

**Bachelor of Technology
(Mechanical & Automation Engineering)**

Programme Code: UMA

Duration – 5 Years Full Time

(Integrated M. Tech.)

**Programme Structure And Curriculum & Scheme of
Examination**

2017-22

**AMITY UNIVERSITY
RAJASTHAN**

PROGRAMME STRUCTURE

FIRST SEMESTER

Code	Title	Category	L	T	P	Credit
AM 101	Applied Mathematics – I	CC	3	1	-	4
AP 102	Applied Physics-I – Fields & Waves	CC	2	1	-	3
AC 103	Applied Chemistry	CC	2	1	-	3
UMA 104	Elements of Mechanical Engineering	CC	2	1	-	3
UMA 105	Programming in C	CC	2	1	-	3
UMA 106	Electrical Science	CC	2	1	-	3
AP 122	Applied Physics-I – Fields & Waves Lab	CC	-	-	2	1
AC 123	Applied Chemistry Lab	CC	-	-	2	1
UMA 124	Elements of Mechanical Engineering Lab	CC	-	-	2	1
UMA 125	Programming in C Lab	CC	-	-	2	1
UMA 126	Electrical Science Lab	CC	-	-	2	1
Value Added						
BCS 101	English	VA	1	-	-	1
BSS 101	Behavioural Science - I	VA	1	-	-	1
	Foreign Language – I	VA	2	-	-	2
FLF 101	French					
FLG 101	German					
FLS 101	Spanish					
FLC 101	Chinese					
TOTAL						28
Note:- CC - Core Course, VA - Value Added Course, OE - Open Elective, DE - Domain Elective, FW - Field Work						

SECOND SEMESTER

Code	Title	Category	L	T	P	Credit
Core Courses						
AM 201	Applied Mathematics – II	CC	3	1	-	4
AP 202	Applied Physics-II – Modern Physics	CC	2	1	-	3
BCS 203	Object Oriented Programming using C ⁺⁺	CC	2	1	-	3
UMA 204	Engineering Mechanics	CC	2	1	-	3
UMA 205	Engineering Graphics	CC	1	-	-	1
AP 222	Applied Physics-II – Modern Physics Lab	CC	-	-	2	1
UMA 223	Object Oriented Programming using C ⁺⁺ Lab	CC	-	-	2	1
UMA 224	Engineering Mechanics Lab	CC	-	-	2	1
UMA 225	Engineering Graphics Lab	CC	-	-	2	1
Open Elective						
	Open Elective-1	OE	3	-	-	3
Value Added						
BCS 201	English	VA	1	-	-	1
BSS 201	Behavioural Science – II	VA	1	-	-	1
	Foreign Language - II	VA	2	-	-	2
FLF 201	French					
FLG 201	German					
FLS 201	Spanish					
FLC 201	Chinese					
EVS 001	Environmental Studies	VA	3	1	-	4
TOTAL						29

THIRD SEMESTER

Code	Title	Category	L	T	P	Credit
UMA 301	Numerical Analysis & Programming	CC	3	-	-	3
UMA 302	Thermodynamics	CC	2	1	-	3
UMA 303	Mechanics of Solids	CC	2	1	-	3
UMA 304	Mechanics of Fluids	CC	2	1	-	3
UMA 305	Electronics	CC	2	-	-	2
UMA 320	Machine Drawing Lab	CC	-	-	2	1
UMA 321	Numerical Analysis & Programming Lab	CC	-	-	2	1
UMA 322	Thermodynamics Lab	CC	-	-	2	1
UMA 323	Mechanics of Solids Lab	CC	-	-	2	1
UMA 324	Mechanics of Fluids Lab	CC	-	-	2	1
UMA 325	Electronics Lab	CC	-	-	2	1
DE Electives 1: Student has to select 1 course from the list of following DE electives						
UMA 306	Material Science & Metallurgy	DE	2	-	-	2
UMA 307	Compressible flow	DE	2	-	-	
Open Elective						
	Open Elective-2	OE	3	-	-	3
Value Added						
BCS 301	Communication Skills – I	VA	1	-	-	1
BSS 301	Behavioral Science – III	VA	1	-	-	1
	Foreign Language - III	VA	2	-	-	2
FLF 301	French					
FLG 301	German					
FLS 301	Spanish					
FLC 301	Chinese					
TOTAL						29

FOURTH SEMESTER

Code	Title	Category	L	T	P	Credit
UMA 401	Kinematics of Machines	CC	3	-	-	3
UMA 402	Computer Networks	CC	3	-	-	3
UMA 403	Heat & Mass Transfer	CC	2	1	-	3
UMA 404	Manufacturing Machines	CC	3	-	-	3
UMA 405	Principles of Computer Graphics	CC	2	-	-	2
UMA 421	Kinematics of Machines Lab	CC			2	1
UMA 422	Manufacturing Machines Lab	CC			2	1
UMA 423	Principles of Computer Graphics Lab	CC			2	1
DE Electives 2: Student has to select 1 course from the list of following DE electives						
UMA 406	Metrology	DE	2	-	-	3
UMA 424	Metrology Lab	DE	-	-	2	
UMA 407	Quality control & Quality Assurance	DE	3	-	-	
Open Elective						
	Open Elective-3	OE	3	-	-	3
Value Added						
BCS 401	Communication Skills - II	VA	1	-	-	1
BSS 401	Behavioural Science – IV	VA	1	-	-	1
	Foreign Language - IV	VA	2	-	-	2
FLF 401	French					
FLG 401	German					
FLS 401	Spanish					
FLC 401	Chinese					
TOTAL						27

INDUSTRIAL TRAINING – I: 6-8 Weeks

FIFTH SEMESTER

Code	Title	Category	L	T	P	Credit
UMA 501	Machine Design – I	CC	3	-	-	3
UMA 502	Relational Database Management System	CC	2	-	-	2
UMA 503	Measurements & Controls	CC	2	-	-	2
UMA 504	Dynamics of Machines	CC	2	1	-	3
UMA 507	Casting Technology	CC	3	-	-	3
UMA 521	Machine Design – I Lab	CC			2	1
UMA 522	Relational Database Management System	CC			2	1
UMA 523	Measurements & Controls	CC			2	1
UMA 524	Programming Lab - II (MAT Lab)	CC	-	-	2	1
UMA 525	Computer Aided Drafting & Design Lab	CC	-	-	2	1
UMA 550	Practical Training (Evaluation)	CC	-	-	-	6
DE Electives 3: Student has to select 1 course from the list of following DE electives						
UMA 505	Theory of Metal Forming	DE	2	-	-	2
UMA 506	Management of Manufacturing Systems	DE	2	-	-	
Open Elective						
	Open Elective-4	OE	3	-	-	3
Value Added						
BCS 501	Communication Skills - III	VA	1	-	-	1
BSS 501	Behavioural Science –V	VA	1	-	-	1
	Foreign Language - V	VA	2	-	-	2
FLF 501	French					
FLG 501	German					
FLS 501	Spanish					
FLC 501	Chinese					
TOTAL						33

SIXTH SEMESTER

Code	Title	Category	L	T	P	Credit
UMA 601	Machine Design – II	CC	2	1	-	3
UMA 602	Microprocessor System	CC	2	-	-	2
UMA 603	Fluid Power System	CC	2	1	-	3
UMA 604	Metal Cutting & Tool Design	CC	3	-	-	3
UMA 605	Internal Combustion Engines	CC	3	-	-	3
UMA 608	Metal Forming Analysis	CC	3	-	-	3
UMA 621	Machine Design – II Lab	CC	-	-	2	1
UMA 622	Microprocessor System Lab	CC	-	-	2	1
UMA 623	Fluid Power System Lab	CC	-	-	2	1
UMA 624	Metal Cutting & Tool Design Lab	CC	-	-	2	1
DE Electives 4: Student has to select 1 course from the list of following DE electives						
UMA 606	Power Plant Practices	DE	3	-	-	3
UMA 607	Industrial Automation & Control	DE	3	-	-	
Open Elective						
	Open Elective-5	OE	3	-	-	3
Value Added						
BCS 601	Communication Skill – IV	VA	1	-	-	1
BSS 601	Behavioural Science – VI	VA	1	-	-	1
	Foreign Language - VI	VA	2	-	-	2
FLF 601	French					
FLG 601	German					
FLS 601	Spanish					
FLC 601	Chinese					
TOTAL						31

INDUSTRIAL TRAINING – II: 6-8 Weeks

SEVENTH SEMESTER

Code	Title	Category	L	T	P	Credit
UMA 701	Operations Research	CC	3	-	-	3
UMA 702	Mechatronics	CC	3	-	-	3
UMA 703	Electrical Machines	CC	2	-	-	2
UMA 706	Total Quality Management	CC	3	-		3
UMA 707	Welding and Allied Process	CC	3	-		3
UMA 721	Operations Research Lab	CC	-	-	2	1
UMA 722	Mechatronics Lab	CC	-	-	2	1
UMA 723	Electrical Machines Lab	CC	-	-	2	1
UMA 750	Industrial Training (Evaluation)	CC	-	-	-	6
UMA 760	Seminar	CC	-	-	-	3
DE Electives 5: Student has to select 1 course from the list of following DE electives						
UMA 704	Automotive Engineering	DE	3	-	-	4
UMA 724	Automotive Engineering Lab	DE	-	-	2	
UMA 705	Robotics	DE	3	-	-	
UMA 725	Robotics Lab	DE	-	-	2	
Open Elective						
	Open Elective-6	OE	3			3
Value Added						
BCS 701	Communication Skills – V	VA	1	-	-	1
BSS 701	Behavioural Science – VII	VA	1	-	-	1
	Foreign Language – VII	VA	2	-	-	2
FLF 701	French					
FLG 701	German					
FLS 701	Spanish					
FLC 701	Chinese					
TOTAL						37

EIGHTH SEMESTER

Code	Title	Category	L	T	P	Credit
Core Courses						
UMA 801	Refrigeration & Air-conditioning	CC	3	-	-	3
UMA 802	Computer Aided Manufacturing	CC	3	-	-	3
UMA 806	Flexible Manufacturing Systems	CC	3	-	-	3
UMA 807	CNC Technology and Programming	CC	3	-	-	3
UMA 821	Refrigeration & Air-conditioning Lab	CC	-	-	2	1
UMA 822	Computer Aided Manufacturing Lab	CC	-	-	2	1
UMA 860	Project	CC	-	-	-	12
DE Electives 6: Student has to select 1 course from the list of following DE electives						
UMA 803	Gear Technology	DE	2	-	-	2
UMA 804	Mathematical Modeling	DE	2	-	-	
UMA 805	Advanced manufacturing machines	DE	2	-	-	
Value Added						
BCS 801	Business Communication – VI	VA	1	-	-	1
BSS 801	Behavioural Science – VIII	VA	1	-	-	1
	Foreign Language – VIII	VA	2	-	-	2
FLF 801	French					
FLG 801	German					
FLS 801	Spanish					
FLC 801	Chinese					
TOTAL						32

NINTH SEMESTER

Code	Course	Category	L	T	P	Credit
UMA 901	Non-Conventional Manufacturing Processes	CC	3	-	2	4
UMA 902	Finite Element Methods	CC	3	-	2	4
UMA 903	Simulation, Modelling and Analysis	CC	3		2	4
UMA 904	Advance Mechanical Vibration	CC	3	-	-	3
UMA 950	Summer Internship (Evaluation)		-	-	-	12
DE Electives 7: Student has to select 1 course from the list of following DE electives						
UMA 905	Quality Management Systems	DE	3	-		3
UMA 906	Neural Network and Fuzzy Systems	DE	3	-		
Value Added						
BCS 901	Business Communication – VII	VA	1	-	-	1
BSS 901	Behavioural Science – IX	VA	1	-	-	1
	Foreign Language – IX	VA	2	-	-	2
FLF 901	French					
FLG 901	German					
FLS 901	Spanish					
FLC 901	Chinese					
TOTAL						34

TENTH SEMESTER

Code	Course	Category	L	T	P	Credit
UMA 001	Final Dissertation	CC	-	-	-	30
	TOTAL					30

Notes:

1. For non-credit courses, evaluation will be done but no credit units will be assigned. They will be reflected in the grade sheet with result as “satisfactory” or “Unsatisfactory”.
2. In semester III & IV, a student can opt for one course of BSI/ EMC² in each semester either as an alternative to one of the elective courses or as an additional course. In case these are taken as an alternative to an elective course, each of these courses will have 4 credit units and if taken as an additional course then each will be treated as non-credit course.

Eligibility Criteria:

Min60% aggregate in class X & XII and PCM min 70% for Non-sponsored / 65 % for self sponsored & 60% for Company Sponsored Category

Track-I			
S. No.	Code	Subject Name	Credit
1	UMA 302/322	Thermodynamics (T/P)	4
2	UMA 401/421	Kinematics of Machines (T/P)	4
3	UMA 504	Dynamics of Machines (T)	3
4	UMA 604/624	Metal Cutting & Tool Design (T/P)	3
5	UMA 704/724	Automotive Engineering (T/P)	4
Total			18

Track-II			
S. No.	Code	Subject Name	Credit
1	UMA 303/323	Mechanics of Solids (T/P)	4
2	UMA 404/422	Manufacturing Machines (T/P)	4
3	UMA 501/521	Machine Design-I (T/P)	4
4	UMA 601/621	Machine Design-II (T/P)	4
5	UMA 701/721	Operation Research (T/P)	4
Total			20

Curriculum & Scheme of Examination

APPLIED MATHEMATICS – I

Course Code: AM 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: UMA 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 ultrasonic waves.

Module II: Wave Nature of Light

Interference: Coherent Sources, Conditions of interference, Interference due to division of wavefront, Fresnel's 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

APPLIED CHEMISTRY

Course Code: UMA 103

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

ELEMENTS OF MECHANICAL ENGINEERING

Course Code: UMA 104

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 stroke 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: UMA 105

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: UMA 106

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

APPLIED PHYSICS LAB - I

Course Code: UMA 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 & Griffith'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 axis 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.

APPLIED CHEMISTRY LAB

Course Code: UMA 121

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.
7. (b) To determine the composition of a liquid mixture A and B (acetic acid and water) by surface tension method.
8. To prepare and describe a titration curve for phosphoric acid – sodium hydroxide titration using pH-meter.
9. (a) To find the cell constant of conductivity cell.
10. (b) Determine the strength of hydrochloric acid solution by titrating it against standard sodium hydroxide solution conductometrically
11. Determination of Dissolved oxygen in the given water sample.
12. To determine the total residual chlorine in water.
13. 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.
14. Determination of viscosity of given oil by means of Redwood viscometer I.
15. To determine flash point and fire point of an oil by Pensky Martin's Apparatus
16. 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.

ELEMENT OF MECHANICAL ENGINEERING LAB

Course Code: UMA 122

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: UMA 123

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: UMA 124

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.

ENGINEERING GRAPHICS LAB

Course Code: UMA 125

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 from 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

To Autumn

O! Captain, My Captain.

Where the Mind is Without Fear

Psalm of Life

Shakespeare

Keats

Walt Whitman

Rabindranath Tagore

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: UMA 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, Judith 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: UMA 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 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:

<i>Components</i>	<i>CT1</i>	<i>CT2</i>	<i>C</i>	<i>I</i>	<i>V</i>	<i>A</i>
<i>Weightage (%)</i>	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: UMA 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, wohnen, 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 Diphthongs

Module IV: Countries, nationalities and their languages

To make the students acquainted with the most widely used country names, their nationalities 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: UMA 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 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, Zeros 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: UMA 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, Zeeman effect (normal & anomalous), Paschen-Bach effect, X-ray spectra and energy level diagram, Moseley's 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

Sommerfeld's free electron theory of metals, Fermi energy, Introduction to periodic potential & Kronig-Penny model (Qualitative) Band Theory of Solids, Semi-conductors: Intrinsic and Extrinsic Semiconductors, photoconductivity and photovoltaics, 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

ENVIRONMENT STUDIES

Course Code: UMA 203

Credit Units: 04

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

Module V: 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 VI: 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 VII: 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 VIII: 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, Clarendon Press Oxford (TB)
- 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
- 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 Environmental Management. W.B. Saunders Co. Philadelphia, USA 499p

OBJECT ORIENTED PROGRAMMING USING C++

Course Code: UMA 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 hierarchies, 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:

- Parsons, “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: UMA 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

APPLIED PHYSICS LAB - II

Course Code: UMA 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 tuning 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 Kater'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.

OBJECT ORIENTED PROGRAMMING USING C++ LAB

Course Code: UMA 221

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: UMA 222

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: UMA 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 from 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

To Autumn

O! Captain, My Captain.

Where the Mind is Without Fear

Psalm of Life

Shakespeare

Keats

Walt Whitman

Rabindranath Tagore

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: UMA 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: UMA 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: UMA 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 prepositions with their use

Both theoretical and figurative use

Module VIII: Dialogues

Dialogue reading: 'In the market place'

'At the Hotel'

Examination Scheme:

<i>Components Weightage (%)</i>	<i>CT1</i>	<i>CT2</i>	<i>C</i>	<i>I</i>	<i>V</i>	<i>A</i>
	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

NUMERICAL ANALYSIS AND PROGRAMMING

Course Code: UMA 301

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, Runge-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: UMA 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, Ericsson 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/Vanhyllene, 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.
- Dhombkondwar Kothandaraman, "A Course in Thermal Engineering", Dhanpat Rai Publications

MECHANICS OF SOLIDS

Course Code: UMA 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.

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: Bending Stress

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

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:

- Cantilevers
- Simply supported beams with or without overhang
- 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	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.
 - L.S Srinath, TMH

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: UMA 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) nucleation (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 decreases 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.
- G. Narula THH
- Srinivasasan THM

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: UMA 305

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, buoyancy 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

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 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

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: Flow Measurements

Measurement of flow using Venturi meter, orifice meter, Pitot tube, measurement of flow in open channels – rectangular, triangular, trapezoidal weir, Cipoletti weir.

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: UMA 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: UMA 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_v 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 LAB

Course Code: UMA 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.

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: UMA 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: UMA 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.

COMMUNICATION SKILLS - I

Course Code: UMA 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:

<i>Components Weightage (%)</i>	<i>CT1</i>	<i>CT2</i>	<i>CAF</i>	<i>V</i>	<i>GD</i>	<i>GP</i>	<i>A</i>
	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: UMA 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

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: UMA 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:

<i>Components</i>	<i>CT1</i>	<i>CT2</i>	<i>C</i>	<i>I</i>	<i>V</i>	<i>A</i>
<i>Weightage (%)</i>	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: UMA 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:

<i>Components</i>	<i>CT1</i>	<i>CT2</i>	<i>C</i>	<i>I</i>	<i>V</i>	<i>A</i>
<i>Weightage (%)</i>	<i>20</i>	<i>20</i>	<i>20</i>	<i>20</i>	<i>15</i>	<i>5</i>

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: UMA 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.

2. *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.

3. *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.

4. *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.

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:

- 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.

6. *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: UMA 401

Credit Units: 04

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

Introduction to simple mechanisms, different types of 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. Instantaneous center method for analysis three center in line theorem, concept of rotating reference frame and its application for Coriolis's acceleration

Module II: Friction

Thread friction, pivot and collar friction, clutches, belt and rope drives, friction axis, friction circle;

Module III: Cams

Classification, Cams with uniform acceleration and retardation, SHM, Cycloidal motion, oscillating followers.

Module IV: Gears

Geometry of tooth profiles, Law of gearing, involutes profile, interference, helical, spiral and worm gears, simple, compound gear trains. Epicyclic gear trains – Analysis by tabular and relative velocity method, fixing torque.

Module V: Vibrations

Vibration analysis of SDOF systems, natural, damped, forced vibrations, base-excited vibrations, transmissibility ratio.

Module VI: Dynamic Analysis

Slider-crank mechanism, turning moment computation

Balancing: Static and dynamic balancing, balancing of revolving and reciprocating masses, single and multi-cylinder engines.

Module VII: Gyroscopes

Gyroscopic law, effect of gyroscopic couple on automobiles, ships, aircrafts.

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: UMA 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

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.

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 forced convection; important dimensionless number.

Module III

Thermal radiation; Kirchoff's law; Planck's distribution law, Wien's displacement law; Stefan-Boltzmann's relation, Configuration factors; radiant interchange between black and grey surfaces; radiation shielding solar radiation.

Module IV

Combined heat transfer analysis; overall heat transfer co-efficient; 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, 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. Oxford University Press.
- Arora, Domkundwar, S. and Domkundwar, A. (1988). A Course in Heat & Mass Transfer, Dhanpat Rai & Co.

MANUFACTURING MACHINES

Course Code: UMA 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: UMA 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: UMA 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. Fractional Kilo Watt Hour Motor, Stepper Motor, Hysteresis Motor, A C Series Motors, Universal 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: UMA 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", 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

KINEMATICS AND DYNAMICS OF MACHINE LAB

Course Code: UMA 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: UMA 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: UMA 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 1) Separately excited DC Generator 2) Shunt Generator
3.	To obtain the load characteristics 1) DC Shunt Motor 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: UMA 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.

COMMUNICATION SKILLS - II

Course Code: UMA 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:

<i>Components Weightage (%)</i>	<i>CT1</i>	<i>CT2</i>	<i>CAF</i>	<i>V</i>	<i>GD</i>	<i>GP</i>	<i>A</i>
	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: UMA 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: UMA 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:

<i>Components</i>	<i>CT1</i>	<i>CT2</i>	<i>C</i>	<i>I</i>	<i>V</i>	<i>A</i>
<i>Weightage (%)</i>	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: UMA 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 prepositions 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:

<i>Components</i>	<i>CT1</i>	<i>CT2</i>	<i>C</i>	<i>I</i>	<i>V</i>	<i>A</i>
<i>Weightage (%)</i>	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

MACHINE DESIGN - I

Course Code: UMA 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 raising and lowering 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

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, Slip, 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.

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: UMA 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: UMA 503

Credit Units: 04

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 Criterion. Block diagram representation & reduction.

Module V: Modes of Control & Controller Mechanism

P, PI and PID Controller. Pneumatic & Hydraulic Controller, General Pr. of generating various Control Actions. Concept of Control Valves.

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: UMA 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 SYSTEM

Course Code: UMA 505

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

Interfacing with 8085. Interfacing with input/output devices (memory mapped, peripheral I/O), Cache memory system. Study of following peripheral devices 8255, 8253, 8257, 8255, 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. Internal architecture of 8086, Bus Interface Unit, Register Organization, Instruction Pointer, Stack & Stack pointer, merits of memory segmentation, Execution Unit, Register Organization.

Module V: Pentium Processors

Internal architecture of 8087, Operational overview of 8087, Introduction to 80186, 80286, 80386 & 80486 processors, Pentium processor.

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. Rafiqzaman, "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.

CASTING TECHNOLOGY

Course Code: UMA 506

Course Units: 03

Course Objective:

Course Contents:

Module I: Introduction and Materials in Casting

Ferrous and Non-ferrous materials and their properties, Metal Matrix Composites and their properties and suitability as casting materials, Selection of material for casting, melting of metals, Solidification and cooling of castings

Module II: Design consideration in Casting

Casting design considerations, mould designs for sand and die castings, gating system design, riser design, casting defects: their causes and their removal, cleaning of castings.

Module III: Inspection in Casting

Heat treatment of castings, inspection, repair and salvage of castings, quality control in foundries, Special casting processes, Specific considerations to Grey CI, steel and non-ferrous foundry practices

Module IV: Modernization in Casting

Pollution control in Foundries, Modernization, Mechanization, Computerization of foundries. Application of CAD/CAM in foundries.

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:

- Foundry Technology by O.P. Khanna
- Principles of Metal casting by P.L. Jain

Reference Books:

- Little, Welding and Welding Technology, Tata Mc Graw Hill
- R.S.Parmar, Welding and Welding Processes, Khanna Publication
- Welding Technology by O.P. Kahanna

METAL FORMING ANALYSIS

Course Code: UMA 507

Credit Units: 03

Course Objective:

Course Contents:

Module I: Methods of forming and cutting technology

Basic terms, Flow condition and flow curve, Deformation and material flow, Force and work, Formability Units of measurement.

Module II: Fundamentals of press design

Press types and press construction, Press frame, Slide drive, Drive systems for deep drawing presses, draw cushions, Mechanical presses, Hydraulic presses, Changing dies, Press control systems, Press safety and certification

Module III:

Stress-strain relations in elastic and plastic deformations, Yield Criteria for ductile metals, Work hardening and Anisotropy in yielding, Flow curves, Elements of theory of plasticity, Formulation of plastic deformation problems, Application of theory of plasticity, Application of theory of plasticity for solving metal forming problems using slab method, Upper and lower bound methods, slip line field theory, extremisms principles, Effect of temperature and strain rate in metal working, Friction and lubrication in cold and hot working.

Module IV:

Technology and Analysis of important metal forming processes – Forging, Rolling, Extrusion, Wire Drawing, Sheet Metal forming processes like Deep drawing, Stretch forming, Bending, Introduction to Finite Element Analysis of metal forming 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:

- Metal Forming Handbook Springer
- R. H. Wagoner Ohio State University
- Fundamentals of Metal Forming Processes by Dr. B.L. Juneja

MACHINE DESIGN LAB - I

Course Code: UMA 520

Credit Units: 01

Course Contents:

Design of:

- (i) Cotter Joint
- (ii) Knuckle Joint
- (iii) Pipe Joint
- (iv) Screw Jack
- (v) Rigid and Flexible coupling
- (vi) Spur Gear Train

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: UMA 521

Credit Units: 01

Course Contents:

S. NO.	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 (90°, 60°, ...) / 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: UMA 522

Credit 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 poisson'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: UMA 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 - III (MAT LAB)

Course Code: **UMA 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

S. NO.	NAME OF EXPERIMENTS
1	<p>To draw the time response for first order transfer function</p> $H(S) = \frac{6}{S + 9}$ <p>second order transfer function</p> $H(S) = \frac{45}{S^2 + 6S + 49}$ <p>third order transfer function</p> $H(S) = \frac{8S}{S(S + 2)(S + 3)}$
2	<p>To realize the time response in simulink by importing the system parameters from the work window for given transfer function</p> $H(S) = \frac{4S}{S(S + 9)(S + 5)}$
3	<p>To draw the bode plot for following function</p> $H(S) = \frac{46S}{(S + 2)(S + 4)(S^2 + 2S + 4)}$ <p>and draw the bode plot using input arguments that represents the continuous state space system:</p> $\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ -3 & -4 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u$ $y = [10 \quad 0] \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + [0]u$
4	<p>To draw the Nyquist plot for following function</p> $H(S) = \frac{46S}{(S + 2)(S + 4)(S^2 + 2S + 4)}$ <p>and draw the Nyquist plot using input arguments that represents the continuous state space system:</p> $\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ -3 & -4 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u$ $y = [10 \quad 0] \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + [0]u$
5	<p>To draw the root locus plot for following transfer function</p> $H(S) = \frac{45}{S(S + 2)(S + 4)^2}$

6	Write a program to determine the values of the DTFT of a real sequence described as a rational function in $e^{-j\omega}$ $X(e^{-j\omega}) = \frac{0.008 - 0.033e^{-j\omega} + 0.05e^{-j2\omega} - 0.033e^{-j3\omega} + 0.033e^{-j4\omega}}{1 + 2.37e^{-j\omega} + 2.7e^{-j2\omega} + 1.6e^{-j3\omega} + 0.41e^{-j4\omega}}$ where K= 256
7	Write a program to determine the M-point DFT $u[k]$ of the following N-points sequence $u[n] = \begin{cases} 1, & 0 \leq n \leq N-1 \\ 0, & \text{Otherwise} \end{cases}$ 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: UMA 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: UMA 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: UMA 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

Text & References:

- Organizational Behaviour, Davis, K.
- Hoover, Judith 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: UMA 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: UMA 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 prepositions 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

PRACTICAL TRAINING - I

Course Code: UMA 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: UMA 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

Types, organization for maintenance department, Breakdown and preventive maintenance.

Module V: Inventory control and replacement analysis

Introduction replacement policy and method adopted, EOQ.

Module VI: Management concepts

Development of management principles, scientific management, human relation aspects. Project Management – CPM and PERT.

Examination Scheme:

C 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: UMA 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: Mechanical Drives

Selection of transmission, helical, bevel and worm gears, belt and chain drives.

Module II: Friction Clutches & Brakes

Common friction materials, shoe, band, cone and disc brake their characteristics and design, friction clutches.

Module III: Bearings and Lubrication

Types of sliding bearing, materials, type of lubrication, design of sliding bearing, selection and application of rolling bearing, seals.

Module IV

Design of spring, helical spring, Leaf spring

Module V: Engine parts

Piston, connecting rod and 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: UMA 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 stationary 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: UMA 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: UMA 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: UMA 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", 6th Edition, PHI, 2000.
- Forouzan, "Data Communication & Networking", 2nd Edition, McGraw Hill, 2003.

References:

- W. Tomasi, "Advanced Electronic Communication Systems", 2000
- James Martin, "Telecommunications & The Computer", 3rd Edition, PHI. 2001
- P. C. Gupta, "Data Communications, PHI, 2001.

TOTAL QUALITY MANAGEMENT

Course Code: UMA 607

Credit Units: 03

Course Objective

- To understand the Total Quality Management concept and principles and the various tools available to achieve Total Quality Management.
- To understand the statistical approach for quality control.
- To create an awareness about the ISO and QS certification process and its need for the industries.

Module I: Introduction

Definition of Quality, Dimensions of Quality, Quality Planning, Quality costs - Analysis Techniques for Quality Costs, Basic concepts of Total Quality Management, Historical Review, Principles of TQM, Leadership – Concepts, Role of Senior Management, Quality Council, Quality Statements, Strategic Planning, Deming Philosophy, Barriers to TQM Implementation.

Module II: TQM Principles

Customer satisfaction – Customer Perception of Quality, Customer Complaints, Service Quality, Customer Retention, Employee Involvement – Motivation, Empowerment, Teams, Recognition and Reward, Performance Appraisal, Benefits, Continuous Process Improvement – Juran Trilogy, PDSA Cycle, 5S, Kaizen, Supplier Partnership – Partnering, sourcing, Supplier Selection, Supplier Rating, Relationship Development, Performance Measures – Basic Concepts, Strategy, Performance Measure.

Module III: Statistical Process Control (SPC)

The seven tools of quality, Statistical Fundamentals – Measures of central Tendency and Dispersion, Population and Sample, Normal Curve, Control Charts for variables and attributes, Process capability, Concept of six sigma, New seven Management tools.

Module IV: TQM Tools

Benchmarking – Reasons to Benchmark, Benchmarking Process, Quality Function Deployment (QFD) – House of Quality, QFD Process, Benefits, Taguchi Quality Loss Function, Total Productive Maintenance (TPM) – Concept, Improvement Needs, FMEA – Stages of FMEA.

Module V: Quality Systems

Need for ISO 9000 and Other Quality Systems, ISO 9000:2000 Quality System – Elements, Implementation of Quality System, Documentation, Quality Auditing, TS 16949, ISO 14000 – Concept, Requirements and Benefits.

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. Dale H. Besterfield, et al., "Total Quality Management", Pearson Education, Inc. 2003. (Indian reprint 2004). ISBN 81-297-0260-6.

References:

1. James R. Evans & William M. Lidsay, "The Management and Control of Quality", (5th Edition), South-Western (Thomson Learning), 2002 (ISBN 0-324-06680-5).
2. Feigenbaum, A.V. "Total Quality Management", McGraw-Hill, 1991.
3. Oakland, J.S. "Total Quality Management", Butterworth Heinemann Ltd., Oxford, 1989.
4. Narayana V. and Sreenivasan, N.S. "Quality Management – Concepts and Tasks", New Age International 1996.
5. Zeiri. "Total Quality Management for Engineers", Wood Head Publishers, 1991.

WELDING AND ALLIED PROCESSES

Course Code: UMA 608

Credit Units: 03

Course Objective:

- To understand the various welding process and different types of welding
- Application of various welding process

Course Contents:

Module I: Introduction to the Processes of Welding

Introduction to joining technology, General survey and classification of welding processes, Safety and hazards in welding.

Module II: Fusion Welding Processes

Physics of the welding arc and arc characteristics, Metal transfer & its importance in arc welding, Various forces acting on a molten droplet and melting rates, Power sources for arc welding, Welding consumables: fluxes, gasses and filter materials, SMAW, SAW, GTAW and related processes, GMAW and variants, PAW, Gas Welding, Soldering, Brazing and diffusion bonding, Thermal cutting of metals, Surfacing and spraying of metals, Resistance welding processes: spot seam, butt, flash, projection, percussion etc.

Module III: Thermally Induced Distortion Welding

Thermit welding, Electro-slag and electrogas welding, Solid State and radiant energy welding processes such as EBW; LBW; USW

Module IV: Molten Metal Transfer in Consumable Electrode

Explosive welding; Friction welding and Underground Welding. Welding of plastics, Advances, challenges and bottlenecks in welding. Welding of Plain carbon, low alloy, austenitic and other nickel chrome steels. Problems and procedures for welding non ferrous alloys, electrode selection, design of welded joints, distortion, residual stresses and stress relieving, Weld defects and Non Destructive testing.

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:

- Foundry Technology by O.P. Khanna
- Principles of Metal casting by P.L. Jain

References:

- Little, Welding and Welding Technology, Tata Mc Graw Hill
- R.S.Parmar, Welding and Welding Processes, Khanna Publication
- Welding Technology by O.P. Kahanna

MACHINE DESIGN LAB - II

Course Code: UMA 620

Credit Units: 01

Course Contents:

Design and drawing based upon the course Machine Design II such as automotive transmission, brakes, clutches connecting rod, I.C. engine piston, connecting rod, hydraulic rivet, mechanical hoist 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: UMA 621

Credit Units: 01

Course Contents:

S. NO. NAME OF EXPERIMENTS

1. To conduct a test on Centrifugal Pump and plot its characteristics
2. To Plot the characteristics of Pelton turbine.
4. To conducts an experiment on Francis turbine.
5. To study the effect of a draft tube on reaction turbines.
6. To find the friction factor for flow through pipes
7. To study the hydraulic controls rig.
8. To conduct an experiment for verifying model laws.
9. To study the cavitations phenomenon in turbines.
10. 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.

METAL CUTTING AND TOOL DESIGN LAB

Course Code: UMA 622

Credit Units: 01

Course Contents:

S. NO. NAME OF EXPERIMENTS

1. Step and taper turning on lathe machine
2. To make a hexagonal headed bolt on a milling machine.
3. To make a job on a shaper.
4. To study the Kinematics design of workshop machines.
5. To make a job on drilling machine as per given specifications.
6. To measure cutting forces on a single point cutting tool
7. To measure cutting parameters for multipoint cutting tool.
8. Study of a punch and die set.
9. Study of a jig and fixture.
10. Fixture fabrication with case study.
11. Study of formation of chips during turning and shaping operations on samples of C.I., M.S., Brass, Cu & aluminum.
12. Determination of the life of the cutting tool used on lathe for various cutting speeds, feeds and different work piece materials.

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 DRAFTING AND DESIGN LAB

Course Code: UMA 623

Credit Units: 01

Course Contents:

1. Basics of Auto CAD
2. Modeling of machine Components such as Connecting Rod, Piston etc.
3. 2D modeling for different Geometrics such as Hexagon, Pentagon etc.
4. 3D modeling for Nuts and Bolts.
5. Modeling of Gear.
6. 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.

COMMUNICATION SKILLS - IV

Course Code: UMA 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: UMA 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

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: UMA 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: UMA 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