the properties of different types of materials and their applications.

**Course Contents:**

**Module I: Crystal Geometry: (10 Hours)**
Atomic structure of metals crystal structure, crystal lattice of (i) Body centered cubic (ii) face centered cubic (iii) closed packed hexagonal, crystallographic notation of atomic planes, polymorphism and allotropy, solidification of crystallization (i) nuclear formation (crystal growth) (ii) crystal imperfection Elementary treatment of theories of plastic deformation, phenomenon of slip twinning, dislocation, identification of crystallographic possible slip planes and direction in FCC, BCC, C.P., recovery, re-crystallization, preferred orientation causes and effects on the property of metals.

**Module II: Mechanical Properties: (5 Hours)**
Introduction to Engineering materials, their mechanical behaviour, testing and manufacturing properties of materials, physical properties of materials, classification of engineering materials.

**Module III: Steels and Cast Irons: (8 Hours)**
General principles of phase transformation in alloys, phase rule and equilibrium diagrams, Equilibrium diagrams of Binary system in which the components form a mechanical mixture of crystals in the solid state and are completely mutually soluble in both liquid state. Equilibrium diagrams of a systems whose components have complete mutual solubility in the liquid state and limited solubility in the solid state in which the solid state solubility deceases with temperature. Equilibrium diagram of alloys whose components have complete mutual solubility in the liquid state and limited solubility in solid state (Alloy with a peritectic transformation) Equilibrium diagrams of a system whose components are subject to allotropic change. Iron carbon equilibrium diagram. Phase transformation in the iron carbon diagram (i) Formation of Austenite (ii) Transformation of austenite into pearlite (iii) Martensite transformation in steel, time temperature transformation curves.

**Module IV: Heat treatment: (7 Hours)**
Principles and applications of heat treatment processes viz. annealing, normalizing hardening, tempering; harden ability & its measurement, surface hardening processes. Defects in heat treatment and their remedies; effects produced by alloying elements on the structures and properties of steel. Distribution of alloying elements (Si, Mn. Ni. Cr. Mo. TL. Al) in steel.

**Module V: Industrial Visit**
At least one day visit to local industry in the field of Mechanical Engineering.

## Course Outcome:

After completing this course, the students will be able to understand metallic engineering alloys, semiconductors and superconductors, ceramics, plastics and composites.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att:

Attendance

## Text & References:


- V. Raghavan, “Material Science & Engineering”, Prentice Hall India Ltd., 2001.
- Shackelford, J.F. and Muralidhara, M.K., Introduction to Material Science for Engineers (6/e), Pearson Education, 2007
- S.K. Hazra Chaudhuri, “Material Science & Processes”, Indian Book Publishers, Calcutta, 1983.
- R.B. Gupta, “Material Science Processes”, Satya Prakashan, New Delhi, 2000.
- Degarmo E. Paul et.al, “Materials & Processes in Manufacture”, Prentice Hall India, New Delhi, 2001.
- Raymond A Higgim., “Engineering Metallurgy Part 1”, Prentice Hall India, New Delhi, 1998.
- L. Krishna Reddi, “Principles of Engineering Metallurgy”, New Age Publication, New Delhi, 2001.
- Buduisky et al, “Engineering Materials & Properties”, Prentice Hall India, New Delhi, 2004.
- Peter Haasten, “Physical Metallurgy”, Cambridge Univ. Press, 1996.

# THERMODYNAMICS

**Course Code: BME 303** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
Objective of this course is to impart in depth understanding of the principles of thermodynamics and heat transfer. This course also helps students understand the application of basic fluid mechanics, thermodynamic, and heat transfer principles and techniques, including the use of empirical data, to the analysis of representative fluid and thermal energy components and systems encountered in the practice of electrical, electronic, industrial, and related disciplines of engineering.

**Course Contents:**

**Module I: Basic Concepts: (6 Hours)**
Thermodynamic system, intensive and extensive properties, cyclic process, Zeroth Law of Thermodynamics, Heat and Work, Flow work

**Module II: First Law of Thermodynamics: (5 Hours)**
Mechanical equivalent of heat, internal energy, Analysis of non-flow system, flow process and control volume, steady flow, energy equation, flow processes

**Module III: Second Law of Thermodynamics and Entropy: (7 Hours)**
Heat Engine, heat pump, Kelvin Planck and Clausius statement of Second Law of Thermodynamics, Perpetual motion machine, Reversible cycle- Carnot Cycle, Clausius inequality, entropy, Principle of entropy increase, concepts of availability, irreversibility.

**Module IV: Air-Cycles: (6 Hours)**
Carnot cycle, Otto cycle, Diesel cycle, Dual cycle, Stirling cycle, Erricsson cycle, Brayton cycle; Reversed Carnot cycle.

**Module V: Properties of Steam: (6 Hours)**
Definition of Pure substance, Definitions of saturated states; P-v-T surface; Use of steam tables and R134a tables; Saturation tables; Superheated tables; Identification of states & determination of properties, Mollier's chart.

## Course Outcomes:
- After completing this course, the students will be able to apply energy balance to systems and control volumes, in situations involving heat and work interactions.
- Students can evaluate changes in thermodynamic properties of substances.
- The students will be able to evaluate the performance of energy conversion devices
- The students will be able to differentiate between high grade and low-grade energies.

**Examination Scheme:**

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text Books & References:
Cengel& Boles, "Thermodynamics", Tata McGraw Hill.
- Nag, P.K, 1995, Engineering Thermodynamics, Tata McGraw-Hill Publishing Co. Ltd.
- V. Wylen and Sonntag, Fundamentals of Classical Thermodynamics, John Wiley.
- Y.V.C. Rao, Engineering Thermodynamics, Khanna Publications
- DhomkundwarKothandaraman, "A Course in Thermal Engineering", Dhanpat Rai Publications.
- P. L. Ballany, *Thermal Engineering* –Khanna Publishers.

# BASIC ELECTRONICS

**Course Code: ECE 307** **Credit Units: 02**
**Total Hours: 20**

**Course Objective:**

The objective of this Course is to provide the students with an introductory and broad treatment of the field of Electronics Engineering to facilitate better understanding of the devices, instruments and sensors used in Civil & Mechanical Engineering applications. Lab should be taken concurrently. This course emphasizes more on the laboratory/practical use of the knowledge gained from the course lectures.

**Course Contents:**

**Module I: Diodes and Applications: (5 Hours)**
Semiconductor Diode - Ideal versus Practical, Diode Equivalent Circuits, Load Line Analysis; Diode as a Switch, Diode as a Rectifier, Half Wave and Full Wave Rectifiers; Breakdown Mechanisms, Zener Diode – Operation and Applications; Opto-Electronic Devices – LEDs, Clipper and clampers.

**Module II: Transistor Characteristics: (5 Hours)**
Bipolar Junction Transistor (BJT) –Construction, Operation, Amplifying Action, Common Base, Common Emitter and Common Collector Configurations, Operating Point, Voltage Divider Bias Configuration.
Introduction to FET, Feedback Amplifiers – Principle, Advantages of Negative Feedback, Topologies, Current Series and Voltage Series Feedback Amplifiers.

**Module III: Operational Amplifiers and Applications: (5 Hours)**
Introduction to Op-Amp, Differential Amplifier Configurations, CMRR, PSRR, Slew Rate; Block Diagram, Pin Configuration of 741 Op-Amp, Characteristics of Ideal Op-Amp, Concept of Virtual Ground; inverting and non-inverting amplifier applications: summing and difference amplifier, unity gain buffer, comparator, integrator and differentiator.

**Module IV: Digital Electronics Fundamentals: (5 Hours)**
Difference between analog and digital signals, Boolean algebra, Basic and Universal Gates, Symbols, Truth tables, logic expressions, Logic simplification using K- map, Logic ICs, half and full adder/subtractor, multiplexers, de-multiplexers

## Course Outcomes:

- Know broadly the concepts and functionalities of the electronic devices, tools and instruments
- Understand use, general specifications and deploy abilities of the electronic devices, and assemblies
- Confidence in handling and usage of electronic devices, tools and instruments in engineering applications

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Suggested Text/Reference Books:


- David. A. Bell (2003), Laboratory Manual for Electronic Devices and Circuits, Prentice Hall, India
- SantiramKal (2002), Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall, India
- Thomas L. Floyd and R. P. Jain (2009), Digital Fundamentals by Pearson Education,
- Paul B. Zbar, A.P. Malvino and M.A. Miller (2009), Basic Electronics – A Text-Lab. Manual, TMH
- R. T. Paynter (2009), Introductory Electronic Devices & Circuits, Conventional Flow Version, Pearson

# APPLIED PHYSICS LAB – II

**Course Code: PHY 323** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**

To develop understanding of various laws associated with oscillations, waves and optics and associated phenomena.

**Course Contents:**

**List of Experiments:**
**Time allocated for experiments is 2 Hours each.**

1. To determine the wavelength of sodium light by Newton's rings method.
2. To determine the dispersive power of the material of prism with the help of a spectrometer.
3. To determine the specific rotation of sugar by Bi-quartz or Laurent half shade polarimeter.
4. To determine the speed of ultrasonic waves in liquid by diffraction method.
5. To determine the width of a narrow slit using diffraction phenomena.
6. To determine the density of material of the given wire with the help of sonometer.
7. To determine the value of acceleration due to gravity ('g') in the laboratory using bar pendulum.
8. To determine the moment of inertia of a flywheel about its own axis of rotation.
9. To determine the frequency of an electrically maintained tunning fork by Melde's method.
10. To determine the frequency of AC mains using sonometer

## Course Outcomes:

After completion of course student will develop

- Practical understanding and applications of oscillations and optics.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

# ENGINEERING MECHANICS LAB

**Course Code: BME 321** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
To understand the measurement of force system and its effect on the behaviour of the bodies that may be in dynamic or in static state. It includes the equilibrium of different structures like beams, frames, truss etc and the force transfer mechanism in the different components of a body under given loading condition.

**Course Contents:**

**List of Experiments/demonstrations: [Any 10]**
**Time allocated for experiments No. 1 -12 is 2 Hours each**

1. To verify the law of Force Polygon
2. To verify the law of Moments using Parallel Force apparatus. (Simply supported type)
3. To determine the co-efficient of friction between wood and various surface (like Leather, Wood, Aluminum) on an inclined plane.
4. To find the forces in the members of Jib Crane.
5. To determine the mechanical advantage, Velocity ratio and efficiency of a screw jack.
6. To determine the mechanical advantage, Velocity ratio and Mechanical efficiency of the
7. Wheel and Axle
8. To determine the MA, VR, $\eta$ of Worm Wheel (2-start)
9. Verification of force transmitted by members of given truss.
10. To verify the law of moments using Bell crank lever
11. To find CG and moment of Inertia of an irregular body using Computation method.

## Course Outcomes:

- Understand and be able to apply Newton’s laws of motion.
- Understand basic dynamics concepts – force, momentum, work and energy.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# THERMODYNAMICS LAB

**Course Code: BME 323** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
To understand the theory and applications of classical thermodynamics, thermodynamic properties, equations of state, methods used to describe and predict phase equilibrium.

**Course Contents:**

**List of Experiments:**
**Time allocated for experiments is 2 Hours each.**

1. To study of various types of boilers.
2. To study various types of Boiler mountings and accessories.
3. To study the working of two stroke petrol Engine.
4. To study the working of four stroke petrol Engine.
5. To study the working of two stroke Diesel Engine.
6. To study the working of four stroke Diesel Engine.
7. To study of Velocity & Pressure compounded steam turbine.
8. To study of Impulse & Reaction turbine.
9. To study of steam Engine model.
10. To study of Gas Turbine Model.

## Course Outcomes:

- Ability to apply fundamental concepts of thermodynamics to engineering applications.
- Ability to estimate thermodynamic properties of substances in gas and liquid state.
- Capability to determine thermodynamic efficiency of various energy related processes.

**Examination Scheme**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# BASIC ELECTRONICS LAB

**Course Code: ECE 327** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**

To understand the theory and applications of diode & transistors.

**Course Contents:**

**List of Experiments: [Any 10]**
**Time allocated for experiments is 2 Hours each.**

1. To study and verify the VI characteristic of a diode.
2. To study the Zener diode in breakdown region.
3. To study diode as a half wave rectifier.
4. To study diode as a full wave rectifier.
5. To study the characteristics of a CE Transistor.
6. To study the VI characteristic of CB &CC Transistor.
7. To study transistor as an amplifier.
8. To study OP Amp. As inverting and non-inverting Amp.
9. To study OP Amp in open loop and close loop.
10. To study OP Amp. As summer and differentiator Amp.
11. To study the Truth Table of Universal gates.
12. Verification of truth table of Half adder and full adder.
13. Verification of MUX and DEMUX.

## Course Outcomes:

- Know broadly the concepts and functionalities of the electronic devices, tools and instruments
- Understand use, general specifications and deploy abilities of the electronic devices, and assemblies
- Confidence in handling and usage of electronic devices, tools and instruments in engineering applications

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# COMMUNICATION SKILLS – III

**Course Code: BCU 341** **Credit Units: 01**
**Total Hours: 10**

**Course Objective:**

To emphasize the essential aspects of effective written communication necessary for professional success.

**Prerequisites:** NIL

| **Course Contents / Syllabus:** | | |
|---|---|---|
| **1.** | **Module I Principles of Effective Writing** | **35% Weightage** |
| | • Spellings-100 Most Misspelled Words in English<br>• Web Based Writing<br>• Note Taking: Process & Techniques | |
| **2.** | **Module II Formal Letter Writing** | **35% Weightage** |
| | • Block Format<br>• Types of Letters<br>• E-mail<br>• Netiquette | |
| **3.** | **Module III Business Memos**<br>• Format & Characteristics | **20% Weightage** |
| **4.** | **Module IV Short Stories** | **10% Weightage** |
| | • Stench of Kerosene-Amrita Pritam<br>• A Flowering Tree-A.K. Ramanujan<br>• The Gift of the Magi- O. Henry<br>• A Fly in Buttermilk-James Baldwin | |
| **5.** | **Student Learning Outcomes:**<br>The students should be able to write correctly and properly with special reference to Letter writing. | |
| **6.** | **Pedagogy for Course Delivery:**<br>• Workshop<br>• Group Discussions<br>• Presentations<br>• Lectures | |
| **7.** | **Assessment/ Examination Scheme:** (see tables below) | |

**Assessment/ Examination Scheme:**

| **Theory L/T (%)** | **Lab/Practical/Studio (%)** | **End Term Examination** |
|---|---|---|
| 100% | NA | 70% |

**Theory Assessment (L&T):**

| **Components (Drop down)** | ClE | Mid Sem | Attendance | **End Term Examination** |
|---|---|---|---|---|
| **Weightage (%)** | 10% | 15% | 5% | 70% |

**Text:** ***Rai, Urmila & S.M. Rai. Business Communication, Mumbai: Himalaya Publishing House, 2002.***
***K.K.Sinha, Business Communication, Galgotia Publishing Company.***
**Reference:** ***Sanjay Kumar & Pushp Lata, Communication Skills, Oxford University Press.***
**Additional Reading: Newspapers and Journals**

# BEHAVIOURAL SCIENCE – III

**Course Code: BSU 343** **Credit Units: 01**
**Total Hours: 10**

**Course Objective:**
To enable the students:
- Understand the process of problem solving and creative thinking.
- Facilitation and enhancement of skills required for decision-making.

**Course Contents:**
**Module I: Thinking as a tool for Problem Solving** **(02 Hours)**
- What is thinking: The Mind/Brain/Behavior
- Critical Thinking and Learning:
  - Making Predictions and Reasoning
  - Memory and Critical Thinking
  - Emotions and Critical Thinking
- Thinking skills

**Module II: Hindrances to Problem Solving Process** **(02 Hours)**
- Perception
- Expression
- Emotion
- Intellect
- Work environment

**Module III: Problem Solving** **(02 Hours)**
- Recognizing and Defining a problem
- Analyzing the problem (potential causes)
- Developing possible alternatives
- Evaluating Solutions
- Resolution of problem
- Implementation
- Barriers to problem solving:
  - Perception
  - Expression
  - Emotion
  - Intellect
  - Work environment

**Module IV: Plan of Action** **(02 Hour)**
- Construction of POA
- Monitoring
- Reviewing and analyzing the outcome

**Module V: Creative Thinking** **(02 Hours)**
- Definition and meaning of creativity
- The nature of creative thinking
  - Convergent and Divergent thinking
  - Idea generation and evaluation (Brain Storming)
  - Image generation and evaluation
  - Debating
- The six-phase model of Creative Thinking: ICEDIP model

**Student learning outcomes**

- Student will be able to understand and solve the problems effectively in their personal and professional life.
- Students will outline multiple divergent solutions to a problem,
- Student will able to create and explore risky or controversial ideas, and synthesize ideas/expertise to generate innovations.

**Examination Scheme:**

| Evaluation Components | Attendance | Journal of Success (JOS) | Social Awareness Program (SAP) SAP Report/SAP Presentation | End Semester Exam | Total |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 15 | 70 | 100 |

**Suggested Readings:**


- Michael Steven: How to be a better problem solver, Kogan Page, New Delhi, 1999
- Geoff Petty: How to be better at creativity; Kogan Page, New Delhi, 1999
- Richard Y. Chang and P. Keith, Kelly: Wheeler Publishing, New Delhi, 1998.
- Phil Lowe Koge Page: Creativity and Problem Solving, New Delhi, 1996
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 3, Management (1996); Pfeiffer & Company
- Bensley, Alan D.: Critical Thinking in Psychology – A Unified Skills Approach, (1998), Brooks/Cole Publishing Company.

# FRENCH – III

**Course Code: FLU 344**

**Credit Units: 02**
**Total Hours: 20**

**Course Objective:**
To enable the students
- to talk about the qualities and defects of people.
- to ask/give directions, to enquire about a lodging.
- to ask and give informations about a certain place.
- to describe events in past tense.

**Course Contents:**

**Dossiers5,6–pg45-64**

**Dossier5:Ici etlà**

**Actesde Communication:**
Exprimer l'obligationetl'interdiction,parler desqualitésetdesdéfautsdequelqu'un,demander son chemin, indiquerunitinéraire,se situerdansl'espace,serenseignersurunlogement.

**Dossier6:Ailleurs**
**Actesde Communication:**
S'exprimeraupassécomposé, raconterunvoyage, sesituerdanslemonde,exprimerletemps(avecindicateursdetemps–ilya,depuis),serenseignersurunhébergement,exprimerla satisfactionet l'insatisfaction.

**Grammaire :**
1. lesadjectifsdémonstratifs
2. lesverbes:'irgroupe'devoir,falloir
3. lesprépositionsdelieu,depays
4. l'impératif,lepassé composé,forme et accordduparticipe passé,lanégationaupassécomposé
5. les indicateursdetemps(il ya,depuis)

**Examination Scheme:**

| | INTERNAL | | | | EXTERNAL | GRAND TOTAL |
|---|---|---|---|---|---|---|
| **Components** | MID-SEM | VIVA-VOCE | ATTENDANCE | **TOTAL** | **END SEMESTER** | |
| **Weightage (%)** | 15 | 10 | 5 | **30** | **70** | **100** |

## Text &References:

***Text:***
**Le livre àsuivre:**
· Andant,Christineet al.<u>A proposA1Livre del'élève</u>.Grenoble:Pressesuniversitairesde Grenoble,2010.
· Andant,Christineet al.<u>A proposA1Cahierd'exercices</u>.Grenoble:Pressesuniversitairesde Grenoble,2010.
***Références:***
· Girardeau,Brunoet NellyMous.<u>Réussirle DELFA1.</u>Paris: Didier,2010.

# TERM PAPER

**Course Code: NTP 330** **Credit Units: 02**

**Course Objective:**
A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject. The objective of this course to make a student to carry out intense study on a specific topic related to current development in their field of specialization and Develop skills of presentation and report writing.

**METHODOLOGY:** The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

**GUIDELINES FOR TERM PAPER**
The procedure for writing a term paper may consist of the following steps:
1. Choosing a subject
2. Finding sources of materials
3. Collecting the notes
4. Outlining the paper
5. Writing the first draft
6. Editing & preparing the final paper

**1. Choosing a Subject**
The subject chosen should not be too general.

**2. Finding Sources of Materials**
a) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
b) Begin by making a list of subject-headings under which you might expect the subject to be listed.
c) The sources could be books and magazine articles, news stories, periodicals, scientific journals etc.

**3. Collecting the notes**
Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.
a) Get facts, not just opinions. Compare the facts with author's conclusion.
b) In research studies, notice the methods and procedures, results & conclusions.
c) Check cross references.

**4. Outlining the paper**
a) Review notes to find main sub-divisions of the subject.
b) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

**5. Writing the first draft**
Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:
a) statement of purpose
b) main body of the paper
c) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main idea.

**6. Editing & Preparing the final Paper**
a) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.
b) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
c) Check for proper spelling, phrasing and sentence construction.
d) Check for proper form on footnotes, quotes, and punctuation.

e) Check to see that quotations serve one of the following purposes:
   (i) Show evidence of what an author has said.
   (ii) Avoid misrepresentation through restatement.

   (iii) Save unnecessary writing when ideas have been well expressed by the original author.

f) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

1) Title page
2) Table of contents
3) Introduction
4) Review
5) Discussion &Conclusion
6) References
7) Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

**Discussion**
The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

**Conclusion**
The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

a) summary of question posed
b) summary of findings
c) summary of main limitations of the study at hand
d) details of possibilities for related future research

**Reference**
From the very beginning of a research project, you should be careful to note all details of articles gathered. The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.
The key to a good bibliography is consistency. Choose a particular convention and stick to this.

**Conventions**
Monographs
Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

**Edited volumes**
Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.
[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hoursg.) for Herausgeber].

**Edited articles**
Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

**Journal articles**
McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

**Electronic book**
Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] from the World Wide Web, http://www.aber.ac.uk/media/Documents/S4B/.

**Electronic journal articles**
Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document].German as a Foreign

Language Journal [online] 1.Retrieved [12.09.'00] from the World Wide Web, http://www.gfl-journal.com/.

**Other websites**
Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document].Retrieved [13.10.'01] from the World Wide Web, http://olaf.hiof.no/~sverrev/eng.html.

**Unpublished papers**
Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

**Unpublished theses/ dissertations**
Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg.
Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

**Appendix**
The appendix should be used for data collected (e.g. questionnaires, transcripts, ...) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

**Assessment Scheme:**

**Continuous Evaluation:** **40%**
(Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)

**Final Evaluation:** **60%**

(Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/ presented, outcomes vs. objectives, presentation/ viva etc.)

**Course Outcomes:**
After successful completion of this course, students will be able to
1. Carry out intense study on a specific topic related to current development in their field of specialization
2. Collect, interpret and analyze the information
3. Compare and evaluate the existing solutions for a specific cases study
4. Develop skills of presentation and report writing.

# FLUID MECHANICS

**Course Code: BME 401** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The objective of this subject is to familiarize the students with the properties of fluids, application of pressure measurement devices, application of mass and momentum conservation laws for fluid flows, importance of dimension and model analysis, laminar and turbulent flow, flow measurement devices and to obtain velocity and pressure variations in various types of simple flow.

**Course Contents:**

**Module I: Fluid Properties and Fluid Statics: (8 Hours)**
Definition of fluid, Newton's Law of viscosity, Properties of fluids, mass density, specific volume, specific gravity, viscosity, compressibility and surface tension. Pressure at a point, manometers, Forces on plane surfaces, forces on curved surfaces, buoyant forces, and stability of floating bodies, metacentre and metacentric height.

**Module II: Kinematics of Fluid Motion: (5 Hours)**
Steady and unsteady flow; uniform and non-uniform flow; Laminar and turbulent flow; streamline, path line and streak line; continuity equation, irrotational and rotational flow, velocity potential and stream function, vortex flow, free and forced vortex.

**Module III: Dynamics of Fluid Flow: (5 Hours)**
Euler's equation of motion and its integration to yield Bernoulli's equation, its practical applications – Pitot tube, Venturi meter, Orificemeter; steady flow momentum equation, force exerted on a pipe bend.

**Module IV: Dimensional Analysis and Principles of Similarity: (4 Hours)**
Dimensional analysis, Dimensional homogeneity, Buckingham $\pi$-Theorem and its applications, Geometric, Kinematics and Dynamic similarity; Dimensionless numbers-Reynolds, Froude, Euler, Mach, Weber Number and their significance.

**Module V: Laminar and Turbulent Flow: (5 Hours)**
Reynold's experiment, critical velocity, transition from laminar to turbulent flow, Boundary layer thickness, steady laminar flow through a circular tube, flow between parallel plates., courses of turbulence, velocity distribution law near a solid boundary, velocity distribution in rough pipes, Hazen – Williams's formula.

**Module VI: Analysis of Pipe Flow: (3 Hours)**
Energy losses, minor losses in pipe lines, concept of equivalent length, siphon.

## Course Outcome:
Upon completion of this course, students will be able to understand the principles of fluid statics and kinematics, mathematically analyze simple flow situations, measurement of flow rates and dimensional analysis of model studies.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:

- R.K. Bansal, "Fluid Mechanics & Hydraulic Machines", Laxmi Publications (P) Ltd., 2002.
- Gupta, S. C., Fluid Mechanics and Hydraulic Machines, Pearson Education, 2007.
- D.S. Kumar, "Fluid Mechanics and Fluid Power Engineering", S.K. Kataria & Sons, 2000.
- F. M. White, Introduction to Fluid Mechanics, McGraw Hill
- I.H. Shames, "Mechanics of Fluids", Tata McGraw Hill
- Douglas, J. F., Gasiorek, J.M. and Swaffield, J., Fluid Mechanics, Pearson Education, 4/e, 2006
- V.L. Streeter and E.B. Wylie, "Fluid Mechanics", Tata McGraw Hill
- Massey B S, Mechanics of Fluids, Van Nostrand Reinhold Co

# HEAT AND MASS TRANSFER

**Course Code: BME 402** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The objective of this course is to build a solid foundation in heat transfer exposing students tothe three basic modes namely conduction, convection and radiation. Rigorous treatment of governing equations and solution procedures for the three modes will be provided, along with solution of practical problems using empirical correlations. The course will also briefly cover boiling and condensation heat transfer, and the analysis and design of heat exchangers.

**Course Contents:**

**Module I: Conduction: (8 Hours)**
Heat transfer - Different Modes, Governing Laws, One-dimensional steady-state conduction through homogeneous and composite plane walls, cylinders and spheres, critical thickness of insulation.

**Module II: Extended Surfaces or Fins: (5 Hours)**
Heat transfer from fins of uniform cross section, Temperature Distribution and Heat Transfer Calculations, Fin Efficiency and Effectiveness, Applications, Numerical Problems.

**Module III: Convection: (4 Hours)**
Concept of hydrodynamic and thermal boundary layers, momentum and energy equation for boundary layers on a flat plate, application of dimensional analysis to free and force convection; important dimensionless number.

**Module IV: Thermal Radiation: (6 Hours)**
Fundamental principles - gray, white, opaque, transparent and black bodies, Spectral emissive power, Planck's laws, Wien's displacement law; Stefan-Boltzmann's relation, Configuration factors; radiant interchange between black and grey surfaces; radiation shielding solar radiation.

**Module V: Heat Exchangers& Mass transfer: (7 Hours)**
Definition, classification, combined heat transfer analysis; overall heat transfer co-efficient; LMTD method, Effectiveness - NTU method, Analytical Methods, Numerical Problems.
Mass transfer: Definition, Examples, Fick's law of diffusion, Fick's law as referred to ideal gases.

## Course Outcomes:

- After completing the course, the students will be able to formulate and analyze a heat transfer problem involving any of the three modes of heat transfer
- The students will be able to obtain exact solutions for the temperature variation using analytical methods where possible or employ approximate methods or empirical correlations to evaluate the rate of heat transfer
- The students will be able to design devices such as heat exchangers and also estimate the insulation needed to reduce heat losses where necessary.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Incropera, F.P. and DeWitt, D.P. (2002). Fundamentals of Heat and Mass Transfer, John Willy&Sons, New York, NY.
- Nag, P.K. (2002). Heat and Mass Transfer, TMH.
- John R.Howell & Richrd O Buckius, Fundamentals of Engg. Thermodynamics, McGraw Hill International.
- Holman, J.P. (1997). Heat Transfer, 9$^{th}$ edition, McGraw-Hill.
- Mills, A.F. (1999). Basic Heat and Mass Transfer. Prentice-Hall.
- Thirumaleshwar, M. (2006). Fundamentals of Heat and Mass Transfer, Pearson education.
- Ghoshdastidar, P.S. (2004). Heat Transfer. OxfordUniversity Press.

- Arora, Domkundwar, S. and Domkundwar, A. (1988). A Course in Heat & Mass Transfer, Dhanpat Rai & Co.

# KINEMATIC OF MACHINE

**Course Code: BME 403** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
To expose the students to learn the fundamentals of various laws governing rigid bodies and its motions.

**Course Contents:**

**Module I: Mechanisms and Machines: (6 Hours)**
Links, Pairs, Chains, Structure, Mechanism, MachineEquivalentlinkage, Degrees of freedom, Gruebler's&Kutzback's criterion, Inversions of four bar chain,Mechanism with lower pairs Pantograph, Straight line motion mechanisms, Davis and Ackermann'ssteering mechanisms, Hooke's joint, Numerical problems based on above topics.

**Module II: Motion: (6 Hours)**
Plane motion, Absolute & Relative motion, Displacement, Velocity and Acceleration of apoint, Velocity and Acceleration Analysis by Graphical & Analytical methods, Velocity image Velocity of rubbing, Kennedy's Theorem, Acceleration image, Acceleration polygon, Coriolis acceleration component, Klein's construction, Velocity and Acceleration Analysis using Complex Algebra (Raven's Approach), Numerical problems based on above topics

**Module III: Gears: (6 Hours)**
Classification of gears, Helical, Spiral, Bevel, Worm and Spur Gear, Spur Gear Terminology, Law of gearing, Tooth profiles, velocity of sliding, Path of contact, Arc of contact, Contact Ratio, Interference and Undercutting, Conjugate action. Gear Trains: Simple, compound, reverted and epi cyclic gear trains. Velocity ratio and torque calculation in gear trains

**Module IV: Cams: (6 Hours)**
Classification of Cams and Followers, Radial Cam Terminology, Analysis of Follower motion (uniform, modified uniform, simple harmonic, parabolic, cycloidal), Pressure Angle, Radiusof Curvature, Cam Profile for radial and offset followers Synthesis of Cam Profile by Graphical Approach, Cams with Specified Contours.

**Module V: Gyroscope: (6 Hours)**
Gyroscopic Action in Machines, Angular Velocity and Acceleration, Gyroscopictorque/ couple, Gyroscopic effect on Naval Ships, Stability of two and four wheel Vehicles, Rigiddisc at an angle fixed to a rotating shaft.

## Course Outcomes:
At the completion of this course, students should be able to know
- Basic mechanisms, velocity and acceleration of simple mechanisms
- Drawing the profile of cams and its analysis
- Gear train calculations, Gyroscopes
- Inertia force analysis and flywheels
- Balancing of rotating and reciprocating masses

**Examination Scheme:**

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text &References:

- Thomas Bevan; Theory of Machines; Pearson Education
- Rattan SS; Theory of machines; MC Graw Hills
- Ambekar AG; Mechanism and Machine Theory; PHI. Eastern Economy Edition 2015
- Uicker&Shigley, Theory of machines & Mechanism Second Edition Oxford University Press
- Dr.Jagdish Lal; Theory of Machines; Metropolitan Book Co; Delhi
- Rao J S and Dukkipati; Mechanism and Machine Theory; New Age Delhi.

- Abdulla Shariff, Theory of Machines.

# MANUFACTURING MACHINE

**Course Code: BME 404** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
This is a new developmental graduate course for students interested in learning how to design, analyze and build specialty manufacturing process machines. It anticipated that this course would become part of the new manufacturing emphasis area in mechanical engineering.

**Course Contents:**

**Module I: Introduction to Machine Tools: (4 Hours)**
Classification of machine tools, kinds of motion in machine tool operations, definition of cutting speed, feed and depth of cut.

**Module II: Lathe: (4 Hours)**
Classification and various parts of Lathe, specification, Description of important mechanism viz. apron, tail stock, head stock, work holding, devices and operations, e.g. taper, turning, eccentric turning and screw-cutting, Geometry of a single point cutting tool. Calculation of machining time, Capstan and turret lathe

**Module III: Drilling Machine: (4 Hours)**
Geometry and nomenclature of a twist drill, specification and classification of drilling machines, cutting speed, feed, depth of cut and calculation machining time in drilling, tool holding devices, different types of operations performed on a drilling machine.

**Module IV: Milling Machine: (4 Hours)**
Classification, up milling and down milling, dividing Head, different types of operations – simple, compound and differential indexing, slab milling, spiral milling, slot milling, T-slot milling and end milling.

**Module V: Shaper, Slotter & Planner: (4 Hours)**
Principal part of a shaper, classification, Quick Return mechanism, table feed mechanism of a shaper, Operations, e.g. horizontal, vertical and inclined shaping, difference between a shaper, planer and slotter, cutting speed, feed, and depth of cut and calculation of machining time in shaping.

**Module VI: Grinding Machines: (5 Hours)**
Construction and specification of a grinding wheel, wheel turning and dressing, Grinding machines surface, cylindrical and center less grinding.

**Module VII: Special Machines: (5 Hours)**
Horizontal and vertical boring machines, Gear Geometry, Gear generation and hobbing; Lapping, honing and super finishing processes.

## Course Outcome:
Upon completion of this course, students will be able to understand the different conventional and unconventional manufacturing methods employed for making different products.

### Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- P.N. Rao, “Manufacturing Technology: Metal Cutting & Machine Tools”, Tata McGraw Hill, Delhi, 2004.
- B.S. Raghuwanshi, “Workshop Technology”, Vol.2, Dhanpat Rai & Sons, 2003.
- Hazra Chandhari S.K., “Elements of Workshop Technology”, Vol.2, Media Promoters, 2003.
- P.C. Sharma, “A Text Book of Production. Engineering”, S. Chand, New Delhi, 2004.
- Bawa H.S., “Workshop Technology”, Vol.2, Tata McGraw Hill, 2004.
- Juneja & Shekhon, “Fundamental of Metal Cutting”, New Age Publications
- S.F. Krar Stevan F. and Check A.F., “Technology of M/C Tools”, McGraw Hill Book Co., 1986.
- Kibbe Richard et al, “M/c Tool practices”, Prentice HallIndia, 2003.
- Bangalore HMT, “Production Technology”, Tata McGraw Hill, 1980.
- R.K. Jain, “Production Technology”, Khanna Publishers
- Gerling Heinrich, “All about Machine Tools”, New Age Publication, 2003.

# STRENGTH OF MATERIAL

**Course Code: BME 405** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The objective of this course is to make the students understand the concept of stress and strain in different types of structure/machine under different loading conditions. The course also covers the simple and compound stresses due to forces, stresses and deflection in beams due to bending, torsion in circular section, strain energy, different theories of failure, stress in thin cylinder thick cylinder and spheres due to external and internal pressure.

**Course Contents:**

**Module I: Simple Stresses and Strains: (5 Hours)**
Stress and Strain- Tension and Compression -Thermal Stresses -pure shear –Young's modulus of elasticity, Poisson's ratio, Modulus of rigidity and Bulk modulus - Relation between elastic constants –Stress -strain diagrams for brittle and ductile materials-working stress Strain energy in tension and compression, stress and strains in bars subjected to axial loading. thermal stress.

**Module II: Compound Stress and Strains: (5 Hours)**
Principal Stresses and Strains: Analysis of Biaxial state of stress with and without shear -Mohr's Circle. Shear Force and Bending Moment: Types of supports-Types of beams –Types of loads –articulated beams -Shear Force and Bending Moment diagrams.

**Module III: Bending Stress: (5 Hours)**
Theory of Simple Bending: Assumptions -Bending stresses in beams - Derivation of formula for Efficiency of various cross sections of beams (rectangular, circular and channel sections). Shear Stress Distribution: Flexural shear stress distribution in different cross sections of beams.

**Module IV: Torsion: (5 Hours)**
Torsion of Circular cross sections: Theory of pure torsion -transmission of Power in Solid and Hollow circular shafts–Combined bending and torsion.

**Module V: Thin Cylinders and Spheres: (3 Hours)**
Thin and Thick Cylinders: Thin and Thick Cylinders – spherical shells subjected to internal fluid pressure

**Module VI: Columns and Struts: (3 Hours)**
Columns and struts: column and failure of columns, Euler's formulas.

**Module VII: Slope and Deflection: (4 Hours)**
Deflection of Beams: Slope and deflection of beams- Double Integration method –Macaulay's method –strain energy method.

## Course Outcomes:

- After completing this course, the students should be able to recognize various types loads applied on machinecomponents of simple geometry and understand the nature of internal stresses that will develop within the components.
- The students will be able to evaluate the strains and deformation that will result due to the elastic stresses developed within the materials for simple types offloading.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;Att: Attendance

## Text & References:


- Jindal U.C., “Strength of Materials”, Galgotia Publication, New Delhi, 1998.
- Ryder G.H., “Strength of Materials”, Macmillan, Delhi, 2003.
- R.K. Bansal, “Strength of Materials”, Laxmi Publication, New Delhi, 2001.
- Sadhu Singh, “Strength of Materials”, Khanna Publishers, New Delhi, 2000.
- Timoshenko S.P., “Elements of Strength of Materials”, East-West affiliated, New Delhi, 2000.
- Hibbler R.C., “Mechanics of Materials”, Prentice Hall, New Delhi, 1994.
- Popov Eger P., “Engg. Mechanics of solids”, Prentice Hall, New Delhi, 1998.
- Fenner, Roger. T, “Mechanics of Solids”, U.K. B.C. Publication, New Delhi, 1990.
- Srinath L.S. et.al., “Strength of Materials”, McMillan, New Delhi,2001

# HEAT AND MASS TRANSFER LAB

**Course Code: BME 422** **Credit Units: 01**
**Total Hours: 20**

**Course Objectives:**

The objective of this course is to understand the principle of conduction, free & forced convection and radiation. To evaluate the thermal conductivity of a metallic bar & insulating powder and the performance evaluation of parallel flow and counter flow heat exchangers.

**Course Contents:**

**List of experiments/demonstrations: [Any 10]**
**Time allocated for experiments is 2 Hours each.**

1. To determine the thermal conductivity of a Metal Bar.
2. To determine the convective heat transfer co-efficient for a vertical cylinder by free or natural convection.
3. To determine the convective heat transfer co-efficient for a Horizontal Pipe by forced convection.
4. To determine the value of Stefan – Boltzman constant for radiation heat transfer.
5. To determine the heat transfer coefficient under forced condition using Pin Fin apparatus.
6. To determine the effectiveness & overall heat transfer coefficient for parallel & counter parallel flow heat exchanger.
7. To determine the emissivity of a Grey surface at different temperatures.
8. To determine the overall heat transfer co-efficient for the composite wall and to compare the same with that calculated from the equations.
9. Determination of effectiveness of temperature distribution plotted for the temperature.
10. To determine the effectiveness of temperature distribution of Pin Fin.
11. Determination of thermal effectiveness of insulating Powder.

## Course Outcome:

After completion of course student will develop practical understanding and applications of fundamental concept of conduction, convection and radiation.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

# KINEMATIC OF MACHINE LAB

**Course Code: BME 423** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
To understand the kinematics and rigid- body dynamics of kinematically driven machine components. Tounderstand the motion of linked mechanisms in terms of the displacement, velocity and acceleration at any point in a rigidlink.To be able to design some linkage mechanisms and cam systems to generate specified outputmotion. To understand the kinematics of geartrains.

**Course Contents:**

**List of experiments/demonstrations: [Any 10]**
**Time allocated for experiments is 2 Hours each.**

**List of Experiments:**
1. To study various types of Links, Pairs, Chain and Mechanism
2. To study inversion of Four Bar Mechanism, Single Slider Crank Chain Mechanism and Double Slider Crank Chain Mechanism
3. To study velocity diagram for Slider Crank Mechanism.
4. Study of working models of various popular mechanisms like quick return mechanism etc.
5. To Find out velocity & acceleration of slider crank mechanism by Klein's Construction
6. To study Different types of Gears.
7. To find out velocity ratio of various gear trains
8. To study various types of belt drives & find out the velocity ratio of the drive.
9. To draw the cam profile.
10. Study of the mechanisms like Pantograph mechanism, Davis & Ackerman's steering mechanisms etc.
11. To finds out gyroscopic couple.

## Course Outcome:

Students who have undergone the course will be able to understand the measurement of mechanical properties of materials and will be able to characterize the dynamic behavior of mechanicalsystems.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

# MANUFACTURING MACHINE LAB

**Course Code: BME 424** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
To motivate and challenge students to understand and develop an appreciation of the processes in correlation with material properties which change the shape, size and form of the raw materials into the desirable product by conventional or unconventional manufacturing methods

**Course Contents:**
**List of experiments/demonstrations**

1. Operations on the Lathe Machine.**: (5 Hours)**
2. Operations on the Shaper Machine.**: (3 Hours)**
3. Operations on the Planner Machine.**: (3 Hours)**
4. Operations on the Drilling Machine.**: (3 Hours)**
5. Operations on the Grinding Machine.**: (3 Hours)**
6. Operations on the Milling Machine.**: (3 Hours)**

## Course Outcome:

Students who have undergone the course will be able to understand the measurement of Mechanical machines and operations.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# STRENGTH OF MATERIAL & FLUID MECHANICS LAB

**Course Code: BME 425** **Credit Units: 01**
**Total Hours: 20**

**Course Objectives:**
To describe the concepts and principles, understand the theory of elasticity includingstrain/displacement and Hooke's law relationships; and perform calculations, relative tothe strength and stability of structures and mechanical components. To explain the Bernoulli's theorem, flow measurement devices and various losses occurs in the flow.

**Course Contents:**

**List of experiments/demonstrations: [Any 10]**
**Time allocated for experiments is 2 Hours each.**

1. Universal Testing Machine
2. Tensile Test (MS)
3. Double Shear Test (MS)
4. Compression Test (CI)
5. Brinell Hardness Number
6. Izod Impact
7. Testing Machine
8. Rockwell Hardness Tester
9. Spring Stiffness (Spring Compression Testing machine)
10. Torsion testing machine
11. Verification of Bernoulli's Theorem
12. Experiment using Venturimeter
13. Determination of coefficient of Discharge $C_d$, $C_c$, $C_!$ Using Circular/triangular/rectangular orifice
14. To find major head losses in a pipe line
15. To find minor head losses in a pipe line (sudden expansion/contraction/bend)

## Course Outcome:
Students who have undergone the course will be able to understand the theory of elasticity including strain/displacement and Hooke's law relationships; mechanical properties. Be able to calculate fluid properties and various kinds of losses occur in flow.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

# COMMUNICATION SKILLS – IV

**Course Code: BCU 441** **Credit Units: 01**
**Total Hours: 10**

**Course Objective:**

This course is designed to develop the skills of the students in preparing job search artifacts and negotiating their use in GDs and interviews.

**Prerequisites:** NIL

| **Course Contents / Syllabus:** | | |
|---|---|---|
| **1.** | **Module I Employment-Related Correspondence** | **35% Weightage** |
| | • Resume Writing<br>• Covering Letters<br>• Follow Up Letters | |
| **2.** | **Module II Dynamics of Group Discussion** | **35% Weightage** |
| | • Significance of GD<br>• Methodology & Guidelines | |
| **3.** | **Module III Interviews**<br>• Types & Styles of Interviews<br>• Fundamentals of facing Interviews<br>• Interview-Frequently Asked Questions | **20% Weightage** |
| **4.** | **Module IV Short Stories** | **10% Weightage** |
| | • Proof of the Pudding - O. Henry<br>• “The Lottery” 1948 – Shirley Jackson<br>• The Eyes Have it- Ruskin Bond<br>• Kallu- Ismat Chughtai<br>All the four stories will be discussed in one class.<br>One Long Question will be set in the Exam from the Text. | |
| **5.** | **Student Learning Outcomes:**<br>• Develop a resume for oneself<br>• Ability to handle the interview process confidently<br>• Learn the subtle nuances of an effective group discussion | |
| **6.** | **Pedagogy for Course Delivery:**<br>• Workshop<br>• Group Discussions<br>• Presentations<br>• Lectures | |
| **7.** | **Assessment/ Examination Scheme:** | |

| **Theory L/T (%)** | **Lab/Practical/Studio (%)** | **End Term Examination** |
|---|---|---|
| 100% | NA | 70% |

**Theory Assessment (L&T):**

| **Components (Drop down)** | CIE | Mid Sem | Attendance | **End Term Examination** |
|---|---|---|---|---|
| **Weightage (%)** | 10% | 15% | 5% | 70% |

**Text:** ***Sharma, R.C. & Krishna Mohan. Business Correspondence and Report Writing: A Practical approach to Business & Technical Communication, New Delhi: Tata McGraw Hill & Co. Ltd., 2002.***

***Rai, Urmila & S.M. Rai. Business Communication, Mumbai: Himalaya Publishing House, 2002.***

***Rizvi, M.Ashraf. Effective Technical Communication, New Delhi: Tata McGraw Hill, 2007.***

**Reference:** ***Brusaw, Charles T., Gerald J. Alred & Walter E. Oliu. The Business Writer’s Companion, Bedford: St. Martin’s Press, 2010.***

***Lewis, Norman. How to Read Better and Faster. New Delhi: Binny Publishing House.***

- **Additional Reading: Newspapers and Journals**

# BEHAVIOURAL SCIENCE - IV

**Course Code: BSU 443** **Credit Units: 01**
**Total Hours: 10**

**Course Objective:**
This course aims at imparting an understanding of Values, Ethics & Morality among students for making a balanced choice between personal & professional development.

**Course Contents:**

**Module I: Introduction to Values & Ethics** **(2 Hours)**

Meaning & its type
Relationship between Values and Ethics
Its implication in one's life

**Module II: Values Clarification & Acceptance** **(2 Hours)**

Core Values-Respect, Responsibility, Integrity, Resilience, Care, & Harmony
Its process-Self Exploration
Nurturing Good values

**Module III: Morality** **(2 Hours)**
Difference between morality, ethics &values
Significance of moral values

**Module IV: Ethical Practice** **(2 Hours)**

Ethical Decision making
Challenges in its implementation
Prevention of Corruption &Crime

**Module V: Personal & Professional Values** **(2 Hours)**
Personal values-Empathy, honesty, courage, commitment
Professional Values-Work ethics, respect for others
Its role in personality development
Character building-"New Self awareness"

**Student learning outcomes**
- Able to answer the question: What do I stand for?
- Ability to apply a coherent set of moral principles within professional and specialized contexts
- Willing to make unpopular but right decision
- Committed to working for justice and peace locally and globally

**Examination Scheme:**

| Evaluation Components | Attendance | Journal of Success (JOS) | Social Awareness Program (SAP) SAP Report/SAP Presentation | End Semester Exam | Total |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 15 | 70 | 100 |

## Text & References:


- Cassuto Rothman, J. (1998). From the Front Lines, Student Cases in Social Work Ethics. Needham Heights, MA: Allyn and Bacon.
- Gambrill, E. & Pruger, R. (Eds). (1996). Controversial Issues in Social Work Ethics, Values, & Obligations. Needham Heights, MA: Allyn and Bacon, Inc.

# FRENCH – IV

**Course Code: FLU 444** **Credit Unit: 02**
**Total Hours: 20**

**Course Objective:**
To strengthen the language of the students in both oral and written
To revise the grammar in application and the communication tasks related to topics covered already
To get acquainted with the current social communication skills, oral (dialogue, telephone conversations, etc.) and written and perform simple communication tasks such as

- Talking about personal habits
- Narrating events in the past, marking the stages, using appropriate connectors
- Holding conversations on telephone
- Asking for/giving advices

**Course Contents:**

**Dossier7–pg65-74,**
**Dossiers1,2and3(révision)**
**Dossier7:auboulot**
**ActesdeCommunication:**
Parlerdeshabitudesetdécrireunesituationàl'imparfait,comparer(nometverbe),qualifier(qui,que)s'exprimer autéléphone,demanderet donnerunavis.

**Dossiers1,2,3–Révision**
Exercicesd'écoute,productionorale et écrite.

**Grammaire :**
1. l'imparfait,
2. lacomparaisonduverbe/dunom ; mieux/meilleur
3. lespronomsrelatifs

**Examination Scheme:**

| Components | INTERNAL | | | | EXTERNAL | GRAND TOTAL |
|---|---|---|---|---|---|---|
| | MID-SEM | VIVA-VOCE | ATTENDANCE | **TOTAL** | **END SEMESTER** | **100** |
| **Weightage (%)** | 15 | 10 | 5 | **30** | **70** | |

## Text &References:

**Le livre àsuivre:**
- Andant,Christineet al.A proposA1Livre del'élève.Grenoble:Pressesuniversitairesde Grenoble,2010.
- Andant,Christineet al.A proposA1Cahierd'exercices.Grenoble:Pressesuniversitairesde Grenoble,2010.
- Girardeau,Brunoet NellyMous.Réussirle DELFA1.Paris: Didier,2010.

# APPLIED THERMODYNAMICS

**Course Code: BME 501** **Credit Units: 03**
**Total Hours: 30**

**Course Objectives:**
- To learn about of I law for reacting systems and heating value of fuels.
- To learn about gas and vapor cycles and their first law and second law efficiencies.
- To understand about the properties of dry and wet air and the principles of psychrometry
- To learn about gas dynamics of air flow and steam through nozzles.
- To learn the about reciprocating compressors with and without intercooling
- To analyze the performance of steam turbines

**Course Contents:**

**Module I: (6 Hours)**
Introduction to solid, liquid and gaseous fuels– Stoichiometry, exhaust gas analysis- First law analysis of combustion reactions- Heat calculations using enthalpy tables- Adiabatic flame temperature- Chemical equilibrium and equilibrium composition calculations using free energy.

**Module II: Standard Cycles: (8 Hours)**
Vapor power cycles, Rankine cycle with superheat, reheat and regeneration, exergy analysis. Super-critical and ultra super-critical Rankine cycle- Gas power cycles, Air standard Otto, Diesel and Dual cycles-Air standard Brayton cycle, effect of reheat, regeneration and intercooling- Combined gas and vapor power cycles- Vapor compression refrigeration cycles,

**Module III: Nozzle and Diffuser: (7 Hours)**
Basics of compressible flow. Stagnation properties, Isentropic flow of a perfect gas through a nozzle, choked flow, subsonic and supersonic flows- normal shocks- use of ideal gas tables for isentropic flow and normal shock flow- Flow of steam and refrigerant through nozzle, supersaturation- compressible flow in diffusers, efficiency of nozzle and diffuser.

**Module IV: Reciprocating Compressors: (5 Hours)**
Reciprocating compressors, staging of reciprocating compressors, optimal stage pressure ratio, effect of intercooling, minimum work for multistage reciprocating compressors.

**Module V: Steam turbines: (4 Hours)**
Analysis of steam turbines, velocity and pressure compounding of steam turbines.

**Module VI: Industrial Visit**
At least one visit up to Two days to industry in the field ofMechanical Engineering.

## Course Outcomes:
- After completing this course, the students will get a good understanding of various practical power cycles and heat pump cycles.
- They will be able to analyze energy conversion in various thermal devices such as combustors, air coolers, nozzles, diffusers, steam turbines and reciprocating compressors
- They will be able to understand phenomena occurring in high speed compressible flows.

**Examination Scheme**

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Sonntag, R. E, Borgnakke, C. and Van Wylen, G. J., 2003, 6th Edition, Fundamentals ofThermodynamics, John Wiley and Sons.
- Moran, M. J. and Shapiro, H. N., 1999, Fundamentals of Engineering Thermodynamics,John Wiley and Sons.
- Nag, P.K, 1995, Engineering Thermodynamics, Tata McGraw-Hill Publishing Co. Ltd
- S M Yahya, Fundamentals of Compressible Flow with Aircraft and Rocket Propulsion, new age nternational publishers
- P. L. Ballany, Thermal Engineering –Khanna Publishers.
- DhomkundwarKothandaraman, “A Course in Thermal Engineering”, Dhanpat Rai Publications.

# DYNAMICS OF MACHINES

**Course Code: BME 502** **Credit Units: 03**
**Total Hours: 30**

**Course Objectives:**

- To understand free and forced vibrations of single degree freedom systems.
- To analyze balancing problems in rotating and reciprocating machinery.
- To characterize and design flywheels.
- To analyze and design centrifugal governors.

**Course Contents:**

**Module I: Dynamics of Engine Mechanisms: (4 Hours)**
Displacement, velocity and acceleration of pistonturning moment on crankshaft, turning moment diagram; fluctuation of crankshaft speed, analysis of flywheel.

**Module II: Governor Mechanisms: (4 Hours)**
Types of governors, characteristics of centrifugal governors,gravity and spring controlled centrifugal governors, hunting of centrifugal governors, inertiagovernors.

**Module III: Balancing of Inertia Forces and Moments in Machines: (5 Hours)**
Balancing of rotating masses,two plane balancing, determination of balancing masses (graphical and analytical methods),balancing of rotors, balancing of internal combustion engines (single cylinder engines, in-lineengines, V-twin engines, radial engines.

**Module IV: Fundamental Aspects of Vibrations: (7 Hours)**
Vibration, main causes, advantages anddisadvantages; engineering applications of vibration and noise; vector method of representingharmonic motion; characteristics of vibration, harmonic analysis and beats phenomenon, workdone by harmonic forces on harmonic motion; periodic, non-harmonic functions- Fourier seriesanalysis; evaluation of coefficients of Fourier series; elements of vibratory system; lumped anddistributed parameter systems.

**Undamped Free Vibrations:**
Derivation of differential equation of motion: the energy method, the method based on Newton's second law of motion, and Rayleigh's method. Solution ofdifferential equation of motion: Natural frequency of vibration. Systems involving angularoscillations: the compound pendulum.

**Module V: Damped Free Vibrations: (5 Hours)**
Viscous damping: coefficient of damping; damping ratio, under damped, over damped and critically damped systems; logarithmic decrement; frequencyof damped free vibration; Coulomb or dry friction damping; frequency, decay rate andcomparison of viscous and Coulomb damping; solid and structural damping; slip or interfacialdamping.

**Module VI: Harmonically excited Vibration: (5 Hours)**
One degree of freedom- forced harmonic vibration, vector representation of forces; excitation due to rotating and reciprocating unbalance; vibration isolation, force and motion transmissibility; absolute and relative motion of mass (SeismicInstruments ).

## Course Outcome:

Upon completion of this course, students will be able to understand the principles of fluid statics and kinematics, mathematically analyze simple flow situations, measurement of flow rates and dimensional analysis of model studies.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:


- Ambekar, AG; Mechanism and Machine Theory; PHI
- Rattan SS; Theory of machines; TMH
- Sharma and Purohit; Design of Machine elements; PHI
- Bevan; Theory of Machines;
- Ghosh and Mallik; Theory of Mechanisms and Machines; Affiliated East-West Press, Delhi
- Norton RL; kinematics and dynamics of machinery; TMH
- Ambekar A.G.,' Mechanical Vibrations and Noise Engineering; PHI
- Thomson , W.T., Theory of Vibration with Applications , C.B.S Pub & distributors .
- Singiresu Rao, "Mechanical Vibrations , Pearson Education .
- G.K. Grover, " Mechanical Vibration , Nemchand and Bross , Roorkee

# MACHINE DESIGN – I

**Course Code: BME 503** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The objective of this course is to help students apply concepts learned in the mechanics, structure, material and manufacturing courses. This course offers working knowledge in the use of proper failure theories under steady and variable loading, design of mechanical elements, such as shaft, coupling, power screws, and detachable, permanent and welded connections.

**Course Contents:**

**Module I: Variable stresses in Machine Parts: (5 Hours)**
Fatigue and Endurance Limit, Factor of Safety for Fatigue Loading, Stress concentration, Notch sensitivity, Gerber Method, Goodman Method and Soderberg Method for combination of stresses.

**Module II: Power Screws: (5 Hours)**
Types of screw threads, Torque required to raise and lower the load, Efficiency of square threaded screw, overhauling and self locking screw, stresses in power screw, design of screw jack.

**Module III: Cotter and Knuckle Joints: (5 Hours)**
Types of cotter joints, design of socket and spigot joint, design of sleeve and cotter joint, design of jib and cotter joint, Design procedure of Knuckle joint.

**Module IV: Riveted and Welded Joint: (5 Hours)**
Types of Riveted joint, Lap joint , Butt Joint, Caulking and Fullering, Failure of Riveted joint, Strength of Riveted joint, Efficiency of Riveted joint. Advantages and Disadvantages of welded joint over Riveted joint, Strength of Fillet joint, strength of Butt joints.

**Module V: Keys and Couplings: (5 Hours)**
Types of Keys, Splines, Strength of Sunk Key, types of shaft coupling, Sleeve and muff coupling, Flange coupling, Flexible coupling, Oldham coupling, Universal coupling.

**Module VI: Drives: (5 Hours)**
Types of Belt drives, Flat Belt drives, Velocity ratio, Sleep, Creep of Belt, Length of open Belt, length of cross belt, power transmission by belt, Maximum tension in the belt. Types of V belt and Pulleys, advantages and disadvantages of V belt over Flat Belt, Ratio of Driving tensions for V belt, Rope drives. Chain drives, advantages and disadvantages of Chain drives.

## Course Outcome:
Upon completion of this course, students will get an overview of the design methodologies employed for the design of various machine components.

**Examination Scheme:**

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

- J.E. Shigley, Mechanical Engineering Design.
- Sadhu Singh, Machine Design
- R.S. Khurmi& J.K. Gupta, Machine design
- D.K. Aggarwal & P.C. Sharma, Machine Design.
- Deutschman, D., Michels, W.J. and Wilson, C.E., Machine Design Theory and Practice, Macmillan,1992.
- Juvinal, R.C., Fundamentals of Machine Component Design, John Wiley,1994.
- Spottes, M.F., Design of Machine elements, Prentice-Hall India,1994.
- R. L. Norton, Mechanical Design – An Integrated Approach, Prentice Hall,1998.

# MEASUREMENT AND CONTROL

**Course Code: BME 504** **Credit Units: 03**
**Total Hours: 30**

## Course Objectives:

- To impart knowledge of architecture of the measurement system.
- To deliver working principle of mechanical measurement system.
- To study concept of mathematical modeling of the control system.
- To analyze control system under different time domain.

**Course Contents:**

**Module I: (6 Hours)**
Significance of Mechanical Measurements, Classification of measuring instruments, generalized measurement system, types of inputs: Desired, interfering and modifying inputs. Static characteristics: Static calibration, Linearity, Static Sensitivity, Accuracy, Static error, Precision, Reproducibility, Threshold, Resolution, Hysteresis, Drift, Span & Range etc.

**Module II: (7 Hours)**
Displacement Measurement: Transducers for displacement, displacement measurement, potentiometer, LVDT, Capacitance Types, Digital Transducers (optical encoder), Nozzle Flapper Transducer. Measurement of Angular Velocity: Tachometers, Tachogenerators, Digital tachometers and Stroboscopic Methods.Acceleration Measurement, theory of accelerometer and vibrometers, practical accelerometers, strain gauge based and piezoelectric accelerometers.

**Module III: (7 Hours)**
Pressure Measurement: Elastic pressure transducers viz. Bourdon tubes, diaphragm, bellows and piezoelectric pressure sensors, High Pressure Measurements, Bridge man gauge. Vacuum measurement: Vacuum gauges viz. McLeod gauge, Ionization and Thermal Conductivity gauges. Flow Measurement: Bernoullis flowmeters, Ultrasonic Flowmeter, Magnetic flow meter, rotameter. Temperature Measurement: Electrical methods of temperature measurement Resistance thermometers, Thermistors and thermocouples, Pyrometers.

**Module IV: (5 Hours)**
Strain Measurement: Theory of Strain Gauges, gauge factor, temperature Compensation, Bridge circuit, orientation of strain gauges for force and torque, Strain gauge based load cells and torque sensors

**Module V: (5 Hours)**
Introduction to control systems.Classification of control system. Open loop and closed loop systems. Mathematical modeling of control systems, concept of transfer function, Block diagram algebra.

## Course Outcomes:

After completing this course, the students will be able to

- Identify and select proper measuring instrument for specific application.
- Illustrate working principle of measuring instruments.
- Explain calibration methodology and error analysis related to measuring instruments.
- Mathematically model and analyze system/process for standard input responses.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

- A.K. Sawhney (Author), Puneet Sawhney, A Course in Mechanical Measurements and Instrumentation & Control, Dhanpat Rai Publications.
- Thomas Beckwith, N.Lewis Buck, Roy Marangoni, Mechanical Engineering Measurement - -Narosa Publishing House, Bombay
- R. S. Sirohi, H. C. Radha Krishna, Mechanical Measurements, New Age Publishers, 1991.
- Experimental Methods for Engineers - J. P. Holman.- McGraw Hills Int. Edition.
- Control System Engineering: by Nagrath IJ. and Gopal .M., Wiley EasternLtd.
- Modem Control Engineering: by K.Ogata, Prentice Hall.

# METROLOGY

**Course Code: BME 505** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The main objective of this course is to give the student: a basic understanding of the physical loss governing metrology and tolerance design. Gain and appreciation for the capabilities and applications of metrology through hands own experiences.

**Course Contents:**

**Module I: Principles of Measurement: (8 Hours)**
Definition of metrology, difference between precision and accuracy. Sources of errors: Controllable and Random Errors, Effects of Environment and Temperature, Effects of support, alignment errors.
**Length Standards:** Line standards, end standards and wavelength standards, transfer from line standards to end standards. Numerical based on line standards. Slip gauges – its use and care, methods of building different heights using different sets of slip gauges.
**Limits, fits and tolerances:** Various definitions, different types of fits and methods to provide these fits. Numerical to calculate the limits, fits and tolerances, ISO system of limits and fits; Gauges and its types, limit gauges – plug and ring gauges. Gauge Design – Taylor's Principle, wear allowance on gauges.

**Module II: Comparators: (7 Hours)**
Principles and working of Mechanical, Electrical, Optical and Pneumatic Comparators.
**Angular Measurement:** Sine Bar – different types of sine bars, use of sine bars in conjunction with slip gauges, Use of angle gauges, spirit level, errors in use of sine bars. Numericals.Principle and working of autocollimator.

**Module III: Straightness and flatness: (8 Hours)**
Definition of Straightness and Flatness error.Numericals based on determination of straightness error of straight edge with the help of spirit level and auto collimator
**Screw Thread Measurement:** Errors in threads, Measurement of elements of screw threads –major diameter, minor diameter, pitch, flank angle and effective diameter (Two and three wire methods). Effect of errors in pitch and flank angles
**Gear Measurement:** Measurement of tooth thickness – Gear tooth vernier caliper, Constant chord method, base tangent method and derivation of mathematical formulae for each method.Parkinson Gear Tester.

**Module IV: Machine Tool Alignment: (7 Hours)**
Machine tool tests and alignment tests on lathe. Alignment tests on milling machine. Alignment tests on a radial drilling machine, Interferometry.
**Surface texture:** Introduction, types of irregularities, Elements of surface, Texture, Measurement of surface finish, Examination of surface Roughness.

## Course Outcome:
Upon completion of this course, students will be able to the tooling needed formanufacturing, the dimensional accuracy and tolerances of products, assembly of differentcomponents and the application of optimization methods in manufacturing.

**Examination Scheme:**

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

- R.K. Jain, "Engineering Metrology", Khanna Publishers, Delhi
- I.C. Gupta, "Engineering Metrology", Dhanpat Rai Publications, Delhi
- F.W. Galyer & C.R. Shotbolt, "Metrology for Engineers", ELBS edition.

# DYNAMICS OF MACHINE LAB

**Course Code: BME 522** **Credit Units: 01**
**Total Hours: 20**

**Course Objectives:**

- To identify the essential system properties and physically visualize the concepts of frequency and time period of vibrations under free vibration.
- To explain the mechanism of forced vibration to analyze the damping properties.
- Evaluate the mechanism of forced vibration to analyze the different mode shapes and critical speed of shaft.

**Course Contents:**

**List of Experiment: (Any 10):**
**Time allocated for experiments is 2 Hours each.**

1. Study of various models of governors.
2. Study of gyroscopic motion and calculation of value of gyroscopic couple.
3. Study of various types of Cams and followers and drawing the cam profile with the help oftest kit.
4. Determination of static and dynamic unbalances.
5. Balancing the apparatus statically and dynamically.
6. Study of various first order vibration systems.
7. To find out frequency of damped free vibration and rate of decay of vibration-amplitude inthe system.
8. To observe the phenomenon of whirl in a horizontal light shaft and to determine the critical speed of the shaft.
9. To demonstrate universal vibration apparatus.
10. To demonstrate natural undammed free vibration on universal vibration apparatus.
11. To demonstrate dammed forced vibration on universal vibration apparatus.

## Laboratory Outcome:

After completion of course student will develop practical understanding and applications of fundamental concept of frequency and time period of vibrations under free vibration, critical speed of shaft, functioning of governor, cams & followers and gyroscopic couples.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

# MEASUREMENT AND CONTROL LAB

**Course Code: BME 524** **Credit Units: 01**
**Total Hours: 20**

**Course Objectives:**

- To demonstrate the use of different sensors, strain gauges and inclinometers.
- Calibration of measuring sensors and instruments.

**Course Contents:**

**List of Experiments: (Any 10)**
**Time allocated for experiments is 2 Hours each.**

1. Measurement of resolution and sensitivity of thermocouple (study of various thermocouples J, K, T, etc.) (Calibration)
2. Measurement of resolution, sensitivity and non linearity of termistor. (termistor instability)
3. Measurement of thickness of LVDT.
4. Measurement of resolution of LVDT (and displacement measurement)
5. Study of proportional control and offset Problems.
6. Study of proportional integral control.
7. Study of proportional integral derivative (PID) control.
8. Vibration measurement by stroboscope (natural frequency of a cantilever)
9. Angular frequency (speed of rotating objects) measurement by stroboscope.
10. Pressure transducer study and calibration.
11. Proving ring (force measurement)
12. Torque cell.
13. Closed loop study of an electric circuit.
14. Young’s modulus of a cantilever.
15. Young’s modulus and poison’s ratio of tensile test piece of M.S.

## Laboratory Outcome:

Students will be able to select proper measuring instrument and know requirement of calibration, errors in measurement etc. They can perform accurate measurements.

### Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# METROLOGY LAB

**Course Code: BME 525** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
Objective of this course is designed for measuring and gauging instruments for inspection of precision linear, geometric forms, angular and surface finish measurements. The student can learn the measurements with and calibration of instruments.

**Course Contents:**

**List of Experiments: (Any 10)**
**Time allocated for experiments is 2 Hours each.**

1 Set up a dimension by slip gauges (example 36.936; 14.727…..) Measure this set up by micrometer (least count 0.01) several times and read dimensions. Find statistical mean and record the expected variation between the actual dimension and dimension measured by micrometer.

2 To check the roundness of a circular bar with the help of dial gauge.

3 Mill a component to dimension (23, 57.6,…). Set up a comparator by slip gauge set to this dimension. Check component deviation by the comparator and record the deviation. Measure several times and obtain the mean value.

4 Check the bore in a component by a bore-indicator. Set the bore indicator by micrometer and measure the deviation in the bore. Measure several times and obtain the mean value at three positions along the length of the bore.

5 Set – up a sine bar for measuring the angle of an inclined surface (of a bracket, milling cutter arbor with 7/24 taper, ….). Measure the angle several times and record the mean value. Use height gauge wherever necessary.

6 Check angular dimension of a dovetail guide way by measuring across rollers.
Check the included angle of a V – block (90º, 60º, …) / or a machined groove by measuring over a roller using height gauge and parallel blocks/slip gauges.

7 Measure the straightness of a surface (surface plate; guide way of machine tool) by using straight edge and dial gauge and dial gauge stand. Set up straight edge on jacks such that dial reading at each end coincide. Move the dial stand along the straight edge. Record readings at 50 mm interval and draw a plot. Obtain maximum deviation which is the straightness.

8 Measure straightness using a spirit level. Place spirit level at an initial position and note level reading. Move the level on a straight line and take readings at 50 mm intervals. Plot the difference from the original reading and obtain the straightness value.

9 Draw a trapezoidal and any other profile in AutoCAD to 1:1 scale. On a steel plate make the profile by fitting and filing. Set up the drawing on profile projector. Check the component and note deviations. Correct the profile and recheck. Make the profile as close to the required one.

10 To machine a given surface and study its roughness characteristics

11 To measure the geometry of a screw using profile projector

12 To study the cutting tool geometry using tool makers microscope

## Laboratory Outcomes:
Student will become familiar with the different instruments that are available for linear, angular, roundness and roughness measurements they will be able to select and use the appropriate measuring instrument according to a specific requirement (in terms of accuracy, etc.)

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# COMMUNICATION SKILLS – V

**Course Code: BCU 541** **Credit Units: 01**
**Total Hours: 10**

**Course Objective:**

- To enable the students to adopt strategies for effective reading and writing skills.
- The course would enhance student's vocabulary, language and fluency. It would also teach the students to deliver professional presentations.

**Prerequisites:** NIL

<table>
<tr><td colspan="3">Course Contents / Syllabus:</td></tr>
<tr><td rowspan="2">1.</td><td>Module I Vocabulary</td><td>35% Weightage</td></tr>
<tr><td>• Define Vocabulary<br>• Significance of Vocabulary<br>• One Word Substitution, Synonyms & Antonyms and Idioms & Phrases<br>• Define and Differentiate Homonyms, Homophones and Homographs<br>• Vocabulary Drills<br>• Foreign Words</td><td></td></tr>
<tr><td rowspan="2">2.</td><td>Module II Comprehension Skills</td><td>25% Weightage</td></tr>
<tr><td>• Reading Comprehension-SQ3R Reading Techniques<br>• Summarising and Paraphrasing<br>• Précis Writing<br>• Listening Comprehension</td><td></td></tr>
<tr><td>3.</td><td>Module III Presentation Skills<br>• Discussing the Significance of Audio-visual Aids, Audience and Feedback in Presentation Skills<br>• Analyzing the Significance of Non-Verbal Communication</td><td>30% Weightage</td></tr>
<tr><td>4.</td><td>Module IV Prose<br>• How Far is the River-Ruskin Bond<br>• My Wood-E.M.Forster<br>• I have a Dream-Martin Luther King<br>• Spoken English and Broken English-G.B. Shaw</td><td>10% Weightage</td></tr>
<tr><td>5.<br><br>6.</td><td>Student Learning Outcomes:<br>• Communicate fluently and sustain comprehension of an extended discourse.<br>• Demonstrate ability to interpret texts and observe the rules of good writing.<br>• Prepare and present effective presentations aided by ICT tools.<br>Pedagogy for Course Delivery: Workshop<br>• Group Discussions<br>• Presentations<br>• Lectures</td><td></td></tr>
<tr><td>7.</td><td>Assessment/ Examination Scheme:<br><table><tr><th>Theory L/T (%)</th><th>Lab/Practical/Studio (%)</th><th>End Term Examination</th></tr><tr><td>100%</td><td>NA</td><td>70%</td></tr></table><br>Theory Assessment (L&T):<br><table><tr><td>Components (Drop down)</td><td>CIE</td><td>Mid Sem</td><td>Attendance</td><td>End Term Examination</td></tr><tr><td>Weightage (%)</td><td>10%</td><td>15%</td><td>5%</td><td>70%</td></tr></table></td><td></td></tr>
</table>

**Text:Jaffe, C.I. Public Speaking: Concepts and Skills for a Diverse Society, 4th ed. Belmont, CA: Wadsworth, 2004.**

**Effective English for Engineering Students, B Cauveri, Macmillan India**

***Creative English for Communication*, Krishnaswamy N, Macmillan**

**Reference: *A Textbook of English Phonetics*, Balasubramanian T, Macmillan**

**Additional Reading: Newspapers and Journals**

# BEHAVIOURAL SCIENCE – V

**Course Code: BSU 543** **Credit Units: 01**
**Total Hours: 10**

**Course Objective:**
- To inculcate in the students an elementary level of understanding of group/team functions
- To develop team spirit and to know the importance of working in teams

**Course Contents:**

**Module I: Group formation: (02 Hours)**
- Definition and Characteristics
- Importance of groups
- Classification of groups
- Stages of group formation
- Benefits of group formation

**Module II: Group Functions: (02 Hours)**
- External Conditions affecting group functioning: Authority, Structure, Org. Resources, Organizational policies etc.
- Internal conditions affecting group functioning: Roles, Norms, Conformity, Status, Cohesiveness, Size, Inter group conflict.
- Group Cohesiveness and Group Conflict
- Adjustment in Groups

**Module III: Teams: (02 Hours)**
- Meaning and nature of teams
- External and internal factors effecting team
- Building Effective Teams
- Consensus Building
- Collaboration

**Module IV:Leadership: (02 Hours)**
- Meaning, Nature and Functions
- Self leadership
- Leadership styles in organization
- Leadership in Teams

**Module V: Power to empower: Individual and Teams: (02 Hours)**
- Meaning and Nature
- Types of power
- Relevance in organization and Society

## Student learning outcomes
- Students will Develop critical and reflective thinking abilities
- Students will Demonstrate an understanding of group dynamics and effective teamwork
- Student will develop a range of leadership skills and abilities such as effectively leading change, resolving conflict, and motivating others
- Student will Gain knowledge and understanding of organization resources, policies, and involvement opportunities.
- Student will Develop strategies to recruit, retain, and continually motivate contributing members to the organization

**Examination Scheme:**

| Evaluation Components | Attendance | Journal of Success (JOS) | Social Awareness Program (SAP) SAP Report/SAP Presentation | End Semester Exam | Total |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 15 | 70 | 100 |

## Suggested Readings:


- Organizational Behaviour, Davis, K.
- Hoover, Judhith D. Effective Small Group and Team Communication, 2002, Harcourt College Publishers
- Dick, Mc Cann & Margerison, Charles: Team Management, 1992 Edition, viva books
- Bates, A. P. and Julian, J.: Sociology - Understanding Social Behaviour
- Dressers, David and Cans, Donald: The Study of Human Interaction
- Lapiere, Richard. T – Social Change
- Lindzey, G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology, Addison – Welsley, US.
- Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.
- LaFasto and Larson: When Teams Work Best, 2001, Response Books (Sage), New Delhi
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 2, Group (1996); Pfeiffer & Company
- Smither Robert D.; The Psychology of Work and Human Performance, 1994, Harper Collins College Publishers.

# FRENCH – V

**Course Code: FLU 544** **Credit Units: 02**
**Total Hours: 20**

**Course Objective:**
To strengthen the language of the students in both oral and written
To revise the grammar in application and the communication tasks related to topics covered already
To get acquainted with the current social communication skills, oral (dialogue, telephone conversations, etc.) and written and perform simple communication tasks such as

- narrating events in the past, marking the stages, using appropriate connectors
- expressing causes and consequences, using appropriate logical connectors
- present in gabiography

**Course Contents:**
**Dossier8–Pg75-84Dossiers4,5and6(révision) Dossier8:Vivre ensemble**
**Actesde Communication:**
Exprimerlacause,l'opposition,laconséquence,décrirelesétapesd'uneaction,s'exprimersurl'environnement, l'écologie, identifieret décrirelesdifférencesde comportement, décrire le fonctionnementd'une association, fairela biographied'une personne.

**Dossiers4, 5,6–Révision**
Exercicesd'écoute,productionorale et écrite.

**Grammaire :**
1. le présent (révision),lepassé composé(révision)
2. lespronomscomplémentsdirects,lespronomscompléments indirects
3. lesmarqueurschronologiques
4. lesarticulateurslogiques

**ExaminationScheme:**

| | INTERNAL | | | | EXTERNAL | GRAND TOTAL |
|---|---|---|---|---|---|---|
| **Components** | MID-SEM | VIVA-VOCE | ATTENDANCE | **TOTAL** | **END SEMESTER** | |
| **Weightage (%)** | 15 | 10 | 5 | **30** | **70** | **100** |

## Text &References:

***Text:***
**Le livre àsuivre:**

· Andant,Christineet al.A proposA1Livre del'élève.Grenoble:Pressesuniversitairesde Grenoble,2010.
· Andant,Christineet al.A proposA1Cahierd'exercices.Grenoble:Pressesuniversitairesde Grenoble,2010.

***Références:***

· Girardeau,Brunoet NellyMous.Réussirle DELFA1.Paris:Didier,2010.

# INDUSTRIAL PRACTICAL TRAINING – I

## Course Code: NPT 550 Credit Units: 03

**Course Objective:**

This course will enable the students to explore the preferred field of specialization and develop analytical / hardware / software / experimental / observation skills. It will help them to manage the technical content and work. It will also help them to prepare and present technical report.

**Methodology:**

Practical training is based on the theoretical subjects studied by students. It can be arranged within the college or in any related industrial unit. The students are to learn various industrial, technical and administrative processes followed in the industry. In case of on-campus training the students will be given specific task of fabrication/assembly/testing/analysis. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation on same.

**Examination Scheme:**

| | |
|---|---|
| Feedback from industry/work place | 20 |
| Training Report | 40 |
| Viva | 15 |
| Presentation | 25 |
| **Total** | **100** |

## Course Outcome:

After successful completion of the course, the students will be able to
- Explore the preferred field of specialization and develop analytical / hardware / software / experimental / observation skills.
- Manage the technical content and work.
- Learn the various administrative process followed in industry.
- Prepare and present technical report.

# FLUID POWER SYSTEMS

**Course Code: BME 601** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
Fluid power systems cover generation, transmission, and control applications of power by using pressurized fluids. This course imparts the knowledge of different fluid power systems (pneumatic and hydraulic) which are used in industries and hydropower plants.

**Course Contents:**

**Module I: Introduction: (6 Hours)**
Euler turbine equation, theory of rotodynamic machines; various efficiencies, impulse and reaction forces due to fluid systems on stationery and moving system of vanes.

**Module II: WaterTurbines: (7 Hours)**
Classification of water turbines, head and efficiencies, velocity triangles- Axial, radial and mixed flow turbines-Pelton wheel, Francis turbine and Kaplan turbines, working principles, draft tube, performance curves for turbines.

**Module III: Water Pumps: (4 Hours)**
Centrifugal pumps, working principle, velocity triangles, work done by the impeller, reciprocating pumps, working principle, efficiency.

**Module IV: Performance of Fluid Machines: (4 Hours)**
Similarity laws applied to rotodynamic machines; specific speed, unit quantities; characteristic curves; use of models; cavitations and attendant problems in turbo machines; selection of turbines hydroelectric plants.

**Module V: HydraulicPower Transmission: (5 Hours)**
Transmission of hydraulic power through pipe lines; water hammer; precautions against water hammer in turbine and pump installations.

**Module VI: PowerHydraulics: (4 Hours)**
Positive pumps: gear, vane, screw pump, variable delivery valves: solenoid operated valve, hydraulic press, hydraulic ram, fluid coupling and torque converter.

## Course Outcome:
Upon the completion of this course students will be able to apply basic principles to fluid flow problems and to evaluate performance of hydraulic machines (turbines and pumps).

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:

- Gupta, S. C., Fluid Mechanics and Hydraulic Machines, Pearson Education, 2007
- R.K. Bansal, “Fluid Mechanics & Hydraulic Machines”, Laxmi Publications (P) Ltd., 2002.
- Dr. D.S. Kumar, “Fluid Mechanics & Fluid Power Engineering”, S.K. Kataria & Sons,2001
- D.R. Malhotra & N.K. Malhotra, “The Fluid Mech. & Hydraulics”, Satya Prakashan, 2001
- V.P. Gupta, Alam Singh, Manish Gupta, “Fluid Mechanics, Fluid Mechanics & Hydraulics”, CBS Publishers; 1999.

# IC ENGINE &GAS TURBINE

**Course Code: BME 602** **Credit Units: 03**
**Total Hours: 30**

**Course Objectives:**

- To familiarize with the terminology associated with IC engines.
- To understand the basics of IC engines.
- To understand combustion, and various parameters and variables affecting it in varioustypes of IC engines.
- To learn about various systems used in IC engines and the type of IC engine required forvarious applications.

**Course Contents:**

**Module I: Fundamentals: (5 Hours)**
Introduction to I. C Engine-Classification-Components- Indicator diagram, comparison of SI and CI engine, two-stroke and four-stroke engine, Valve timing diagram of SI and CI engine.

**Module II: Air Standard Cycle: (6 Hours)**
Assumptions in air standard cycle & fuel-air cycle, fuel-air cycle calculations, factors influencing fuel-air cycle, effects of variable specific heats, dissociation.

**Module III: Fuel and Combustion: (8 Hours)**
Combustion of SI engine, ignition limits, normal combustion, abnormal combustion, effect of engine Variable in ignition lag, spark advance and factors affecting ignition timing, pre-ignition, theory, and factors affecting detonation, PN, HUCR. Combustion in CI engine, fundamentals ofcombustion process in Diesel engine, delay period, diesel knock, and cold starting of CI engine. IC engine Fuel, combustion equations, theoretical air and excess air, stoichiometric air fuel ratio, desirable Properties of good IC engine fuels knock rating of SI engine fuel.

**Module IV: Performance & Testing: (6 Hours)**
Testing and performance of IC engine, performance parameters, basic measurement, engine Performance curve, fuel consumption, load outputs, engine power, heat balance.

**Module V: Gas Turbine: (5 Hours)**
General aspect of gas turbine, Jules cycle, Brayton cycle, classification, merits of gas turbine, open- cycle gas turbine, closed cycle gas turbine, Inter cooling, Reheating, Re-generation in gas turbine.

## Course Outcomes:

- Understand working and performance of IC Engines through thermodynamic cycles.
- Understand combustion phenomena in SI and CI engines and factors influencing combustion chamber design.
- Outline emission formation mechanism of IC engines, its effects and the legislation standards.
- Understand working principles of instrumentation used for engine performance and emission parameters.
- Evaluate methods for improving the IC engine performance.
- Understand the latest developments in IC Engines and alternate fuels.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

**Text & References:**


- Ganesan, V. Internal Combustion Engine, Tata McGraw-Hill.
- J. B Heywood, Internal Combustion Engine Fundamentals, McGraw Hill
- Vladimir Leonidas Maleev. Internal-combustion Engines, Theory and Design. McGraw-Hill.
- Mathur, M.L. and Sharma, R.P. Internal Combustion Engine. Dhanpat Rai Publication
- Lester Clyde Lichty, Robert Leroy Streeter. Internal Combustion Engines, McGraw-Hill
- Wallace Ludwig Lind. Internal-combustion Engines: Their Principles and Applications to Automobile, Aircraft, Ginn
- Edward Frederic Obert, Burgess Hill Jennings, Internal Combustion Engines: Analysis and Practice
- Joseph Albert Polson. Internal Combustion Engines, Chapman & Hall, limited

# MACHINE DESIGN – II

**Course Code: BME 603** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The course aims at developing concepts as to how to analyze mechanical systems and select proper machine elements (bearing, gears, belts, chains). It prepares the students how to design machine element by specifying their type, geometry, material and how to integrate these elements to build a mechanical system.

**Course Contents:**

**Module I: Introduction: (5 Hours)**
Introduction: Different theories of failure and design based on theories. Design for fatigue, design for creep and design for wear and corrosion.

**Module II: Belt and Chain drives: (5 Hours)**
Belt Drives: Types of Belt drives, Flat Belt drives, Velocity ratio, Creep of Belt, Length of open Belt, length of cross belt. Power transmission by belt, Maximum tension in the belt. Types of V belt and Pulleys, advantages and disadvantages of V belt over Flat Belt. Ratio of driving tensions for V belt, Rope drives. Chain drives, advantages and disadvantages of Chain drives.

**Module III: Brakes and Clutches Brakes: (5 Hours)**
Types, Design of shoe brakes, and Design of Band and Disc Brakes. Clutches: Types, Plate clutches –design for uniform pressure and wear.

**Module IV: Bearings: (5 Hours)**
Design of Bearings: Brief overview of bearings, Design of Fluid Film bearings and Rolling contact bearings. Types of sliding bearing. Materials, type of lubrication, design of sliding bearing. Selection and application of rolling bearing, seals.

**Module V: - Gears: (5 Hours)**
Design of Gears: Law of gearing -conjugate action and gear tooth profile-basics Analysis of forces on spur, helical, bevel and worm gears. Design procedure of various gears.

**Module VI: - Engine Parts: (5 Hours)**
Design of Engine parts: Design of cylinder and cylinder head, Design of Piston.

## Course Outcome:
Upon completing this course, the students will be able to design transmission systems for engines and machines.

**Examination Scheme:**

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text& References:

- Maleeve Hartman and O.P. Grover, “Machine Design”, CBS Publication & Publishers.
- V.B Bhandari, “Machine Design”, Tata McGraw Hill.
- P.C. Sharma and D.K Aggarwal., “Machine Design”, S.K. Kataria& Sons.
- Mahadevan, “Design Data Book”, CBS Publication & Publisher

# MANUFACTURING TECHNOLOGY

**Course Code: BME 604** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
Metal cutting involves removing metal through machining operations. Machining traditionally takes place on lathes, drill presses, and milling machines with the use of various cutting tools. Successful machining also requires knowledge about the material being cut. This course is designed in such way that it explains all aspects (process and tools) of metal cutting. The course also covers the common tooling setups and operations as well as specialized applications for the more experienced users.

**Course Contents:**

**Module I: Introduction: (4 Hours)**
Basic shape of cutting tools, Function of different angles of cutting tools, tool geometry and Nomenclatures- ASA, ORS systems, Conversion of angles, Tool Materials.

**Module II: Mechanism of Chip Formation: (5 Hours)**
Fracture & yielding mechanism, Types of chips, Factors involved in chip formation analysis, shear plane in flat chips, chip formation in drilling and milling.

**Module III: Mechanism of Metal Cutting: (6 Hours)**
Force system during turning, merchant circle diagram, velocity relationship, stress in conventional shear plane, Energy of cutting process, Ernst& merchant angle relationship, Lee-Shafer relationship, measurement of forces, Heat generation and temperature distribution in metal cutting.

**Module IV: Theory of Tool Wears: (5 Hours)**
Criteria of wear, machinability and tool life, Flank wear, Crater wear, Taylor's tool life equation, causes and mechanism of tool failure, cutting fluid, Economics of metal machining.

**Module V: Design for Sheet Metal Works: (5 Hours)**
Press working Terminology, press operation, types of dies, clearance, cutting forces, methods of reducing cutting forces, minimum diameter of piercing, center of pressure, Drawing dies-blank diameter, drawing force.

**Module VI: Jigs and Fixture Design: (5 Hours)**
Important considerations in jig and fixture design, Locating and clamping, principles for location purposes, principles for clamping purposes, design principles for jigs and fixtures.

## Course Outcome:
Upon completion of this course, students will be able to the tooling needed for manufacturing, assembly of different components and the application of optimization methods in manufacturing.

### Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

- A Bhattacharya , "Metal cutting theory& practice", C.B. Publication
- Geoffrey Boothroyd, "Fundamentals of Metal Machining & Machine Tools", Tata McGraw Hill Kogakusha Ltd.
- P.N. Rao, "Manufacturing Technology", Tata McGraw Hill Publication Ltd.
- Dr. P.C. Pandey & C.K. Singh, "Production Engg. Sciences", Standard Publisher. Distributors.
- Dr. B.J. Ranganath, "Metal Cutting & Tool Design" Vikas Publishing House Pvt. Ltd.

# FLUID POWER SYSTEMS LAB

**Course Code: BME 621** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
The objective of this course is to help students in understanding the working principle, construction and performance characteristics of hydraulic turbines and hydraulic pumps, understanding the cavitation phenomenon and frictional losses in a fluid flow.

**Course Contents:**

**List of experiments/demonstrations:**

1. To conduct a test on Centrifugal Pump and plot its characteristics**: (3 Hours)**
2. To Plot the characteristics of Pelton turbine**: (3 Hours)**
3. To conducts an experiment on Francis turbine**: (2 Hours)**
4. To study the effect of a draft tube on reaction turbines**: (2 Hours)**
5. To find the friction factor for flow through pipes**: (2 Hours)**
6. To study the hydraulic controls rig**: (2 Hours)**
7. To conduct an experiment for verifying model laws**: (2 Hours)**
8. To study the cavitation phenomenon in turbines**: (2Hours)**
9. Study of hydraulic couplings and torque converters**: (2 Hours)**

## Laboratory Outcome:
After the completion of course student will be able to measure the performance of pumps and turbines. Students will be able to understand the cavitation and water hammering.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

# IC ENGINE & GAS TURBINE LAB

**Course Code: BME 622** **Credit Units: 01**
**Total Hours: 20**

**Course Objectives:**

- To describe the performance and operating characteristics of Internal Combustion Engines.
- To explain the parts and complete knowledge of type of fuels used in IC engines and the fuel supply systems.
- To describe combustion process phenomena in IC engines.
- To explain the different methods of performance analysis of IC engines.
- To explain the effects of exhaust emission on human health and different pollution norms.

**Course Contents:**

**List of Experiments:**

1. Load test on Diesel Engine**: (3 Hours)**
2. Testing and performance of IC engines using Morse Test**: (3 Hours)**
3. Prepare the heat balance sheet for Diesel Engine test rig**: (2 Hours)**
4. Prepare the heat balance sheet for Petrol Engine test rig**: (2 Hours)**
5. Study of Fuel Injection system in SI Engine**: (2 Hours)**
6. Study of lubricating system in CI Engines**: (2 Hours)**
7. Study of Battery Ignition system and Electronic Ignition System**: (2 Hours)**
8. Study of a Carburetors**: (2 Hours)**
9. Study of Gas Turbine Model**: (2 Hours)**

## Laboratory Outcomes:

- Identify the various types of I.C. Engines and Cycles of operation.
- Express the effect of various operating variables on engine performance
- Demonstration of fuel metering and fuel supply systems for different types of engines
- Analyze & Justify the suitability of conventional and non-conventional fuels for IC engines
- Understand the effects of emission formation of IC engines, its effects and the legislation standards.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# MACHINE DESIGN LAB – II

**Course Code: BME 623** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**

It prepares the students how to design machine element by specifying their type, geometry, material and how to integrate these elements to build a mechanical system.

**Course Contents:**

**List of Experiments/demonstrations:**

1. Design and drawing of automotive transmission**: (3 Hours)**
2. Design and drawing of brakes**: (3 Hours)**
3. Design and drawing of clutches**: (2 Hours)**
4. Design and drawing of connecting rod**: (2 Hours)**
5. Design and drawing of I.C. engine piston**: (2 Hours)**
6. Design and drawing of connecting rod**: (2 Hours)**
7. Design and drawing of hydraulic rivet**: (2 Hours)**
8. Design and drawing of mechanical hoist**: (2 Hours)**
9. Design and drawing of Gears**: (2 Hours)**

## Laboratory Outcome:

The students will able to design transmission systems for engines and machines.

**Examination Scheme:**

| **IA** | | | | **EE** | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

# MECHATRONICS

**Course Code: BME 606** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
Mechatronics is basically combination of mechanical and electronics engineering. With growing demands of automation of different mechanical operation this subject full fills the needs. Main objective of this course is to provide knowledge of different combinations of mechanical and electronics processes and various software using in it.

**Course Contents:**

**Module I: Introduction: (6 Hours)**
Measurement systems control systems, Microprocessor-based controllers, Classification, characteristics and calibration of different sensors and transducers, Signal conditioning processes.

**Module II: Actuation Systems: (6 Hours)**
Pneumatic and hydraulic actuation systems, Directional control valves, pressure control valves, process control valves.

**Module III: System Models: (6 Hours)**
Mathematical models, Mechanical system building blocks, modeling dynamic systems, First order systems, second order systems.

**Module IV: Principles of Feedback & Intelligent Control: (6 Hours)**
Control Systems, Open & Closed loop control Systems, Controllers, and Artificial Neural Network.

**Module V: Programmable Logic Controllers: (6 Hours)**
Architecture of Programmable Logic Controllers, input / output modules, programming methods, timers and counters, Master control, Analog input/output.

## Course Outcomes:
- Identify the elements of mechatronics system.
- Select suitable sensors, actuators and controllers to meet specific requirements.
- Demonstrate intelligent mechatronics system for engineering applications.

**Examination Scheme:**

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance.

## Text & References:

- W. Bolton, “Mechatronics”, Pearson Education Ltd., 2003.
- Mohammad Ali Mazidi Janice Gillispier Mazidi, “The 8051 Microcontroller”, Pearson Education Inc., 2004.
- Gary Dunning, “Introduction to Programmable Logic Controllers”, Thomson Asia P. Ltd., Singapore, 1998.
- Gopal K. Dubey, “Fundamentals of Electrical Drives”, Narosa Publishing House, 2001.
- Charles H. Roth, “Jr. Fundamentals of Logic Design”, Jaico Publishing House, 2001.
- "HMT Mechatronics”, Tata McGraw Hill Publishing Co. Ltd., 2001.
- Devdas Shetty, Richard A. Kolk “Mechatronics System Design”, Thomson Asia Pvt. Ltd., Singapore, 2001.
- A.K. Tayal, “Instrumentation & Mechanical Measurements”, Galgotia Publication Pvt. Ltd., 2003.
- D. Rana Durgaiah, “Fluid Mechanics & Machinery”, New Age Int. Publishers, 2004.
- Nitaigour Premchand Mahalik, “Mechatronics Principles, Concepts & Application”, Tata McGraw Hill Publishing Co.Ltd, 2003.
- Mikell P. Groover, “Automation, Production Systems and Computer-Integrated Manufacturing”, 2nd Edition, Prentice Hall, 2001.

# ARTIFICIAL INTELLIGENCE AND ROBOTICS

**Course Code: BME 607** **Credit Units: 03**
**Total Hours: 30**

## Course Objective:

To develop semantic-based and context-aware systems to acquire, organize process, share and use the knowledge embedded in multimedia content. Research will aim to maximize automation of the complete knowledge lifecycle and achieve semantic interoperability between Web resources and services. The field of Robotics is a multi-disciplinary as robots are amazingly complex system comprising mechanical, electrical, electronic H/W and S/W and issues germane to all these.

**Course Contents:**

**Module I: Scope of AI: (5 Hours)**
Games, theorem proving, natural language processing, vision and speech processing, robotics, expert systems, AI techniques- search knowledge, abstraction.
Problem solving
State space search; Production systems, search space control: depth-first, breadth-first search, heuristic search - Hill climbing, best-first search, branch and bound. Problem Reduction, Constraint Satisfaction End, Means-End Analysis

**Module II: Knowledge Representation: (6 Hours)**
Predicate Logic: Unification, modus ponens, resolution, dependency directed backtracking. Rule based Systems: Forward reasoning: conflict resolution, backward reasoning: use of no backtracks.
Structured Knowledge Representation: Semantic Nets: slots, exceptions and default frames, conceptual dependency, scripts.
Expert Systems
Need and justification for expert systems, knowledge acquisition, Case studies: MYCIN, RI.
Learning: Concept of learning, learning automation, genetic algorithm, learning by inductions, neural nets.

**Module III: Manipulator kinematics**: **(4 Hours)**
Kinematics: Introduction, solvability, algebraic solution by reduction to polynomial, standard frames, repeatability and accuracy, computational considerations.

**Module IV: Manipulator dynamics: (5 Hours)**
Introduction, acceleration of rigid body, mass distribution, Newton’s equation, Euler’s equation, Iterative Newton-Euler dynamic formulation, closed dynamic equation, Lagrangian formulation of manipulator dynamics, dynamic simulation, computational consideration.

**Module V: Trajectory Generation: (4 Hours)**
Introduction, general considerations in path description and generation, joint space schemes, Cartesian space schemes, Path generation in runtime, Planning path using dynamic model.

**Module VI: Linear control of manipulators: (6 Hours)**
Introduction, feedback and closed loop control, second order linear systems, control of second-order systems, Trajectory following control, modeling and control of a single joint, sensor and vision system.
Robot Programming languages & systems: Introduction, the three level of robot programming, requirements of a robot programming language, problems peculiar to robot programming languages.

## Course Outcome:

Upon completion of this course, students will get an overview of artificial intelligence applicationsand the use of micro-sensors and microprocessors.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- E. Rich and K. Knight, “Artificial intelligence”, TMH, 2nd ed., 1992.
- N.J. Nilsson, “Principles of AI”, Narosa Publ. House, 1990.
- John J. Craig, “Introduction to Robotics”, Addison Wesley publication
- Richard D. Klafter, Thomas A. Chmielewski, Michael Negin, “Robotic Engineering – An integrated approach”, PHI Publication
- Tsuneo Yoshikawa, “Foundations of Robotics”, PHI Publication
- D.W. Patterson, “Introduction to AI and Expert Systems”, PHI, 1992.
- Peter Jackson, “Introduction to Expert Systems”, AWP, M.A., 1992.
- R.J. Schalkoff, “Artificial Intelligence - an Engineering Approach”, McGraw Hill Int. Ed., Singapore, 1992.
- M. Sasikumar, S. Ramani, “Rule Based Expert Systems”, Narosa Publishing House, 1994.

# MECHATRONICS LAB

**Course Code: BME 626** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**

To provide knowledge on electrical circuits, signal conditioning and to make familiar about control system and power electronics in designing Mechatronics system

**Course Contents:**

**Name of Experiments: (Any 10)**
**Time allocated for experiments is 2 Hours each.**

1. To make the sequential operation
   a. $A^+ B^+ A^- B^-$ ; $A^+, B^+, B^- A^-$ using Pneumatic trainer
2. For the above write a ladder logic giving time delays
3. Design a Pneumatic Circuit for clamping type & operated by PLC
4. To make the sequential operation
   a. $A^+, B^+, A^-, B^-$ ; $A^+, B^+, B^- A^-$ using Hydraulic trainer kit.
5. For the above write a ladder logic giving time delays
6. Design a Hydraulic Circuit for clamping type & operated by PLC
7. To make the ladder logic for water level control & reaction vessel to detect different levels of water and switch off the water supply.
8. Starter Control & Star Delta Starter for ¼ HP AC. Motor to demonstrate the use of PLC Motor Starting
9. Design Fan operation using PLC
10. Design n a Lift Control
11. Design a pick & Place
12. Design Sequential Switching Motors

## Laboratory Outcome:

On successful completion of the course, the student will be able to describe mechatronic systems andoverview of control systems & actuators. To differentiate between various sensors, transducers and actuators and their applications. To relate various signal conditioning units, amplifiers, logic gates and their role in programmable logic controllers.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# ARTIFICIAL INTELLIGENCE AND ROBOTICS LAB

**Course Code: BME 627** | **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
The students will learn to make self-learning/adaptive control systems for robots/intelligent systems. Robotics and Intelligent Systems provides a comprehensive background in both software and hardware to work with the future of robotics and adaptive systems.

**Course Contents:**

**Name of Experiments:**
**Time allocated for experiments is 2 Hours each.**

1. Robot Arm (Model 1055)

2. Write a prolog program to define a relations knowledge base as follows : Assume the following in the kbase :
   Male (person), female (person), husband (person, person0, wife(person, person), father (person, person), mother (person, person). Define the predicates for
   Parent
   Brother
   Sister
   Grandfather
   Ancestor

3. Write a prolog program to simulate a non deterministic finite automation (NFA)

4. A computer system accepts a user's name and password which are stored as facts in the kbase. Validate this information through a predicate login. If not valid, display a suitable message.

5. Write prolog predicates to perform list manipulation as follows :
   List membership relation
   Length of a list
   Concatenate 2 list to produce a third list
   Reverse a list
   Subset of a list
   Appending an element to a list
   Summing the element of a list

6. Write a prolog program to implement Depth first search algorithm.

7. Write a prolog program to simulate the Towers of Hanoi problem.

8. There is a gold treasure hidden inside a cave. The cave is a maze of galleries connecting different rooms in which there are dangerous beings like monsters and robbers. The gold treasure is all in one room. Determine a route by which a person can get to the treasure and escape with it unhurt. Enclosed is a photocopy of the cave lay out. Write the corresponding prolog program.

9. Write a prolog program to simulate the xor logic circuit. In this program make use of the predicate definitions for AND, NOT and OR gate.

10. A hungry monkey finds himself in a room in which a bunch of bananas is hanging from the ceiling. The monkey cannot reach the bananas. In the room there is a chair and a stick. The ceiling is just the right height so that a monkey standing on a chair could knock the bananas down with the stick. The monkey knows how to move around, carry other things around, reach for the bananas and wave a stick in the air. Write prolog predicate that define the monkey's legal moves, the different legal states and enable the monkey to got to the bananas.

## Course outcome:
After study this course, students will be able to design robots and machine which are able to understand human and its working style and strategies.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

# COMMUNICATION SKILLS – VI

**Course Code: BCU 641** **Credit Units: 01**
**Total Hours: 10**

**Course Objective:** The main emphasis of this course is to enable students to learn the dynamics of social communication and to demonstrate the ability to learn the nuances of informal communication.
**Prerequisites:** NIL

<table>
<tr><td colspan="3">Course Contents / Syllabus:</td></tr>
<tr><td>1.</td><td>Module I:Social Communication Essentials<br>• Small talk/Building rapport<br>• Expand social and Corporate Associations<br>• Informal Communication: Grapevine, Chat</td><td>30% Weightage</td></tr>
<tr><td>2.</td><td>Module II: Workplace Interpersonal Skills<br>• Understanding Social Communication in Workplace environment.<br>• Employee feedback: Assess employee performance and satisfaction.<br>• Simulation<br>➢ Humour in Communication-Use of ‘Puns’<br>➢ Entertainment and Communication (Infotainment)<br>• Infotainment and Social Media<br>• Entertainment in Journalism<br>➢ Social Networking</td><td>25% Weightage</td></tr>
<tr><td>3.</td><td>Module III: Verbal Ability<br>• Comprehension<br>• Antonyms, Synonyms<br>• Idioms & Phrases<br>• Analogy<br>• Sentence Order<br>• Active and Passive Voice<br>• Error Sorting</td><td>35% Weightage</td></tr>
<tr><td>4.</td><td>Module IV: Prose<br>• Secret of Socrates - Dale Carnegie<br>• My Financial Career-Stephen Leacock<br>• The Luncheon - W. Somerset Maugham<br>• The National Flag - Jawahar Lal Nehru<br>All the four stories will be discussed in one class<br>One Long Question will be set in the Exam from the Text</td><td>10% Weightage</td></tr>
<tr><td>5.</td><td>Student Learning Outcomes:<br>• To communicate contextually in specific personal and professional situations with courtesy.<br>• To inject humour in their regular interactions.<br>• To strengthen their creative learning process through individual expression and collaborative peer activities.</td><td></td></tr>
<tr><td>6.</td><td>Pedagogy for Course Delivery:<br>• Workshop<br>• Group Discussions<br>• Presentations<br>• Lectures</td><td></td></tr>
<tr><td>7.</td><td>Assessment/ Examination Scheme:<br><table><tr><th>Theory L/T (%)</th><th>Lab/Practical/Studio (%)</th><th>End Term Examination</th></tr><tr><td>100%</td><td>NA</td><td>70%</td></tr></table><br>Theory Assessment (L&T):<br><table><tr><th>Components (Drop down)</th><th>CIE</th><th>Mid Sem</th><th>Attendance</th><th>End Term Examination</th></tr><tr><td>Weightage (%)</td><td>10%</td><td>15%</td><td>5%</td><td>70%</td></tr></table></td><td></td></tr>
</table>

**Text:***Krizan, Merrier, Logan & Williams. Effective Business Communication, New Delhi: Cengage, 2011*

- ***Communication and Organizational Culture*. Keyton. Joann. Sage Publications**
- ***Social Communication (Frontiers of Social Psychology)*.Fiedler, Klaus. Psychology Press**

**Reference:** ***Cypherpunks: Freedom and the Future of the* Internet.** Assange, Julian Assange**. OR Books.**

- **Additional Reading: Newspapers and Journals**

# BEHAVIOURAL SCIENCE - VI

**Course Code: BSU 643** **Credit Units: 01**
**Total Hours: 10**

**Course Objective:**
- To develop an understanding the concept of stress its causes, symptoms and consequences.
- To develop an understanding the consequences of the stress on one's wellness, health, and work performance.

**Course Contents:**

**Module I: Stress** **(02 Hours)**
- Meaning & Nature
- Characteristics
- Types of stress

**Module II: Stages and Models of Stress** **(02 Hours)**
- Stages of stress
- The physiology of stress
- Stimulus-oriented approach.
- Response-oriented approach.
- The transactional and interact ional model.
- Pressure – environment fit model of stress.

**Module III: Causes and symptoms of stress** **(02 Hours)**
- Personal
- Organizational
- Environmental

**Module IV: Consequences of stress** **(02 Hours)**
- Effect on behavior and personality
- Effect of stress on performance
- Individual and Organizational consequences with special focus on health

**Module V: Strategies for stress management** **(02 Hours)**
- Importance of stress management
- Healthy and Unhealthy strategies
- Peer group and social support
- Happiness and well-being

## Student Learning Outcomes:
- Student will able demonstrate thorough understanding of stress and its effects
- Student will able to learn various coping strategies to deal stress effectively so to overcome the consequences and impact of stress on their health and wellbeing, ultimately it will enhance their performance.

**Examination Scheme:**

| Evaluation Components | Attendance | Journal of Success (JOS) | Social Awareness Program (SAP) SAP Report/SAP Presentation | End Semester Exam | Total |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 15 | 70 | 100 |

## Suggested Readings:

- Blonna, Richard; Coping with Stress in a Changing World: Second edition
- Pestonjee, D.M, Pareek, Udai, Agarwal Rita; Studies in Stress And its Management
- Pestonjee, D.M.; Stress and Coping: The Indian Experience

# FRENCH – VI

**Course Code: FLU 644** **Credit Units: 02**
**Total Hours: 20**

**Course Objective:**
To provide the students with the linguistic tools to enhance social communication skills and be able
- To approve or disapprove a behavior
- To congratulate somebody
- To express possession

**Course Contents:**

**Dossier1–pg7-16,**
**Dossier1:Aufil dutemps**
**Actesde Communication:**
Approuveroudésapprouverl'attitudede quelqu'un(désapprouverle comportementdesparents) Féliciterquelqu'un(féliciterunparticipant dansle courrierdeslecteurs) Parlerde sasanté(exprimerlesproblèmesde santéchez lemédecin) Accueillir/Interpeller(conversationentrel'invitéet l'hôte)

**Thèmesabordés:**
Lestrentenaires(diresi l'onpartage lesvaleursetlesattentesdestrentenaires)
Le sport(sportet famille,dusportpourtouslesgoûts)
Laprofession: Lespsychologues(débats-pouroucontrelebesoind'unpsy,la télé-confession)

**Grammaire :**
1. Le présent (révision)
2. Lesprépositionset lesverbes
3. Lespronomspossessifs
4. Lesverbesréciproques

**ExaminationScheme:**

| | INTERNAL | | | | EXTERNAL | GRAND TOTAL |
|---|---|---|---|---|---|---|
| **Components** | MID-SEM | VIVA-VOCE | ATTENDANCE | **TOTAL** | **END SEMESTER** | **100** |
| **Weightage (%)** | 15 | 10 | 5 | **30** | **70** | |

## Text &References:

***Text:***
**Le livre àsuivre:**
- Carenzi-Vialaneix,Christelle et al. A proposA2Livre de l'élève.Grenoble:PressesuniversitairesdeGrenoble,2010.
- Carenzi-Vialaneix,Christelle et al. A proposA2Cahierd'exercices.Grenoble:PressesuniversitairesdeGrenoble,2010.

***Références:***
- Girardeau,Brunoet Mous,Nelly.Réussir leDELFA1.Paris:LesÉditionsDidier,2010.

# MINOR PROJECT

**Course Code: NMP 660** **Credit Units: 02**

**Course objectives:**
The objective of Minor project is to enable the student to take up investigative study in the broad field of Engineering, either fully theoretical/practical or involving both theoretical and practical work to be assigned by the Department on an individual basis or two/three students in a group, under the guidance of a Supervisor.

**Methodology:**

Topics of project are to be based on the latest trends, verifying engineering concepts /principals and should involve elementary research work. The projects may involve design, fabrications, testing, computer modeling, and analysis of any engineering problem. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation on same.

**Examination Scheme:**

| | |
|---|---|
| Literature study/ Fabrication/ Experimentation | 40 |
| Written Report | 20 |
| Viva | 15 |
| Presentation | 25 |
| **Total** | **100** |

## Course Outcomes:
At the end of the course, students will demonstrate the ability to:
- Conceive a problem statement either from rigorous literature survey or from the requirements raised from need analysis.
- Design, implement and test the prototype/algorithm in order to solve the conceived problem.
- Write comprehensive report on mini project work.

# OPERATIONS RESEARCH

**Course Code: BME 701** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
In a rapidly changing environment an understanding is sought which will facilitate the choice and the implementation of more effective solutions, which, typically, may involve complex interactions among people, materials and money. Organizations may seek a very wide range of operational improvements - for example, greater efficiency, better customer service, higher quality or lower cost. Whatever the business, engineering aim, Operation Research can offer the flexibility and adaptability to provide objective help. This course introduces students to the principles of operational research.

**Course Contents:**

**Module I: Linear Programming: (5 Hours)**
Formulation of problem.Graphical and simplex method for maximization and minimization.duality theory and sensitivity analysis

**Module II: Transportation Models & Assignment Models: (8 Hours)**
Stepping stone algorithm, MODI method and Vogel's Approximation Method (VAM) for self balanced/ unbalanced transportation problems and problems of degeneracy and maximization. Assignment model for maximization and traveling salesman problems, Industrial Problems

**Module III: Queuing Theory: (4 Hours)**
Basic structured, Terminology, classification. Birth and death process. Sequencing: Processing in jobs through machines with the same processing order. Processing of 2 jobs through machines with each having different processing order.

**Module IV: Network Models: (5 Hours)**
Introduction to PERT and CPM. Fundamental concept of Network models and construction of network diagrams. PERT activity, time estimate. Critical path and project time duration. Probability of completing the project on or before specified time. Float of a activity.

**Module V: Project Management: (4 Hours)**
Gantt chart, milestone char.Network scheduling terminology. Path enumeration, Activity on node & activity on arc network precedence diagrams. Reliability: Concept of reliability, objectives, applications, area of use, use of reliability in industry.

**Module VI**: **Games Theory: (4 Hours)**
Zero Sum two person competitive games, Minimax and maximini principle Arithmetic, algebraic, matrix algebra method,.Solution by dominance, sub game, Graphical and linear programming method.

**Module VII**: **Industrial Visit**
At least one visit up to Three days to industry in the field of Mechanical Engineering.

## Course Outcomes:

- To familiarize students with the basic concepts, models and statements of the operations research theory.
- Know principles of construction of mathematical models of conflicting situations and mathematical analysis methods of operations research;
- Be able to choose rational options in practical decision-making problems using standard• mathematical models of operations research;
- Have skills in analysis of operations research objectives, mathematical methods and• computer systems.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

- HM Wagner, Principles of Operations Research, Prentice Hall
- Heizer, J. & Render B., Operations Management, Pearson Education (8/e), 2006
- PK Gupta and DS Hira, Operations Research, S. Chand & Co.
- Taha, Introduction to Operation Research
- F.S. Hiller and G.I. Libermann, Introduction to Operation Research, Holden Ray.

# COMPUTER AIDED MANUFACTURING

**Course Code: BME 702** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The aim of the course is to impart the students the basic and essential concepts in using Computer Assisted Manufacturing (CAM) and Computer Numerical Control (CNC) machines. Students will learn the basic concepts of manufacturing planning and control. They will be offered hands on experience in using CAM software to design, simulate and write CNC programs.

**Course Contents:**

**Module I: (6 Hours)**
Introduction to Numerical control.Programmed automation. Nomenclature, type and features of NC machines tools. Axes designation. Point to point, straight and continuous control systems**,** Constructional features of CNC machine tools.

**Module II: (6 Hours)**
Machining centre and Turning centre, Automatic tool changer, Machine Tool beds and automated pallet changers.

**Module III: (6 Hours)**
Machine Control Unit, Actuation Systems, open and close loop systems, transducers for NC Systems, revolves encoders and inductosyn.

**Module IV: (6 Hours)**
Manual Part Programming: Processes planning, G&M codes. Interpolation Cycles. Tools compensation, Computed aided part programming - Post processors - APT programming-CNC programming based on CAD Feedback devices - tooling for CNC machine.

**Module V: (6 Hours)**
Tooling and tool presetting.Computer Aided inspection - Contact Inspection (Coordinate Measuring Machine) & Non Contact Inspection.

## Course Outcomes:

- Understand the importance of CAD/CAM principles in the Product development.
- Develop programs related to manufacturing using codes.
- Analyze the importance of networking in manufacturing environment.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance.

## Text & References:


- Mikell P. Groover, “Automation, Production Systems and Computer-Integrated Manufacturing”, 2nd Edition, Pentice Hall, 2001.
- Rao, Kundra & Tiwari, “Computer aided Manufacturing” Tata McGraw Hill, 2007.
- Numerical Control: by Koren, Khanna Publisher.
- Mikell P. Groover, Emory W. Zimmers, “CAD/CAM”, Pearson Education, 2006.
- P.N. Rao, “CAD/CAM Principles and Applications”, Tata McGraw Hill, 2006.

# MANAGEMENT OF MANUFACTURING SYSTEMS

**Course Code: BME 703** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The overall objective of this course is to provide high caliber engineering students with an in-depth understanding of strategic, tactical and operational issues relating to manufacturing industries worldwide. On completion of the course the students will be equipped with the state-of-the-art concepts, methods, techniques and tools to allow them to contribute towards the competitiveness of manufacturing organizations.

**Course Contents:**

**Module I: Introduction: (5 Hours)**
Production functions, Plant Organization: Principles of organization, Organization structure-line and staff Organization, Plant Location layout, Process layout product layout and combination layout methods of layout, economics of layout.

**Module II: Production Planning & Control: (5 Hours)**
Types of products, demand, demand forecasting, marketing strategies, scheduling and control of scheduling, production control.

**Module III: Work and Method Study: (5 Hours)**
Definition and concepts, method study procedures, symbols, advantages, Flow process charts, Motion study, micro motion, SIMO charts, system concepts, classification, analysis techniques.

**Module IV: Industrial Maintenance: (5 Hours)**
Definition and concepts of Maintenance, Need of Maintenance Management, Maintenance Policies, Strategies and options in Maintenance management.Types, organization for maintenance department, Breakdown and preventive maintenance.

**Module V: Inventory Control and Replacement Analysis: (5 Hours)**
Purpose of Inventory – Cost related to inventors – Basic EOQ model, Introduction replacement policy and method adopted, ABC Analysis, MRP Analysis.

**Module VI: Management Concepts: (5 Hours)**
Development of management principles, scientific management, human relation aspects.Project Management – CPM and PERT.

## Course Outcomes:

- Conduct market research, demand forecasting and costing
- Demonstrate the knowledge of designing plants and controlling production.
- Optimize the resources of an organization and improve productivity.

**Examination Scheme:**

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance.

## Text & References:


- S.K. Sharma, "Industrial Engg. & Operation Management", S.K. Kataria & Sons.
- Dr. Ravi Shankar, "Industrial Engg. & Management", Galgotia Publications
- M. Mahajan, "Industrial Engg. & Production Management", Dhanpat Rai & Co.
- J Moore, Manufacturing Management, Prentice Hall
- Buffa, Modern production and operations management, E.S. Wiley eastern.
- Joseph S. Martinich, "Production & Operation Management", John Wiley & Sons.

# OPERATIONS RESEARCH (PROGRAMMING) LAB

**Course Code: BME 721** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
The aims to introduce students to use quantities methods and techniques for effective decisions–making; model formulation and applications that are used in solving business decision problems.

**Course Contents:**

1. Program on C or C++ for Linear Programming**: (4 Hours)**
2. Program on C or C++ for Simplex Problem**: (4 Hours)**
3. Program on C or C++ for Assignment Problem**: (3 Hours)**
4. Program on C or C++ for Transportation Problem**: (3 Hours)**
5. Program on C or C++ for PART, CPM Problem**: (3 Hours)**
6. Program on C or C++ for Sequencing Problem**: (3 Hours)**

## Course Outcomes:

- Solve the problems using special solution algorithms.
- Use CPM and PERT techniques, to plan, schedule, and control project activities.
- Analyse the general nonlinear programming problems.
- Formulate the nonlinear programming models.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# COMPUTER AIDED MANUFACTURING LAB

**Course Code: BME 722** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
To introduce the student to the basic tools of computer aided manufacturing (CAM). To expose the student to contemporary computer design tools for aerospace and mechanical engineers. Prepare the student to be an effective user of a CAM system.

**Course Contents:**

**Name of Experiments:**

1. Make a sketch of CNC lathe showing major assemblies and indicate the CNC axes with designations. Make a sketch of the conventional lathe and, if it is considered as a CNC lathe, show the axes with designations.**: (3 Hours)**

2. Make a Kinematics diagram of CNC Lathe showing all machine sub-assemblies. Indicate bearing arrangements, ball screw arrangements with sizes, wherever available**: (3 Hours)**

3. Repeat (1) on CNC machining centre and conventional milling machine**: (2 Hours)**

4. Repeat (2) for CNC machining centre**: (2 Hours)**

5. Study the CNC lathe. Prepare a block diagram of controls. Identify location and type of transducers and indicate on an outline of the machine. Describe how they function**: (2 Hours)**

6. Repeat (5) on machining centre**: (2 Hours)**

7. Study the work holding and tool holding devices in the CNC lathe and machining centre and draw up their specifications and capacities**: (2 Hours)**

8. Prepare part programs for 2 specified components for CNC lathe by manual part programming. First write the machining technology in full; then prepare part program and then enter in the machine. Test the program in dry run and by tool path graphic simulation. Machine the component**: (2 Hours)**

9. Do the above work for machining centre**: (2 Hours)**

## Course Outcomes:

- On successful completion of the course, the student will be able to,
- Explain lifecycle of a product and the role of computer-aided Manufacturing (CAM) in product development.
- Describe the concepts of geometric and solid modeling.
- Visualize geometric models through animation and transform them into real world systems.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# AUTOMOTIVE ENGINEERING

**Course Code: BME 704** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
This course emphasizes on constructional details of automotive vehicles which includes – Basic structure, engine, transmission systems, suspension systems, steering system, braking systems and wheels & tyres.

**Course Contents:**

**Module I: (6 Hours)**
Introduction, Components of an automobile, basic engine terminology, engine cycles, working of an IC engine.Basic engine design considerations, constructional details of C.I. and S.I. engines.crank shafts, connecting rod, piston, values, cams, manifolds, air cleaners, mufflers, radiators, and oil filters.

**Module II: Transmission System: (6 Hours)**
Description and working of manually operated gearboxes like sliding mesh, constant mesh, synchromesh and epicycle; hydraulic torque convertor and its construction working and performance, sem-automatic and fully automatic transmission, Hydramatic transmission, analysis of differentials, live axles, construction working and requirements of overdrive.

**Module III: Steering System: (6 Hours)**
Introduction, Front axle, wheel alignment, Steering geometry, steering mechanisms, Ackerman steering, center point steering, power steering.

**Module IV: Suspension: (6 Hours)**
Objective, requirement, function, types Shock absorbers, Independent suspension, Stabilizer, air suspension, Hydroelastic suspension, Hydragas interconnected suspension.

**Module V: (6 Hours)**
Principle, braking requirements, brake efficiency, fading of brakes, types of brakes, bleeding of brakes, brake fluid.

## Course Outcome:
Upon completion of this course, students will understand the function of each automobile component and also have a clear idea about the overall vehicle performance.

### Examination Scheme:

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

- Kirpal Singh, “Automobile Engg.”, Vol. I & II, Standard Publishers, 2004
- N.K. Giri, “Automotive Mechanics”, Khanna Publishers
- Narang G.B.S., “Automobile Engg.”, Khanna Publishers
- Srinivasan, “Automotive Engines”, Tata McGraw Hill
- K.K. Jain & R.B. Asthana, “Automobile Engineering”, Tata McGraw Hill
- James D. Halderman and Chase D. Mitchell Jr., Automotive Engines- Theory and Servicing, Pearson Education, 2007
- Joseph Haitner, “Automotive Mechanics”, C.B.S. Publications

# COMPUTER AIDED DESIGNING

**Course Code: BME 705** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The objective of this course is to impart students an in-depth exposure to methods in geometric modeling and its applications in CAD/CAM. This course introduces integrated approach to CAD including: Overview of CAD, numerical techniques for CAD, Computer graphics and design, Principle and management of design data base system, finite element analysis and CAD, Design optimization. Along with the theoretical presentations, commercial CAD software are also introduced and applied to create Engineering components and assemblies.

**Course Contents:**

**Module I: Introduction: (6 Hours)**
Introduction to CAD. Design process, Introduction to solid modeling and aided design of some elements/ components, hardware requirements, concurrent engineering.

**Module II: Projections: (6 Hours)**
Elementary Computer Graphics. Transformations, Mappings, Projections – orthographic, isometric, perspective.

**Module III: Surface Modeling: (6 Hours)**
Representation of surfaces. Plane surfaces, Ruled surfaces, Surfaces of revolution, Sweep surfaces, Bezier surface, Bicubic surface patch, Approximation B – spline surface, composite surfaces.

**Module IV: Solid Modeling: (6 Hours)**
Set theory, Graph theory, Regularized Boolean operations, B-rep modeling, Sweep representations, Spatial occupancy enumeration.

**Module V: Advanced CAD: (6 Hours)**
Mechanical assembly, Geometric property formulation- curve length, surface are calculations, volume calculation, centroid calculation, Tolerances representations, Animation, Simulation, Strategic factors in product design, Robust design for product, Introduction to Finite element modeling and analysis.

## Course Outcome:
Upon completion of this course, the students can use computer and CAD software for modeling mechanical components.

**Examination Scheme:**

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

- Ibrahim Zeid, "CAD/CAM Theory and Practice", Tata McGraw-Hill Publishing Company Limited, 6$^{th}$ Edition 1998.
- David F. Rogers and J. Alan Adams, "Mathematical Elements for Computer GraPrentice Hall Indiacs", Tata McGraw-Hill, 2$^{nd}$ Edition 2002.
- Ibrahim Zeid, "Mastering CAD/CAM", Tata McGraw-Hill Publishing Company Limited,

# AUTOMOTIVE ENGINEERING LAB

**Course Code: BME 724** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
To introduce the student to the basic tools of automobiles. To expose the student to contemporary automotive engineering for automobile and mechanical engineers. Prepare the student to be an effective user of a Automotive engineering.

**Course Contents:**

**List of Experiments:**
**Time allocated for experiments is 2 Hours each.**

1. Drawing Valve Timing Diagram
2. Determination of Firing Order of engine
3. Specification of engine
4. Study of different parts of engine
5. Study of Clutch
6. Study of Hydraulic Brake System
7. Study of Carburetor
8. Study of various parts of Auxiliary systems
9. Study of Wheel
10. Study of emission system

## Course Outcomes:

- Ability to dismantle and assemble the automobile components
- Understand different types of frames used in various Automobiles
- Understand the petrol engine fuel system.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

# COMPUTER AIDED DESIGNING LAB

**Course Code: BME 725** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
The objective of this course is to help students in understanding the working principle of Computer aided designing systems and various designing software's.

**Course Contents:**

**List of Experiments:**

1. Analysis and design using ANSYS/Pro-E software for**: (3 Hours)**
2. Flange Coupling**: (3 Hours)**
3. Design Shaft**: (3 Hours)**
4. Design for Key**: (3 Hours)**
5. Design for Spur Gear**: (3 Hours)**
6. Design for Helical Gear**: (3 Hours)**
7. Parts of Thin Cylinder Pressure Vessels**: (2 Hours)**

## Course Outcomes:

- To develop different types of surfaces with the help of different curves
- Suggest whether the given component is safe or not for the applied loading conditions
- Select suitable manufacturing method for different mechanical components using CAM software.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

# MARKETING MANAGEMENT

**Course Code: BME 706** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The course aims at making students understand concepts, philosophies, process and techniques of managing marketing operations of a firm.

**Course Contents:**

**Module I: Introduction to Marketing: (5 Hours)**
Meaning, nature and scope of marketing; Marketing philosophies; Marketing management process; Concept of marketing mix.

**Module II: Market Analysis: (6 Hours)**
Understanding marketing environment; Consumer and industrial buyer behaviour; Market measurement; Market segmentation, selection and positioning.

**Module III: Product Planning and Pricing: (7 Hours)**
Product concept; Types of products; Major product decisions; Brand management; Product life cycle, New product development process; Pricing decisions; Determinants of price; Pricing process, policies and strategies.

**Module IV: Promotion and Distribution Decisions: (7 Hours)**
Communication process; Promotion tools – advertising, personal selling, publicity and sales promotion; Distribution channel decisions – types and functions of intermediaries, Selection and management of intermediaries; Logistics decisions – inventory management, warehousing, transportation and insurance.

**Module V: Marketing Organization and Control: (5 Hours)**
Emerging trends and issues in marketing – Consumerism, rural marketing, social marketing; direct and online marketing; green marketing.

## Course Outcomes:
- This course is taught with both strategic and managerial focus.
- Through cases, discussions, exercises and activities, participants would be given opportunities to perform the role of a marketing manager.
- At the end of this course, participants should have acquired analytical skills in solving marketing related problems and challenges and be familiar with the strategic marketing management process.

**Examination Scheme:**

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

- Baker, Michael J., Marketing: An Introductory Text, McMillan Press Ltd.
- Czinkota, Michael R., Massaki, Kotabe and David Mercer B., Marketing Management: Text and Cases, Blackwell Publishers, Massachusetts.
- Kotler, Philip, Marketing Management: Analysis Planning, Implementation and Control, 9th Ed., Prentice Hall of India Pvt. Ltd. , New Delhi.
- Kotler, Philip and Armstrong, Gary, Principles of Marketing, $6^{th}$ ed., Prentice Hall of Indi, Pvt. Ltd., New Delhi.
- Mc Carthy, E.Jerome and Pessault, William D. Jr., Basic Marketing, Richard D. Irwin Inc., Homewood, Illinois.
- Saxena, Rajan, Marketing Management, Tata McGraw Hill Publishing Company, New Delhi.
- Stanton, William J., Eizel, Michael J. and Walker Bruce J., Fundamentals of Marketing, $10^{th}$ ed., McGraw

# SOLAR ENERGY

**Course Code: BME 707** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The objective of this course is to introduce materials relevant to the engineering of solar electric and thermal systems. Students will develop the skills to calculate the amount of incident solar flux, the amount of useful energy collected, the amount stored and the amount ultimately used. Many of these calculations will be based on solar applications in different area. Finally the concepts of engineering economics applied to solar energy will also be introduced.

**Course Contents:**

**Module I: Selected topics in Heat Transfer: (6 Hours)**
Heat transfer modes, properties and radiation characteristics of opaque and partially transparent media.

**Module II: Model Solar Radiation: (8 Hours)**
Origin, nature and availability of solar radiation, measurements of solar radiation data and its estimation, effects of receiving surface orientation and motion.

**Module III: Components, Process and System Modes: (10 Hours)**
Design consideration and performance of flat plate and focussing collectors; energy storage components, water storage, packed bed and phase-change energy storage; mathematical models of various solar systems and components.

**Module IV: Application: (6 Hours)**
Solar water heating, solar air heaters, solar space heating and cooling, solar pumps, solar thermal power, solar furnaces and solar distillation.

## Course Outcomes:

Upon completion of the course, students will have:

- Ability to recognize the need of renewable energy technologies and their role in the Greece and world energy demand.
- Ability to distinguish between the sustainable energy sources and fossil energy sources with emphasis on wind and photovoltaic systems.
- Knowledge of the operating principles of renewable energy production from various renewable sources, especially.

**Examination Scheme:**

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- H.P. Garg and J. Prakash, “Solar Energy fundamental and Applications”, Tata McGraw Hill Pulishing Co. Ltd.
- Magal, “Solar Power Engineering”, Tata McGraw Hill Publishing Co. Ltd

# POWER PLANT PRACTICES

**Course Code: BME 708** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The objective of this course is that the students come to know different ways of producing energy such as thermal energy from gas and steam, hydraulic energy nuclear energy, non conventional source of energy from wind, solar and tidal. And their different uses in productive works.

**Course Contents:**

**Module I: Steam Generator Plant: (6 Hours)**
Fuel handling systems, Indian coals, combustion of coal in furnaces; fluidized bed combustion; High pressure heavy duty boilers, Super critical and once through boilers influence of operating conditions on layout of evaporator, superheated, reheated and economizer; dust collectors; ash disposal, fans and draft systems.

**Module II: Turbine Plane: (6 Hours)**
Layout of turbine plant room, corrosion in condensers and boilers, feed water treatment; feed heating and de aeration system; cooling water systems and cooling towers.

**Module III: Control: (6 Hours)**
Important instruments on steam generator and turbine; drum water level control, combustion control and super heat temperature control; testing of power plants and heat balance.

**Module IV: Other Power Plant: (6 Hours)**
General layout of I.C. Engines and turbine power plants, types, gas turbine plants, fields of application, Nuclear power plants, power reactors and nuclear steam turbines; handling of nuclear waste and safety measures, peak load power generation methods.

**Module V: Economics: (6 Hours)**
Planning for power generation in India, super thermal power plants, estimation of cost of power generation; choice of plant site.

## Course Outcomes:

After completion of this course, the students should be able to:

- Discuss the energy resources and energy conversion methods available for the production of electric power in India.
- Determine the efficiency and output of a modern Rankine cycle steam power plant from given data, including superheat, reheat, regeneration, and irreversibility
- Calculate the heat rate, fan power consumption, flame temperature and combustion air requirements of conventional steam generators (boilers).
- Select the heat transfer tubes needed for condensers and feed water heaters
- Explain the blade shapes, and calculate work output of typical turbine stages.

**Examination Scheme:**

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Arora & Domkundwar, “A course in Power Plant Engineering”, Dhanpat Rai & Sons
- Black Veatch, “Power Plant Engineering”, CBS Publisher

# COMBUSTION ENGINE EMISSIONS

**Course Code: BME 709** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The main objective of this course is to introduce students the fundamentals, Operations and performance of internal combustion engines and their different types; to provide them with the theoretical and experimental ability to operate, analyze and design internal combustion engines; to assess the relation between engine power output to the required power for vehicle propulsion; to make them understand the fuel metering systems and assembling and dismantling internal combustion engines.

**Course Contents:**

**Module I: Engine Fundamentals: (5 Hours)**
Cycle analysis, fuels, and types of hydrocarbons, gasoline specifications, effect of engine parameters on performance, carburetion, engine vehicle road performance, road performance and fuel economy.

**Module II: Emission and Air Pollution: (6 Hours)**
Automotive emissions and their role in air pollution, photochemical smog, Chemistry of smog formation, Combustion in homogeneous mixtures, emission formation, Incomplete combustion formation of Hydrocarbons (HC), carbon monoxide and oxides of nitrogen, Aldehyde emissions of unregulated toxic pollutants such as benzene, 1, 3, butadiene etc.

**Module III: (8 Hours)**
Influence of engine design and operating parameters on S.I. engine exhaust emissions. Hydrocarbon Evaporative Emissions, Various sources and method of their control, Canisters for controlling evaporative emissions, emission control system for S.I. engines, Blow by control closed PCV system, Reduction of exhaust emissions / Various methods, fuels system design.

**Module IV: Exhaust Treatment Devices: (5 Hours)**
Air injection into exhaust system, Thermal reactors, Catalytic converters.Stratified charge engines, Honda CVCC engine.
Diesel engine emissions: Source of emissions during combustion, Effect of Air injection timing on performance and formation. D.I. and I.D.I. engines emissions, Diesel smoke, PM and RSPM emission.

**Module V: (6 Hours)**
Methods of reducing emission, Exhaust gas re-circulation smoke emission form diesel engines, Particulate Traps, Continuous regeneration Traps (CRT).
Emission from CNG and LPG engines. Emission Instruments: Non-dispersive infrared analyzer, Gas chromatography, Flame ionization Detector, Chemiluminescent analyser.

## Course Outcomes:
- Differentiate among different internal combustion engine designs
- Recognize and understand reasons for differences among operating characteristics of different engine types and designs
- Given an engine design specification, predict performance and fuel economy trends with good accuracy
- Based on an in-depth analysis of the combustion process, predict concentrations of primary exhaust pollutants
- Exposure to the engineering systems needed to set-up and run engines in controlled laboratory environments
- Develop skills to run engine dynamometer experiments.

## Examination Scheme:

| **Components** | **A** | **CT** | **S/V/Q** | **HA** | **EE** |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

- R.P. Sharma and M.L. Mathur, “Internal Combustion Engine”, Dhanpat Rai Publications
- V. Ganeshan, “Internal Combustion Engine”, Tata McGraw Hill
- Angli M Course., “Automotive Engines”, CBS Publications

- Harper, "Fuel Systems Emission Control", CBS Publications

# GREEN VEHICLE TECHNOLOGY

**Course Code: BME 710** **Credit Units: 03**
**Total Hours: 30**

## Course Objective:

This course introduces the fundamental concepts, principles, analysis and design of hybrid and electric vehicles. This course aims to cover different configurations of electric vehicles, hybrid vehicle configuration and its components, performance analysis, drive systems and testing of electric vehicles.

## Course Contents:

### Module I - Introduction

Overview of green vehicles in India. Benefit of using green vehicles. Economic and environmental impact of electric hybrid vehicle. Comparison of hybrid electric vehicles and conventional vehicles. Introduction to Hybrid Electric Vehicles: History of hybrid and electric vehicles, social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies. Conventional Vehicles: Basics of vehicle performance, vehicle power source characterization, transmission characteristics.

### Module II -Hybrid and Electric Drive-trains

Hybrid Electric Drive-trains: Basic concept of hybrid traction, introduction to various hybrid drive-train topologies, power flow control in hybrid drive-train topologies, fuel efficiency analysis. Electric Drive-trains: Basic concept of electric traction, introduction to various electric drive-train topologies, power flow control in electric drive-train topologies, fuel efficiency analysis.

### Module III-Propulsion System

Introduction to electric components used in hybrid and electric vehicles, Configuration and control of DC Motor drives, Configuration and control of Induction Motor drives, configuration and control of Permanent Magnet Motor drives, Configuration and control of Switch Reluctance Motor drives, drive system efficiency.

### Module IV- Energy Storage System

Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles, Battery based energy storage and its analysis, Fuel Cell based energy storage and its analysis, Super Capacitor based energy storage and its analysis, Flywheel based energy storage and its analysis, Hybridization of different energy storage devices. .

### Module V- Testing of Electric Vehicles

Homologation & its Types, Regulations overview (EEC, ECE, FMVSS, AIS, CMVR), Type approval Scheme. Types of test tracks, Hardware in The Loop (HIL) concepts for EV/HEVs. static testing of vehicle, dynamics testing of vehicle, vehicle component testing.

## Examination Scheme:

| Components | CT | Attendance | Assignment/ Project/Seminar/Quiz | EE |
|---|---|---|---|---|
| Weightage (%) | 15 | 5 | 30 | 50 |

## Text and References:


- Mehrdad Ehsani, Yimin Gao, Stefano Longo and Kmbiz Ebrahimi, "Modern Electric, Hybrid Electric, and Fuel Cell Vehicles", CRC Press, 3rd edition (2019)
- A.K. Babu, "Electric & Hybrid Vehicles",Khanna Publishing, 1st edition (2019).
- Tom Denton, "Electric and Hybrid Vehicles", Routledge; 1st edition (2016).
- ARAI Standards for Electric Vehicles (https://www.araiindia.com/downloads)

# COMMUNICATION SKILLS – VII

**Course Code: BCU 741** **Credit Units: 01**
**Total Hours: 10**

**Course Objective:**

The course is designed to empower students to carry out day to day communication at the work place by adequate understanding of various types of communication to facilitate efficient interpersonal communication.

**Prerequisites:** NIL

| **Course Contents / Syllabus:** | | |
|---|---|---|
| **1.** | **Module I Meetings** | **30% Weightage** |
| | • Notices<br>• Circulars<br>• Agenda<br>• Minutes | |
| **2.** | **Module II Report Writing & Telephony Skills** | **25% Weightage** |
| | ➢ **Report Writing**<br>• Purpose/Significance<br>• Types<br>• Format<br>➢ **Telephony Skills**<br>• Call Receiving/ Handling/ Concluding Etiquette<br>• Voice Modulation<br>• Effective Listening<br>• Dos and Don'ts of Telephony Skills | |
| **3.** | **Module III Negotiation Skills**<br>• Definition/Concept<br>• Purpose/ Significance<br>• Checklist- Good & Bad Practices | **35% Weightage** |
| **4.** | **Module IV Prose** | **10% Weightage** |
| | • The Great Trial-Robert Payne<br>• The Home Coming - Rabindra Nath Tagore<br>• How Much Land does a Man Need? - Leo Tolstoy<br>• Valiant Vicky, The Brave Weaver - Flora Anne Steel<br>All the four stories will be discussed in one class<br>One Long Question will be set in the Exam from the Text | |
| **5. Student Learning Outcomes:**<br>• Conduct all business activities related to the workplace with technical efficiency.<br>• Contribute positively to the overall growth of the organization. | | |
| **6.** | **Pedagogy for Course Delivery:**<br>• Workshop<br>• Group Discussions<br>• Presentations<br>• Lectures | |
| **7.** | **Assessment/ Examination Scheme:** | |

| **Theory L/T (%)** | **Lab/Practical/Studio (%)** | **End Term Examination** |
|---|---|---|
| 100% | NA | 70% |

**Theory Assessment (L&T):**

| **Components (Drop down)** | CIE | Mid Sem | Attendance | **End Term Examination** |
|---|---|---|---|---|
| **Weightage (%)** | 10% | 15% | 5% | 70% |

**Text:***Penrose, Rasberry & Myers. Business Communication for Managers: An Advanced Approach, New Delhi: Cengage, 2012.*

*T.N Chabbra , Business Communication , Sun India Publication.*

*Sanjay Kumar &Pushplata , Communication skills , Oxford University Press.*

**Reference:***Jones, Working in English, First Edition, Cambridge, CUP, 2001.*

**Additional Reading: Newspapers and Journals**

# BEHAVIOURAL SCIENCE – VII

**Course Code: BSU 743** **Credit Units: 01**
**Total Hours: 10**

**Course Objective:**

This course will help the students to:

- Explore interest and attitude

- Explore career opportunities
- Set career goals
- Developing attributes that employers value

**Course Contents:**

**Module I: Career Planning: (02 Hours)**
- Importance of Career Planning & Development
- Career Development Plan
- Assessment of Career Development

**Module II: Career Success: Interest, Aptitude & Attitude (Personality): (02 Hours)**
- Interest, Aptitude & Attitude
- Knowing and assessing one's Interest
- Knowing and assessing one's Aptitude

**Module III: Explore Career for Growth: (02 Hours)**
- Selecting from available resources
- Career selection (Jobs)
- Career planning and development

**Module IV: Self Reliance and Employability skills: (02 Hours)**
- Self awareness, Self promotion and Presentation, Self confidence
- Action planning, Networking, Negotiation
- Political awareness, Coping with uncertainty,
- Developing positive attributes at work place (personal and professional)
- Time Management as Self Management

**Module V: Impression Management for Career Enhancement: (02 Hours)**
- Meaning & Components of Impression Management
- Impression Management Techniques(Influencing Tactics)
- Impactof Impression Management on Career Planning and Development

## Student learning outcomes
- Students develop the ability to identify suitable career options and to create a suitable career plan based on the utilization of the counseling process, assessment tools, and other resources.
- Students will know how to assess their skills, interests and values.
- Students will know how to make informed career choices based on their self- assessment.
- Students will know how to explore relevant career options and build skills pertinent to those of greatest interest.

**Examination Scheme:**

| Evaluation Components | Attendance | Journal of Success (JOS) | Social Awareness Program (SAP) SAP Report/SAP Presentation | End Semester Exam | Total |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 15 | 70 | 100 |

## Suggested Readings:
- Organizational Behaviour, Davis, K.
- Hoover, Judhith D. Effective Small Group and Team Communication, 2002,Harcourt College Publishers
- Dick, Mc Cann & Margerison, Charles: Team Management, 1992 Edition, viva books
- Bates, A. P. and Julian, J.: Sociology - Understanding Social Behaviour
- Dressers, David and Cans, Donald: The Study of Human Interaction
- Lapiere, Richard. T – Social Change
- Lindzey, G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology, Addison – Welsley, US.
- Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.
- LaFasto and Larson: When Teams Work Best, 2001, Response Books (Sage), New Delhi
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 2, Group (1996); Pfeiffer & Company

- Smither Robert D.; The Psychology of Work and Human Performance, 1994, Harper Collins College Publishers

# FRENCH – VII

**Course Code: FLU 744** **Credit Units: 02**
**Total Hours: 20**

**Course Objective:**
To provide the students with the linguistic tools to enhance social communication skills and be able
- To describe an object, compare objects and evaluate
- To ask for information, precision
- To make claims

**Course Contents:**

**Dossier2–pg17-28,**

**Dossier2:64millionsde consommateurs**
**ActesdeCommunication:**
Décrireunobjet(unbijouunique,unvoyageextraordinaire,unnouvelappareil photo)
Évaluerune chose (acheteruncadeau,discuterleprix)
Ouvriruncompteà la banque (demanderdesrenseignementsaubanquierafind'ouvriruncompte) Demanderdes informations/précisions(précisionssurunproblème danslerelevéde compte)
Faire uneréclamation(s'adresserauservice après-vente pouréchangerunproduit défectueux)

**Thèmesabordés:**
S'habillerbonmarché (commentvoushabillez-vousbonmarché ?)
Le e-commerce (le portrait del'e-acheteurde votre pays) Lesproduitscontrefaits(parlerdesproduitscontrefaits)
Laprofession:Lesmaraîchers(débats:commentéviterlegaspillage?lamodedeviedesdécroissants,privilégie-t- onla qualité oule prixlorsd'unachat?)

**Grammaire :**
1. Le pronom <<en>>
2. Laplace de l'adjectif
3. Le présent progressif
4. Le passé récent
5. Le futurproche(révision)
6. Le comparatifet le superlatif

**ExaminationScheme:**

| | INTERNAL | | | | EXTERNAL | GRAND TOTAL |
|---|---|---|---|---|---|---|
| **Components** | MID-SEM | VIVA-VOCE | ATTENDANCE | **TOTAL** | **END SEMESTER** | |
| **Weightage (%)** | 15 | 10 | 5 | **30** | **70** | **100** |

## Text &References:
***Text:***
**Le livre àsuivre:**
- Carenzi-Vialaneix,Christelle et al. A proposA2Livre de l'élève.Grenoble:PressesuniversitairesdeGrenoble,2010.
- Carenzi-Vialaneix,Christelle et al. A proposA2Cahierd'exercices.Grenoble:PressesuniversitairesdeGrenoble,2010.

***Références:***
- Girardeau,Brunoet Mous,Nelly.Réussir leDELFA1.Paris:LesÉditionsDidier,2010.

# INDUSTRIAL PRACTICAL TRAINING – II

**Course Code: NPT 750** **Credit Units: 05**

**Course objectives:**

1. To expose students to the 'real' working environment and get acquainted with the organization structure, business operations and administrative functions.
2. To have hands-on experience in the students' related field so that they can relate and reinforce what has been taught at the university.
3. To promote cooperation and to develop synergetic collaboration between industry and the university in promoting a knowledgeable society.
4. To set the stage for future recruitment by potential employers.

**Methodology:**

Practical training is based on the theoretical subjects studied by students. It can be arranged within the college or in any related industrial unit. The students are to learn various industrial, technical and administrative processes followed in the industry. In case of on-campus training the students will be given specific task of fabrication/assembly/testing/analysis. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation on same.

**Examination Scheme:**

| | |
|---|---|
| Feedback from industry/work place | 20 |
| Training Report | 40 |
| Viva | 15 |
| Presentation | 25 |
| **Total** | **100** |

## Course Outcomes:

After successful completion of the course, the students will be able to

1. Explore the preferred field of specialization and develop analytical / hardware / software / experimental / observation skills.
2. Manage the technical content and work.
3. Learn the various administrative process followed in industry.
4. Prepare and present technical report.

# MAJOR PROJECT- I

## Course Code: NMP 760 Credit Units: 06

**Course Objectives:**

The object of Major Project I is to enable the student to extend further the investigative study taken up under NMP 660, either fully theoretical/ practical or involving both theoretical and practical work, under the guidance of a Supervisor from the Department alone or jointly with a Supervisor drawn from R&D laboratory/Industry. This is expected to provide a good training for the student(s) in R&D work and technical leadership. The aim is to provide students an opportunity to exercise their creative and innovative qualities in a group project environment and to excite the imagination of aspiring engineers, innovators and technopreneurs.

**Methodology:**

Topics of project are to be based on the latest trends, verifying engineering concepts /principals and should involve elementary research work. The projects may involve design, fabrications, testing, computer modeling, and analysis of any engineering problem. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation on same.

## Course Outcomes:

On successful completion of the course students will be able to:

1. Demonstrate a sound technical knowledge of their selected project topic.
2. Undertake problem identification, formulation and solution.
3. Design engineering solutions to complex problems utilising a systems approach.
4. Conduct an engineering project
5. Communicate with engineers and the community at large in written an oral forms.
6. Demonstrate the knowledge, skills and attitudes of a professional engineer.
7. Write comprehensive report on project work.

**Examination Scheme:**

| | |
|---|---|
| Literature study/ Fabrication/ Experimentation | 40 |
| Written Report | 20 |
| Viva | 15 |
| Presentation | 25 |
| **Total** | **100** |

# QUALITY CONTROL & QUALITY ASSURANCE

**Course Code: BME 801** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
In engineering and manufacturing, **quality control** & **quality assurance** is a set of measures taken to ensure that defective product or services are not produced, and that the design meets performance requirements. Course includes the regulation of the quality of raw materials, assemblies, products and components; services related to production; and management, production, and inspection processes.

**Course Contents:**

**Module I: Introduction:(6 Hours)**
Meaning of Quality and quality improvement, need of Quality, Statistical methods for quality control, Process capability.

**Module II: Quality Control: (6 Hours)**
Statistical Quality Control, control charts, Control charts for attributes & variables, Moving average chart.

**Module III: Production Control: (10 Hours)**
Acceptance Sampling, OC curve, Sampling Plan, Producer' risk, Consumer's risk, Average Quality Level, AOQL, Design of Single & double sampling plan.

**Module IV: Quality Assurance: (8 Hours)**
Need of Quality Assurance, Quality Audit, Concept of Zero defect, ISO 9000 quality systems, total quality management.

## Course Outcomes:
To pass this subject the student will be able to:
- Explain the different meanings of the quality concept and its influence.
- Describe, distinguish and use the several techniques and quality management tools.
- Explain and distinguish the normalization, homologation and certification activities.
- Identify the elements that are part of the quality measuring process in the industry.

**Examination Scheme:**

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:

- EL Grant & RS Leavenworth, "Statistical Quality Control", McGraw Hill & Co.
- M. Mahajan, "Statistical Quality Control", Dhanpat Rai & Co.
- O.P. Khanna, "Statistical Quality Control", Dhanpat Rai & Co.
- R.C. Gupta, "Statistical Quality Control", Khanna Pulishers
- Amitav Mitra, "Fundamentals of Quality Control", Pearson Education
- Feigenbaum, "Total Quality Control", McGraw Hill & Co.
- Suresh Dalela, "Quality Systems", Standard Publishers & Distributors
- Montgomery DC, "Introduction to Statistical Quality Control", John Wiley & Sons Inc.
- Stephan B. Vardeman, J Marcus Jobe, "Statistical QA Methods for Engineers", John Wiley & Sons Inc.
- Taylor J.R., "Quality Control systems", McGraw Hill Int. Education
- K.C. Arora, "Total Quality Management", S.K. Kataria & Sons.

# REFRIGERATION & AIR-CONDITIONING

**Course Code: BME 802** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The objective of this course is to familiarize the students with the basic principles of Refrigeration and Air Conditioning, different types of refrigerants, simple mathematical models representing the conditioned space and its components used to control environmental conditions. It includes an understanding of psychometrics, human comfort and air quality, calculation of heating and cooling loads.

**Course Contents:**

**Module I: Introduction: (5 Hours)**
Introduction, Principles and methods of production of low temperature, heat engine, heat pump and refrigerator, unit of refrigeration, coefficient of performance.

**Module II**: **Vapor Compression Refrigeration System: (8 Hours)**
Vapor Compression Refrigeration system - Carnot vapor compression refrigeration cycle, Working and analysis, Limitations, Standard Vapor Compression Refrigeration system, Working and analysis, Effects of sub cooling and super heating, multiple compression and evaporation system, cascading.

**Module III: Air Refrigeration: (6 Hours)**
Air Refrigeration Cycles - reversed Carnot cycle, Bell-Coleman cycle analysis, Air Refrigeration systems.
Refrigerants: Classification, nomenclature of refrigerants, desirable properties of an ideal refrigerant, Ozone layer depletion and global warming.

**Module IV: Vapor Absorption Systems: (4 Hours)**
Introduction to simple vapor absorption system, working of practical vapor absorption system, electrolux system comparison of VAS and VCR system.

**Module V: Air-conditioning: (7 Hours)**
Psychrometry and psychrometric charts, property calculations of air vapor mixtures, Psychometric processes, air conditioning, comfort air-conditioning, sensible heat factor, human comfort, effective temperature & chart, heat production & regulation of human body, estimation of cooling and heating loads, industrial air conditioning.

## Course Outcome:
A student will have a good understanding of the working principles of refrigeration and air-conditioning systems.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:

- CP Arora, Refrigeration and Conditioning, Tata McGraw Hill.
- Manohar Prasad, Refrigeration and Conditioning, Wiley Eastern Limited.
- Jordan and Priester, Refrigeration and Conditioning, Prentice Hall of India.
- WF Stoecker, Refrigeration and Conditioning, McGraw Hill.

# REFRIGERATION & AIR-CONDITIONING LAB

**Course Code: BME 822** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
The objective of this course is to help students in understanding the working principle of refrigeration and air conditioning systems. It includes the performance evaluation of refrigeration test rig & air conditioning duct.

**List of experiments/demonstrations:**

1. Study of refrigeration testing.**: (3 Hours)**
2. Study of Air-Conditioning testing**: (3 Hours)**
3. To calculate the COP of Refrigerator**: (3 Hours)**
4. Study of effect of superheating**: (3 Hours)**
5. To calculate the efficiency of Compressor**: (3 Hours)**
6. To calculate total Heat Load for Air-Conditioning unit**: (3 Hours)**
7. To calculate the COP of Heat Pump**: (2 Hours)**

## Course Outcome:
After completion of course student will be able to evaluate the performance of refrigerator and air conditioning system.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

# ADVANCED METHODS OF MANUFACTURING

**Course Code: BME 803** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The aim of the course is to provide the students with the understanding of the basic principles underlying the design, analysis, and synthesis of robotic systems plus machine vision technology in automation. In particular, the course will start from simple problem in transformations, kinematics and inverse kinematics, dynamics and control. Later in the semester more complex problems in sensing, force control, mobile robots and robot programming will be discussed.

**Course Contents:**

**Module I: Kinematics Analysis of Robot: (8 Hours)**
Matrix algebra or coordinate transformation, kinematics analysis; geometric and dynamic analysis of robot manipulators.

**Module II: Robot Control: (7 Hours)**
Robot Control, Robot Vision, Robot Controlled, CNNC, Path planning, Obstruction Avoidance

**Module III: Material Handling: (10 Hours)**
Computer aided Materials Management-inventory control, materials requirements planning. Computer Controlled parts handling and equipments.

**Module IV:Automation Protocol: (5 Hours)**
Manufacturing Automation protocol, cross functional implementation Technology for system integration.

## Course Outcomes:

- Student should be able to select appropriate manufacturing processes for advanced components with characterization of work pieces.
- Student should be able to understand Various Advanced manufacturing metal forming Processes Student should be able to understand to select proper Advanced Manufacturing process for welding, casting and forging

**Examination Scheme:**

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

## Text & References:


- Raghuvanshi, Manufacturing Process.
- P.N. Rao, Manufacturing Technology, TMH publications
- Hazra-Chowdhary , Workshop Technology
- R.K. Jain, Production Engineering

# GEAR TECHNOLOGY

**Course Code: BME 804** **Credit Units: 03**
**Total Hours: 30**

**Course Objective:**
The objective of gear technology is to provide information on gears, gear manufacturing, and the gear industry in general. This course includes information about hobbling, shaping, shaving, broaching and other gear manufacturing processes. It also covers gear design, gear engineering and related topics.

**Course Contents:**

**Module I: Introduction to Gears: (6 Hours)**
Types of gears, Geometric and Kinetics characteristics, Undercutting and interference-correction, Non-Circular gears.

**Module II: Gear Design: (6 Hours)**
Design of tools to make gear teeth, Kinds and cases of gear failures, Special Design Problems; Center distance problem, profile modification.

**Module III: Gear Trains: (6 Hours)**
Gear Trains (Analysis & Synthesis), Problem Combined bending and Torsion of pinions with large length to diameter ratio, high speed gearing.

**Module IV: Gear Set Design: (6 Hours)**
Some example of optimal kinematics system Design; Gear Set design, Design of sub-system consisting of Geneva wheel and elliptical gears for reduction of maximum acceleration of the wheel.

**Module V:** Geneva Mechanisms (Analysis & Synthesis)**: (6 Hours)**

## Course Outcomes:

- Transmission through Gears: mechanism, gear trains, classification and analysis, familiarity with gear standardization.
- Power transmission through gear train, mechanism and materials.
- Gear set design, gear train and gear teeth.

**Examination Scheme:**

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 8 | 7 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance.

## Text & References:


- D.W. Dudley, “Practical Gear Design”, Tata McGraw Hill Co. Inc.
- S.S. Rattan, “Theory of Machines”, Tata McGraw Hill, 2000
- V.B. Bhandari, “Design of Machine Elements”, Tata McGraw Hill Co. Inc.
- Sadhu Singh, “Design of Machine Elemets”, Khanna Publishers Fifth Edition 2012.
- AGMA (American Gear Manufacturing Association) Standards

# ADVANCED METHODS OF MANUFACTURING LAB

**Course Code: BME 823** **Credit Units: 01**
**Total Hours: 20**

**Course Objective :**
The objective of course is to learn about the advanced method of manufacturing processes and develop recent manufacturing processes.

**Course Contents:**

1. Practice of part programming and operations of**: (3 Hours)**
   i) Turning Center.
   ii) Machining Center.

2. Tool planning and selection for**: (3 Hours)**
   i) Turning Center.
   ii) Machining Center.

3. Tool Design for a plastic component**: (3 Hours)**
   i) Core and Cavity Extraction of Industrial switch Knob.
   ii) Gating Design.

4. Assembly of various die components for the above**: (3 Hours)**

5. Pattern design for a casting component**: (2 Hours)**
   i) Cope and Drag design of a butterfly valve.
   ii) Gating design.

6. Assembly of various pattern components for the above**: (2 Hours)**

7. Generation of G and M codes for the above assemblies and electrodes**: (2 Hours)**

8. Programming and study of Robots for material handling**: (2 Hours)**

## Course Outcomes:

- Student should be able to understand selection of latest additive manufacturing processes
- Student should be able to understand and select various measurement techniques in micro machining processes

### Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# GEAR TECHNOLOGY LAB

**Course Code: BME 824** **Credit Units: 01**
**Total Hours: 20**

**Course Objective:**
Identify the basic relative kinematics relations of two moving gears. Develop analytical equations describing the relative position, velocity and acceleration of all gears and identify all reaction and inertia forces on the gears. Demonstrate familiarity with standards in different gear and machine components.

**Course Contents:**

**List of Experiments:**

1. To study the different elements of Worm Gear**: (4 Hours)**
2. To study the different elements of Bevel Gear**: (4 Hours)**
3. To study the different elements of Helical Gear**: (3 Hours)**
4. To study the Differential Gear System**: (3 Hours)**
5. Calculation of train ratio and velocity ratio for compound Gear**: (3 Hours)**
6. Calculation of train ratio and velocity ratio for Sun and Planet Gear**: (3 Hours)**

## Course Outcomes:

On successful completion of the course, the student will be able to,

- Explain the basic principles of gears.
- Demonstrate the design process of commonly used gears.
- Recognize the standards used in design of gears.
- Analyze the force acting on the gears.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

# COMMUNICATION SKILLS – VIII

**Course Code: BCU 841** **Credit Units: 01**
**Total Hours: 10**

**Course Objective:**
This course is designed to hone the creative minds of students to develop knowledge of diverse ethnic groups and cultures and to increase self-awareness for cultural competence and sensitivity.

**Prerequisites:** NIL

| Course Contents / Syllabus: | | |
|---|---|---|
| 1. | **Module I Speaking in Public**<br>• Essentials in Public Speaking<br>• Parameters of Public Speaking | **45% Weightage** |
| 2. | **Module II Cross Cultural Communication**<br>• Culture and Context<br>• Awareness & Significance of Understanding Culture<br>• Ethnocentrism, Stereotyping and Cultural Relativism<br>• Cultural Shock and Social Change | **45% Weightage** |
| 3. | **Module III Prose** | **10% Weightage** |
| 4. | • India Cinema: Tradition & Change-Chidananda Das Gupta<br>• Kabuliwala-Rabindranath Tagore<br>• The Duchess and the Jewelller -Virginia Woolf<br>• The Park- James Mathews<br>All the four stories will be discussed in one class<br>One Long Question will be set in the Exam from the Text | |
| | **Student Learning Outcomes:**<br>• Students will be able to navigate cross cultural encounters in a global economy.<br>• Facilitate students to develop learning to construct and deliver messages that incorporate the appropriate use of organizing content, language, vocabulary, kinesics, eye contact, appearance, visual aids, and time constraints. | |
| 5. | **Pedagogy for Course Delivery:**<br>• Workshop<br>• Group Discussions<br>• Presentations<br>• Lectures | |
| 6. | **Assessment/ Examination Scheme:** | |

| Theory L/T (%) | Lab/Practical/Studio (%) | End Term Examination |
|---|---|---|
| 100% | NA | 70% |

**Theory Assessment (L&T):**

| Components (Drop down) | CIE | Mid Sem | Attendance | End Term Examinati |
|---|---|---|---|---|
| **Weightage (%)** | 10% | 15% | 5% | 70% |

**Text:** ***Penrose, Rasberry & Myers. Business Communication for Managers: An Advanced Approach, New Delhi: Cengage, 2012.***
***Raman, Meenakshi. Business Communication, Oxford***
***Krizan, Merrier, Logan & Williams. Effective Business Communication, New Delhi: Cengage, 2011***
**References:**
***Beamer, Linda. Intercultural Communication in the Global Workplace, Irwin/McGraw-Hill, 2005.***
***Reynolds, Sana & Deborah Valentine. Guide to Cross-cultural Communication, Prentice Hall, 2003.***
**Additional Reading: Newspapers and Journals**

# BEHAVIOURAL SCIENCE – VIII

**Course Code: BSU 843** | **Credit Units: 01**
**Total Hours: 10**

**Course Objective:**
- To have a great deal of insight into one's character.
- Understanding of positive emotions
- To explore the dimensions of happiness, well-being, Optimism and hope
- Quick understanding of different situations and grasp new concepts.

**Course Contents:**

**Module I: Positivity in personality: (02 Hours)**
- Importance of Positivity in personality
- Positivity Vs. Negativity
- Introspection and personal growth

**Module II: Positive Emotions:(02 Hours)**
- Understanding positive emotions
- Importance of Positive emotion
- Types and identification of positive emotions (Love, happiness, Contentment, Resilience, etc.)

**Module III: Hope, Optimism and Resilience: (02 Hours)**
- Positive approach towards future
- Benefits of Positive approach
- Resilience during challenge and loss

**Module IV: Application of Positive Emotions: (02 Hours)**
- Application of positive emotions in relationships, and organizations
- Creating healthy organizational climate
- Positive emotions enhances performance

**Module V: Happiness and Well Being: (02 Hours)**
- Concept of Happiness & Well-Being
- Secret of happy mind and healthy life
- Work life balance

## Course outcome:
- Students develop the ability to identify and regulate positive emotions for personal and professional excellence.
- Students will know how to develop resilience.
- Students will know how to role of happiness to attain wellbeing.
- Students will know how to nurture personality by positivity.

**Examination Scheme:**

| Evaluation Components | Attendance | Journal of Success (JOS) | Social Awareness Program (SAP) SAP Report/SAP Presentation | End Semester Exam | Total |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 10 | 15 | 70 | 100 |

## Suggested Readings:

- Raman, A.T. (2003) Knowledge Management: A Resource Book. Excel Books, Delhi.
- Kamalavijayan D. (2005). Information and Knowledge Management Macmillan India Ltd. Delhi

# FRENCH – VIII

**Course Code: FLU 844** **Credit Units: 02**
**Total Hours: 20**

**Course Objective:**
To provide the students with the linguistic tools to enhance social communication skills and be able

- To express an intention, announce a news, enquire about an event
- To speak about the future
- To discuss the media

**Course Contents:**
**Dossier3–pg29-40,Dossiers1&2(révision). Dossier3:Médias.fr**
**ActesdeCommunication:**
Parlerdel'avenir(lesavantageset lesinconvénientsdesréseauxsociaux)
Exprimeruneintention(poserdesquestionssurunforum) Parlerdesmédias
Engager/ terminerune conversation(demanderpourquoionn'a pasréponduaumèl)
Interrogersurunévénement (vol,accident) Annoncerunenouvelle (celle de démission)

**Thèmesabordés:**
LesFrançaiset la presse (débat: Croyez-vousauxlégendesurbaines?)
LesFrançaisetInternet(débat:lesinformationsdelapresseécritesontplusfiablesquelesinformationssurInternet ?)
LatélévisiondesFrançais
Laprofession: Lesanimateursradio(débat : pouroucontre le téléchargement illégal de la musique oudesfilms)

**Grammaire :**
1. Le futursimple
2. L'hypothèse surlefutur
3. Lesformesde la négation
4. Lespronomscomplémentsdirectset indirects(révision)

**ExaminationScheme:**

| | INTERNAL | | | | EXTERNAL | GRAND TOTAL |
|---|---|---|---|---|---|---|
| **Components** | MID-SEM | VIVA-VOCE | ATTENDANCE | **TOTAL** | **END SEMESTER** | |
| **Weightage (%)** | 15 | 10 | 5 | **30** | **70** | **100** |

## Text &References:

*Text:*
**Le livre àsuivre:**
- Carenzi-Vialaneix,Christelle et al. A proposA2Livre de l'élève.Grenoble:PressesuniversitairesdeGrenoble, 2010.
- Carenzi-Vialaneix,Christelle et al. A proposA2Cahierd'exercices.Grenoble:PressesuniversitairesdeGrenoble, 2010.

*Références:*
- Girardeau,Brunoet Mous,Nelly.Réussir leDELFA1.Paris:LesÉditionsDidier,2010.

# MAJOR PROJECT – II

## Course Code: NMP 860 Credit Units: 09

**Course Objectives:**
The objective of Major project is to enable the student to take up investigative study in the broad field of Engineering, either fully theoretical/practical or involving both theoretical and practical work to be assigned by the Department on an individual basis or two/three students in a group, under the guidance of a Supervisor. The aim is to provide students an opportunity to exercise their creative and innovative qualities in a group project environment and to excite the imagination of aspiring engineers, innovators and technopreneurs.

**Methodology:**

Topics of project are to be based on the latest trends, verifying engineering concepts /principals and should involve elementary research work. The projects may involve design, fabrications, testing, computer modeling, and analysis of any engineering problem. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation on same.

## Course Outcomes:
On successful completion of the course students will be able to:
- Apply critical and creative thinking in the design of engineering projects
- Plan and manage time effectively as a team.
- Consider the business context and commercial positioning of designed devices or systems.
- Apply knowledge of the ‘real world’ situations that a professional engineer can encounter.
- Use fundamental knowledge and skills in engineering and apply it effectively on a project.
- Design and develop a functional product prototype while working in a team.
- Use various tools and techniques to study existing systems.
- Achieve precision in uses of the tools related to their experiments/fabrication.
- Timely reflect on peers’ technical and non-technical learning.
- Orally present and demonstrate your product to peers, academics, general and industry community.
- Write comprehensive report on project work.

**Examination Scheme:**

| | |
|---|---|
| Literature study/ Fabrication/ Experimentation | 40 |
| Written Report | 20 |
| Viva | 15 |
| Presentation | 25 |
| **Total** | **100** |

**Master of Technology**

**(STRUCTURAL ENGINEERING)**

## Programme Code: CEM

**Duration – 2 years full Time**

**Programme Structure**
**And**
**Curriculum & Scheme of Examination**
**2022-2024**

# AMITY UNIVERSITY

## MADHYA PRADESH

## PREAMBLE

Amity University aims to achieve academic excellence by providing multi-faceted education to students and encourage them to reach the pinnacle of success. The University has designed a system that would provide rigorous academic programme with necessary skills to enable them to excel in their careers.

This booklet contains the Programme Structure, the Detailed Curriculum and the Scheme of Examination. The Programme Structure includes the courses (Core and Elective), arranged semester wise. The importance of each course is defined in terms of credits attached to it. The credit units attached to each course has been further defined in terms of contact hours i.e. Lecture Hours (L), Tutorial Hours (T), Practical Hours (P). Towards earning credits in terms of contact hours, 1 Lecture and 1 Tutorial per week are rated as 1 credit each and 2 Practical hours per week are rated as 1 credit. Thus, for example, an L-T-P structure of 3-0-0 will have 3 credits, 3-1-0 will have 4 credits, and 3-1-2 will have 5 credits.

The Curriculum and Scheme of Examination of each course includes the course objectives, course contents, scheme of examination and the list of text and references. The scheme of examination defines the various components of evaluation and the weightage attached to each component. The different codes used for the components of evaluation and the weightage attached to them are:

| Components | Codes | Weightage (%) |
|---|---|---|
| Case Discussion/ Presentation/ Analysis | C | 05 - 10 |
| Home Assignment | H | 05 - 10 |
| Project | P | 05 - 10 |
| Seminar | S | 05 - 10 |
| Viva | V | 05 - 10 |
| Quiz | Q | 05 - 10 |
| Class Test | CT | 10 - 15 |
| Attendance | A | 05 |
| End Semester Examination | ESE | 70 |

It is hoped that it will help the students study in a planned and a structured manner and promote effective learning. Wishing you an intellectually stimulating stay at Amity University.

31st Jan. 2022

**PROGRAMME STRUCTURE**

**M.TECH (STRUCTURAL ENGINEERING)**

| **FIRST SEMESTER** | | | | | | |
|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Lecture (L) Hours Per Week** | **Tutorial (T) Hours Per Week** | **Practical (P) Hours Per Week** | **Total Credits** | **Total Hours** |
| CEM 101 | Numerical Analysis and Computer Programming | 3 | 1 | - | 4 | 40 |
| CEM 102 | Concrete Technology | 3 | 1 | - | 4 | 40 |
| CEM 103 | Advanced Structural Analysis | 3 | 1 | - | 4 | 40 |
| **Elective-I (Select any one)** | | **3** | **1** | **-** | **4** | **40** |
| CEM 105 | Bridge Engineering | | | | | |
| CEM 106 | Advanced Elasticity and Plasticity | | | | | |
| CEM 201 | Optimization Techniques | | | | | |
| | | | | | | |
| CEM 120 | Numerical Analysis Lab | - | - | 4 | 2 | 40 |
| CEM 123 | Advanced Concrete Lab | - | - | 4 | 2 | 40 |
| CEM 124 | Computer Aided Design Lab | - | - | 4 | 2 | 40 |
| BCP 141 | Advanced Communication – I | 1 | - | - | 1 | 10 |
| BSP 143 | Behavioral Science – I | 1 | - | - | 1 | 10 |
| MTP 130 | Term Paper | - | - | - | 3 | |
| **Total Credits** | | | | | **27** | |
| **Total Hours** | | | | | | **300** |

| SECOND SEMESTER | | | | | | |
|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Lecture (L) Hours Per Week** | **Tutorial (T) Hours Per Week** | **Practical (P) Hours Per Week** | **Total Credits** | **Total Hours** |
| CEM 104 | Structural Dynamics and Earthquake Resistant Building | 3 | 1 | - | 4 | 40 |
| CEM 203 | Finite Element Method | 3 | 1 | - | 4 | 40 |
| CEM 207 | Structural Health Monitoring | 3 | 1 | - | 4 | 40 |
| **Elective-II (Select any one)** | | **3** | **1** | **-** | **4** | **40** |
| CEM 204 | Advanced Steel Structure | | | | | |
| CEM 205 | Design of Pre-Stressed Structures | | | | | |
| CEM 206 | Experimental Stress Analysis | | | | | |
| | | | | | | |
| CEM 220 | Structural Engineering Lab | - | - | 4 | 2 | 40 |
| CEM 222 | Finite Element Method Lab | - | - | 4 | 2 | 40 |
| CEM 223 | Non- Destructive Testing Lab | - | - | 4 | 2 | 40 |
| BCP 241 | Advanced Communication – II | 1 | - | - | 1 | 10 |
| BSP 243 | Behavioral Science – II | 1 | - | - | 1 | 10 |
| MMP 260 | Minor Project I | - | - | - | 4 | |
| **Total Credits** | | | | | **28** | |
| **Total Hours** | | | | | | **300** |
| **SUMMER PROJECT: 08 WEEKS** | | | | | | |

| **THIRD SEMESTER** | | | | | | |
|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Lecture (L) Hours Per Week** | **Tutorial (T) Hours Per Week** | **Practical (P) Hours Per Week** | **Total Credits** | **Total Hours** |
| CEM 301 | Research Methodology | 3 | 1 | - | 4 | 40 |
| CEM 302 | Advanced RCC Design | 3 | 1 | - | 4 | 40 |
| CEM 303 | High Rise Buildings analysis | 3 | 1 | - | 4 | 40 |
| **Elective – III (Select any one)** | | **3** | **1** | **-** | **4** | **40** |
| CEM 304 | Analysis of Plate and Shells | | | | | |
| CEM 305 | Reliability Based Civil Engineering Design | | | | | |
| CEM 306 | Evaluation and Retrofitting of Building | | | | | |
| | | | | | | |
| CEM 322 | Structural Material Testing Lab-II | - | - | 4 | 2 | 40 |
| CEM 323 | Structural Dynamics Lab | - | - | 4 | 2 | 40 |
| CEM 324 | Advanced Structural Detailing Lab | - | - | 4 | 2 | 40 |
| MSP 350 | Summer Internship Programme (SIP) | - | - | - | 6 | |
| MMP 360 | Minor Project II | - | - | - | **4** | |
| **Total Credits** | | | | | **32** | |
| **Total Hours** | | | | | | **280** |

| **FOURTH SEMESTER** | | | | | | |
|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Lecture (L) Hours** | **Tutorial (T) Hours** | **Practical (P) Hours** | **Total Credits** | **Total Hours** |

| | | **Per Week** | **Per Week** | **Per Week** | | |
|---|---|---|---|---|---|---|
| MMP 460 | Dissertation | - | - | - | 30 | - |
| **Total** | | | | | **30** | **-** |

**Master of Technology**

# (Structural Engineering)

# Programme Code: CEM

# Duration – 2 Years Full Time

## (2022-24)

## OVERALL CREDIT

| Sr. No. | Semester | No. of Credits | No. of Hours |
|---|---|---|---|
| 1 | I | 27 | 300 |
| 2 | II | 28 | 300 |
| 3 | III | 32 | 280 |
| 4 | IV | 30 | - |
| **Total Credits** | | **117** | **880** |

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## Course Structure: NUMERICAL ANALYSIS AND COMPUTER PROGRAMMING – CEM 101

**Course Title: NUMERICAL ANALYSIS AND COMPUTER PROGRAMMING** **Credit Units: 4**

**Course Level: PG Level** **Course Code: CEM 101**

**Course Objectives:**

- The main objective of this course is to make student aware about application of numerical techniques of solving the real life problems of Civil Engineering.

**Pre-requisites:** Students should possess a fundamental knowledge of numerical techniques at UG level.

**Course Contents/Syllabus:**

| | **Weightage (%)** |
|---|---|
| **Module I Solution of Algebraic and Transcendental Equation** | |
| **Descriptors/Topics**<br>Newton-Raphson method including method of complex roots, Graeffe's root square method (Computer based algorithm and programme for these methods) | **20 %** |
| **Module II Interpolation and Approximation** | |
| **Descriptors/Topics**<br>Lagrange's and Newton-divided difference formula, Newton interpolation formula for finite differences, Gauss's forward and backward interpolation formulae, Bessel's and Laplace-Everett's formulae, Cubic spline, least squares approximation using Chebyshev polynomial. | **20 %** |
| **Module III Solution of Linear Simultaneous Equations** | |
| **Descriptors/Topics**<br>Cholesky's (Crout's) method, Gauss-Seidel iteration and relaxation methods, Solution of Eigenvalue problems; Smallest, largest and intermediate Eigen values (Computer based algorithm and programme for these methods). | **20 %** |
| **Module IV Numerical Differentiation and Integration** | |
| **Descriptors/Topics**<br>The numerical examples solved using the analysis program developed in the above to be verified using common commercial packages. | **20 %** |

| **Module V Solution of Differential Equations** | |
|---|---|
| **Descriptors/Topics**<br>Modified Euler's method, Runge-Kutta method of 2nd, 3rd and 4th orders, Predictor-Corrector method, Stability of Ordinary differential equation, Solution of Laplace's and Poisson's equations by Liebmann's method, Relaxation method. | **20 %** |

**Student Learning Outcomes:**

- After the completion of this subject course, the students can develop the algorithm and program in the various field of structural Engineering. The knowledge of numerical techniques will be very helpful in their dissertation work.

**Pedagogy for Course Delivery:** Problem-based learning (PBL), Internet/Web-Based Learning and formation real life problems.

**List of Professional Skill Development Activities (PSDA):** Webinars, Seminars, Conferences & Workshop.

**Assessment/Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

**Text Reading:**

- Numerical Method for Scientific and Engineering Computation M.K. Jain, S.R.K. Iyenger and R.K. Jain
- Wiley Eastern Ltd.
- Numerical Methods for Engineers S.K. Gupta Wiley Eastern Ltd.
- Numerical Methods B.S. Grewal Khanna Publications
- Numerical Methods A.D. Booth Academic Press, NY

**References:**

- An Introduction to Numerical Analysis K.E. Atkinson John Wiley & Sons, NY
- Introduction Methods of Numerical Analysis S.S. Sastry Prentice Hall of India
- Elementary Numerical Analysis S.D. Conte McGraw Hill.

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## Course Structure: CONCRETE TECHNOLOGY – CEM 102

**Course Title: CONCRETE TECHNOLOGY** **Credit Units: 4**

**Course Level: PG Level** **Course Code: CEM 102**

**Course Objectives:**

- The main objective of this course is to make student aware the various types of concrete and its properties. The effects of various ingredients on the performance of concrete have also been included.

**Pre-requisites:** Students should possess the basic knowledge of concrete & its ingredients.

**Course Contents/Syllabus:**

| | **Weightage (%)** |
|---|---|
| **Module I Cement and Concrete** | **20 %** |
| **Descriptors/Topics**<br>Portland cement: chemical composition, hydration of cement, structure of hydrated cement, mechanical strength of cement gel, water held in hydrated cement paste and heat of hydration. Cements of different types. | |
| **Module II Properties of Concrete** | **20 %** |
| **Descriptors/Topics**<br>Factors affecting the strength of concrete. Elasticity, shrinkage and creep of concrete; Durability of concrete: Permeability of concrete. Chemical attack of concrete, air-entrained concrete and thermal properties of concrete. The mechanical test of hardened concrete | |
| **Module III Special Concrete** | **20 %** |
| **Descriptors/Topics**<br>Light weight and high density concrete. Mix design. Statistical quality control; biaxial strength of concrete, Fibre reinforced concrete; | |
| **Module IV Metals** | **20 %** |
| **Descriptors/Topics**<br>Behaviour of common constructional metals in tension and compression. True stress-strain curve for mild steel in simple tension. Theories of failure and yield surfaces; Fatigue properties: Nature of fatigue failure, fatigue strength for completely reversed stresses, fatigue strength with super imposed static stress and factors influencing fatigue strength; | |

| **Module V Temperature and Creep Properties** | |
|---|---|
| **Descriptors/Topics**<br>Temperature and Creep properties: Low temperature properties, high temperature properties, creep-stress-time-temperature relations for simple tension, mechanics of creep in tension. Structure of materials and their imperfections. Deformation of crystals and theory of is locations. | **20 %** |

**Student Learning Outcomes:**

- On the completion of this subject course, the students can apply the basic knowledge of concrete in the development of more smart concrete composites.

**Pedagogy for Course Delivery:** Problem-based learning (PBL) and Internet/Web-Based Learning.

**List of Professional Skill Development Activities (PSDA):** Seminars, Conferences & Site visits.

**Assessment/Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

**Text Reading:**

- M.L. Gambir, Concrete Technology, Tata McGraw Hill Book Co.
- Peurifoy R.L., Construction Planning Equipment & Methods, TMH
- A.M. Neville, J.J. Brooks, Concrete Technology, Low Priced Edition, Pearson Education, 2004.
- A J Martin, Mechanical behavior of engineering materials
- M.S.Shetty, Concrete technology- Theory & Practice, S.Chand & Company New Delhi, 2005

**References:**


- R. Park and T. Pauley, Reinforced concrete structures, John Wiley and sons
- A.K. Jain, Reinforced Concrete: Limit State design, Nem Chand and Bros. 1999.
- J. Krishna and OP Jain, Plain and Reinforced Concrete, Vol. II, Roorkee, Nem Chand and Bros.
- H. Nilson, D. Darwin and C. W. Dolar, Design of Concrete structures, Tata McGraw Hill

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## Course Structure: ADVANCED STRUCTURAL ANALYSIS – CEM 103

**Course Title: ADVANCED STRUCTURAL ANALYSIS** **Credit Units: 4**

**Course Level: PG Level** **Course Code: CEM 103**

**Course Objectives:**

- This course provides the exposure of various methods of analysis of various types of structures.

**Pre-requisites:** Students should possess the basic knowledge of Structural analysis.

**Course Contents/Syllabus:**

| Methods of Structural Analysis | Weightage (%) |
|---|---|
| **Module I Matrix Method** | |
| **Descriptors/Topics**<br>Force methods, Basic Concepts, evaluation of flexibility, transformation, analysis of a single member of different types, transformation of single member. | **25 %** |
| **Module II Flexibility Method** | |
| **Descriptors/Topics**<br>Applications to plane and space structures with pin joints and rigid joints, energy approach in flexibility method, effect of support displacement and transformation. | **25 %** |
| **Module III Stiffness Method** | |
| **Descriptors/Topics**<br>Displacement methods, Basic concepts, Evaluation of stiffness coefficients, Direct stiffness method, energy approach in stiffness method. Code No. approach for global stiffness matrix, effect of support displacement and temperature. | **25 %** |
| **Module IV Application of matrix methods** | |
| **Descriptors/Topics**<br>Symmetrical & anti-symmetrical problems, Stiffness of plane & space frames solution of problems, comparison of force and displacement methods of solution. | **25 %** |

**Student Learning Outcomes:**

- Skill of computer aided analysis & design of the Civil Engineering structures.

**Pedagogy for Course Delivery:** Problem-based learning (PBL), Internet/Web-Based Learning and formation real life problems.

**List of Professional Skill Development Activities (PSDA):** Webinars, Seminars, Conferences &Workshop.

**Assessment/Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

**Text Reading:**

- C.S. Reddy, Basic Structural Analysis, TMH, Publishers
- Pandit, Structural Analysis: a matrix approach, TMH

**References:**

- W Wearer Jr. & James M. Gere, Matrix Analysis of Framed Structures, CBS Pub.
- Rajsekeran, Sankarsubramanian, Computational structural Mechanics, PHI

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## Course Structure: BRIDGE ENGINEERING – CEM 105

**Course Title: BRIDGE ENGINEERING** **Credit Units: 4**

**Course Level: PG Level** **Course Code: CEM 105**

**Course Objectives:**
- Provide the exposure of various components of Bridges. The analysis and design has also been included in this course.

**Pre-requisites:** Students should possess the basic knowledge of Structural Engineering.

**Course Contents/Syllabus:**

| Bridge Engineering | Weightage (%) |
|---|---|
| **Module I Introduction** | |
| **Descriptors/Topics**<br>Historical review, engineering and aesthetic requirements in bridge design. Introduction to bridge codes. | **20 %** |
| **Module II Planning of Bridge** | |
| **Descriptors/Topics**<br>Economic evaluation of a bridge project. Site investigation and planning;. Scour - factors affecting and evaluation. | **20 %** |
| **Module III Foundation of Bridges** | |
| **Descriptors/Topics**<br>Bridge foundations - open, pile, well and caisson. Piers, abutments and approach structures; Superstructure - analysis and design of right, skew and curved slabs. | **20 %** |
| **Module IV Analysis, Design & Construction of bridges** | |
| **Descriptors/Topics**<br>Girder bridges - types, load distribution, design. Orthotropic plate analysis of bridge decks Introduction to long span bridges - cantilever, arch, and cable stayed and suspension bridges. | **20 %** |
| **Module V Methods of Constructions** | |
| **Descriptors/Topics**<br>Methods of construction of R.C Bridges, Pre-stressed concrete bridges and steel bridges Fabrication, Launching & creation. Design and construction of construction joints (use of relevant codes of practice are permitted in the examination). | **20 %** |

**Student Learning Outcomes:**

- On the completion of this subject course, the students can apply the basic knowledge of Bridge engineering in their M. Tech dissertation like optimization in design of bridges, Health monitoring of bridges and reliability of bridges.

**Pedagogy for Course Delivery:** Problem-based learning (PBL), Internet/Web-Based Learning and formation real life problems.

**List of Professional Skill Development Activities (PSDA):** Webinars, Seminars, Conferences &Workshop.

**Assessment/Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

**Text Reading:**

- V. K. Raina, *Concrete Bridges Practice – Analysis, Design and Economics*, Shroff Publications, New Delhi 2nd Ed. 2005.
- Vazirani, Ratwani and Aswani, *Design of Concrete Bridges*, Khanna Publishers, 2nd Ed. 2008.
- Victor Johnson D. - Essential of Bridge Engineering, Oxford & IBH Publishing Company.

**References:**

- IRC codes for Road bridges- IRS Sec –I , II, III
- IRS Codes of Practice for Railway bridges.
- B. M. Das, Principles of Foundation Engineering, Thomson, Indian Edition, 2003.
- IS: 1893(Part 3) - 2002 Criteria for Earthquake Resistant Design of Structures.

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## Course Structure: ADVANCED ELASTICITY AND PLASTICITY – CEM 106

**Course Title: ADVANCED ELASTICITY AND PLASTICITY** **Credit Units: 4**

**Course Level: PG Level** **Course Code: CEM 106**

**Course Objectives:**

- This subject is included to provide the thorough knowledge of theory of elasticity and plasticity in two dimensional analyses of stress-strain problems subjected to various types of loads.

**Pre-requisites:** Students should possess the basic knowledge of mechanics of materials.

**Course Contents/Syllabus:**

| | **Weightage (%)** |
|---|---|
| **Module I Plane stress and plane strain problems** | |
| **Descriptors/Topics**<br>General stress and strain equations (Equilibrium and compatibility equations). Two dimensional problems in rectangular coordinates. | **20 %** |
| **Module II Equations of Stress-strain problems** | |
| **Descriptors/Topics**<br>Stress and strain components, differential equation, equilibrium equations and compatibility equations in polar coordinate. Stress distribution for axisymmetric problems. | **20 %** |
| **Module III Stress Distribution in various members** | |
| **Descriptors/Topics**<br>Pure bending of curved bars, thick walled cylinder. Concentrated force at a point of straight boundary. Force acting on the end of a wedge. Concentrated force acting on a beam. Effect of circular holes on stress distributions in plates. | **20 %** |
| **Module IV Stress and strain in three dimensions** | |
| **Descriptors/Topics**<br>Principles stresses, maximum shearing stress, principal axes of strain. Stretching of prismatic bar by its own axis. Elementary problems of elasticity in three dimensions. Torsion of non-circular prismatic bars. | **20 %** |

| **Module V Miscellaneous topics** | |
|---|---|
| **Descriptors/Topics**<br>Saint Venant's theory. Various analogies. Torsion of hollow and thin section. Application of energy methods; Introduction to the theory of plasticity, the yield criteria of metals, stress space representation of yield criteria. Stress-strain relations plastic potential, flow rules and maximum work hypothesis. Two dimensional plastic flow problems. Incompressible two dimensional flows, stresses in plastic materials in condition of plane strain, equation of equilibrium the simplest slip-line fields. | **20 %** |

**Student Learning Outcomes:**

- On the completion of this subject course, the students can apply the basic knowledge of stress-strain concept in the development of various types modeling and analysis of Civil Engineering problems using finite element method.

**Pedagogy for Course Delivery:** Problem-based learning (PBL), Internet/Web-Based Learning and formation real life problems.

**List of Professional Skill Development Activities (PSDA):** Webinars, Seminars, Conferences &Workshop.

**Assessment/Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

**Text Reading:**

- Timoshenko, S.P., Theory of Elasticity
- Timoshenko, S.P., Theory of Elastic Stability

**References:**

- Iyenger N.G.R., Structural Stability of Columns & Plates.
- S P Timoshenko and J N Goodier, *Theory of Elasticity*, McGraw Hill
- W. Johnson and P B Meller, *Plasticity of Mechanical Engineers*
- Theory of plasticity, Hoffman and Sachs

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## Course Structure: OPTIMIZATION TECHNIQUES – CEM 201

**Course Title: OPTIMIZATION TECHNIQUES** **Credit Units: 4**

**Course Level: PG Level** **Course Code: CEM 201**

**Course Objectives:**

- The main objective of this course is to make student aware about the various optimization techniques and its application in structural Engineering.

**Pre-requisites:** Students should possess the basic knowledge of mechanics of materials.

**Course Contents/Syllabus:**

| | **Weightage (%)** |
|---|---|
| **Module I Linear Programming** | |
| Solution of LPP by Simplex Method, Duality and its solution, Transportation Problem: Initial Solution, Test for Optimality, Unbalanced Transportation Problem, Degeneracy, Alternative Optimal Solutions, Prohibited Transportation, Maximization Transportation Problem Routs, Assignment Problem: Introduction, Solution by Hungarian Method, Multiple Optimal Solution, Unbalanced Assignment Problem, Maximization Case in Assignment Problem, Restriction on Assignments. | **20 %** |
| **Module II Sensitivity Analysis** | |
| Introduction, Change in Objective Function Coefficients, Change in Right Hand Side Values, Change in Availability of resources, Addition of a new variable, Addition of a new constraint. | **20 %** |
| **Module III Game Theory** | |
| Introduction, Two-Person Zero Sum Games, Pure Strategies: Games with Saddle Point, Mixed Strategies: Games without saddle point, Principle of Dominance, Solution Methods for games without saddle point – Algebraic Method, Arithmetic Method, Matrix Method, Graphical Method. | **20 %** |
| **Module IV Queuing Theory** | |
| Features of Queuing System, Solution of Queuing Models {(MM/1): (∞/FCFS)} Single server, Exponential Service-Unlimited Queue. | **10 %** |

| Module V Simulation | |
|---|---|
| Process of simulation, Monte Carlo Simulation, Simulation of an Inventory System, Simulation of Queuing System, Applications of Simulation | **10 %** |
| **Module VI Sequencing** | |
| Gantt charts, Algorithm for solving sequencing problems: Johnson's Rule, Processing n jobs through 2 machines, Processing n jobs through 3 machines, Processing 2 jobs through 'k' machines, Maintenance crew scheduling | **20 %** |

**Student Learning Outcomes:**

- After the completion of this subject course, the students can develop the optimization based algorithms which will be used in different problems related to structural engineering. This knowledge will be very helpful in their dissertation work.

**Pedagogy for Course Delivery:** Problem-based learning (PBL), Internet/Web-Based Learning and formation real life problems.

**List of Professional Skill Development Activities (PSDA):** Webinars, Seminars, Conferences &Workshop.

**Assessment/Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

**Text Reading:**

- Vohra N.D., Quantitative Techniques in Management, Tata McGraw Hill Taha H. A. 1998, Operations Research: An Introduction, 6th Ed. Prentice Hall of India
- London N.P., Linear Programming, Tata McGraw-Hill
- Phillips and Solberg, Operations Research, Ravindran, 2nd edition 2000, John Wiley & Sons.
- Chapra and Canale, Numerical Methods for Engineers, 4th edition, 2005, Tata McGraw Hill.
- S.S.Rao, Engineering Optimization, 3rd edition, 2000, New Age methods.

**References:**


- Sharma J.K. 1997, Operations Research: Theory & Application, Mac Millan India Ltd. Grobner D.F. & Shannon P.W., Essential of Business Statistics: A DecisionMaking Approach, MacMillan College Publishing Co.
- Anderson David R, Sweeny Dennis J, Williams Thomas A, Quantitative Methods for Business, Cengage learning.
- Operations Research, Taha, 7th ed, 2002, Prentice Hall.

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## Course structure: NUMERICAL ANALYSIS LAB - CEM 120

**Course Title: NUMERICAL ANALYSIS LAB** **Credit Units: 2**

**Course Level: PG Level** **Course Code: CEM 120**

**Course Objectives:**

- This lab is included to make student aware about application of numerical and statistical techniques in the analysis of structure and reliability of structure.
- The aim of the course is to develop a sound understanding of the various numerical techniques, principles and their application to Civil engineering problems. Fundamental principles and basics of numerical methods will be covered.

**Pre-requisites:** The students must possess fair understanding and Knowledge of Numerical methods.

**Course Contents/Syllabus:**

| **Problems will be consists of the following** |
|---|
| **1. Analysis of various numerical and statistical techniques** |
| Analysis of Structures<br>Reliability of Structures based problems |
| **2. Application of Numerical techniques in Civil Engineering problems** |
| Finite difference techniques<br>Application of finite Element Modeling in solving the Civil Engineering problems. |

**Student Learning Outcomes:**

- Practice of solving Small problems of Structural Engineering will help in solving the major Civil Engineering problems.

**Pedagogy for Course Delivery:** The students will refer the various software for solving the real life problems in Structural Engineering to cross check the own methods developed.

**List of Professional Skill Development Activities (PSDA):** N/A

**Assessment / Examination Scheme:**

| | **IA** | | | | **EE** | |
|---|---|---|---|---|---|---|
| **Components** | **A** | **PR** | **LR** | **V** | **PR** | **V** |
| **Weightage (%)** | 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

**Text Reading:**

- N. Dutta: Computer Programming & Numerical Analysis, Universities Press.
- SoumenGuha& Rajesh Srivastava: Numerical Methods, OUP.
- Srimanta Pal: Numerical Methods, OUP.

**References:**

- Balagurusamy: Numerical Methods, Scitech.
- Baburam: Numerical Methods, Pearson Education.

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## Course structure: ADVANCED CONCRETE LAB - CEM 123

**Course Title: ADVANCE CONCRETE LAB** **Credit Units: 2**

**Course Level: PG Level** **Course Code: CEM 123**

**Course Objectives:**

- The course is designed to understand the various properties of concrete, distress in concrete and its remedial measures using high performance concrete (HPC).

**Pre-requisites:** The students must possess fair understanding and Knowledge of properties of Civil Engineering materials.

**Course Contents/Syllabus:**

| **Experimental studies on various materials** |
| --- |
| **1. Tests on Cement Concrete** |
| a) Strength<br>b) Workability |
| **2. Experimental studies on various types of High performance concrete (Any two)** |
| a) Fibre reinforced concrete<br>b) Light weight Concrete<br>c) Fly ash concrete<br>d) Polymer concrete<br>e) Ferro-cement concrete |
| **3. Studies various distress in Concrete and its remedial measures** |
| Prepare the report on the various causes of distress in concrete by visual inspection and tests. |

**Student Learning Outcomes:**

- On the completion of this subject course, the students can apply the basic knowledge of concrete in the development of more smart concrete.

**Pedagogy for Course Delivery:** The students will refer the IS Standards for above various experimental studies.

**List of Professional Skill Development Activities (PSDA):** Incorporate the site visits and conduct the studies for verifications.

**Assessment / Examination Scheme:**

| | IA | | | | EE | |
|---|---|---|---|---|---|---|
| **Components** | **A** | **PR** | **LR** | **V** | **PR** | **V** |
| **Weightage (%)** | 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

**Text Reading:**

- Hand Book of Reinforced Concrete Design by S. K. Sinha, McGraw Hill.
- A.M. Neville, J.J. Brooks, Concrete Technology, Low Priced Edition, Pearson Education, 2004.

**References:**


- M.L. Gambir, Concrete Technology, Tata McGraw Hill Book Co.
- R.C.C Design by A. K. Jain , Nem Chand & Bros, Roorkee.

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## Course structure: COMPUTER AIDED DESIGN LAB – CEM 124

**Course Title: COMPUTER AIDED DESIGN LAB** **Credit Units: 2**

**Course Level: PG Level** **Course Code: CEM 124**

**Course Objectives:**

- The main objective of this course is to make student aware about the various software and its application in design & analysis of structures.

**Pre-requisites:** The students must possess fair understanding and Knowledge of Structural analysis & Design.

**Course Contents/Syllabus:**

| **Solving various Analysis & Design problems Using various software** |
|---|
| **1.** Working on Latest Version of ANALYSIS SOFTWARE LIKE ANSYS, ADINA, NISA, MATLAB |
| |
| **2.** Working on Latest Version of DESIGN SOFTWARE LIKE STAAD PRO / STRUDS / SAP / ETAB |
| |
| **3.** Working on Latest Version of Geotechnical software like Geo-5 |
| |

**Student Learning Outcomes:**

- With this back ground, students can do the modeling in the various phases of analysis & Design of the structures.

**Pedagogy for Course Delivery:** The students will refer to cross check the various problems solved by manually.

**List of Professional Skill Development Activities (PSDA):** Incorporate the site visits and conduct the studies for verifications.

**Assessment / Examination Scheme:**

| | **IA** | | | | **EE** | |
|---|---|---|---|---|---|---|
| **Components** | **A** | **PR** | **LR** | **V** | **PR** | **V** |
| **Weightage (%)** | 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

**Text Reading:**

- Hand Book of Reinforced Concrete Design by S. K. Sinha, McGraw Hill.
- Analysis and Design of Structures by R. S. Vaishwanar, M. M. Malhotra, Subhash Chandra, 5$^{th}$ Edition, Neeraj Publication.

**References:**

- Software related to ANSYS & MATLAB
- Software related to STAAD- Pro, STRUDS & Geo- 5
- Software related to NISA, SAP, STRUDS, etc.

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# Course Structure: ADVANCED COMMUNICATION-I- BCP 141

**Course Title: ADVANCED COMMUNICATION-I** **Credit Units: 1**

**Course Level: PG Level** **Course Code: BCP 141**

**Course Objectives:**

- The Course is designed to enhance vocabulary skills and make students fluent, thereby improving receptive and expressive skills.

**Pre-requisites: NIL.**

**Course Contents/Syllabus:**

| | Weightage (%) |
|---|---|
| **Module I Fundamentals of Communication** | |
| **Descriptors/Topics**<br>• Role and Purpose of Communication,7 C's of Communication<br>• Barriers to Effective Communication<br>• Forms of Communication: One-to-One, Informal and Formal | **30** |
| **Module II Oral Communication** | |
| **Descriptors/Topics**<br>• Effective Listening: Principles and Barriers<br>• Effective Speaking: Pronunciation and Accent | **20** |
| **Module III Advanced Vocabulary Building** | |
| **Descriptors/Topics**<br>• Word Formation; Synonyms; Antonyms; Eponyms; Homonyms, Homophones & Homographs<br>• One Word Substitution; Phrasal Verbs, Idiomatic Expressions & Proverbs<br>• Foreign Words in English | **20** |
| **Module IV Non Verbal Communication** | |
| **Descriptors/Topics**<br>• Principles & Significance<br>• Kinesics, Oculesics, Proxemics,, Para-Language, Artifacts, Chronemics, Tactilics | **30** |

**Student Learning Outcomes:**

- The students will be able to use the LSRW Skills to communicate effectively in a professional environment.
- Will be able to develop fluency

**Pedagogy for Course Delivery:** Workshop, Presentation, Group Discussion & Lectures

**List of Professional Skill Development Activities(PSDA):** N/A.

**Assessment/ Examination Scheme:**

| Theory L/T (%) | Lab/ Practical/ Studio (%) | End Term Examination |
|---|---|---|
| 100% | NA | 70% |

**Theory Assessment (L&T):**

| End Term Examination | | | | |
|---|---|---|---|---|
| **Components (Drop down)** | CIE | Mid Sem | Attendance | **End Term Examination** |
| **Weightage (%)** | 10% | 15% | 5% | 70% |

**Text Reading:**

- Jones, Working in English, 1st ed. Cambridge, CUP 2001
- Raman Prakash, Business Communication, 2nd ed. Delhi OUP 2006
- Butterfield, Jeff Soft skills for Everyone, Cengage Learning 2011
- Reference: Guffey, Ellen Mary, Business Communication, Thomson (South Western)
- Dale Carnegie: Quick and Easy Way of Public Speaking

**References:**


- Business Communication Today – Courtland L Bovee, John V Thill Mukesh Chaturvedi, Pearson 2009
- Additional Reading:  Newspapers and Journals

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## Course Structure: BEHAVIOURAL SCIENCE - I – BSP 143

**Course Title: BEHAVIOURAL SCIENCE - I** **Credit Units: 1**

**Course Level: PG Level** **Course Code: BSP 143**

**Course Objectives:**

- Self and the process of self exploration
- Learning strategies for development of a healthy self esteem
- Importance of attitudes and their effect on work behavior
- Effective management of emotions and building interpersonal competencee

**Pre-requisites: NIL.**

**Course Contents/Syllabus:**

| | **Weightage (%)** |
|---|---|
| **Module I Understanding Self** | |
| **Descriptors/Topics**<br>• Formation of self concept<br>• Dimension of Self<br>• Components of self<br>• Self Competency | **20** |
| **Module II Self-Esteem: Sense of Worth** | |
| **Descriptors/Topics**<br>• Meaning and Nature of Self Esteem<br>• Characteristics of High and Low Self Esteem<br>• Importance & need of Self Esteem<br>• Self Esteem at work<br>• Steps to enhance Self Esteem | **20** |
| **Module III Emotional Intelligence: Brain Power** | |
| **Descriptors/Topics**<br>• Introduction to EI<br>• Difference between IQ, EQ and SQ<br>• Relevance of EI at workplace<br>• Self assessment, analysis and action plan | **20** |
| **Module IV Managing Emotions and Building Interpersonal Competence** | |
| **Descriptors/Topics**<br>• Need and importance of Emotions<br>• Healthy and Unhealthy expression of emotions<br>• Anger: Conceptualization and Cycle | **20** |

| | |
|---|---|
| • Developing emotional and interpersonal competence<br>• Self assessment, analysis and action plan | |
| **Module V Leading Through Positive Attitude** | **10** |
| **Descriptors/Topics**<br>• Understanding Attitudes<br>• Formation of Attitudes<br>• Types of Attitudes<br>• Effects of Attitude on<br>• Behavior<br>• Perception<br>• Motivation<br>• Stress<br>• Adjustment<br>• Time Management<br>• Effective Performance<br>• Building Positive Attitude | |
| **Module VI End-of-Semester Appraisal** | **10** |
| **Descriptors/Topics**<br>• Viva - Voce based on personal journal<br>• Assessment of Behavioral change as a result of training<br>• Exit Level Rating by Self and Observer | |

**Student Learning Outcomes:**

- The students will be able to use the LSRW Skills to communicate effectively in a professional environment.
- 

**Pedagogy for Course Delivery:** Lectures, Presentation.

**List of Professional Skill Development Activities (PSDA):** Seminar & Workshop.

**Assessment/ Examination Scheme:**

| Evaluation Components | Attendance | Journal of Success (JOS) | Social Awareness Progra (SAP) SAP Report/SAP Presentation | End Semester Exam | Total |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 15 | 70 | 100 |

**Text Reading:**

- Jon Towers, Marc: Self Esteem, 1st Edition 1997, American Media
- Pedler Mike, Burgoyne John, Boydell Tom, A Manager's Guide to Self-Development: Second edition, McGraw-Hill Book company.
- Covey, R. Stephen: Seven habits of Highly Effective People, 1992 Edition, Simon & Schuster Ltd.,
- Singh, Dalip, 2002, Emotional Intelligence at work; First Edition, Sage Publications.

- Goleman, Daniel: Emotional Intelligence, 1995 Edition, Bantam Books
- Goleman, Daniel: Working with E.I., 1998 Edition, Bantam Books.

**References:**


- Bu Khera Shiv: You Can Win, 1st Edition, 1999, Macmillan
- Gegax Tom, Winning in the Game of Life: 1st Edition, Harmony Books
- ChatterjeeDebashish, Leading Consciously: 1998 1st Edition, Viva Books Pvt.Ltd.,
- Dr. Dinkmeyer Don, Dr. Losoncy Lewis, The Skills of Encouragement:

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## Course structure: TERM PAPER – MTP 130

**Course Title: TERM PAPER** **Credit Units: 4**

**Course Level: PG Level** **Course Code: MTP 130**

**Course Objectives:**

- A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject.
- The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

**Pre-requisites:** N/A.

**Course Contents/Syllabus:**

**GUIDELINES FOR TERM PAPER**

The procedure for writing a term paper may consist of the following steps:

- Choosing a subject
- Finding sources of materials
- Collecting the notes
- Outlining the paper
- Writing the first draft
- Editing & preparing the final paper

**1. Choosing a Subject**

- The subject chosen should not be too general.

**2. Finding Sources of Materials**

- The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
- Begin by making a list of subject-headings under which you might expect the subject to be listed.
- The sources could be books and magazine articles, news stories, periodicals, scientific journals etc.

**3. Collecting the notes**

- Skim through sources, locating the useful material, then make good notes of it, including quotes and Information for footnotes.
- Get facts, not just opinions. Compare the facts with author's conclusion.
- In research studies, notice the methods and procedures, results & conclusions.

Check cross references.

4. **Outlining the paper**
   - Review notes to find main sub-divisions of the subject.
   - Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. **Writing the first draft**
   Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:
   i) statement of purpose
   ii) main body of the paper
   iii) statement of summary and conclusion
   Avoid short, bumpy sentences and long straggling sentences with more than one main idea.

6. **Editing & preparing the final Paper**
   Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.
   Read the paper to ensure that the language is not awkward, and that it "flows" properly.
   Check for proper spelling, phrasing and sentence construction.
   Check for proper form on footnotes, quotes, and punctuation.
   Check to see that quotations serve one of the following purposes:
   a) Show evidence of what an author has said.
   b) Avoid misrepresentation through restatement.
   c) Save unnecessary writing when ideas have been well expressed by the original author.
   Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:
- Title page
- Table of contents
- Introduction
- Review
- Discussion&Conclusion
- References
- Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

**Discussion**
The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

**Conclusion**
The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:
summary of question posed
summary of findings
summary of main limitations of the study at hand

details of possibilities for related future research

**Text & Reference:**

From the very beginning of a research project, you should be careful to note all details of articles thered.

The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.

The key to a good bibliography is consistency. Choose a particular convention and stick to this.

**Conventions**

Monographs

Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

**Edited volumes**

Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.

[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

**Edited articles**

Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

**Journal articles**

McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

**Electronic book**

Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] From the World Wide Web, http://www.aber.ac.uk/media/Documents/S4B/.

**Electronic journal articles**

Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document]. German as a Foreign Language Journal [online] 1. Retrieved [12.09.'00] from the World Wide Web, http://www.gfl-journal.com/.

**Other websites**

Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document]. Retrieved [13.10.'01] from the World Wide Web, http://olaf.hiof.no/~sverrev/eng.html.

**Unpublished papers**

Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

**Unpublished theses/ dissertations**

Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg.

Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

**Appendix**

The appendix should be used for data collected (e.g. questionnaires, transcripts, ...) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

**Assessment Scheme:**

**Continuous Evaluation:**40%
(Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)

**Final Evaluation:**60%
(Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/ presented, outcomes vs. objectives, presentation/ viva etc.)

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# Course structure: STRUCTURAL DYNAMICS AND EARTHQUAKE RESISTANT BUILDING – CEM 104

**Course Title: STRUCTURAL DYNAMICS AND EARTHQUAKE RESISTANT BUILDING** **Credit Units: 4**

**Course Level: PG Level** **Course Code: CEM 104**

**Course Objectives:**

- This course is included to provide the basic knowledge of Structural dynamics, Seismology and concept of earthquake engineering.

**Pre-requisites:** Students should possess the basic knowledge of Solid mechanics& Structural Analysis.

**Course Contents/Syllabus:**

| | Weightage (%) |
|---|---|
| **Module I Seismic Strengthening of Existing Buildings** | **20 %** |
| **Descriptors/Topics**<br>Cases histories-Learning from earthquakes, seismic strengthening procedures. | |
| **Module II Seismic Analysis** | **20 %** |
| **Descriptors/Topics**<br>Torsion & Rigidity: Rigid Diaphragms, Torsional moment, Center of mass and center of rigidity torsion effects. Lateral Analysis of Building Systems: Lateral load distribution with rigid floor diaphragms, moment resisting frames, shear walls, lateral stiffness of shear walls, shear wall-frame combination, examples. | |
| **Module III Seismic Design** | **20 %** |
| **Descriptors/Topics**<br>Concept of Earthquake Resistant Design: Objectives of seismic design , Ductility, Hysteric response & energy dissipation, response modifications factor, design spectrum, capacity design, classification of structural system, IS code provisions for seismic design of structures, multi-storied buildings, design criteria, P-A effects, storey drift, design examples ductile detailing of RCC structures. | |
| **Module IV Design of Special Structures** | **20 %** |
| **Descriptors/Topics**<br>Seismic Design of Special Structures: Elevated liquid storage tanks, Hydrodynamic pressure in tanks, stack like structures, IS-1893 code provisions for bridges; Superstructures, substructures, submersible bridges, dams; Hydrodynamic effect due to reservoir, concrete gravity dams. | |

| | |
|---|---|
| **Module V Engineering Seismology** | **20 %** |
| **Descriptors/Topics**<br>Basic terms, seismic waves, earthquake magnitude and intensity, ground motion, dynamic response of structures, normalized response spectra, seismic coefficients and seismic zone coefficients. | |

**Student Learning Outcomes:**

- Basic knowledge of this course will create a skill of designing the earthquake resistance Civil engineering structures using IS: 1893-2002 and ductile detailing using IS: 13920-2016.

**Pedagogy for Course Delivery:** Problem-based learning (PBL), Internet/Web-Based Learning and formation real life problems.

**List of Professional Skill Development Activities (PSDA):** Webinars, Seminars, Conferences &Workshop.

**Assessment/Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

**Text Reading:**

- Chopra A.K., Dynamics of Structures', Theory & Applications to Eqrthquake Engineering, Prentice Hall India, New Delhi-1995
- Paz M, Structural Dynamics, , Van Nostrand Reinhold, New York
- Paz, M, International Handbook of Earthquake Engineering, Chapman & Hall, New York.

**References:**


- Clough & Penzien, Dynamics of Structures , McGraw Hill Book CO. Inc.
- IS-1893-1984, Indian Standard Criteria for Earthquake Resistant Design of Structures, B.I.S., New Delhi.
- IS-4326-1993, Indian Standard Code of Practice for Earthquake Resistant Design and Construction of Buildings, B.I.S., New Delhi.

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## Course Structure: FINITE ELEMENT METHOD – CEM 203

**Course Title: FINITE ELEMENT METHOD** **Credit Units: 4**

**Course Level: PG Level** **Course Code: CEM 203**

**Course Objectives:**

- The main objective of this course is to make student aware about the programming, computer added drafting, modeling and analysis of structures.

**Pre-requisites:** The students must possess a good foundation and keen interest in physics, along with knowledge and familiarity of Structural Analysis & Mechanics of Materials.

**Course Contents/Syllabus:**

| | **Weightage (%)** |
|---|---|
| **Module I Introduction to Finite Element Method** | **20** |
| **Descriptors/Topics**<br>General Applicability and Description of Finite Element Method Comparison with other methods. | |
| **Module II Solution of Finite Element Method** | **20** |
| **Descriptors/Topics**<br>Solution of Equilibrium Problems, Eigen value problems, propagation problems, computer implementation of Gaussian eliminations, Choleski's decomposition, Jocobi and Ranga Kutta Method. | |
| **Module III General Procedure of Finite Element Method** | **20** |
| **Descriptors/Topics**<br>Descretization of the domain, Selection of Shapes, Types and Number of elements, node numbering technique, Interpolation Polynomials, their selection and derivation in terms of global and local coordinates, Convergence requirements. Formulation of Element Characteristic matrices and vectors, Variational approach. Assembly of Element matrices and Vectors and Derivation system equations, computation of element resultants. | |
| **Module IV Iso-parametric Formulation** | **20** |
| **Descriptors/Topics**<br>Lagrange and Hermite interpolation functions, Isoparametric Elements, Numerical Integration. | |

| **Module V Analysis** | |
|---|---|
| **Descriptors/Topics**<br>Static Analysis: Formulation of equilibrium equation, Analysis of truss, Frames, Plane<br>Stress and Plane Strain Problems Plates and Shells. | **20** |

**Student Learning Outcomes:**

- On the completion of this subject course, the students can apply the elemental approach of analysis & design in the various field of structural Engineering. The knowledge of numerical techniques will be very helpful in their dissertation work.

**Pedagogy for Course Delivery:** Lectures, Presentation, Internet based Learning.

**List of Professional Skill Development Activities (PSDA):** Workshop and Seminar

**Assessment/Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

**Text Reading:**

- Weaver, Johnson, Finite element and structural analysis
- HC Martin, Matrix structural analysis
- CF Abel, CS Desai, Finite element methods
- Buchanan, Finite element Analysis (schaum Outline S), TMH
- R. D. Cook, Concepts and Applications of Finite Element Analysis, John Wiley, New York, 2004. 2. O. C. Zienkiewicz and R. L. Taylor, Finite Element Method, Butterworth Heinemann publication, 2000.
- C.S. Krishnamoorty, Finite element methods, Tata-McGraw Hill, Second Edition, New Delhi, 2002.

**References:**

- T. R. Chandupatla& A. D. Belegundu, Introduction to Finite Elements in Engineering, Prentice Hall of India Pvt. Ltd., New Delhi, 5th Reprint, 1999
- J. N. Reddy, An introduction to Linear Finite Element Method, Oxford University Press, Oxford, 2004.

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## Course Structure: STRUCTURAL HEALTH MONITORING – CEM 207

**Course Title: STRUCTURAL HEALTH MONITORING** **Credit Units: 4**

**Course Level: PG Level** **Course Code: CEM 207**

**Course Objectives:**

- This course is included to provide the basic knowledge of Structural health monitoring.

**Pre-requisites:** Students should possess the basic knowledge of Properties of concrete and material testing.

**Course Contents/Syllabus:**

| | Weightage (%) |
|---|---|
| **Module I Structural Health** | **20 %** |
| **Descriptors/Topics**<br>Factors affecting Health of Structures, Causes of Distress, Regular Maintenance. | |
| **Module II Structural Health Monitoring Procedure** | **20 %** |
| **Descriptors/Topics**<br>Concepts, Various Measures, Structural Safety in Alteration. Structural Audit: Assessment of Health of Structure, Collapse and Investigation, Investigation Management, SHM Procedures. | |
| **Module III Static Field Testing** | **20 %** |
| **Descriptors/Topics**<br>Types of Static Tests, Simulation and Loading Methods, sensor systems and hardware requirements, Static Response Measurement. | |
| **Module IV Dynamic Field Testing** | **20 %** |
| **Descriptors/Topics**<br>Types of Dynamic Field Test, Stress History Data, Dynamic Response Methods, Hardware for Remote Data Acquisition Systems, Remote Structural Health Monitoring. | |
| **Module V Introduction to Repairs and Rehabilitations of Structures** | **20 %** |
| **Descriptors/Topics**<br>Case Studies (Site Visits), piezo–electric materials and other smart materials, electro–mechanical impedance (EMI) technique, adaptations of EMI technique. | |

**Student Learning Outcomes:**

At the end of the course, students will be able to

- Diagnosis the distress in the structure understanding the causes and factors.
- Assess the health of structure using static field methods.
- Assess the health of structure using dynamic field tests.
- Suggest repairs and rehabilitation measures of the structure

**Pedagogy for Course Delivery:** Problem-based learning (PBL), Internet/Web-Based Learning and formation real life problems.

**List of Professional Skill Development Activities (PSDA):** Webinars, Seminars, Conferences &Workshop.

**Assessment/Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

**Text Reading:**

- Structural Health Monitoring, Daniel Balageas, Claus_PeterFritzen, Alfredo Güemes, John Wiley and Sons, 2006
- Health Monitoring of Structural Materials and Components_Methods with Applications, Douglas E Adams, John Wiley and Sons, 2007.

**References:**

- Structural Health Monitoring and Intelligent Infrastructure, Vol1, J. P. Ou, H. Li and Z. D. Duan, Taylor and Francis Group, London, UK, 2006.
- Structural Health Monitoring with Wafer Active Sensors, Victor Giurglutiu, Academic P

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## Course Structure: ADVANCED STEEL STRUCTURE – CEM 204

**Course Title: ADVANCED STEEL STRUCTURE** **Credit Units: 4**

**Course Level: PG Level** **Course Code: CEM 204**

**Course Objectives:**

- The main objective of this course is to impart the knowledge of advanced topics in Structural Steel Design and prepare their career in the field of steel design

**Pre-requisites:** The students must possess a good foundation and knowledge on Design of Steel structures and Structural Analysis.

**Course Contents/Syllabus:**

| | Weightage (%) |
|---|---|
| **Module I Basics of Steel Design** | 20 |
| **Descriptors/Topics**<br>Design for tension and compression members, connections. | |
| **Module II Design of Plate girders** | 20 |
| **Descriptors/Topics**<br>Design of plate girders, crane girders and trusses. Multi-storyed buildings | |
| **Module III Design of Special Structures** | 20 |
| **Descriptors/Topics**<br>Silos, bins and hoppers. Design of steel tanks and staging. | |
| **Module IV Design of Bridges** | 20 |
| **Descriptors/Topics**<br>Design of bridges, trusses, lateral bracings, sway brackens and stress reversals | |
| **Module V Plastic Design** | 20 |
| **Descriptors/Topics**<br>Design of continuous beams and frames by plastic theory; Use of reference books and relevant codes of practice are permitted in the examination | |

**Student Learning Outcomes:**

- The outcome of this course results the job opportunities in the field of structural steel design i.e. industrial design, steel bridges, and railway construction

**Pedagogy for Course Delivery:** Lectures, Problem based learning, Presentations

**List of Professional Skill Development Activities (PSDA):** Industrial Visit, Seminar, Workshop

**Assessment/Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

**Text Reading:**

- Morsis L.J. Plum, D.R., Structural Steel Work Design
- Sinha D.A., Design of Steel Structures
- Yu, W.W., Cold Formed Steel Structures Design
- K.Mukhanov, Design of Metal structures.

**References:**


- B Bresler, T Y Lin and J B Scalzi, Design of Steel structures.
- P Dayaratnam, Design of Steel Structures.

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## Course Structure: DESIGN OF PRE-STRESSED STRUCTURES – CEM 205

**Course Title: DESIGN OF PRE-STRESSED STRUCTURES** **Credit Units: 4**

**Course Level: PG Level** **Course Code: CEM 205**

**Course Objectives:**

- The main objective of this course is to impart the knowledge of Pre-stressed Design and construction.

**Pre-requisites:** The students must possess a good foundation and knowledge on Design of RC structures and Structural Analysis.

**Course Contents/Syllabus:**

| | **Weightage (%)** |
|---|---|
| **Module I Design Standards** | |
| **Descriptors/Topics**<br>Different systems of pre-stressing, Characteristics of concrete and steel, other suitable design of section for flexure, shear and torsion. Design of compressive member. Limit state design as per IS code. Comparison of design with respect to British, Australian and American code. | **20** |
| **Module II Design of Partial Pre-stressing & End blocks** | |
| **Descriptors/Topics**<br>Partial pre-stressing. Stress distribution in end-block of post tensioned section. Magnel's method, Guyen's method, Rowe's method and IS code method. | **20** |
| **Module III Design of Continuous beams** | |
| **Descriptors/Topics**<br>Deflection of pre-stressed structures- short term as well as long term deflections of uncracked and cracked members. Indeterminate structures-Principles of design of prismatic continuous beams of two and three equal, unequal spans with variable moments of inertia, Cap cable. | **20** |
| **Module IV Design of Frames** | |
| **Descriptors/Topics**<br>Jaeques Muller's theorem. Pre-stressing of rigid frames. Composite construction of pre-stressed and in-situ concrete. | **20** |

| **Module V Design of Special structures** | |
|---|---|
| **Descriptors/Topics**<br>Circular tanks, Pipes, Mast, and materials, Losses in pre-stress Analysis of Railway sleepers. | **20** |

**Student Learning Outcomes:**

- After the completion of this subject course, the students can develop their skill in the field of Pre-cast construction and pre-stressed construction. The knowledge of pre-stressed design can help in their dissertation work.

**Pedagogy for Course Delivery:** Lectures, Problem based learning, and Presentations.

**List of Professional Skill Development Activities (PSDA):** Industrial Visit, Seminar and Workshop.

**Assessment/Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

**Text Reading:**


- Y. Guyen, Prestressed concrete Vol-I & Vol.-II, John Willey & Sons, New York-1960.
- N. Krishnaraju, Prestressed concrete, Tata McGraw-Hill, New Delhi-2004.
- T. Y. Lin and H. Burns Ned, Design of Prestressed concrete structures, John Willey & Sons, New York-1982.


**References:**


- S. K. Mallik and A. P. Gupta, Prestressed concrete, Oxford & IBH, New Delhi-1982.
- E. W. Bennet, Prestressed concrete theory & design, Chapman & Hall, London-1962.

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## Course structure: EXPERIMENTAL STRESS ANALYSIS – CEM 206

**Course Title: EXPERIMENTAL STRESS ANALYSIS** **Credit Units: 4**

**Course Level: PG Level** **Course Code: CEM 206**

**Course Objectives:**

- The main objective of this course is to make student aware about experimental stress analysis (ESA) using strain gauge measurements.

**Pre-requisites:** The students must have knowledge on Strength of Materials and Material Testing

**Course Contents/Syllabus:**

| | **Weightage (%)** |
|---|---|
| **Module I Strain Measurement** | |
| **Descriptors/Topics**<br>Strain gauges-theory of resistance strain gauges, basic types and constructions, gauge configurations and their uses, gauge materials and requirements, mounting techniques, strain gauge circuitry, reduction of strain gauge data, special applications such as high temperature, fatigue and creep. **Displacement Measurement**: Mechanical dial gauges, linear variable differential transformers, linear resistance potentiometers. | **20** |
| **Module II Stress and Force Measurements** | |
| **Descriptors/Topics**<br>Load cells-types and sizes, embedded stress meters and plugs, proving rings.<br>**Temperature Measurements:** Thermo – couples and thermistors, thermistor type thermometers. | **20** |
| **Module III Vibration Measurements** | |
| **Descriptors/Topics**<br>Vibration pickups for measuring displacements, velocities and accelerations-principles of operations phase distortions, sensitivity, practical applications. | **20** |
| **Module IV Photoelasticity** | |
| **Descriptors/Topics**<br>Photoelastic theory, Photoelastic equipment, Photoelastic model materials, reduction of Photoelastic data, extrapolation to the prototype, practical applications.<br>**Smart Materials:** Characteristics, piezoelectric materials, shape memory alloys, self healing materials, practical applications. | **20** |

| **Module V Measurement Devices** | |
|---|---|
| **Descriptors/Topics**<br>UPV method, radar and dynamic response testing, radiography and radiometry, infrared thermography, X-Ray diffraction, SEM techniques. | **20** |

**Student Learning Outcomes:**

- After the completion of this subject course, the students can verify their analytical numerical model especially in the FEM modeling.

**Pedagogy for Course Delivery:** Lectures, Presentation, Internet based learning, Lab hands on experiments

**List of Professional Skill Development Activities (PSDA):** Workshop and Seminars

**Assessment/Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

**Text Reading:**

- Dally, J.W. and Riley, W.F., “Experimental Stress Analysis”, McGraw-Hill
- Sabmis, G.J.et al.,”Structural Modeling and Experimental Techniques”, Prentice – Hall.
- Bungey, J.H.and Millard, S.G., “Testing of Concrete in Structures”, Blackie Academic & Professional.

**References:**

- Encyclopedia of Smart materials, John Wiley & Sons

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## Course Structure: STRUCTURAL ENGINEERING LAB – CEM 220

**Course Title: STRUCTURAL ENGINEERING LAB** **Credit Units: 2**

**Course Level: PG Level** **Course Code: CEM 220**

**Course Objectives:**

- The main objective of this course is to make student aware about the various test on concrete required for quality assurance and present status of old structures.

**Pre-requisites:** The students must possess fair knowledge on Strength of Materials and Material Testing and Concrete Technology

**Course Contents/Syllabus:**

| |
|---|
| **Experiment 1** |
| Mix design of concrete of different grades & using admixtures. |
| **Experiment 2** |
| Tensile and Flexural strength of concrete of different grades. |
| **Experiment 3** |
| Tensile strength of different types of steel rebars, rolled steel sections. |
| **Experiment 4** |
| Testing of simply supported RCC beams for flexural failure |
| **Experiment 5** |
| Testing of simply supported RCC beams for shear failure |
| **Experiment 6** |
| Testing of RCC column |
| **Experiment 7** |
| Non-destructive testing of concrete including rebound hammer and ultrasonic pulse method. |
| **Experiment 8** |
| Permeability of concrete |
| **Experiment 9** |
| Vibration analysis of beams and plates |
| **Experiment 10** |
| Buckling load of struts. |

**Student Learning Outcomes:**

- After the completion of this subject course, the students can develop their skill in the field of quality control of materials and various causes of failure of structures.

**Pedagogy for Course Delivery:** Hands on Exercises.

**List of Professional Skill Development Activities (PSDA):** N/A

**Assessment/Examination Scheme:**

| | IA | | | | ESE | | |
|---|---|---|---|---|---|---|---|
| **Components** | A | PR | LR | V | PR | LR | V |
| **Weightage (%)** | 5 | 10 | 10 | 5 | 50 | 10 | 10 |

IA: Internal Assessment, ESE ; End Semester Examination, A : Attendance, PR: practical work, LR : Lab Record, V; viva voice.

**Text Reading:**

- A.M. Neville & J.J. Brooks, Concrete Technology, Pearson Education, Delhi, 2004.
- A.R. Santha kumar, Concrete Technology, Oxford University Press, 2007, New Delhi
- Structural Engineering laboratory manual.

**References:**

- Relevant BIS Codes of practice for mix design, rebar testing, concrete design etc.

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## Course Structure: FINITE ELEMENT METHOD LAB – CEM 222

**Course Title: FINITE ELEMENT METHOD LAB** **Credit Units: 2**

**Course Level: PG Level** **Course Code: CEM 222**

**Course Objectives:**

- The main objective of this course is to make student aware about the Finite element modeling and analysis of structural elements of Civil Engineering structures.

**Pre-requisites:** N/A

**Course Contents/Syllabus:**

| |
|---|
| **Experiment 1** |
| Analysis and design of Multi-storey building frames using Finite Element method (FEM) |
| **Experiment 2** |
| Analysis and design of Elevated Water Tank using FEM |
| **Experiment 3** |
| Analysis and design of bridge decks and other structures using FEM4. |
| **Experiment 4** |
| Analysis of plate bending & Deep beams |
| **Experiment 5** |
| Analysis of thick shell. |

**Student Learning Outcomes:**

- After the completion of this subject course, the students can develop the algorithm and program in the various field of structural Engineering. The knowledge of numerical techniques will be very helpful in their dissertation work.

**Pedagogy for Course Delivery:** Hands on Exercises.

**List of Professional Skill Development Activities (PSDA):** N/A

**Assessment/Examination Scheme:**

| | IA | | | | ESE | | |
|---|---|---|---|---|---|---|---|
| **Components** | A | PR | LR | V | PR | LR | V |
| **Weightage (%)** | 5 | 10 | 10 | 5 | 50 | 10 | 10 |

IA: Internal Assessment, ESE; End Semester Examination, A: Attendance, PR: practical work, LR: Lab Record, V; viva voice.

**Text Reading:**

- Finite Element Analysis (Theory & Programming ) by C. S. Krishnamoorthy, Tata McGraw-Hill Publishing Company Limited, New Delhi.
- Finite Element Analysis by J. N. Reddy

**References:**

- Theory & Practices of FEM using ANSYS.

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## Course Structure: NON-DESTRUCTIVE TESTING LAB - CEM 223

**Course Title: NON-DESTRUCTIVE TESTING LAB** **Credit Units: 2**

**Course Level: PG Level** **Course Code: CEM 223**

**Course Objectives:**

- The main objective of this course is to impart the knowledge in the field Health monitoring of structures through the observations on various forms of distresses by observations and tests.

**Pre-requisites:** N/A

**Course Contents/Syllabus:**

| |
|---|
| **Tests for Concrete** |
| **Experiment 1** |
| Strength assessment using rebound hammer |
| **Experiment 2** |
| Quality assessment using ultrasonic pulse velocity test |
| **Experiment 3** |
| Strength assessment using pull out method |
| **Experiment 4** |
| Assessment of corrosion of reinforcing bars using half-cell potentiometer |
| **Experiment 5** |
| To determine thickness of concrete cover, diameter & spacing of reinforcing bars using rebar scanner. |
| **Test on structural steel** |
| **Experiment 6** |
| Testing for corrosion of structural steel |
| **Experiment 7** |
| Assessment of thickness of pipes/tubes/structural steel |
| **Experiment 8** |
| Test for welding performance with Di-penetration test, ultrasonic test & magnetic particle test. |

**Student Learning Outcomes:**

- Diagnosis the distress in the structure understanding the causes and factors.
- Assess the health of structure using static field methods.

**Pedagogy for Course Delivery:** Hands on Exercises.

**List of Professional Skill Development Activities (PSDA):** N/A

**Assessment/Examination Scheme:**

| | IA | | | | ESE | | |
|---|---|---|---|---|---|---|---|
| **Components** | A | PR | LR | V | PR | LR | V |
| **Weightage (%)** | 5 | 10 | 10 | 5 | 50 | 10 | 10 |

IA: Internal Assessment, ESE ; End Semester Examination, A : Attendance, PR: practical work, LR : Lab Record, V; viva voice.

**Text Reading:**

- Manuals on Non Destructive testing (NDT).
- Non Destructive testing Hand book

**References:**

- Non Destructive testing of materials by Dr. V. Jaykumar and Dr. K. Elangovan

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## Course Structure: ADVANCED COMMUNICATION-II - BCP 241

**Course Title: ADVANCED COMMUNICATION-II** **Credit Units: 1**

**Course Level: PG Level** **Course Code: BCP 241**

**Course Objectives:**

- The Course is designed to enhance vocabulary skills and make students fluent, thereby improving receptive and expressive skills.

**Pre-requisites: NIL.**

**Course Contents/Syllabus:**

| | **Weightage (%)** |
|---|---|
| **Module I Job Correspondence** | **20** |
| **Descriptors/Topics**<br>• Job Applications<br>• Resume & Profile Writing for Social Media<br>• Follow Up Letter | |
| **Module II Dynamics of Group Discussion** | **30** |
| **Descriptors/Topics**<br>• Methodology<br>• Guidelines | |
| **Module III Speaking for Employment** | **50** |
| **Descriptors/Topics**<br>• Types of Interview (Technical & HR Rounds)<br>• Fundamentals of Facing Interviews<br>• Question Answer on Various Dimensions<br>• Non-Verbal Communication Component<br>• Interview Etiquettes | |

**Student Learning Outcomes:**

- The student will be able to write an impressive resume and face the interview confidently

**Pedagogy for Course Delivery:** Workshop, Presentation, Group Discussion & Lectures

**List of Professional Skill Development Activities (PSDA):** N/A.

**Assessment/ Examination Scheme:**

| Theory L/T (%) | Lab/Practical/Studio (%) | End Term Examination |
|---|---|---|
| 100% | NA | 70% |

**Theory Assessment (L&T):**

| End Term Examination | | | | |
|---|---|---|---|---|
| **Components (Drop down)** | **CIE** | **Mid Sem** | **Attendance** | **End Term Examination** |
| **Weightage (%)** | 10% | 15% | 5% | 70% |

**Text Reading:**

- Bovee, L Courtland, Mukeshchaturvedi, and John U Thill, Business Communication Today, Pearson
- Raman Prakash, Business Communication, 2nd ed. Delhi OUP 2006
- Comfort ,Jermy Speaking Effectively, Jermy, et.al, Cambridge, CUP, 1994
- Reference: Guffey, Ellen Mary, Business Communication, Thomson (South Western)
- Stay Hungry, Stay Foolish: Rashmi Bansal
- Business Maharajas: Gita Piramal
- How to Make Friends in Digital Age: Dale Carnegie
- Kathryn Rentz, NeerjaPande, Mc Graw Hill, 2009

**References:**

- Business Communication Today – Courtland L Bovee, John V Thill Mukesh Chaturvedi, Pearson 2009
- Additional Reading:  Newspapers and Journals

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## Course Structure: BEHAVIOURAL SCIENCE - II – BSP 243

**Course Title: BEHAVIOURAL SCIENCE - II** **Credit Units: 1**

**Course Level: PG Level** **Course Code: BSP 243**

**Course Objectives:**

- To develop an understanding the concept of stress its causes, symptoms and consequences.
- To develop an understanding the consequences of the stress on one's wellness, health, and work performance.
- Enhancing personal effectiveness and performance through effective interpersonal communication
- Enhancing their conflict management and negotiation skills

**Pre-requisites: NIL.**

**Course Contents/Syllabus:**

| | Weightage (%) |
|---|---|
| **Module I Conflict Management** | 20 |
| **Descriptors/Topics**<br>• Meaning and nature of conflicts<br>• Types of Conflict<br>• Styles and Techniques of conflict management<br>• Conflict management and interpersonal communication | |
| **Module II Behavioural& Interpersonal Communication** | 20 |
| **Descriptors/Topics**<br>• Importance of Interpersonal Communication<br>• Rapport Building – NLP, Communication mode<br>• Steps to improve interpersonal communication<br>• Meaning and Nature of Behavioural Communication<br>• Relevance of Behavioural Communication | |
| **Module III Relationship Management for Personal and professional Development** | 20 |
| **Descriptors/Topics**<br>• Importance of relationships<br>• Maintaining healthy relationships<br>• Communication Styles<br>• Types of Interpersonal Relationships | |
| **Module IV Stress Management** | 20 |

| Descriptors/Topics | |
|---|---|
| **Descriptors/Topics**<br>• Understanding of Stress & GAS Model<br>• Symptoms of Stress<br>• Individual and Organizational consequences with special focus on health<br>• Healthy and Unhealthy strategies for stress management<br>• Social support for stress management and well being<br>• Stress free, Successful and Happy Life | |
| **Module V Conflict Resolution & Management** | **10** |
| **Descriptors/Topics**<br>• Conflict Resolution Strategies<br>• Ways of Managing Conflict (Healthy & Unhealthy)<br>• Impact of Conflict Resolution & Management mation of Attitudes | |
| **Module VI End-of-Semester Appraisal** | **10** |
| **Descriptors/Topics**<br>• Viva - Voce based on personal journal<br>• Assessment of Behavioral change as a result of training<br>• Exit Level Rating by Self and Observer | |

**Student Learning Outcomes:**

- The students will be able to use the LSRW Skills to communicate effectively in a professional environment.

**Pedagogy for Course Delivery:** Lectures, Presentation.

**List of Professional Skill Development Activities (PSDA):** Seminar & Workshop.

**Assessment/ Examination Scheme:**

| Evaluation Components | Attendance | Journal of Success (JOS) | Social Awareness Progra (SAP) SAP Report/SAP Presentation | End Semester Exam | Total |
|---|---|---|---|---|---|
| **Weightage (%)** | 5 | 10 | 15 | 70 | 100 |

**Text Reading:**

- Vangelist L. Anita, Mark N. Knapp, Inter Personal Communication and Human Relationships: Third Edition, Allyn and Bacon
- Julia T. Wood. Interpersonal Communication everyday encounter
- Simons, Christine, Naylor, Belinda: Effective Communication for Managers, 1997 1st Edition Cassel
- Beebe, Beebe and Redmond; Interpersonal Communication, 1996; Allyn and Bacon Publishers.

**References:**


- Goddard, Ken: Informative Writing, 1995 1st Edition, Cassell
- Harvard Business School, Effective Communication: United States of America
- Foster John, Effective Writing Skills: Volume-7, First Edition 2000, Institute of Public Relations (IPR)

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# Course Structure: MINOR PROJECT I – MMP 260

**Course Title: MINOR PROJECT I** **Credit Units: 4**

**Course Level: PG Level** **Course Code: MMP 260**

**Course Objectives:** The minor project offers the opportunity to apply and extend the knowledge acquired. The minor project can be analytical work, simulation, hardware design or a combination of these in the emerging areas of Technology, under the supervision of a faculty from the Department. The objective of the course is to Develop aptitude for research and independent learning in the students. The emphasis of the minor project shall be on facilitating student learning in technical, project management and presentation spheres. The project work will be carried out individually

**Methodology:**

Topics of project are to be based on the latest trends, verifying engineering concepts /principals and should involve elementary research work. The projects may involve design, fabrications, testing, computer modeling, and analysis of any engineering problem. The specific project topic undertaken will reflect the common interests and expertise of the student(s) and supervisor. Students will be required to1) perform a literature search to review current knowledge and developments in the chosen technical area; 2) undertake detailed technical work in the chosen area using one or more of the following:

- Analytical models
- Computer simulations
- Hardware implementation.

On completion of the project the students are to present a report covering various aspects learnt by them and give a presentation on same.

The student will submit a synopsis at the beginning of the semester for the approval to the school project committee in a specified format. The student will have to present the progress of the work through seminars and progress report. A report must be submitted to the school for evaluation purpose at the end of the semester in a specified format.

**Course Outcomes:**

1. Develop aptitude for research and independent learning.
2. Demonstrate the ability to carry out literature survey and select unresolved problems in the domain of the selected project topic.
3. Gain expertise to use new tools and techniques for design and development.
4. Acquire the knowledge and awareness to carry out cost-effective and environment friendly designs.
5. Develop the ability to write good technical reports, make oral presentations of the work, and publish the work in reputed conferences/journals.

**Examination Scheme:**

| | |
|---|---|
| Literature study/ Fabrication/ Experimentation | 40 |
| Written Report | 20 |
| Viva | 15 |
| Presentation | 25 |
| **Total** | **100** |

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## Course Structure: RESEARCH METHODOLOGY – CEM 301

**Course Title: RESEARCH METHODOLOGY** **Credit Units: 4**

**Course Level: PG Level** **Course Code: CEM 301**

**Course Objectives:**

- The main objective of this course is to make student aware about the programming, computer aided drafting and drawing of modeling

**Pre-requisites:** Nil

**Course Contents/Syllabus:**

| | Weightage (%) |
|---|---|
| **Module I Research** | 25 |
| **Descriptors/Topics**<br>Types, Research process and steps in it, Hypothesis, Research proposals and aspects. Research Design: Need, Problem Definition, variables, research design concepts, Literature survey and review, Research design process, Errors in research.<br>Research Modeling: Types of Models, Model building and stages, Data consideration and testing, Heuristic and Simulation modeling. Report Writing: Pre writing considerations, Thesis writing, Formats of report writing, formats of publications in Research journals | |
| **Module II Research Design** | 25 |
| **Descriptors/Topics**<br>Concepts and Type of research design, Design of research of the basis of application – pure and applied, Design of research on the basis of Techniques / Methodology – Exploratory and Descriptive, Descriptive Research – Qualitative and Quantitative, Quantitative – Field studies, Field experiments and laboratory experiments, Design of research on the basis of area of research – research in Social sciences and Physical sciences, Sampling and Data collection, Population and samples, Techniques of sampling, Random, Stratified, Systematic, Multistage-sampling, Primary and secondary sources of data, Design of questionnaire'. | |
| **Module III Design of Experiments** | 25 |
| **Descriptors/Topics**<br>Objectives, strategies, Factorial experimental design, Designing engineering experiments, basic principles-replication, randomization, blocking, Guidelines for | |

| | |
|---|---|
| design of experiments.<br>Single Factor Experiment: Hypothesis testing, Analysis of Variance components (ANOVA) for fixed effect model; Total, treatment and error of squares, Degrees of freedom, Confidence interval; ANOVA for random effects model, Estimation of variance<br>Components, Model adequacy checking.<br>Two factor Factorial Design, Basic definitions and principles, main effect and interaction, response surface and contour plots, General arrangement for a two factor factorial design; Models: Effects, means and regression, Hypothesis testing. | |
| **Module IV Computer Applications** | |
| **Descriptors/Topics**<br>Spreadsheet Tool: Introduction to spreadsheet application, features and functions, Using formulas and functions, Data storing, Features for Statistical data analysis, Generating charts/ graph and other features. Tools used may be Microsoft Excel, Open office or similar tool.<br>Presentation Tool: Introduction to presentation tool, features and functions, Creating presentation, Customizing presentation, showing presentation. Tools used may be Microsoft Power Point, Open Office or similar tool.<br>Web Search: Introduction to Internet, Using advanced search techniques. | **25** |

**Student Learning Outcomes:**

- To develop the algorithm and program in the various field of structural Engineering. The knowledge of numerical techniques will be very helpful in their dissertation work.

**Pedagogy for Course Delivery:** Lecture and Power point presentation.

**List of Professional Skill Development Activities (PSDA):** N/A

**Assessment/Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **ESE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

**Text Reading:**


- Montgomery, Douglas C. (2007), 5/e, Design and Analysis of Experiments, (Wiley India)
- Montgomery, Douglas C. &Runger, George C. (2007), 3/e, Applied Statistics & Probability for Engineers (Wiley India)
- Fowler, F.J. Survey Research Methods. New Delhi, Sage, 1993 Kothari, C.R., (2008) Research Methodology", New Age International, Wishwa
- Publications, Delhi Reprint 2nd edition.
- Leddy, Paul. D Practical Research: Planning Design. London, Clive Bingley. 1980

**References:**


- Kothari C.K. (2004), 2/e, Research Methodology- Methods and Techniques (New Age International, New Delhi)
- Krishnaswamy, K.N., Sivakumar, AppaIyer and Mathiranjan M. (2006), Management Research Methodology; Integration of Principles, Methods and Techniques (Pearson Education, New Delhi)

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## Course structure: ADVANCED RCC DESIGN – CEM 302

**Course Title: ADVANCED RCC DESIGN** **Credit Units: 4**

**Course Level: PG Level** **Course Code: CEM 302**

**Course Objectives:**

- The main objective of this course is to make student aware about the advanced reinforced concrete design.

**Pre-requisites:** Principles of R.C.C design & Structural steel design.

**Course Contents/Syllabus:**

| | **Weightage (%)** |
|---|---|
| **Module I Plastic theory of Reinforced Concrete** | |
| **Descriptors/Topics**<br>Plastic Section Theory for Reinforced Concrete including interaction of flexure Shear-Axial effects, Upper bound and lower bound plastic theorems, Application of plastic analysis to frames – instantaneous centre of rotation | **25** |
| **Module II Design of Flat Slab** | |
| **Descriptors/Topics**<br>Introduction of flat slab, component of flat slab construction, Indian code recommendation, direct design method, equivalent frame method, shear in flat slab, slab reinforcement, openings in flat slab, Introduction of circular slab | **25** |
| **Module III Yield line theory** | |
| **Descriptors/Topics**<br>Introduction of yield line theory, yield line patterns, moment capacity along yield line, ultimate load on slabs, Analysis by virtual work and equilibrium method, Redistribution of moments, moment curvature analysis, Recommendations of IS 456:2000 | **25** |
| **Module IV Pre-stressed Construction** | |
| **Descriptors/Topics**<br>Introduction to Pre-stressed concrete and behaviour for simple elements, design of section under flexure using limit state, Introduction of Deep beam, IS code method of design of Deep beam | **25** |

**Student Learning Outcomes:**

- To design the advanced R.C.C Structures.
- Various design philosophy of R.C.C design of members.

**Pedagogy for Course Delivery:** Lecture and Power point presentation.

**List of Professional Skill Development Activities (PSDA):** Industrial Visit & Seminar

**Assessment/Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **ESE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

**Text Reading:**

- Reinforced Concrete: Mechanics and Design, 6th Ed., McGregor & White
- Reinforced Concrete: A Fundamental Approach, 6th Ed., Edward Nawy
- Design of Prestressed Concrete, 2nd Ed., Arthur H. Nilso
- Darwin & Dolan, "Design of Concrete Structures", 14th Ed., Nilson,
- Jaikrishna, Chandrasekaran, Elements of earthquake engineering.
- Shah and Karve, Text book of reinforced concrete
- Punamia, RCC designs

**References:**

- IS-456, -875, -1893, -1984
- Krishna Raju, Prestressed concrete.
- Varghese, Advanced RC Designs, PHI
- Everard, Theory and problems of RC design (Shaum�s Outline S), TMH
- R. Park and T. Pauley, Reinforced concrete structures, John Wiley and sons
- A. K. Jain, Reinforced Concrete: Limit State design, NemChand and Bros. 1999.
- J. Krishna and OP Jain, Plain and Reinforced Concrete, Vol. I I, Roorkee, Nem Chand and Bros.
- H. Nilson, D. Darwin and C. W. Dolar, Design of Concrete structures, Tata McGraw Hill.
- T. Paulay and M.J.N. Priestley, Seismic Design of Reinforced Concrete and Masonry Buildings, John Wiley & Sons Inc

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## Course Structure: HIGH RISE BUILDINGS ANALYSIS – CEM 303

**Course Title: HIGH RISE BUILDINGS ANALYSIS** **Credit Units: 4**

**Course Level: PG Level** **Course Code: CEM 303**

**Course Objectives:**

- The main objective of this course is to impart the knowledge of analysis & design of high rise buildings.

**Pre-requisites:** Principles of structural design, Structural steel design, and Earthquake Engineering

**Course Contents/Syllabus:**

| | Weightage (%) |
|---|---|
| **Module I Introduction to High Rise Buildings** | 20 |
| **Descriptors/Topics**<br>Structural systems for multi-storey buildings, gravity and lateral loads on buildings, analysis of multi-storey frames. Behaviour of framed tube, tube-in-tube systems, and bundled tube systems | |
| **Module II Various design Consideration and foundation** | 30 |
| **Descriptors/Topics**<br>Importance of symmetry and regularity in plan, and regularity in elevation. Analysis for torsion in buildings. Design of floor slabs, raft and pile foundations. | |
| **Module III Seismic Design Consideration** | 20 |
| **Descriptors/Topics**<br>Design of buildings with shear walls and coupled shear walls | |
| **Module IV Design and detailing of structures** | 30 |
| **Descriptors/Topics**<br>Design and detailing of various members and beam-column joints for ductility. The capacity design principle. Performance based design philosophy. Application of MS-Excel, ETABS | |

**Student Learning Outcomes:**

- Analysis of Analysis & Design of various components of High Rise Buildings (HRB).
- Design the various foundations of HRBs

**Pedagogy for Course Delivery:** Lecture and Power point presentation.

**List of Professional Skill Development Activities (PSDA):** N/A

**Assessment/Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **ESE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

**Text Reading:**

- U.H.Varyani, “Structural Design of Multi-storeyed Buildings”, 2nd Ed., South Asian Publishers, New Delhi.2002
- V.L. Shah &S.R.Karve, “Illustrated Design of Reinforced Concrete Buildings”, (GF+3storeyed), Structures Publications, Pune.2013
- Design of Multi Storeyed Buildings, Vol. 1 & 2, CPWD Publications. 1976
- Bungale S. Taranath, “Structural Analysis and Design of Tall Buildings”,Mc-Graw Hill.1988

**References:**

- Bryan S. Smith and Alex Coull, “Tall Building Structures”, Wiley India. 1991
- Coull, Smith, Design of tall buildings
- B S Smith & A Coull, Tall Building Structures: - John Wiley & Sons.
- W. Schueller, High Rise Building Structures: John Wiley & Sons.

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## Course structure: ANALYSIS OF PLATE AND SHELLS – CEM 304

**Course Title: ANALYSIS OF PLATES AND SHELLS** **Credit Units: 4**

**Course Level: PG Level** **Course Code: CEM 304**

**Course Objectives:**

- To enable the student analyze and design thin shell structures including domes, hyperbolic, paraboloid, elliptic and cylindrical shells· To enable the student formulate Finite Element Equations for solution of the structural response of plate bending problems.

**Pre-requisites**: Basic knowledge of solving the differential equations, solid mechanics & Properties of Structural steel.

**Course Contents/Syllabus:**

| | Weightage (%) |
|---|---|
| **Module I Pure bending of plates** | |
| **Descriptors/Topics**<br>Pure Bending of Plates: Slope & curvature of slightly bent plates, Relations between bending moments and curvature in pure bending of plates, Strain energy in Pure bending of plates; Symmetrical bending of Circular plates | **20** |
| **Module II Analysis of Plates** | |
| **Descriptors/Topics**<br>Differential equation for symmetrical bending of laterally loaded circular plates, uniformly loaded circular plates, Circular plates with circular hole at center, circular plate concentrically loaded ; Small deflections of laterally loaded plates. | **20** |
| **Module III Various theory of Plates** | |
| **Descriptors/Topics**<br>Differential equation of the deflection surface, Boundary conditions, Simply supported rectangular plates under sinusoidal load, Navier solution for simply supported rectangular plates, Further applications of the Navier solution. | **20** |
| **Module IV Analysis of Shell design** | |
| **Descriptors/Topics**<br>Alternate solution for simply supported and uniformly loaded rectangular plates, concentrated load on simply supported rectangular plates. Importance of membrane theory of shells, shells in the form of a surface of revolution and loaded un- | **20** |

| | |
|---|---|
| symmetrically with respect to their axes, spherical dome, conical shells, cylindrical shells, Elliptic paraboloid, hyperbolic parabolod and conoids. | |
| **Module V Analysis of Cylindrical Shell** | **20** |
| **Descriptors/Topics**<br>General theory of cylindrical shells: Circular cylindrical shell loaded symmetrically with respect to its axis, particular cases of symmetrical deformations of circular cylindrical shells, cylindrical tanks of uniform wall thickness. Design of spherical domes with/without lanterns at top | |

**Student Learning Outcomes:**

- Analyze and design thin shell structures including domes, hyperbolic, paraboloid, elliptic and cylindrical shells
- Formulate Finite Element Equations for solution of the structural response of plate bending problems and obtain solutions to shell structures.

**Pedagogy for Course Delivery:** Lecture and Power point presentation.

**List of Professional Skill Development Activities (PSDA):** Workshop & Guest Lectures

**Assessment/Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **ESE** |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

**Text Reading:**

- S Timoshenko, S Woinowasky K, Theory of Plates and Shells
- S. P. Timoshenko and Woinowsky-Kriegar, Theory of plates and shells, Mc Graw Hill International, New Delhi
- G. S. Ramaswamy, Design and construction of concrete shells Roofs, CBS Publishers, and Delhi

**References:**

- D. P. Billington, Thin shell concrete structures, Mc Graw Hill international, New York
- W. T. Marshall, Design of cylindrical shell roofs, E& FN SPON, London

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## Course Structure: RELIABILITY BASED CIVIL ENGINEERING DESIGN – CEM 305

**Course Title: RELIABILITY BASED CIVIL ENGINEERING DESIGN** **Credit Units: 4**

**Course Level: PG Level** **Course Code: CEM 305**

**Course Objectives:**

- The objective of this course is to develop an understanding of the reliability-based methods of structural analysis

**Pre-requisites:** Principles of Structures.

**Course Contents/Syllabus:**

| | **Weightage (%)** |
|---|---|
| **Module I Probability Theory**<br>**Descriptors/Topics**<br>Mutually exclusive events, set theory, sample points and sample space, laws of probability, total probability theorem, Bayes' rule, random variables discreate and continuous, jointly distributed discrete variables, marginal distribution, conditional distribution, jointly distributed continuous variables functions of random variables, moments and expectations, common probability distribution normal Iognormal, Gamma and Beta distributions, external distributions. | **20** |
| **Module II Resistance Distribution and Parameters**<br>**Descriptors/Topics**<br>Statics of properties of concrete and steel, statics of strength of bricks and mortal, Characterization of variables, allowable stresses based on specified reliability. Probabilistic Analysis of loads: Load as a stochastic process, dead load, statistical analysis of live loads-maximum sustained load intensity model, maximum total load model, wind load-probability model for wind load. | **20** |
| **Module III Structural Reliability**<br>**Descriptors/Topics**<br>General expression for reliability, expression for probability of failure: reliability when strength (S) and load (L) follow normal distribution, lognormal distribution, exponential distribution, extreme value distributions, factor of safety corresponding to a given reliability. Monte Carlo Study of Reliability: Monte Carlo Method-Inverse transformation technique, Application to columns beams and frames. Level 2 Reliability Method: Basic variables and failure surface, first order second moment methods-Hasofer and linds method, Non normal distributions; determination of reliability index of structural elements. | **20** |

| | |
|---|---|
| **Module IV Structural Safety Systems**<br>**Descriptors/Topics**<br>Determination of partial safety checking formats, development of reliability based criteria, optimal safety factors, calibration of IS 456and IS 800 | **20** |
| **Module V Reliability of Structural Systems**<br>**Descriptors/Topics**<br>System reliability, modeling of structural systems, bounds on system reliability, automatic generation of a mechanism, generation of dominant mechanisms, reliability analysis of R.C.C. and Steel Frames | **20** |

**Student Learning Outcomes:**

- Students can reinforce their knowledge of probability and statistics
- Quantify reliability and safety in civil engineering applications.
- Learn how design specifications are based on reliability theory.

**Pedagogy for Course Delivery:** Lecture and Power point presentation.

**List of Professional Skill Development Activities (PSDA):** Workshop & Guest Lectures

**Assessment/Examination Scheme:**

| Components | A | CT | S/V/Q/HA | ESE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

**Text Reading:**

- Ranganathan, R. Reliability Analysis and Design of Structures, TMH
- Rao. S.S. Reliability Based Design, McGraw Hill Book CO. Inc.

**References:**

- Ghosh, D.I., A Primer of Reliability Theory, john Wiley , New York
- Lewis, E.E., Introduction to Reliability Engineering, John Wiley New York.

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## Course structure: EVALUATION AND RETROFITTING OF BUILDING – CEM 306

**Course Title: EVALUATION AND RETROFITTING OF BUILDING** **Credit Units: 4**

**Course Level: PG Level** **Course Code: CEM 306**

**Course Objectives:**

- To impart the knowledge of analytical methods of Evaluation of seismic resistance of buildings. Highlight the deficiencies of existing multi-storeyed reinforced concrete buildings and describe the available seismic retrofit strategies for the deficient buildings.

**Pre-requisites:** Principles of Structures, Concrete Technology

**Course Contents/Syllabus:**

| | Weightage (%) |
|---|---|
| **Module I Distresses in Concrete** | |
| **Descriptors/Topics**<br>Deterioration of concrete buildings. Embedded metal corrosion ,disintegration mechanism moisture effect structural effect faulty construction | **20** |
| **Module II Non Destructive techniques** | |
| **Descriptors/Topics**<br>Evaluation of concrete buildings ,visual investigation destructive testing system ,non-destructive testing technique ,semi destructive testing technique, chemical testing | **20** |
| **Module III Structural Health Monitoring** | |
| **Descriptors/Topics**<br>Structural health monitoring ,vibration based monitoring technique, smart materials and sensors | **20** |
| **Module IV Repair & Retrofitting** | |
| **Descriptors/Topics**<br>Surface repair and retrofitting techniques, strategy and design selection of repair materials, surface preparation , bonding repair materials to existing concrete , placement methods | **20** |
| **Module V Strengthening Techniques** | |
| **Descriptors/Topics**<br>Strengthening technique ,beam shear strengthening technique ,shear transfer | **10** |

| | |
|---|---|
| strengthening between members, column Strengthening, flexural Strengthening and crack stabilization | |
| **Module VI Seismic retrofitting** | **10** |
| **Descriptors/Topics**<br>Seismic rehabilitation of existing buildings seismic vulnerability and strategies for seismic retrofit | |

**Student Learning Outcomes:**

- Students can understand the various deficiencies in R.C.C. buildings & its evaluation.
- Deficiency-based retrofit methods

**Pedagogy for Course Delivery:** Lecture and Power point presentation.

**List of Professional Skill Development Activities (PSDA):** Seminar & Industrial Visit

**Assessment/Examination Scheme:**

| Components | A | CT | S/V/Q/HA | ESE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

**Text Reading:**


- Emmons P.H. “Concrete Repan and Maintenance Illustrated Galgotia Publications Pvt. Ltd. 2001
- Bungey S. Lillard. G and Grantham. M.G “Testing of Concrete in Structure” Taylor and Francis 2001
- Mallhotra V.M and Carino. N.J “Handbook on Non-destructive Testing of Concrete. CRC Press 2004
- Bohni. H. “Corrosion in Concrete Structures” CRC Press 2005
- FEMA 273, NEHRP Guidline for Seismic Rehabilitation of Buildings 1997
- ATC-40 Seismic Evaluation and Retrofit of Concrete Building Vol 1 & 2 1997


**References:**


- Priestley.M.J.N. Seible.F andCalvi. GM. “Seismic Design and Retrofit of Bridges” John Wiley & Sons 1996.
- A. W. Hendry, Sinha, Davis, Introduction to Load Bearing Brick Work Design, 1st UK Edition, Ellis HorwoodLtd., 1981.
- A. W. Hendry, Structural Masonry, 2nd Rev. Edition, Palgrave McMillan Press, 1998.

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## Course structure: STRUCTURAL MATERIAL TESTING LAB - II – CEM 322

**Course Title: STRUCTURAL MATERIAL TESTING LAB – II** **Credit Units: 2**

**Course Level: PG Level** **Course Code: CEM 322**

**Course Objectives:**

- The main objective of this course is to make student aware about the quality assurance at the construction site

**Pre-requisites:** Students should possess the knowledge of Engineering materials & Concrete Technology.

**Course Contents/Syllabus:**

**List of Experiments**

| |
|---|
| 1. Tension test on MS rod |
| 2. Shear Test on MS rod |
| 3. Torsion test on MS Specimen |
| 4. Bending test on steel beams |
| 5. Spring test – open and close coil springs. |
| 6. Compression test on cubes and cylinders – determination of modulus of elasticity |
| 7. Split test on concrete cylinders and flexure test on concrete. |
| 8. Study of extensometers and strain gauges. |
| 9. Bending test on reinforced concrete beams – under reinforced and over reinforced. |
| 10. Demonstration of Non- Destructive Testing Equipment |
| 11. Test on Timber beam – Bending test |
| 12. Tests on tiles – Dimension, Transverse Strength, Water Absorption and Crazing |
| 13. Tests on bricks – Crushing strength, water absorption and efflorescence |
| 14. Tests on metals – Hardness test and impact test |

**Student Learning Outcomes:**

- After the completion of this subject course, the students can work as quality Engineer at site

**Pedagogy for Course Delivery:** Hands on Exercises.

**List of Professional Skill Development Activities (PSDA):** N/A

**Assessment/Examination Scheme:**

| | IA | | | | EE | |
|---|---|---|---|---|---|---|
| **Components** | **A** | **PR** | **LR** | **V** | **PR** | **V** |
| **Weightage (%)** | 5 | 10 | 10 | 5 | 35 | 35 |

IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

**Text Reading:**

- Civil Engineering Materials and their Testing by Syed Danish Hasan

**References:**

- Building material testing hand book (https://civilread.com)
- Handbook of material Testing (www.iricen.gov.in)

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## Course Structure: STRUCTURAL DYNAMICS LAB – CEM 323

**Course Title: STRUCTURAL DYNAMICS LAB** **Credit Units: 2**

**Course Level: PG Level** **Course Code: CEM 323**

**Course Objectives:**

- The course is intended to provide necessary knowledge to establish the equations of motion and for the determination of structural response from dynamic loads and experience in the modeling and calculation of dynamic response for simple structural systems.

**Pre-requisites:** N/A

**Course Contents/Syllabus:**

**List of Experiments**

| |
|---|
| 1. Dynamic Analysis of various civil engineering structures by using MATLAB |
| 2. Analysis of Plain stress strain problems using Finite element method |
| 3. Study on various structural Control system used in Seismic control using following methods: (10 Hours)<br>i) Passive control system like Base Isolation techniques<br>ii) Active control<br>iii) Semi- active control<br>iv) Hybrid control system<br>v) Study of Single degree free and forced vibration on Virtual structural dynamic lab. |

**Student Learning Outcomes:**

- Students can understand the various methods of dynamic analysis.
- Students can use the various control schemes in the research work

**Pedagogy for Course Delivery:** Hands on Exercises.

**List of Professional Skill Development Activities (PSDA):** N/A

**Assessment/Examination Scheme:**

| | IA | | | | EE | |
|---|---|---|---|---|---|---|
| **Components** | **A** | **PR** | **LR** | **V** | **PR** | **V** |
| **Weightage (%)** | 5 | 10 | 10 | 5 | 35 | 35 |

IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

**Text Reading:**

- MATLAB Programming for Engineers by Stephen J. Chapman.
- Structural Dynamics (Theory and Computation) by Paz Mario, Publisher: Springer US

**References:**

- Introduction to Structural Control, Springer Link

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## Course structure: ADVANCED STRUCTURAL DETAILING LAB – CEM 324

**Course Title: ADVANCED STRUCTURAL DETAILING LAB** **Credit Units: 2**

**Course Level: PG Level** **Course Code: CEM 324**

**Course Objectives:**

- The main objective of this course is to make student aware about the Preparation of Structural drawings and computer added drafting and drawing of modeling

**Pre-requisites:** N/A

**Course Contents/Syllabus:**

**List of Experiments:**

| |
|---|
| **1.** Preparation of working drawings for the Residential buildings and Multi – Storied Buildings containing Slabs, RC Beams- Simply supported, Continuous, Cantilever T – Beam / L-Beam floor, Columns and foundation, Shear wall etc. |
| **2.** Preparation of Drawings of Water tanks |
| **3.** Preparation of drawings of R.C.C Bridge and Steel Bridge |

**Student Learning Outcomes:**

- After the completion of this subject course, the students can execute the construction sites easily.

**Pedagogy for Course Delivery:** Hands on Exercises.

**List of Professional Skill Development Activities (PSDA):** N/A

**Assessment/Examination Scheme:**

| | IA | | | | EE | |
|---|---|---|---|---|---|---|
| **Components** | **A** | **PR** | **LR** | **V** | **PR** | **V** |
| **Weightage (%)** | 5 | 10 | 10 | 5 | 35 | 35 |

IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

**Text Reading:**

- Advanced Reinforced Concrete Design by N. Krishna Raju. CBS, Publication.

**References:**

- IS : 456- 2000 & IS: 800- 2007
- Indian Standards of Design of Water Tanks.

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## Course structure: SUMMER INTERNSHIP PROGRAMME – MSP 350

**Course Title: SUMMER INTERNSHIP PROGRAMME** **Credit Units: 6**

**Course Level: PG Level** **Course Code: MSP 350**

**Course Objectives:** This course will enable the students to explore the preferred field of specialization and develop analytical / hardware / software / experimental / observation skills. It will expose technical students to the industrial environment, which cannot be simulated in the classroom and hence creating competent professionals for the industry. It will provide possible opportunities to learn, understand and sharpen the real time technical / managerial skills required at the job. It will help them to manage the technical content and work. It will also help them to prepare and present technical report.

**Methodology:**

Practical training is based on the theoretical subjects studied by students. It can be arranged within the college or in any related industrial unit. Students may choose either to work on innovation or entrepreneurial activities resulting in start-up or undergo internship with industry/ NGO's/ Government organizations/ Micro/ Small/ Medium enterprises to make themselves ready for the industry. Students are to learn various industrial, technical, and administrative processes followed in the industry. In case of on-campus training the students will be given specific task of fabrication/assembly/testing/analysis. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation on same.

**Examination Scheme:**

| | |
|---|---|
| Feedback from industry/work place | 20 |
| Training Report | 40 |
| Viva | 15 |
| Presentation | 25 |
| **Total** | **100** |

**Course Outcome:**

After successful completion of the course, the students will be able to

1. Explore the preferred field of specialization and develop analytical / hardware / software / experimental / observation skills.
2. Manage the technical content and work.
3. Learn the various administrative process followed in industry.
4. Experience gained from the 'Industrial Internship' in classroom will be used in classroom discussions.
5. Create conditions conducive to quest for knowledge and its applicability on the job.
6. Prepare and present technical report.

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# Course structure: MINOR PROJECT II – MMP 360

**Course Title: MINOR PROJECT II** **Credit Units: 4**

**Course Level: PG Level** **Course Code: MMP 360**

**Course Objectives:** The minor project offers the opportunity to apply and extend the knowledge acquired. The minor project can be analytical work, simulation, hardware design or a combination of these in the emerging areas of Technology, under the supervision of a faculty from the Department. The objective of the course is to Develop aptitude for research and independent learning in the students. The emphasis of the minor project shall be on facilitating student learning in technical, project management and presentation spheres. The project work will be carried out individually

**Methodology:**

Topics of project are to be based on the latest trends, verifying engineering concepts /principals and should involve elementary research work. The projects may involve design, fabrications, testing, computer modeling, and analysis of any engineering problem. The specific project topic undertaken will reflect the common interests and expertise of the student(s) and supervisor. Students will be required to1) perform a literature search to review current knowledge and developments in the chosen technical area; 2) undertake detailed technical work in the chosen area using one or more of the following:

- Analytical models
- Computer simulations
- Hardware implementation.

On completion of the project the students are to present a report covering various aspects learnt by them and give a presentation on same.

The student will submit a synopsis at the beginning of the semester for the approval to the school project committee in a specified format. The student will have to present the progress of the work through seminars and progress report. A report must be submitted to the school for evaluation purpose at the end of the semester in a specified format.

**Course Outcomes:**

1. Develop aptitude for research and independent learning.
2. Demonstrate the ability to carry out literature survey and select unresolved problems in the domain of the selected project topic.
3. Gain expertise to use new tools and techniques for design and development.
4. Acquire the knowledge and awareness to carry out cost-effective and environment friendly designs.
5. Develop the ability to write good technical reports, make oral presentations of the work, and publish the work in reputed conferences/journals.

**Examination Scheme:**

| | |
|---|---|
| Literature study/ Fabrication/ Experimentation | 40 |
| Written Report | 20 |
| Viva | 15 |
| Presentation | 25 |
| **Total** | **100** |

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# Course Structure: DISSERTATION – MMP 460

**Course Title: DISSERTATION** **Credit Units: 30**

**Course Level: PG Level** **Course Code: MMP 460**

Dissertation is considered as a special course involving application of the knowledge gained during the course of study in exploring, analyzing and solving complex problems in real life applications. A candidate completes such a course on his own with an advisory support by a teacher/faculty member. Research experience is as close to a professional problem-solving activity as anything in the curriculum. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation. The object of Dissertation is to enable the student to take up either fully theoretical/practical or involving both theoretical and practical work, under the guidance of a Supervisor from the Department alone or jointly with a Supervisor drawn from R&D laboratory/Industry. This is expected to provide a good training for the student(s) in R&D work and technical leadership. The aim is to provide students an opportunity to exercise their creative and innovative qualities and to excite the imagination of aspiring engineers, innovators and technopreneurs.

**Methodology:** The oral dissemination and defense of scientific and engineering concepts is a fundamental communication tool that the students will employ throughout their professional career. Steps to be followed for the dissertation are:

1.**Selecting the Dissertation Topic**

It is usual to give students some discretion in the choice of topic for the dissertation and the approach to be adopted. Students will need to ensure that their dissertation is related to their field of specialization. This can be done under the guidance of supervisors.
Few restrictions are placed on the choice of the topic. Normally it would expect to be:

- relevant to business, defined broadly.
- related to one or more of the subjects or areas of study within the core program and specialization stream.
- clearly focused so as to facilitate an in-depth approach, subject to the availability of adequate sources of information and to their own knowledge.
- of value and interest to student and his/her personal and professional development.

## 2.Planning the Dissertation

This will entail following:

- Selecting a topic for investigation.
- Establishing the precise focus of study by deciding on the aims and objectives of the dissertation or formulating questions to be investigated. Consider very carefully what is worth investigating and its feasibility.
- Drawing up initial dissertation outlines considering the aims and objectives of the dissertation. Workout various stages of dissertation
- Devising a timetable to ensure that all stages of dissertation are completed in time. The timetable should include writing of the dissertation and regular meetings with dissertation guide/supervisors.

## 3.Keeping records

This includes the following:

- Making a note of everything you read; including those discarded.
- Ensuring that when recording sources, author's name and initials, date of publication, title, place of publication and publisher are included. (Database can be maintained from the outset).
- Making an accurate note of all quotations at the time of reading them.
- Make clear what is a direct a direct quotation and what is paraphrase.

## 4.Dissertation report

All students must follow the NTCC guidelines of AUMP in submitting their dissertation. The plagiarism of the report to be checked and should be within the guidelines. The color and type of files to be submitted should be according to the NTCC guidelines.

## Course Outcomes:

After successful completion of the course, students will be able to

1. Understand the issues related with the recent trends in the field of engineering/science and its applications
2. Formulate the problem definition, analyze and do functional simulation of the same.
3. Design, Implement, test and verify the engineering solution related to problem definition.
4. Compile, Comprehend and Present the work carried out.
5. Manage Project
6. Develop the ability to write good technical reports, make oral presentations of the work, and publish the work in reputed conferences/journals.

## Assessment Scheme:

| | |
|---|---|
| **Continuous Evaluation:** | 40% |
| (Based on Abstract, Regularity, | |
| Adherence to initial plan, Records etc.) | |
| | |
| **Final Evaluation:** | 60% |
| Based on, | |
| Contents & Layout of the Report, | 20 |
| Conceptual Framework, | 05 |
| Objectives & Methodology and | 05 |
| Implications & Conclusions | 10 |
| Viva & Presentation | 20 |

# Master of Technology
# Civil Engineering
# (Specialization in Structural Engineering)

**Programme Code: CEM**

**Duration – 2 Years Full Time**

**Programme Structure**
**And**
**Curriculum & Scheme of Examination**

**2019-21**
**(Based on AICTE)**

# AMITY UNIVERSITY
## MADHYA PRADESH

# PREAMBLE

Amity University aims to achieve academic excellence by providing multi-faceted education to students and encourage them to reach the pinnacle of success. The University has designed a system that would provide rigorous academic programme with necessary skills to enable them to excel in their careers.

This booklet contains the Programme Structure, the Detailed Curriculum and the Scheme of Examination. The Programme Structure includes the courses (Core and Elective), arranged semester wise. The importance of each course is defined in terms of credits attached to it. The credit units attached to each course has been further defined in terms of contact hours i.e. Lecture Hours (L), Tutorial Hours (T), Practical Hours (P). Towards earning credits in terms of contact hours, 1 Lecture and 1 Tutorial per week are rated as 1 credit each and 2 Practical hours per week are rated as 1 credit. Thus, for example, an L-T-P structure of 3-0-0 will have 3 credits, 3-1-0 will have 4 credits, and 3-1-2 will have 5 credits.

The Curriculum and Scheme of Examination of each course includes the course objectives, course contents, scheme of examination and the list of text and references. The scheme of examination defines the various components of evaluation and the weightage attached to each component. The different codes used for the components of evaluation and the weightage attached to them are:

| Components | Codes | Weightage (%) |
|---|---|---|
| Case Discussion/ Presentation/ Analysis | C | 05 - 10 |
| Home Assignment | H | 05 - 10 |
| Project | P | 05 - 10 |
| Seminar | S | 05 - 10 |
| Viva | V | 05 - 10 |
| Quiz | Q | 05 - 10 |
| Class Test | CT | 10 - 15 |
| Attendance | A | 05 |
| End Semester Examination | EE | 70 |

It is hoped that it will help the students study in a planned and a structured manner and promote effective learning. Wishing you an intellectually stimulating stay at Amity University.

June, 2019

# PROGRAMME STRUCTURE
# M.TECH. CIVIL ENGINEERING (Structural Engineering)

| **FIRST SEMESTER** | | | | | | |
|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Lecture (L) Hours Per Week** | **Tutorial (T) Hours Per Week** | **Practical (P) Hours Per Week** | **Total Credits** | **Total Hours** |
| CEM 101 | Numerical Analysis and Computer Programming | 3 | 1 | - | 4 | 40 |
| CEM 102 | Concrete Technology | 3 | 1 | - | 4 | 40 |
| CEM 103 | Advanced Structural Analysis | 3 | 1 | - | 4 | 40 |
| CEM 121 | Numerical Analysis and Computer Programming Lab | - | - | 4 | 2 | 40 |
| CEM 122 | Concrete Technology Lab | - | - | 4 | 2 | 40 |
| CEM 123 | Advanced Structural Analysis Lab | - | - | 4 | 2 | 40 |
| **ELECTIVES (Any one from each category)** | | | | | **4** | **40** |
| CEM 104 | Structural Dynamics And Earthquake Resistant Building | 3 | 1 | - | - | - |
| CEM 105 | Bridge Engineering | 3 | 1 | - | - | - |
| CEM 106 | Advanced Elasticity And Plasticity | 3 | 1 | - | - | - |
| | | | | | | |
| BCP 141 | Advanced Communication – I | 1 | - | - | 1 | 10 |
| BSP 143 | Behavioral Science – I | 1 | - | - | 1 | 10 |
| FLP 144 | French – I | 2 | - | - | 2 | 20 |
| MTP 130 | **Term Paper** | - | - | - | 3 | - |
| **TOTAL CREDITS** | | | | | **29** | |
| **Total Hrs per Week** | | | | | **32** | |
| **Total Hrs in the Semester** | | | | | **320** | |

| **SECOND SEMESTER** | | | | | | |
|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Lecture (L) Hours Per Week** | **Tutorial (T) Hours Per Week** | **Practical (P) Hours Per Week** | **Total Credits** | **Total Hours** |
| CEM 201 | Advanced Steel Structure | 3 | 1 | - | 4 | 40 |
| CEM 202 | Advanced Foundation Engineering | 3 | 1 | - | 4 | 40 |
| CEM 203 | Finite Element Method | 3 | 1 | - | 4 | 40 |
| CEM 222 | Advanced Foundation Engineering Lab | - | - | 4 | 2 | 40 |
| CEM 223 | Finite Element Method Lab | - | - | 4 | 2 | 40 |
| CEM 224 | Structural Engineering Lab | - | - | 4 | 2 | 40 |
| **ELECTIVES (Any one from each category)** | | | | | **4** | **40** |
| CEM 205 | Optimization Techniques | 3 | 1 | - | - | - |
| CEM 206 | Design of Pre-Stressed Structures | 3 | 1 | - | - | - |
| CEM 207 | Experimental Stress Analysis | 3 | 1 | - | - | - |
| | | | | | | |
| BCP 241 | Advanced Communication – II | 1 | - | - | 1 | 10 |
| BSP 243 | Behavioral Science – II | 1 | - | - | 1 | 10 |
| FLP 244 | **French-II** | 2 | - | - | 2 | 20 |
| MMP 260 | **Minor Project I** | - | - | - | **4** | **-** |
| **TOTAL CREDITS** | | | | | **30** | |
| **Total Hrs per Week** | | | | | **32** | |
| **Total Hrs in the Semester** | | | | | **320** | |
| Summary Internship Programme (SIP): 6 – 8 WEEKS | | | | | | |

| **THIRD SEMESTER** | | | | | | |
|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Lecture (L) Hours Per Week** | **Tutorial (T) Hours Per Week** | **Practical (P) Hours Per Week** | **Total Credits** | **Total Hours** |
| CEM 301 | Research Methodology | 3 | 1 | - | 4 | 40 |
| CEM 302 | Advanced RCC Design | 3 | 1 | - | 4 | 40 |
| CEM 303 | High Rise Buildings Analysis | 3 | 1 | - | 4 | 40 |
| CEM 322 | Advanced RCC Design Lab | - | - | 4 | 2 | 40 |
| CEM 324 | Building Design Project Lab Using Software | - | - | 4 | 2 | 40 |
| CEM 325 | Structural Material Testing Lab-II | - | - | 4 | 2 | 40 |
| **ELECTIVES (Any one from each category)** | | | | | **4** | **40** |
| CEM 306 | Analysis of Plate And Shells | 3 | 1 | - | - | - |
| CEM 307 | Reliability Based Civil Engineering Design | 3 | 1 | - | - | - |
| CEM 308 | Evaluation and Retrofitting of Building | 3 | 1 | - | - | - |
| | | | | | | |
| BCP 341 | Advanced Communication – III | 1 | - | - | 1 | 10 |
| BSP 343 | Behavioral Science – III | 1 | - | - | 1 | 10 |
| FLP 344 | French– III | 2 | - | - | 2 | 20 |
| MSP 350 | **Summer Internship Programme (SIP)** | - | - | - | 6 | - |
| MMP 360 | **Minor Project II** | - | - | - | **4** | **-** |
| **TOTAL CREDITS** | | | | | **36** | |
| **Total Hrs per Week** | | | | | **32** | |
| **Total Hrs in the Semester** | | | | | **320** | |

| **FOURTH SEMESTER** | | | | | | |
|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Lecture (L) Hours Per Week** | **Tutorial (T) Hours Per Week** | **Practical (P) Hours Per Week** | **Total Credits** | **Total Hours** |
| MMP 460 | **Dissertation (20-22 weeks)** | - | - | - | 30 | - |
| **TOTAL CREDITS** | | | | | **30** | **-** |
| **Total Hrs per Week** | | | | | **-** | |
| **Total Hrs in the Semester** | | | | | **-** | |

# Master of Technology
# Civil Engineering
# (Specialization in Structural Engineering)

# Programme Code: CEM

# Duration – 2 Years Full Time
**(2019-21)**

## OVERALL CREDIT

| Sr. No. | Semester | No. of Credits | No. of Hours |
|---|---|---|---|
| 1 | I | 29 | 32 |
| 2 | II | 30 | 32 |
| 3 | III | 36 | 32 |
| 4 | IV | 30 | - |
| **Total Credits** | | **125** | **96** |

# NUMERICAL ANALYSIS & COMPUTER PROGRAMMING

**Course Code: CEM 101** | **Credit Units: 04**
**Total Hours: 40**

**Course Objectives:**
This course is designed to teach the students about fundamentals of numerical methods and computer programming.

**Course Contents:**

**Module – I: Solution of Algebraic and Transcendental Equation: (8 Hours)**
Newton-Raphson method including method of complex roots, Graeffe's root square method (Computer based algorithm and programme for these methods)

**Module – II: Interpolation and Approximation: (8 Hours)**
Lagrange's and Newton-divided difference formula, Newton interpolation formula for finite differences, Gauss's forward and backward interpolation formulae, Bessel's and Laplace-Everett's formulae, Cubic spline, least squares approximation using Chebyshev polynomial.

**Module – III: Solution of Linear Simultaneous Equations: (8 Hours)**
Cholesky's (Crout's) method, Gauss-Seidel iteration and relaxation methods, Solution of Eigenvalue problems; Smallest, largest and intermediate Eigen values (Computer based algorithm and programme for these methods)

**Module – IV: Numerical Differentiation and Integration: (8 Hours)**
Numerical differentiation using difference operators, Simpson's 1/3 and 3/8 rules, Boole's rule, Weddle's rule.

**Module – V: Solution of Differential Equations: (8 Hours)**
Modified Euler's method, Runge-Kutta method of 2nd, 3rd and 4th orders, Predictor-Corrector method, Stability of Ordinary differential equation, Solution of Laplace's and Poisson's equations by Liebmann's method, Relaxation method.

## Course Outcomes:
On completion of this course, the students will be able to learn about fundamentals of numerical methods such as interpolation, differentiation, integration and differential equations. They will also learn the basics of programming.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

**Reference Books:**


- Numerical Method for Scientific and Engineering Computation M.K. Jain, S.R.K. Iyenger and R.K. Jain
- Wiley Eastern Ltd.
- Numerical Methods for Engineers S.K. Gupta Wiley Eastern Ltd.
- Numerical Methods B.S. Grewal Khanna Publications
- Numerical Methods A.D. Booth Academic Press, NY
- An Introduction to Numerical Analysis K.E. Atkinson John Wiley & Sons, NY
- Introduction Methods of Numerical Analysis S.S. Sastry Prentice Hall of India
- Elementary Numerical Analysis S.D. Conte McGraw Hill

# CONCRETE TECHNOLOGY

**Course Code: CEM 102** **Credit Units: 04**
**Total Hours: 40**

**Course Objectives:**
This course is designed to familiar the students about some wider concepts of concrete such as their types, properties, manufacture etc.

**Course Contents:**

**Module I: (8 Hours)**
Cement and Concrete: Portland cement: chemical composition, hydration of cement, structure of hydrated cement, mechanical strength of cement gel, water held in hydrated cement paste and heat of hydration. Cements of different types.

**Module II: (8 Hours)**
Factors affecting the strength of concrete. Elasticity, shrinkage and creep of concrete; Durability of concrete: Permeability of concrete. Chemical attack of concrete, air-entrained concrete and thermal properties of concrete. The mechanical test of hardened concrete

**Module III: (8 Hours)**
Light weight and high density concrete. Mix design. Statistical quality control; biaxial strength of concrete, Fibre reinforced concrete;

**Module IV: (8 Hours)**
Metals: Behaviour of common constructional metals in tension and compression. True stress-strain curve for mild steel in simple tension. Theories of failure and yield surfaces; Fatigue properties: Nature of fatigue failure, fatigue strength for completely reversed stresses, fatigue strength with super imposed static stress and factors influencing fatigue strength;

**Module V: (8 Hours)**
Temperature and Creep properties: Low temperature properties, high temperature properties, creep-stress-time-temperature relations for simple tension, mechanics of creep in tension. Structure of materials and their imperfections. Deformation of crystals and theory of islocations.

## Course Outcomes:
On completion of this course, the students will be able to learn the manufacture, properties, types and effect of different agencies on properties of concrete.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | **5** | **15** | **10** | **70** |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Reference Books:

- M.L. Gambir, Concrete Technology, Tata Mc Graw Hill Book Co.
- Peurifoy R.L., Construction Planning Equipment & Methods, TMH
- Verma Mahesh, Construction Equipments and its Planning & Application,Metropoliton Book CompanyN.Delhi.
- A.M. Neville, J.J. Brooks, Concrete Technology, Low Priced Edition, Pearson Education, 2004.
- A J Martin, Mechanical behavior of engineering materials
- S P Timoshenko, Strength of materials- Part II
- M.S.Shetty, Concrete technology- Theory & Practice, S.Chand & Company New Delhi, 2005
- R.Park and T.Pauley, Reinforced concrete structures, John Wiley and sons
- A.K. Jain, Reinforced Concrete: Limit State design, NemChand and Bros. 1999.
- J. Krishna and OP Jain, Plain and Reinforced Concrete, Vol. I I, Roorkee, Nem Chand and Bros.
- H. Nilson, D. Darwin and C. W. Dolar, Design of Concrete structures, Tata McGraw Hill
- T. Paulay and M.J.N. Priestley, Seismic Design of Reinforced Concrete and Masonry Buildings, John Wiley & Sons Inc1. R. Park and T. Pauley, Reinforced concrete structures, John Wiley and sons

# ADVANCED STRUCTURAL ANALYSIS

**Course Code: CEM 103** **Credit Units: 04**
**Total Hours: 40**

**Course Objectives:**
This course is designed to teach the students some advanced concepts of structural analysis such as Matrix method, Flexibility method and Stiffness method etc.

**Course Contents:**

**Module-I:** Matrix Method (Flexibility Method): Force methods, Basic Concepts, evaluation of flexibility, transformation, analysis of a single member of different types, transformation of single member**: (10 Hours)**

**Module-II:** Applications to plane and space structures with pin joints and rigid joints, energy approach in flexibility method, effect of support displacement and transformation**: (10 Hours)**

**Module-III:** Matrix Method (stiffness Method): Displacement methods, Basic concepts, Evaluation of stiffness coefficients, Direct stiffness method, energy approach in stiffness method. Code No. approach for global stiffness matrix, effect of support displacement and temperature**: (10 Hours)**

**Module-IV:** Symmetrical & anti-symmetrical problems, Stiffness of plane & space frames solution of problems, comparison of force and displacement methods of solution**: (10 Hours)**

## Course Outcomes:
On completion of this course, the students will be able to learn the advanced concepts of structural analysis such as Force methods, Displacement methods, solution of symmetrical and anti-symmetrical problems, stiffness of plane and space frames solution of problems.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | **5** | **15** | **10** | **70** |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

**Reference Books:**

- C.S. Reddy , Basic Structural Analysis ,TMH, Publishers
- W Wearer Jr. & James M. Gere, Matrix Analysis of Framed Structures, CBS Pub.
- Rajsekeran, Sankarsubramanian, Computational structural Mechanics, PHI
- Pandit, Structural Analysis: a matrix approach, TMH
- W.Weaver Jr. and J.M Gere, *Matrix analysis of Frames and Structures*, CBS Pub

# NUMERICAL ANALYSIS AND COMPUTER PROGRAMMING LAB

**Course Code: CEM 121**

**Credit Units: 02**
**Total Hours: 40**

**Course Objectives:**
This course is designed to teach the students about fundamentals of numerical methods and computer programming.

**Course Contents:**

**Assignments will be provided for the following:**

1. Analysis of various numerical and statistical techniques (part a)**: (8 Hours)**
2. Analysis of various numerical and statistical techniques (part b)**: (8 Hours)**
3. Analysis of various numerical and statistical techniques (part c)**: (8 Hours)**
4. Analysis of various numerical and statistical techniques (part d)**: (8 Hours)**
5. Analysis of various numerical and statistical techniques (part e)**: (8 Hours)**

## Course Outcomes:
On completion of this course, the students will be able to learn about fundamentals of numerical methods such as interpolation, differentiation, integration and differential equations. They will also learn the basics of programming.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| A | PR | LR | V | PR | V |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# CONCRETE TECHNOLOGY LAB

**Course Code: CEM 122** **Credit Units: 02**
**Total Hours: 40**

**Course Objectives:**
This course is designed to familiar the students about some wider concepts of concrete such as their types, properties, manufacture etc.

**Course Contents:**
1. Tests on aggregate for concrete**: (16 Hours)**
   (a) Grain size distribution (b) Specific gravity (c) Density (d) Voids (e) Bulking (f) Aggregate crushing value (g) Aggregate impact value.
2. Tests on cement**: (8 Hours)**
   (a) Fineness (b) Normal consistency (c) Setting time (d) Compressive strength
3. Workability tests – slump, compaction, V-bee, flow and preparation of cubes, Compaction factor test**. (8 Hours)**
4. Flexural strength of concrete beam**: (4 Hours)**
5. Design of Cement concrete mixes with different methods**: (4 Hours)**

## Course Outcomes:
On completion of this course, the students will be able to learn the manufacture, properties, types and effect of different agencies on properties of concrete.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| A | PR | LR | V | PR | V |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.
.
## Reference Books:
- Highway material testing, S.K Khanna, CE.G.Justo
- Engg. Soil Testing by Shamsher Prakash, PK Jain.

## ADVANCED STRUCTURAL ANALYSIS LAB

**Course Code: CEM 123** **Credit Units: 02**
**Total Hours: 40**

**Course Objectives:**
This course is designed to teach the students some advanced concepts of structural analysis such as Matrix method, Flexibility method and Stiffness method etc.

**Course Contents:**

1. Cpp programming language: Basics of programming, loops, decisions, structures, functions, objects/ classes, arrays**: (10 Hours)**
2. Overloading, inheritance, virtual functions and pointers, object oriented programming, Turbo Cpp features and programming, structure engineering problems programming**: (10 Hours)**
3. Computer Aided drafting, 2-D and 3-D drawings, Introduction to CAD software, drawing of buildings**: (10 Hours)**
4. Introduction to computer graphics, 3-D modeling software and analysis software. Learning of civil engineering drawing with auto cad**: (10 Hours)**

### Course Outcomes:
On completion of this course, the students will be able to learn the advanced concepts of structural analysis such as Force methods, Displacement methods, solution of symmetrical and anti-symmetrical problems, stiffness of plane and space frames solution of problems.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| A | PR | LR | V | PR | V |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

**Reference Books:**
- Robert Lafore, Object oriented programming in CPP
- E. Balaguruswamy, Programming in C
- Syal and Gupta, Computer programming and engineering analysis.
- AutoCAD, SolidEdge, Cadlab software and Manuals.

# STRUCTURAL DYNAMICS AND EARTHQUAKE RESISTANT BUILDING

**Course Code: CEM 104** **Credit Units: 04**
**Total Hours: 40**

**Course Objectives:**
This course is designed to teach the students about basic concepts of structural dynamics and earthquake engineering.

**Course Contents:**

**Module-I: (8 Hours)**
Seismic Strengthening of Existing Buildings: Cases histories-Learning from earthquakes, seismic strengthening procedures.

**Module-II: (8 Hours)**
Torsion & Rigidity: Rigid Diaphragms, Torsional moment, Center of mass and center of rigidity torsion effects. Lateral Analysis of Building Systems: Lateral load distribution with rigid floor diaphragms, moment resisting frames, shear walls, lateral stiffness of shear walls, shear wall-frame combination, examples.

**Module-III: (8 Hours)**
Concept of Earthquake Resistant Design: Objectives of seismic design , Ductility, Hysteric response & energy dissipation, response modifications factor, design spectrum, capacity design, classification of structural system, IS code provisions for seismic design of structures, multi-storied buildings, design criteria, P-A effects, storey drift, design examples ductile detailing of RCC structures.

**Module-IV: (8 Hours)**
Seismic Design of Special Structures: Elevated liquid storage tanks, Hydrodynamic pressure in tanks, stack like structures, IS-1893 code provisions for bridges; Superstructures, substructures, submersible bridges, dams; Hydrodynamic effect due to reservoir, concrete gravity dams.

**Module-V: (8 Hours)**
Engineering Seismology: Basic terms, seismic waves, earthquake magnitude and intensity, ground motion, dynamic response of structures, normalized response spectra, seismic coefficients and seismic zone coefficients.

**Course Outcomes:**
On completion of this course, the students will be able to learn the concepts of engineering seismology, earthquake resistant design of buildings, seismic strengthening procedures etc.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

**Reference Books:**


- Chopra A.K., Dynamics of Structures', Theory & Applications to Eqrthquake Engineering , Prentice Hall India, New Delhi-1995
- Clough & Penzien, Dynamics of Structures, McGraw Hill Book CO. Inc.
- Paz M, Structural Dynamics, , Van Nostrand Reinhold, New York
- Paz, M, International Handbook of Earthquake Engineering, Chapman & Hall, New York.
- IS-1893-1984, Indian Standard Criteria for Earthquake Resistant Design of Structures, B.I.S., New Delhi.
- IS-4326-1993, Indian Standard Code of Practice for Earthquake Resistant Design and Construction of Buildings, B.I.S., New Delhi.

# BRIDGE ENGINEERING

**COURSE CODE: CEM 105** **Credit Units: 04**
**Total Hours: 40**

**Course Objectives:**
This course is designed to familiar the students about basic concepts of bridge engineering, bridge foundations, girder bridges and pre-stressed concrete bridges and steel bridges.

**Course Contents:**

**Module I: (8 Hours)**
Introduction, historical review, engineering and aesthetic requirements in bridge design. Introduction to bridge codes.

**Module II: (8 Hours)**
Economic evaluation of a bridge project. Site investigation and planning;. Scour - factors affecting and evaluation.

**Module III: (8 Hours)**
Bridge foundations - open, pile, well and caisson. Piers, abutments and approach structures; Superstructure - analysis and design of right, skew and curved slabs.

**Module IV: (8 Hours)**
Girder bridges - types, load distribution, design. Orthotropic plate analysis of bridge decks Introduction to long span bridges - cantilever, arch, and cable stayed and suspension bridges.

**Module V: (8 Hours)**
Methods of construction of R.C Bridges, Pre-stressed concrete bridges and steel bridges Fabrication, Launching & creation. Design and construction of construction joints (use of relevant codes of practice are permitted in the examination).

## Course Outcomes:
On completion of this course, the students will be able to learn the concepts of bridge engineering piers, abutments, R.C. bridges, Prestressed bridges, their construction and design.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | **5** | **15** | **10** | **70** |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Reference Books:

- V. K. Raina, *Concrete Bridges Practice – Analysis, Design and Economics*, Shroff Publications, New Delhi 2nd Ed. 2005.
- Vazirani, Ratwani and Aswani, *Design of Concrete Bridges*, Khanna Publishers, 2nd Ed. 2008.
- IRC codes for Road bridges- IRS Sec –I , II, III
- IRS Codes of Practice for Railway bridges.
- B. M. Das, Principles of Foundation Engineering, Thomson, Indian Edition, 2003.
- R. W. Clough and J Penzien, *Dynamics of structures* , McGraw-Hill, Inc,
- A K Chropra ,*Dynamics of Structures: Theory and Applications to Earthquake Engineering*, Prentice Hall of India
- M. Paz, *Structural Dynamics - Theory and Computation*, Van Nostrand, 1985.
- *IS: 1893 - 2002 Criteria for Earthquake Resistant Design of Structures*.
- L. Meirovitch, *Elements of Vibration Analysis*, 2nd Ed., McGraw-Hill, 1986.

# ADVANCED ELASTICITY AND PLASTICITY

**Course Code: CEM 106** **Credit Units: 04**
**Total Hours: 40**

**Course Objectives:**
This course is designed to familiar the students about basic concepts of advance elasticity and plasticity.

**Course Contents:**

**Module I: (8 Hours)**
Plane stress and plane strain problems. General stress and strain equations (Equilibrium and compatibility equations).Two dimensional problems in rectangular coordinates.

**Module II: (8 Hours)**
Stress and strain components, differential equation, equilibrium equations and compatibility equations in polar coordinate. Stress distribution for axisymmetric problems.

**Module III: (8 Hours)**
Pure bending of curved bars, thick walled cylinder. Concentrated force at a point of straight boundary. Force acting on the end of a wedge. Concentrated force acting on a beam. Effect of circular holes on stress distributions in plates.

**Module IV: (8 Hours)**
Stress and strain in three dimensions: Principles stresses, maximum shearing stress, principal axes of strain. Stretching of prismatical bar by its own axis. Elementary problems of elasticity in three dimensions. Torsion of non-circular prismatic bars.

**Module V: (8 Hours)**
Saint Venant's theory. Various analogies. Torsion of hollow and thin section. Application of energy methods; Introduction to the theory of plasticity, the yield criteria of metals, stress space representation of yield criteria. Stress-strain relations plastic potential, flow rules and maximum work hypothesis. Two dimensional plastic flow problems. Incompressible two dimensional flows, stresses in plastic materials in condition of plane strain, equation of equilibrium the simplest slip-line fields.

## Course Outcomes:
On completion of this course, the students will be able to learn the behavior of curved bars and thick walled cylinder on pure bending, general stress and strain equations, Saint Venant's theory, 2-D plastic flow etc.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | **5** | **15** | **10** | **70** |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## References Books:

- Timoshenko, S.P. , Theory of Elasticity
- Timoshenko, S.P., Theory of Elastic Stability
- Iyenger N.G.R., Structural Stability of Columns & Plates.
- S P Timoshenko and J N Goodier, *Theory of Elasticity*, Mc Graw Hill
- W. Johnson and P B Meller, *Plasticity of Mechanical Engineers*
- Theory of plasticity, Hoffman and Sachs

# TERM PAPER

**Course Code: MTP 130** **Credit Units: 03**

**Course Objective:**
A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

**GUIDELINES FOR TERM PAPER**
The procedure for writing a term paper may consist of the following steps:
- Choosing a subject
- Finding sources of materials
- Collecting the notes
- Outlining the paper
- Writing the first draft
- Editing & preparing the final paper

**1. Choosing a Subject**
The subject chosen should not be too general.

**2. Finding Sources of Materials**
- The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
- Begin by making a list of subject-headings under which you might expect the subject to be listed.
- The sources could be books and magazine articles, news stories, periodicals, scientific journals etc.

**3. Collecting the notes**
- Skim through sources, locating the useful material, then make good notes of it, including quotes and Information for footnotes.
- Get facts, not just opinions. Compare the facts with author's conclusion.
- In research studies, notice the methods and procedures, results & conclusions.

Check cross references.

**4. Outlining the paper**
- Review notes to find main sub-divisions of the subject.
- Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

**5. Writing the first draft**
Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:
1. statement of purpose
2. main body of the paper
3. statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main idea.

**6. Editing & preparing the final Paper**
Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.
Read the paper to ensure that the language is not awkward, and that it "flows" properly.
Check for proper spelling, phrasing and sentence construction.
Check for proper form on footnotes, quotes, and punctuation.
Check to see that quotations serve one of the following purposes:
a) Show evidence of what an author has said.
b) Avoid misrepresentation through restatement.
c) Save unnecessary writing when ideas have been well expressed by the original author.

Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.
Term papers should be composed of the following sections:
- Title page

- Table of contents
- Introduction
- Review
- Discussion & Conclusion
- References
- Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

**Discussion**

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

**Conclusion**

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:
summary of question posed
summary of findings
summary of main limitations of the study at hand
details of possibilities for related future research

**Text & Reference:**

From the very beginning of a research project, you should be careful to note all details of articles thered.
The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.
The key to a good bibliography is consistency. Choose a particular convention and stick to this.

**Conventions**

Monographs
Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

**Edited volumes**

Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.
[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

**Edited articles**

Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

**Journal articles**

McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

**Electronic book**

Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] From the World Wide Web, http://www.aber.ac.uk/media/Documents/S4B/.

**Electronic journal articles**

Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document]. German as a Foreign Language Journal [online] 1. Retrieved [12.09.'00] from the World Wide Web, http://www.gfl-journal.com/.

**Other websites**

Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document]. Retrieved [13.10.'01] from the World Wide Web, http://olaf.hiof.no/~sverrev/eng.html.

**Unpublished papers**

Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

**Unpublished theses/ dissertations**

Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg.
Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

**Appendix**
The appendix should be used for data collected (e.g. questionnaires, transcripts, ...) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

**Assessment Scheme:**
**Continuous Evaluation:** 40%
(Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)
**Final Evaluation:** 60%
(Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/ presented, outcomes vs. objectives, presentation/ viva etc.)

# ADVANCED STEEL STRUCTURE

**Course Code: CEM 201** | **Credit Units: 04**
**Total Hours: 40**

**Course Objectives:**
This course is designed to familiarize the students about advanced concepts of steel design.

**Course Contents:**

**Module I: (8 Hours)**
Design for tension and compression members, connections.

**Module II: (8 Hours)**
Design of plate girders, crane girders and trusses. Multi-storyed buildings.

**Module III: (8 Hours)**
Silos, bins and hoppers. Design of steel tanks and staging.

**Module IV: (8 Hours)**
Design of bridges, trusses, lateral bracings, sway brackens and stress reversals.

**Module V: (8 Hours)**
Design of continuous beams and frames by plastic theory; Use of reference books and relevant codes of practice are permitted in the examination.

## Course Outcomes:
On completion of this course, the students will be able to learn about tension and compression steel members, plate girders, design of bridges, continuous beams and frames.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Reference Books:

- Morsis L.J. Plum, D.R., Structural Steel Work Design
- Sinha D.A. , Design of Steel Structures
- Yu, W.W. , Cold Formed Steel Structures Design
- K.Mukhanov, *Design of Metal structures.*
- B Bresler, T Y Lin and J B Scalzi, *Design of Steel structures*.
- P Dayaratnam, *Design of Steel Structures]*

# ADVANCED FOUNDATION ENGINEERING

**Course Code: CEM 202** **Credit Units: 04**
**Total Hours: 40**

**Course Objectives:**
This course is designed to teach the students about advanced concepts of foundation engineering, pile and shallow foundations, soil exploration, cofferdams and machine foundations.

**Course Contents:**

**Module I: (8 Hours):**
Deep Open Cuts: Introduction, Types of Coffer Dams, Design data for cellular cofferdam, Stability analysis of cofferdam, interlock stresses.
**Soil Exploration**: Introduction, Methods of exploration, Direct Methods and techniques of exploration, Methods of boring types of samples, Disturbance of soil sample, Soil samplers and sampling techniques, Ground water observations, Boring records, Spacing and depth of bore holes, Indirect methods of soil exploration, Penetration tests, Geophysical methods, Dynamics methods, Sequence of exploration programs

**Module II: (8 Hours):**
Shallow Foundations: Introduction, General Requirements, Depth of foundation, Bearing capacity, Eccentric Inclined loads, Bearing capacity of stratified soils, Settlement of footings, Settlement of footings from constitutive laws, Settlement and tilt of eccentrically loaded footings, Allowable settlement, Plate bearing test, Standard penetration test Effect of water table, shallow foundation classification, Modulus of sub-grade reaction, Beams on elastic foundation, Raft foundation.

**Module III: (8 Hours):**
Pile Foundation: Introduction, Uses of piles, Types of piles, pile drivers, Bearing capacity of piles, Static analysis, Pile load test, Dynamic methods, Other methods, 24 Negative skin friction, Pile group, Ultimate bearing capacity of pile groups, Settlement of pile group, Influence of pile cap. Laterally loaded piles, Ultimate resistance, Elastic methods, Pile groups under lateral load, batter pile under lateral load, Batter pile groups under inclined loads, pile under dynamic loads.

**Module IV: (8 Hours):**
Coffer Dams: Introduction, types of Coffer Dams, Design data for cellular cofferdam, Stability analysis of cofferdam, Interlock stresses.

**Module V: (8 Hours):**
Machine Foundations : Introduction, Criteria for satisfactory action of a machine foundation, Definitions, Degrees of freedom of a block foundation, Analysis of block foundation, Theory of linear weightless spring, Equivalent soil springs, Vertical vibration, Rocking vibration, Vibration in shear, Simultaneous rocking sliding and vertical vibrations for a foundation, Indian standard on design and construction of foundations for reciprocating machines, Foundations for impact type machines, Indian Standard on design and construction of foundations for impact type machines, Analysis of block foundation based on elastic half space theory.

## Course Outcomes:
On completion of this course, the students will be able to learn about advanced concepts of foundation engineering including pile and shallow foundation, cofferdams and machine foundation and soil exploration.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | **5** | **15** | **10** | **70** |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
A: Attendance

**Reference Books:**

- Bowles, Foundation: Analysis and Design, McGraw Hill Book CO. Inc.
- Peck , R.B. , W.E. Hanson and T.H. Thornburn, Foundation Engineering, Wiley , New York

# FINITE ELEMENT METHOD

**Course Code: CEM 203** **Credit Units: 04**
**Total Hours: 40**

**Course Objectives:**
This course is designed to familiarize the students about basics of finite element method, its introduction and applicability to different problems.

**Course Contents:**

**Module I: (8 Hours):**
Introduction to Finite Element Method: General Applicability and Description of Finite Element Method Comparison with other methods.

**Module II: (8 Hours):**
Solution of Finite Element Method: Solution of Equilibrium Problems, Eigen value problems, propagation problems, computer implementation of Gaussian eliminations, Choleski□s decomposition, Jocobi□s and Ranga Kutta Method.

**Module III: (8 Hours):**
General Procedure of Finite Element Method: Descretization of the domain, Selection of Shapes, Types and Number of elements, node numbering technique, Interpolation Polynomials, their selection and derivation in terms of global and local coordinates, Convergence requirements. Formulation of Element Characteristic matrices and vectors, Variational approach. Assembly of Element matrices and Vectors and Derivation system equations, computation of element resultants.

**Module IV: (8 Hours):**
Iso-parametric Formulation: Lagrange and Hermite interpolation functions, Isoparametric Elements, Numerical Integration.

**UNIT V: (8 Hours):**
Static Analysis: Formulation of equilibrium equation, Analysis of truss, Frames, Plane Stress and Plane Strain Problems Plates and Shells.

## Course Outcomes:
On completion of this course, the students will be able to learn about fundamentals of finite element method, its procedures, static analysis and Gaussian elimination.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | **5** | **15** | **10** | **70** |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
A: Attendance

## Reference Books:

- Weaver, Johnson, Finite element and structural analysis
- HC Martin, Matrix structural analysis
- CF Abel, CS Desai, Finite element methods
- Buchanan, Finite element Analysis (schaum Outline S), TMH
- R. D. Cook, *Concepts and Applications of Finite Element Analysis*, John Wiley, NewYork, 2004. 2. O. C. Zienkiewicz and R. L. Taylor, *Finite Element Method*, Butterworth Heinemann publication, 2000.
- C.S. Krishnamoorty, *Finite element methods*, Tata-Mc Graw Hill, Second Edition, New Delhi, 2002.
- T. R. Chandupatla & A. D. Belegundu, *Introduction to Finite Elements in Engineering*, Prentice Hall of India Pvt. Ltd., New Delhi, 5th Reprint, 1999
- J. N. Reddy, *An introduction to Linear Finite Element Method*, Oxford University Press, Oxford, 2004.

# ADVANCED FOUNDATION ENGINEERING LAB

**Course Code: CEM 222** **Credit Units: 02**
**Total Hours: 40**

**Course Objectives:**
This course is designed to teach the students about advanced concepts of foundation engineering, pile and shallow foundations, soil exploration, cofferdams and machine foundations.

**Course Contents:**
1. Specific gravity of coarse and fine grained soils. **(4 Hours)**
2. Grain size analysis (a) Sieve analysis (b) Pipette analysis **(4 Hours)**
3. Atterberg's limits and indices **(4 Hours)**
4. Determination of field density (a) sand replacement method (b) core cutter method **(4 Hours)**
5. Determination of coefficient of permeability by
   (a) Constant head method (b) Variable head method **(4 Hours)**
6. Consolidation test **(4 Hours)**
7. Compaction test (a) IS light compaction test (b) IS heavy compaction test **(4 Hours)**
8. California Bearing Ratio test **(4 Hours)**
9. Direct shear test **(2 Hours)**
10. Triaxial shear test **(2 Hours)**
11. Unconfined compressive strength test **(2 Hours)**
12. Laboratory vane shear test **(2 Hours)**

## Course Outcomes:
On completion of this course, the students will be able to learn about advanced concepts of foundation engineering including pile and shallow foundation, cofferdams and machine foundation and soil exploration.

Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| A | PR | LR | V | PR | V |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

## Reference Books:
- Soil Mechanics & foundation Engg. By Bharat Singh Shamsher Prakash.
- Engg. Soil testing by Shamsher Prakash and PK Jain.

# FINITE ELEMENT METHOD LAB

**Course Code: CEM 223** **Credit Units: 02**
**Total Hours: 40**

**Course Objectives:**
This course is designed to familiarize the students about basics of finite element method, its introduction and applicability to different problems.

**Course Contents:**
1. Analysis and design of Multi-storey building frames using STAAD. Pro. SAP**: (8 Hours)**
2. Analysis and design of Elevated Water Tank using STAAD-Pro., SAP**: (8 Hours)**
3. Analysis and design of bridge decks and other structures using STAAD-Pro., SAP**: (8 Hours)**
4. Analysis and design of steel trusses using STAAD-Pro., SAP**: (8 Hours)**
5. Dynamic response of structures using PULSE software**: (8 Hours)**

## Course Outcomes:
On completion of this course, the students will be able to learn about fundamentals of finite element method, its procedures, static analysis and Gaussian elimination.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| A | PR | LR | V | PR | V |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# STRUCTURAL ENGINEERING LAB

**Course Code: CEM 224** **Credit Units: 02**
**Total Hours: 40**

**Course Objectives:**
This course is designed to familiarize the students about advanced concepts of steel design.

**Course Contents:**
1. Mix design of concrete of different grades & using admixtures**: (4 Hours)**
2. Tensile and Flexural strength of concrete of different grades**: (4 Hours)**
3. Tensile strength of different types of steel rebars, rolled steel sections**: (4 Hours)**
4. Testing of simply supported RCC beams for flexural failure**: (4 Hours)**
5. Testing of simply supported RCC beams for shear failure**: (4 Hours)**
6. Testing of RCC column**: (4 Hours)**
7. Non-destructive testing of concrete including rebound hammer and ultrasonic pulse method**: (4 Hours)**
8. Permeability of concrete**: (4 Hours)**
9. Vibration analysis of beams and plates**: (4 Hours)**
10. Buckling load of struts**: (4 Hours)**

## Course Outcomes:
On completion of this course, the students will be able to learn about tension and compression steel members, plate girders, design of bridges, continuous beams and frames.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| A | PR | LR | V | PR | V |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

## Reference Books:

- A.M. Neville & J.J. Brooks, Concrete Technology, Pearson Education, Delhi, 2004.
- A.R. Santhakumar, Concrete Technology, Oxford University Press, 2007, New Delhi
- Structural Engineering laboratory manual.
- Relevant BIS Codes of practice for mix design, rebar testing, concrete design etc.

# OPTIMIZATION TECHNIQUES

**Course Code: CEM 205** **Credit Units: 04**
**Total Hours: 40**

**Course Objectives:**
This course is designed to teach the students about different aspects of optimization techniques such as linear programming, sensitivity analysis, game and queuing theory.

**Course Contents:**

**Module I: Linear Programming: (7 Hours)**
*Solution of LPP* by Simplex Method, Duality and its solution, Transportation Problem: Initial Solution, Test for Optimality, Unbalanced Transportation Problem, Degeneracy, Alternative Optimal Solutions, Prohibited Transportation, Maximization Transportation Problem Routs, *Assignment Problem:* Introduction, Solution by Hungarian Method, Multiple Optimal Solution, Unbalanced Assignment Problem, Maximization Case in Assignment Problem, Restriction on Assignments.

**Module II: Sensitivity Analysis: (7 Hours)**
Introduction, Change in Objective Function Coefficients, Change in Right Hand Side Values, Change in Availability of resources, Addition of a new variable, Addition of a new constraint.

**Module III: Game Theory: (7 Hours)**
Introduction, Two-Person Zero Sum Games, Pure Strategies: Games with Saddle Point, Mixed Strategies: Games without saddle point, Principle of Dominance, Solution Methods for games without saddle point – Algebraic Method, Arithmetic Method, Matrix Method, Graphical Method.

**Module IV: Queuing Theory: (7 Hours)**
Features of Queuing System, Solution of Queuing Models { (MM/1): (∞/FCFS)} Single server, Exponential Service-Unlimited Queue .

**Module V: Simulation (6 Hours)**
Process of simulation, Monte Carlo Simulation, Simulation of an Inventory System, Simulation of Queuing System, Applications of Simulation

**Module VI: Sequencing: (6 Hours)**
Gantt charts, Algorithm for solving sequencing problems: Johnson's Rule, Processing n jobs through 2 machines, Processing n jobs through 3 machines, Processing 2 jobs through '*k*' machines, Maintenance crew scheduling

## Course Outcomes:
On completion of this course, the students will be able to learn about fundamentals of linear programing, sensitivity analysis, simulation and sequencing.

**Examination Scheme:**

| **Components** | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
A: Attendance

## Reference Books:

- Vohra N.D., Quantitative Techniques in Management, Tata McGraw Hill Taha H. A. 1998, Operations Research: An Introduction, 6th Ed. Prentice Hall of India
- London N.P., Linear Programming, Tata McGraw-Hill
- Sharma J.K. 1997, Operations Research: Theory & Application, Mac Millan India Ltd. Grobner D.F. & Shannon P.W., Essential of Business Statistics: A Decision Making Approach, MacMillan College Publishing Co.
- Anderson David R, Sweeny Dennis J, Williams Thomas A, Quantitative Methods for Business, Cengage learning.
- Operations Research, Taha, 7th ed, 2002, Prentice Hall.
- Phillips and Solberg, Operations Research, Ravindran, 2nd edition 2000, John Wiley & Sons.
- Chapra and Canale, Numerical Methods for Engineers, 4th edition, 2005, Tata McGraw Hill.
- S.S.Rao, Engineering Optimization, 3rd edition, 2000, New Age methods.

# DESIGN OF PRE-STRESSED STRUCTURES

**Course Code: CEM 206** | **Credit Units: 04**
**Total Hours: 40**

**Course Objectives:**
This course is designed to familiarize the students about pre-stressed concrete design and design of special structures such as circular tanks, pipes.

**Course Contents:**

**Module I: (8 Hours)**
Different systems of pre-stressing, Characteristics of concrete and steel, other suitable design of section for flexure, shear and torsion. Design of compressive member. Limit state design as per IS code. Comparison of design with respect to British, Australian and American code.

**Module II: (8 Hours)**
Partial pre-stressing. Stress distribution in end-block of post tensioned section. Magnel's method, Guyen's method, Rowe's method and IS code method.

**Module III: (8 Hours)**
Deflection of pre-stressed structures- short term as well as long term deflections of uncracked and cracked members. Indeterminate structures-Principles of design of prismatic continuous beams of two and three equal, unequal spans with variable moments of inertia, Cap cable,

**Module IV: (8 Hours)**
Jaeques Muller's theorem. Pre-stressing of rigid frames. Composite construction of pre-stressed and in-situ concrete;

**Module V: (8 Hours)**
Design of special structures- Circular tanks, Pipes, Mast, and materials, Losses in pre-stress Analysis of Railway sleepers

## Course Outcomes:
On completion of this course, the students will be able to learn about different systems of pre-stressing, pre-tensioned and post tensioned concrete, losses in pre-stressed concrete.

**Examination Scheme:**

| **Components** | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
A: Attendance

## Reference Books:

- Y. Guyen, *Prestressed concrete Vol-I & Vol.-II,* John Willey & Sons, New York-1960.
- N. Krishnaraju, *Prestressed concrete,* Tata McGraw-Hill, New Delhi-2004.T. Y. Lin and H. Burns Ned, *Design of Prestressed concrete structures*, John Willey & Sons, New York-1982.
- S. K. Mallik and A. P. Gupta, *Prestressed concrete,* Oxford & IBH, New Delhi-1982.
- E. W. Bennet, *Prestressed concrete theory & design,* Chapman & Hall, London-1962.

# EXPERIMENTAL STRESS ANALYSIS

**Course Code: CEM 207** **Credit Units: 04**
**Total Hours: 40**

**Course Objectives:**
This course is designed to familiarize the students about different aspects of strain measurement stress measurements, vibration measurements, photoelasticity.

**Course Contents:**

**Unit- I Strain Measurement: (8 Hours)**
Strain gauges-theory of resistance strain gauges, basic types and constructions, gauge configurations and their uses, gauge materials and requirements, mounting techniques, strain gauge circuitry, reduction of strain gauge data, special applications such as high temperature, fatigue and creep.
**Displacement Measurement:** Mechanical dial gauges, linear variable differential transformers, linear resistance potentiometers.

**Unit- II Stress and Force Measurements: (8 Hours)**
Load cells-types and sizes, embedded stress meters and plugs, proving rings.
**Temperature Measurements:** Thermo – couples and thermistors, thermistor type thermometers.

**Unit- III Vibration Measurements: (8 Hours)**
Vibration pickups for measuring displacements, velocities and accelerations-principles of operations phase distortions, sensitivity, practical applications.

**Unit- IV Photoelasticity: (8 Hours)**
Photoelastic theory, Photoelastic equipment, Photoelastic model materials, reduction of Photoelastic data, extrapolation to the prototype , practical applications.
**Smart Materials:** Characteristics, piezoelectric materials, shape memory alloys, self healing materials, practical applications.

**Unit- V Measurement Devices: (8 Hours)**
UPV method, radar and dynamic response testing, radiography and radiometry, infrared thermography, X-Ray diffraction, SEM techniques.

## Course Outcomes:
On completion of this course, the students will be able to learn about different methods of measurement of strains, stresses and vibrations. They will also learn photoelasticity and different measurement devices.

**Examination Scheme:**

| **Components** | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
A: Attendance

## Reference Books:

- Dally, J.W. and Riley, W.F., "Experimental Stress Analysis", McGraw-Hill
- Sabmis, G.J.et al.,"Structural Modeling and Experimental Techniques", Prentice – Hall.
- Bungey, J.H.and Millard, S.G., "Testing of Concrete in Structures", Blackie Academic & Professional.
- Encyclopedia of Smart materials, John Wiley & Sons.

# MINOR PROJECT I

**Course Code: MMP 260** **Credit Units: 04**

**Course Objective:**
The aim of the dissertation is to provide you with an opportunity to further your intellectual and personal development in your chosen field by undertaking a significant practical unit of activity, having an educational value at a level commensurate with the award of your degree.

The dissertation can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

**Selecting the Dissertation Topic**
It is usual to give you some discretion in the choice of topic for the dissertation and the approach to be adopted. You will need to ensure that your dissertation is related to your field of specialization.

Deciding this is often the most difficult part of the dissertation process, and perhaps, you have been thinking of a topic for some time.

It is important to distinguish here between ‘dissertation topic’ and ‘dissertation title’. The topic is the specific area that you wish to investigate. The title may not be decided until the dissertation has been written so as to reflect its content properly.

Few restrictions are placed on the choice of the topic. Normally we would expect it to be:
relevant to business, defined broadly;
related to one or more of the subjects or areas of study within the core program and specialisation stream;
clearly focused so as to facilitate an in-depth approach, subject to the availability of adequate sources of information and to your own knowledge;
of value and interest to you and your personal and professional development.

**Planning the Dissertation**
This will entail following:
Selecting a topic for investigation.
Establishing the precise focus of your study by deciding on the aims and objectives of the dissertation, or formulating questions to be investigated. Consider very carefully what is worth investigating and its feasibility.
Drawing up initial dissertation outlines considering the aims and objectives of the dissertation. Workout various stages of dissertation
Devising a timetable to ensure that all stages of dissertation are completed in time. The timetable should include writing of the dissertation and regular meetings with your dissertation guide.

**The Dissertation plan or outline**
It is recommended that you should have a dissertation plan to guide you right from the outset. Essentially, the dissertation plan is an outline of what you intend to do, chapter wise and therefore should reflect the aims and objectives of your dissertation.
There are several reasons for having a dissertation plan
It provides a focus to your thoughts.
It provides your faculty-guide with an opportunity, at an early stage of your work, to make constructive comments and help guide the direction of your research.
The writing of a plan is the first formal stage of the writing process, and therefore helps build up your confidence.
In many ways, the plan encourages you to come to terms with the reading, thinking and writing in a systematic and integrated way, with plenty of time left for changes.
Finally, the dissertation plan generally provides a revision point in the development of your dissertation report in order to allow appropriate changes in the scope and even direction of your work as it progresses.

**Keeping records**
This includes the following:
Making a note of everything you read; including those discarded.
Ensuring that when recording sources, author’s name and initials, date of publication, title, place of publication and publisher are included. (You may consider starting a card index or database from the outset). Making an accurate note of all quotations at the time you read them.
Make clear what is a direct a direct quotation and what is your paraphrase.

**Dissertation format**

All students must follow the following rules in submitting their dissertation.
Front page should provide title, author, Name of degree/diploma and the date of submission.
Second page should be the table of contents giving page references for each chapter and section.
The next page should be the table of appendices, graphs and tables giving titles and page references.
Next to follow should be a synopsis or abstract of the dissertation (approximately 500 words)
Next is the 'acknowledgements'.
Chapter I should be a general introduction, giving the background to the dissertation, the objectives of the dissertation, the rationale for the dissertation, the plan, methodological issues and problems. The limitations of the dissertation should also be hinted in this chapter.
Other chapters will constitute the body of the dissertation. The number of chapters and their sequence will usually vary depending on, among others, on a critical review of the previous relevant work relating to your major findings, a discussion of their implications, and conclusions, possibly with a suggestion of the direction of future research on the area.
After this concluding chapter, you should give a list of all the references you have used. These should be cross - references with your text. For articles from journals, the following details are required e.g.

Draper P and Pandyal K. 1991, The Investment Trust Discount Revisited, Journal of Business Finance and Accounting, Vol18, No6, Nov, pp 791-832.

For books, the following details are required:
Levi, M. 1996, International Financial Management, Prentice Hall, New York, 3rd Ed, 1996

Finally, you should give any appendices. These should only include relevant statistical data or material that cannot be fitted into the above categories.

**The Layout Guidelines for the Dissertation**

A4 size Paper
Font: Arial (10 points) or Times New Roman (12 points)
Line spacing: 1.5
Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

**Guidelines for the assessment of the Dissertation**

While evaluating the dissertation, faculty guide will consider the following aspects:
Has the student made a clear statement of the objective or objective(s).
If there is more than one objective, do these constitute parts of a whole?
Has the student developed an appropriate analytical framework for addressing the problem at hand.
Is this based on up-to-date developments in the topic area?
Has the student collected information / data suitable to the frameworks?
Are the techniques employed by the student to analyze the data / information appropriate and relevant?
Has the student succeeded in drawing conclusion form the analysis?
Do the conclusions relate well to the objectives of the project?
Has the student been regular in his work?
Layout of the written report.

**Assessment Scheme:**

| | |
|---|---|
| Continuous Evaluation:<br>(Based on Abstract, Regularity,<br>Adherence to initial plan, Records etc.) | 40% |
| Final Evaluation: Based on, | 60% |
| Contents & Layout of the Report, | 20 |
| Conceptual Framework, | 05 |
| Objectives & Methodology and | 05 |
| Implications & Conclusions | 10 |
| Viva & Presentation | 20 |

# RESEARCH METHODOLOGY

**Course Code: CEM 301** **Credit Units: 04**
**Total Hours: 40**

**Course Objectives:**
This course is designed to teach the students about different research methodologies, research design, design of experiments and computer applications in research work.

**Course Contents:**

**Module I: Research: (10 Hours)**
Types, Research process and steps in it, Hypothesis, Research proposals and aspects. Research Design: Need, Problem Definition, variables, research design concepts, Literature survey and review, Research design process, Errors in research.
Research Modeling: Types of Models, Model building and stages, Data consideration and testing, Heuristic and Simulation modeling. Report Writing: Pre writing considerations, Thesis writing, Formats of report writing, formats of publications in Research journals.

**Module II: Research Design: (10 Hours)**
Concepts and Type of research design, Design of research of the basis of application – pure and applied, Design of research on the basis of Techniques / Methodology – Exploratory and Descriptive, Descriptive Research – Qualitative and Quantitative, Quantitative – Field studies, Field experiments and laboratory experiments, Design of research on the basis of area of research – research in Social sciences and Physical sciences, Sampling and Data collection, Population and samples, Techniques of sampling, Random, Stratified, Systematic, Multistage-sampling, Primary and secondary sources of data, Design of questionnaire'

**Module III: Design of Experiments: (10 Hours)**
Objectives, strategies, Factorial experimental design, Designing engineering experiments, basic principles-replication, randomization, blocking, Guidelines for design of experiments.
Single Factor Experiment: Hypothesis testing, Analysis of Variance components (ANOVA) for fixed effect model; Total, treatment and error of squares, Degrees of freedom, Confidence interval; ANOVA for random effects model, Estimation of variance
Components, Model adequacy checking.
Two factor Factorial Design, Basic definitions and principles, main effect and interaction, response surface and contour plots, General arrangement for a two factor factorial design; Models: Effects, means and regression, Hypothesis testing.

**Module IV: Computer Applications: (10 Hours)**
Spreadsheet Tool: Introduction to spreadsheet application, features and functions, Using formulas and functions, Data storing, Features for Statistical data analysis, Generating charts/ graph and other features. Tools used may be Microsoft Excel, Open office or similar tool.
Presentation Tool: Introduction to presentation tool, features and functions, Creating presentation, Customizing presentation, showing presentation. Tools used may be Microsoft Power Point, Open Office or similar tool.
Web Search: Introduction to Internet, Using advanced search techniques.

## Course Outcomes:
On completion of this course, the students will be able to learn about different research methodologies, research modeling and design. They will learn how to use computer in their research.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Text & References:


- Montgomery, Douglas C. (2007), 5/e, Design and Analysis of Experiments, (Wiley India)
- Montgomery, Douglas C. & Runger, George C. (2007), 3/e, Applied Statistics & Probability for Engineers (Wiley India)
- Kothari C.K. (2004), 2/e, Research Methodology- Methods and Techniques (New Age International, New Delhi)
- Krishnaswamy, K.N., Sivakumar, Appa Iyer and Mathiranjan M. (2006), Management Research Methodology; Integration of Principles, Methods and Techniques (Pearson Education, New Delhi)
- Fowler, F.J. Survey Research Methods. New Delhi, Sage, 1993 Kothari, C.R., (2008) Research Methodology", New Age International, Wishwa
- Publications, Delhi Reprint 2nd edition.
- Leddy, Paul. D Practical Research: Planning Design. London, Clive Bingley. 1980

# ADVANCED RCC DESIGN

**Course Code: CEM 302** | **Credit Units: 04**
**Total Hours: 40**

**Course Objectives:**
This course is designed to familiarize the students about advanced reinforced concrete design, flat slab construction, pre-stressed concrete section and design of deep beam.

**Course Content:**

**Module-I: (10 Hours)**
Plastic Section Theory for Reinforced Concrete including interaction of flexure Shear-Axial effects, Upper bound and lower bound plastic theorems, Application of plastic analysis to frames – instantaneous centre of rotation

**Module-II: (10 Hours)**
Introduction of flat slab, component of flat slab construction, Indian code recommendation, direct design method, equivalent frame method, shear in flat slab, slab reinforcement, openings in flat slab, Introduction of circular slab

**Module-III: (10 Hours)**
Introduction of yield line theory, yield line patterns, moment capacity along yield line, ultimate load on slabs, Analysis by virtual work and equilibrium method, Redistribution of moments, moment curvature analysis, Recommendations of IS 456:2000.

**Module-IV: (10 Hours)**
Introduction to Pre-stressed concrete and behaviour for simple elements, design of section under flexure using limit state, Introduction of Deep beam, IS code method of design of Deep beam.

## Course Outcomes:
On completion of this course, the students will be able to learn about construction of flat slab, yield line theory, virtual work method and deep beam construction.

**Examination Scheme:**

| **Components** | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| **Weightage (%)** | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
A: Attendance

## Reference Books :

- Reinforced Concrete: Mechanics and Design, 6th Ed., McGregor & White
- Reinforced Concrete: A Fundamental Approach, 6th Ed., Edward Nawy
- Design of Prestressed Concrete, 2nd Ed., Arthur H. Nilso
- Darwin & Dolan, "Design of Concrete Structures", 14th Ed., Nilson,
- Jaikrishna, Chandrasekaran, Elements of earthquake engineering.
- Shah and Karve, Text book of reinforced concrete
- Punamia, RCC designs
- IS-456, -875, -1893, -1984
- Krishna Raju, Prestressed concrete.
- Varghese, Advanced RC Designs, PHI
- Everard, Theory and problems of RC design (Shaum□s Outline S), TMH
- R. Park and T. Pauley, Reinforced concrete structures, John Wiley and sons
- A. K. Jain, Reinforced Concrete: Limit State design, NemChand and Bros. 1999.
- J. Krishna and OP Jain, Plain and Reinforced Concrete, Vol. I I, Roorkee, Nem Chand and Bros.
- H. Nilson, D. Darwin and C. W. Dolar, Design of Concrete structures, Tata McGraw Hill
- T. Paulay and M.J.N. Priestley , Seismic Design of Reinforced Concrete and Masonry Buildings, John Wiley & Sons Inc

# HIGH RISE BUILDINGS ANALYSIS

**Course Code: CEM 303**

**Credit Units: 04**
**Total Hours: 40**

**Course Objectives:**
This course is designed to familiarize the students about structural systems for multi-storeyed buildings, analysis of torsion in buildings, shear walls and beam-column joints for ductility.

**Course Content:**

**Module-I: (10 Hours)**
Structural systems for multi-storey buildings, gravity and lateral loads on buildings, analysis of multi-storey frames. Behaviour of framed tube, tube-in-tube systems, and bundled tube systems

**Module-II: (10 Hours)**
Importance of symmetry and regularity in plan, and regularity in elevation. Analysis for torsion in buildings. Design of floor slabs, raft and pile foundations.

**Module-III: (10 Hours)**
Design of buildings with shear walls and coupled shear walls

**Module-IV: (10 Hours)**
Design and detailing of various members and beam-column joints for ductility. The capacity design principle. Performance based design philosophy. Application of MS-Excel, ETABS

## Course Outcomes:
On completion of this course, the students will be able to learn about high rise building analysis, analysis of torsion in buildings, shear walls and beam-column joints for ductility.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
A: Attendance

## Reference Books


- U.H.Varyani, “Structural Design of Multi-storeyed Buildings”, 2nd Ed., South Asian Publishers, New Delhi.2002
- V.L. Shah & S.R.Karve, “Illustrated Design of Reinforced Concrete Buildings”, (GF+3storeyed), Structures Publications, Pune.2013
- Design of Multi Storeyed Buildings, Vol. 1 & 2, CPWD Publications. 1976
- Bungale S. Taranath, “Structural Analysis and Design of Tall Buildings”, Mc-Graw Hill.1988
- Bryan S. Smith and Alex Coull, “Tall Building Structures”, Wiley India. 1991Coull, Smith, Design of tall buildings
- B S Smith & A Coull, Tall Building Structures: - John Wiley & Sons.
- W. Schueller, High Rise Building Structures: John Wiley & Sons.

# ADVANCED RCC DESIGN LAB

**Course Code: CEM 322** **Credit Units: 02**
**Total Hours: 40**

**Course Objectives:**
This course is designed to familiarize the students about advanced reinforced concrete design, flat slab construction, pre-stressed concrete section and design of deep beam.

**Course Content:**
1. Preparation of working drawings for the following using any drafting software RC Beams- Simply supported, Continuous, Cantilever**: (8 Hours)**
2. T – Beam / L-Beam floor**: (8 Hours)**
3. Slabs – Simply supported, Continuous, One way and two way slabs**: (6 Hours)**
4. Columns – Tied Columns and Spirally reinforced columns**: (6 Hours)**
5. Isolated footings for RC Columns**: (6 Hours)**
6. Combined rectangular and trapezoidal footings**: (6 Hours)**

## Course Outcomes:
On completion of this course, the students will be able to learn about construction of flat slab, yield line theory, virtual work method and deep beam construction.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| A | PR | LR | V | PR | V |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# BUILDING DESIGN PROJECT LAB USING SOFTWARE

**Course Code: CEM 324** **Credit Units: 02**
**Total Hours: 40**

**Course Objectives:**
This course is designed to familiarize the students about structural systems for multi-storeyed buildings, analysis of torsion in buildings, shear walls and beam-column joints for ductility.

**Course Content:**

1. Design of simply supported beam using software**: (6 Hours)**
2. Design of continuous beam using software**: (6 Hours)**
3. Design of simply supported beam using software**: (6 Hours)**
4. Design of slab using software**: (6 Hours)**
5. Design of flat slab using software**: (4 Hours)**
6. Design of two way slab using software**: (4 Hours)**
7. Design of column using software**: (4 Hours)**
8. Design of isolated footing using software**: (4 Hours)**

## Course Outcomes:
On completion of this course, the students will be able to learn about high rise building analysis, analysis of torsion in buildings, shear walls and beam-column joints for ductility.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| A | PR | LR | V | PR | V |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

# STRUCTURAL MATERIAL TESTING LAB – II

**Course Code: CEM 325** **Credit Units: 02**
**Total Hours: 40**

**Course Objectives:**
This course is designed to familiarize the students about various tests on mild steel rod, coil springs, concrete cube tests, RCC beams and different NDT tests.

**Course Content:**
1. Tension test on MS rod**: (4 Hours)**
2. Shear Test on MS rod**: (4 Hours)**
3. Torsion test on MS Specimen**: (4 Hours)**
4. Bending test on steel beams**: (4 Hours)**
5. Spring test – open and close coil springs**: (4 Hours)**
6. Compression test on cubes and cylinders – determination of modulus of elasticity**: (4 Hours)**
7. Split test on concrete cylinders and flexure test on concrete**: (2 hour)**
8. Study of extensometers and strain gauges**: (2 hour)**
9. Bending test on reinforced concrete beams – under reinforced and over reinforced**: (2 hour)**
10. Demonstration of Non- Destructive Testing Equipment**: (2 hour)**
11. Test on Timber beam – Bending test**: (2 hour)**
12. Tests on tiles – Dimension, Transverse Strength, Water Absorption and Crazing**: (2 hour)**
13. Tests on bricks – Crushing strength, water absorption and efflorescence**: (2 hour)**
14. Tests on metals – Hardness test and impact test**: (2 hour)**

## Course Outcomes:
On completion of this course, the students will be able to learn about various tests on mild steel rod, coil springs, concrete cube tests, RCC beams and different NDT tests.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| A | PR | LR | V | PR | V |
| 5 | 10 | 10 | 5 | 35 | 35 |

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

## Reference Books:
- Masonry and Timber Structure by A.S Arya
- Reinforced Concrete (Limit State Method) of by Jain.

# ANALYSIS OF PLATES AND SHELLS

**Course Code: CEM 306** | **Credit Units: 04**
**Total Hours: 40**

**Course Objectives:**
This course is designed to familiarize the students about bending of plates, uniformly loaded circular plates, Navier solution for simply supported rectangular plates and design of spherical domes with/without lanterns at top.

**Course Content:**

**Module-I: (8 Hours)**
Pure Bending of Plates: Slope & curvature of slightly bent plates, Relations between bending moments and curvature in pure bending of plates, Strain energy in Pure bending of plates; Symmetrical bending of Circular plates:

**Module-II: (8 Hours)**
Differential equation for symmetrical bending of laterally loaded circular plates, uniformly loaded circular plates, Circular plates with circular hole at center, circular plate concentrically loaded ; Small deflections of laterally loaded plates:

**Module-III: (8 Hours)**
Differential equation of the deflection surface, Boundary conditions, Simply supported rectangular plates under sinusoidal load, Navier solution for simply supported rectangular plates, Further applications of the Navier solution,

**Module-IV: (8 Hours)**
Alternate solution for simply supported and uniformly loaded rectangular plates, concentrated load on simply supported rectangular plates. Classification of shell structures, importance of membrane theory of shells, shells in the form of a surface of revolution and loaded un-symmetrically with respect to their axes, spherical dome, conical shells, cylindrical shells, Elliptic paraboloid, hyperbolic parabolod and conoids;

**Module-V: (8 Hours)**
General theory of cylindrical shells: Circular cylindrical shell loaded symmetrically with respect to its axis, particular cases of symmetrical deformations of circular cylindrical shells, cylindrical tanks of uniform wall thickness. Design of spherical domes with/without lanterns at top

## Course Outcomes:
On completion of this course, the students will be able to learn about bending of plates, uniformly loaded circular plates, Navier solution for simply supported rectangular plates and design of spherical domes with/without lanterns at top.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Reference Books:

- S Timoshenko, S Woinowasky K, Theory of Plates and Shells
- S. P. Timoshenko and Woinowsky-Kriegar, *Theory of plates and shells*, Mc Graw Hill International, New Delhi
- G. S. Ramaswamy, *Design and construction of concrete shells Roofs*, CBS Publishers, and Delhi
- D. P. Billington, *Thin shell concrete structures*, Mc Graw Hill international, New York
- W. T. Marshall, *Design of cylindrical shell roofs*, E& FN SPON, London

# RELIABILITY BASED CIVIL ENGINEERING DESIGN

**Course Code: CEM 307** **Credit Units: 04**
**Total Hours: 40**

**Course Objectives:**
This course is designed to familiarize the students about probability theory for reliability based civil engineering design, resistance distribution, structural reliability.

**Course Content:**

**Module-I: (8 Hours)**
Probability Theory : Mutually exclusice events, set theory, sample points and sample spece, laws of probability, toal probability theorem, Bayes rule, random variablesdiscreate and continuous, jointly distributed discrete variables, marginal distribution, conditional distribution, jointly distributed continuous variables functions of random variables, moments and expectations, common probability distribution normal Iognormal, Gamma and Beta distributions, external distributions.

**Module-II: (8 Hours)**
Resistance Distribution and Parameters: Statics of properties of concrete and steel, statics of strength of bricks and mortal, Characterization of variables, allowable stresses based on specified reliability. Probabilistic Analysis of loads: Load as a stochastic process, dead load, statistical
analysis of live loads-maximum sustained load intensity model, maximum total load model, wind load-probability model for wind load.

**Module-III: (8 Hours)**
Structural Reliability : General expression for reliability , expression for probability of failure: reliability when strength (S) and load (L) follow normal distribution, lognormal distribution, exponential distribution, extreme value distributions, factor of safety corresponding to a given reliability. Monte Carlo Study of Reliability: Monte Carlo Method-Inverse transformation technique, Application to columns beams and frames. Level 2 Reliability Method: Basic variables and failure surface, first order second moment methods-Hasofer and linds method, Non normal distributions; determination of reliability index of structural elements.

**Module-IV: (8 Hours)**
Reliability Based Design: Determination of partial safety checking formats, development of reliability based criteria, optimal safety factors, calibration of IS 456 and IS 800.

**Module-V: (8 Hours)**
Reliability of Structural Systems: System reliability, modeling of structural systems, bounds on system reliability, automatic generation of a mechanism, generation of dominant mechanisms, reliability analysis of R.C.C. and Steel Frames.

## Course Outcomes:
On completion of this course, the students will be able to learn about probability theory for reliability based civil engineering design, resistance distribution, structural reliability.

**Examination Scheme:**

| **Components** | **A** | **CT** | **S/V/Q/HA** | **EE** |
|---|---|---|---|---|
| **Weightage (%)** | **5** | **15** | **10** | **70** |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## Reference Books:

- Ranganathan, R. Reliability Analysis and Design of Structures, TMH
- Rao. S.S. Reliability Based Design , McGraw Hill Book CO. Inc.
- Ghosh , D.I., A Primer of Reliability Theory, john Wiley , New York
- Lewis, E.E., Introduction to Reliability Engineering , John Wiley New Y

# EVALUATION AND RETROFITTING OF BUILDINGS

**Course Code: CEM 308** **Credit Units: 04**
**Total Hours: 40**

**Course Objectives:**
This course is designed to familiarize the students about deterioration of concrete buildings, structural health monitoring of buildings, surface repair and retrofitting techniques and seismic rehabilitation of existing buildings.

**Course Content:**

**Module –I: (7 Hours)**
Deterioration of concrete buildings. Embedded metal corrosion ,disintegration mechanism moisture effect structural effect faulty construction

**Module –II: (7 Hours)**
Evaluation of concrete buildings , visual investigation destructive testing system ,non destructive testing technique ,semi destructive testing technique , chemical testing

**Module –III: (7 Hours)**
Structural health monitoring , vibration based monitoring technique, smart materials and sensors

**Module –IV: (7 Hours)**
Surface repair and retrofitting techniques, strategy and design selection of repair materials, surface preparation , bonding repair materials to existing concrete , placement methods

**Module –V: (6 Hours)**
Strengthening technique ,beam shear strengthening technique ,shear transfer strengthening between members ,column Strengthening ,flexural Strengthening and crack stabilization

**Module –VI: (6 Hours)**
Seismic rehabilitation of existing buildings seismic vulnerability and strategies for seismic retrofit

## Course Outcomes:
On completion of this course, the students will be able to learn about deterioration of concrete buildings, structural health monitoring of buildings, surface repair and retrofitting techniques and seismic rehabilitation of existing buildings.

**Examination Scheme:**

| Components | A | CT | S/V/Q/HA | EE |
|---|---|---|---|---|
| Weightage (%) | 5 | 15 | 10 | 70 |

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A:Attendance

## Reference Books:

- Emmons P.H. “ Concrete Repan and Maintenance Illustrated Galgotia Publications Pvt. Ltd. 2001
- Bungey S. Lillard. G and Grantham. M.G “ Testing of Concrete in Structure” Taylor and Francis 2001
- Mallhotra V.M and Carino. N.J “ Handbook on Non-destructive Testing of Concrete . CRC Press 2004
- Bohni. H. “ Corrosion in Concrete Structures” CRC Press 2005 FEMA 273, NEHRP Guidline for Seismic Rehabilitation of Buildings 1997
- ATC-40 Seismic Evaluation and Retrofit of Concrete Building Vol 1 & 2 1997
- Priestley.M.J.N. Sei ble.F and Calvi. GM. “Seismic Design and Retrofit of Bridges” John Wiley & Sons 1996.
- A. W. Hendry, Sinha, Davis, Introduction to Load Bearing Brick Work Design, 1st UK Edition, Ellis Horwood Ltd., 1981.
- A. W. Hendry, Structural Masonry, 2nd Rev. Edition, Palgrave McMillan Press, 1998.

# SUMMER INTERNSHIP PROGRAMME (SIP)

**Course Code: MSP 350** **Credit Units: 06**

**Course Objective:**
The objective of project work is to provide students, exposure about the technology they have learnt in previous and current semesters and their applications in real time situations. Appropriate application software as assigned by the project guide to be developed individually or in-groups.
They are supposed to follow the following technologies:
C,
C++
DBMS

**Guidelines:**
There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal classroom situations. These attributes are intellectual ability, professional judgment and decision-making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc.
In order to achieve these objectives, each student will maintain a file (**Internship File**). The Internship File aims to encourage students to keep a personal record of their learning and achievement throughout the Programme. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development.

The File will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

The **layout guidelines** for the Project & Seminar Report:

**1. File should be in the following specification**
- A4 size paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top & bottom margins: 1 inch/ 2.5 cm
- Left & right margins: 1.25 inches/ 3 cm

**2. Report Layout:** The report should contain the following components
Front Page
Table of Content
Acknowledgement
Student Certificate
Company Profile (optional)
Introduction
Main Body
References / Bibliography

The File will include ***five sections*** in the order described below. The content and comprehensiveness of the main body and appendices of the report should include the following:

1. **The Title Page**--Title - An Internship Experience Report For (Your Name), name of internship organization, name of the Supervisor/Guide and his/her designation, date started and completed, and number of credits for which the report is submitted.
2. **Table of Content**--an outline of the contents by topics and subtopics with the page number and location of each section.
3. **Introduction**--short, but should include how and why you obtained the internship experience position and the relationship it has to your professional and career goals.
4. **Main Body**--should include but not be limited to daily tasks performed. Major projects contributed to, dates, Hours on task, observations and feelings, meetings attended and their purposes, listing of tools and materials and their suppliers, and photographs if possible of projects, buildings and co-workers.

5. **References / Bibliography** --This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system

**ASSESSMENT OF THE INTERNSHIP FILE**

The student will be provided with the Student Assessment Record (SAR) to be placed in front of the Internship File. Each item in the SAR is ticked off when it is completed successfully. The faculty will also assess each item as it is completed. The SAR will be signed by the student and by the faculty to indicate that the File is the student's own work. It will also ensure regularity and meeting the delaines.

**STUDENT ASSESSMENT RECORD (SAR)**

1. **Range of Research Methods used to obtain information**

2. **Execution of Research**

3. **Data Analysis**
   - Analyse Quantitative/ Qualitative information
   - Control Quality

4. **Draw Conclusions**

**Examination Scheme:**

| Components | V | S | R | FP |
|---|---|---|---|---|
| **Weightage (%)** | 20 | 20 | 20 | 40 |

V – Viva, S – Synopsis, FP – Final Presentation, R - Report

# MINOR PROJECT II

**Course Code: MMP 360** **Credit Units: 04**

**Course Objective:**
The aim of the dissertation is to provide you with an opportunity to further your intellectual and personal development in your chosen field by undertaking a significant practical unit of activity, having an educational value at a level commensurate with the award of your degree.

The dissertation can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

**Selecting the Dissertation Topic**
It is usual to give you some discretion in the choice of topic for the dissertation and the approach to be adopted. You will need to ensure that your dissertation is related to your field of specialization.

Deciding this is often the most difficult part of the dissertation process, and perhaps, you have been thinking of a topic for some time.

It is important to distinguish here between 'dissertation topic' and 'dissertation title'. The topic is the specific area that you wish to investigate. The title may not be decided until the dissertation has been written so as to reflect its content properly.

Few restrictions are placed on the choice of the topic. Normally we would expect it to be:
relevant to business, defined broadly;
related to one or more of the subjects or areas of study within the core program and specialisation stream;
clearly focused so as to facilitate an in-depth approach, subject to the availability of adequate sources of information and to your own knowledge;
of value and interest to you and your personal and professional development.

**Planning the Dissertation**
This will entail following:
Selecting a topic for investigation.
Establishing the precise focus of your study by deciding on the aims and objectives of the dissertation, or formulating questions to be investigated. Consider very carefully what is worth investigating and its feasibility.
Drawing up initial dissertation outlines considering the aims and objectives of the dissertation. Workout various stages of dissertation
Devising a timetable to ensure that all stages of dissertation are completed in time. The timetable should include writing of the dissertation and regular meetings with your dissertation guide.

**The Dissertation plan or outline**
It is recommended that you should have a dissertation plan to guide you right from the outset. Essentially, the dissertation plan is an outline of what you intend to do, chapter wise and therefore should reflect the aims and objectives of your dissertation.
There are several reasons for having a dissertation plan
It provides a focus to your thoughts.
It provides your faculty-guide with an opportunity, at an early stage of your work, to make constructive comments and help guide the direction of your research.
The writing of a plan is the first formal stage of the writing process, and therefore helps build up your confidence.
In many ways, the plan encourages you to come to terms with the reading, thinking and writing in a systematic and integrated way, with plenty of time left for changes.
Finally, the dissertation plan generally provides a revision point in the development of your dissertation report in order to allow appropriate changes in the scope and even direction of your work as it progresses.

**Keeping records**
This includes the following:
Making a note of everything you read; including those discarded.
Ensuring that when recording sources, author's name and initials, date of publication, title, place of publication and publisher are included. (You may consider starting a card index or database from the outset). Making an accurate note of all quotations at the time you read them.
Make clear what is a direct a direct quotation and what is your paraphrase.

**Dissertation format**

All students must follow the following rules in submitting their dissertation.
Front page should provide title, author, Name of degree/diploma and the date of submission.
Second page should be the table of contents giving page references for each chapter and section.
The next page should be the table of appendices, graphs and tables giving titles and page references.
Next to follow should be a synopsis or abstract of the dissertation (approximately 500 words)
Next is the ‘acknowledgements’.
Chapter I should be a general introduction, giving the background to the dissertation, the objectives of the dissertation, the rationale for the dissertation, the plan, methodological issues and problems. The limitations of the dissertation should also be hinted in this chapter.
Other chapters will constitute the body of the dissertation. The number of chapters and their sequence will usually vary depending on, among others, on a critical review of the previous relevant work relating to your major findings, a discussion of their implications, and conclusions, possibly with a suggestion of the direction of future research on the area.
After this concluding chapter, you should give a list of all the references you have used. These should be cross - references with your text. For articles from journals, the following details are required e.g.

Draper P and Pandyal K. 1991, The Investment Trust Discount Revisited, Journal of Business Finance and Accounting, Vol18, No6, Nov, pp 791-832.

For books, the following details are required:
Levi, M. 1996, International Financial Management, Prentice Hall, New York, 3rd Ed, 1996

Finally, you should give any appendices. These should only include relevant statistical data or material that cannot be fitted into the above categories.

**The Layout Guidelines for the Dissertation**

A4 size Paper
Font: Arial (10 points) or Times New Roman (12 points)
Line spacing: 1.5
Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

**Guidelines for the assessment of the Dissertation**

While evaluating the dissertation, faculty guide will consider the following aspects:
Has the student made a clear statement of the objective or objective(s).
If there is more than one objective, do these constitute parts of a whole?
Has the student developed an appropriate analytical framework for addressing the problem at hand.
Is this based on up-to-date developments in the topic area?
Has the student collected information / data suitable to the frameworks?
Are the techniques employed by the student to analyze the data / information appropriate and relevant?
Has the student succeeded in drawing conclusion form the analysis?
Do the conclusions relate well to the objectives of the project?
Has the student been regular in his work?
Layout of the written report.

**Assessment Scheme:**

| | |
|---|---|
| Continuous Evaluation:<br>(Based on Abstract, Regularity,<br>Adherence to initial plan, Records etc.) | 40% |
| Final Evaluation: Based on, | 60% |
| Contents & Layout of the Report, | 20 |
| Conceptual Framework, | 05 |
| Objectives & Methodology and | 05 |
| Implications & Conclusions | 10 |
| Viva & Presentation | 20 |

# DISSERTATION

**Course Code: MMP 460** **Credit Units: 30**

**GUIDELINES FOR DISSERTATION**

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation. Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.

The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

**In general, the File should be comprehensive and include**

A short account of the activities that were undertaken as part of the project;

A statement about the extent to which the project has achieved its stated goals.

A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;

Any activities planned but not yet completed as part of the DISSERTION, or as a future initiative directly resulting from the project;

Any problems that have arisen that may be useful to document for future reference.

**Report Layout**

The report should contain the following components:

**Title or Cover Page**

***The title page should contain the following information: Project Title; Student's Name; Course; Year; Supervisor's Name.***

**Acknowledgements (optional)**

Acknowledgment to any advisory or financial assistance received in the course of work may be given.

**Abstract**

A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project

**Table of Contents**

Titles and subtitles are to correspond exactly with those in the text.

**Introduction**

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

**Materials and Methods**

This section should aim at experimental designs, materials used. Methodology should be mentioned in details including modifications if any.

**Results and Discussion**

Present results, discuss and compare these with those from other workers, etc. In writing these section, emphasis should be given on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various secions, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary never write in "point" form.

**Conclusion**

A conclusion should be the final section in which the outcome of the work is mentioned briefly.

Future prospects

**Appendices**
The Appendix contains material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

**References / Bibliography**
This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

**Examples**
**For research article**
Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichia coli* O157: H7. *Clin Microbiol Infect*, 8 (suppl 1): 116–117.

**For book**
Kowalski,M.(1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), 7: 63-67

**ASSESSMENT OF THE DISSERTATION FILE**
Essentially, marking will be based on the following criteria: the quality of the report, the technical merit of the project and the project execution.
Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project.
Project execution is concerned with assessing how much work has been put in.
The File should fulfill the following *assessment objectives:*

Range of Research Methods used to obtain information
**Execution of Research**
Data Analysis
Analyse Quantitative/ Qualitative information
Control Quality
**Draw Conclusions**
**Examination Scheme:**

| | |
|---|---|
| Dissertation | 150 |
| Viva Voce | 50 |
| Total | 200 |

Data, leading to production of a structured report.

**Selecting the Dissertation Topic**
It is usual to give you some discretion in the choice of topic for the dissertation and the approach to be adopted. You will need to ensure that your dissertation is related to your field of specialization.

Deciding this is often the most difficult part of the dissertation process, and perhaps, you have been thinking of a topic for some time.

It is important to distinguish here between ‘dissertation topic’ and ‘dissertation title’. The topic is the specific area that you wish to investigate. The title may not be decided until the dissertation has been written so as to reflect its content properly.
Few restrictions are placed on the choice of the topic. Normally we would expect it to be:
relevant to business, defined broadly;
related to one or more of the subjects or areas of study within the core program and specialisation stream;
clearly focused so as to facilitate an in-depth approach, subject to the availability of adequate sources of information and to your own knowledge;
of value and interest to you and your personal and professional development.

**Planning the Dissertation**
This will entail following:
Selecting a topic for investigation.
Establishing the precise focus of your study by deciding on the aims and objectives of the dissertation, or formulating questions to be investigated. Consider very carefully what is worth investigating and its feasibility.

Drawing up initial dissertation outlines considering the aims and objectives of the dissertation. Workout various stages of dissertation
Devising a timetable to ensure that all stages of dissertation are completed in time. The timetable should include writing of the dissertation and regular meetings with your dissertation guide.

**The Dissertation plan or outline**
It is recommended that you should have a dissertation plan to guide you right from the outset. Essentially, the dissertation plan is an outline of what you intend to do, chapter wise and therefore should reflect the aims and objectives of your dissertation.

***There are several reasons for having a dissertation plan***
It provides a focus to your thoughts.
It provides your faculty-guide with an opportunity, at an early stage of your work, to make constructive comments and help guide the direction of your research.
The writing of a plan is the first formal stage of the writing process, and therefore helps build up your confidence.
In many ways, the plan encourages you to come to terms with the reading, thinking and writing in a systematic and integrated way, with plenty of time left for changes.
Finally, the dissertation plan generally provides a revision point in the development of your dissertation report in order to allow appropriate changes in the scope and even direction of your work as it progresses.

**Keeping records**
This includes the following:
Making a note of everything you read; including those discarded.
Ensuring that when recording sources, author's name and initials, date of publication, title, place of publication and publisher are included. (You may consider starting a card index or database from the outset). Making an accurate note of all quotations at the time you read them.
Make clear what is a direct a direct quotation and what is your paraphrase.

**Dissertation format**
All students must follow the following rules in submitting their dissertation.
Front page should provide title, author, Name of degree/diploma and the date of submission.
Second page should be the table of contents giving page references for each chapter and section.
The next page should be the table of appendices, graphs and tables giving titles and page references.
Next to follow should be a synopsis or abstract of the dissertation (approximately 500 words)
Next is the 'acknowledgements'.

Chapter I should be a general introduction, giving the background to the dissertation, the objectives of the dissertation, the rationale for the dissertation, the plan, methodological issues and problems. The limitations of the dissertation should also be hinted in this chapter.

Other chapters will constitute the body of the dissertation. The number of chapters and their sequence will usually vary depending on, among others, on a critical review of the previous relevant work relating to your major findings, a discussion of their implications, and conclusions, possibly with a suggestion of the direction of future research on the area.After this concluding chapter, you should give a list of all the references you have used. These should be cross - references with your text. For articles from journals, the following details are required e.g.
*Draper P and Pandyal K. 1991, The Investment Trust Discount Revisited, Journal of Business Finance and Accounting, Vol18, No6, Nov, pp 791-832.*

For books, the following details are required:
*Levi, M. 1996, International Financial Management, Prentice Hall, New York, 3rd Ed, 1996*
Finally, you should give any appendices. These should only include relevant statistical data or material that cannot be fitted into the above categories.

**The Layout Guidelines for the Dissertation**
A4 size Paper
Font: Arial (10 points) or Times New Roman (12 points)
Line spacing: 1.5
Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

**Guidelines for the assessment of the Dissertation**

While evaluating the dissertation, faculty guide will consider the following aspects:
- Has the student made a clear statement of the objective or objective(s).
- If there is more than one objective, do these constitute parts of a whole?

- Has the student developed an appropriate analytical framework for addressing the problem at hand.
- Is this based on up-to-date developments in the topic area?
- Has the student collected information / data suitable to the frameworks?
- Are the techniques employed by the student to analyse the data / information appropriate and relevant?
- Has the student succeeded in drawing conclusion form the analysis?
- Do the conclusions relate well to the objectives of the project?
- Has the student been regular in his work?
- Layout of the written report.

**Assessment Scheme:**

| | |
|---|---|
| Continuous Evaluation:<br>(Based on Abstract, Regularity,<br>Adherence to initial plan, Records etc.) | 60% |
| Final Evaluation: Based on, | 40% |
| Contents & Layout of the Report, | 10 |
| Conceptual Framework, | 05 |
| Objectives & Methodology and | 05 |
| Implications & Conclusions | 05 |
| Viva & Presentation | 15 |