# AMITY UNIVERSITY
## MADHYA PRADESH
(Established by Ritnand Balved Education Foundation)

**Approval by Board of Studies**

The board of studies of Amity School of Engineering and Technology, Amity University Madhya Pradesh held on 28 January 2016, approved the syllabus of B.Tech. (Civil Engineering) and course of choice based credit system [CBCS] before the members of the Board of studies.

| | | |
|---|---|---|
| **Dr.Anshul Gangele** | **Mr. Vivek Parashar** | **Mrs. Rinkoo Bhatia** |
| **Dr. Sanjay Gomasta** | **Mr. Mohan Kantharia** | **Dr. Manisha Singh** |
| **Dr. Rachana Kathal** | **Dr. Manisha Jain** | **Dr.Manoj Kumar Trivedi** |

28/01/16

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Amity University Madhya Pradesh
Gwalior

# AMITY UNIVERSITY
## MADHYA PRADESH
(Established by Ritnand Balved Education Foundation)

## AMITY SCHOOL OF ENGINEERING AND TECHNOLOGY

## Department of Civil Engineering

## Board of Studies for session 2016-17

## Agenda of the meeting (for B.Tech Civil Engineering)

| S. No. | Proposal | Discussion And experts comments | Previous Subject Code | Previous Credits | New Subject Code | New Credits |
|---|---|---|---|---|---|---|
| 1 | To shift Building Desing & Drawing drawing (BTCE 606) in 3rd semester | Civil Engineering Drawing theory subject should be with the practical lab of the drawing in 3rd semester | BTCE 606 | 4 | BTCE 302 | 4 |
| 2 | Credit of Civil Engineering Drawing Lab (BTCE 321) should be increased by 1 credit | Civil Engineering drawing lab (BTCE 321) should be of 2 credits | BTCE 321 | 1 | BTCE 321 | 2 |
| 3 | Surveying (BTCE 306) to be renamed as Geo Informatics - I with credit 3 | Surveying (BTCE 306) subject is renamed as Geo informatics -I and credit should be increased | BTCE 306 | 2 | BTCE 306 | 3 |
| 4 | Geo informatics (BTCE 404) should be renamed as Geo informatics - II | Geo informatics (BTCE 404) is renamed as Geo informatics - II | BTCE 404 | 3 | BTCE 404 | 3 |
| 5 | To compensate the Civil engineering drawing which was shifted from 6th sem to 3rd sem, engineering geology is shifted to 6th sem from 3rd sem and demonstration of samples is included in the syllabus | Engineering Geology (BTCE 302) can be shifted in 6th semester and demonstration of ssamples should also be included in the syllabus | BTCE 302 | 3 | BTCE 605 | 3 |
| 6 | Construction Management & quantity Surveying (BTCE 801) should be shifted in 4th semester | Construction Management & quantity Surveying (BTCE 801) should be added in 4th semester in place of 8th semester | BTCE 801 | 3 | BTCE 405 | 3 |
| 7 | Interchange the syllabus of Transportation Engineering-I (BTCE 406) and Transportation Engineering-II (BTCE 504) | Highway Engineering should be taught with Geotechnical engineering-I (BTCE 503) | BTCE 504 | 4 | BTCE 406 | 4 |
| | As per New Subject Codes, Airport Engineering should be taught with highway (BTCE 504) and elements of bridge should be added with Railway & Tunnel | As per suggestion changes have been made in the syllabus of these subjects | BTCE 406 | 3 | BTCE 504 | 3 |

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| | | | | | | |
|---|---|---|---|---|---|---|
| 9 | Concrete Technology (BTCE 605) to be shifted to 4th sem | Concrete Technology (BTCE 605) should be shifted to 4th sem | BTCE 605 | 3 | BTCE 403 | 3 |
| 10 | Hydrosystem (BTCE 403)is shifted in 5th sem | Hydrosystem (BTCE 403) is kept in 5th sem | BTCE 403 | 3 | BTCE 506 | 3 |
| 11 | Material testing lab-II (BTCE 520) should be renamed as Highway engineeirng lab with modified syllabus including test of bitumen | Highway Engineering lab should be added | BTCE 520 | 1 | BTCE 520 | 1 |
| 12 | Material testing lab-I (BTCE 421) should be renamed as Concrete technology lab | Concrete Technology lab should be included in 4th sem | BTCE 421 | 1 | BTCE 421 | 1 |
| 13 | Advance Concrete Design (BTCE 807) should be included in the 8th sem | Advance Concrete Design (BTCE 807) is included in the 8th sem | BTCE 807 | 4 | BTCE 801 | 4 |
| 14 | Functional Design of Buildings (BTCE 405) can be kept in the elective subjects | Functional Design of Buildings (BTCE 405) is kept in the elective subjects | BTCE 405 | 4 | BTCE 807 | 4 |
| 15 | Water Resource Engineering (BTCE 703) should be split into 2 parts | Irrigation Engineering (BTCE 606) has been introduced in 6th sem and Design of hydraulic structure has been kept in 7th sem | BTCE 703 | 3 | BTCE 606 | 3 |
| | | | BTCE 703 | 3 | BTCE 703 | 3 |

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# AMITY SCHOOL OF ENGINEERING AND TECHNOLOGY

## Department of Civil Engineering

## Board of Studies for session 2016-17

## Total Credits

| S. No. | Semester | Previous Credits | New Credits |
|---|---|---|---|
| 1 | I | 25 | 25 |
| 2 | II | 28 | 28 |
| 3 | III | 28 | 31 |
| 4 | IV | 26 | 27 |
| 5 | V | 27 | 29 |
| 6 | VI | 26 | 25 |
| 7 | VII | 26 | 26 |
| 8 | VIII | 29 | 30 |
| **Total Credits** | | **215** | **221** |

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## Approval by Board of Studies

A meeting of board of board of studies of Amity School of Engineering and Technology, Amity University Madhya Pradesh was held on 28 January 2016, and the members of the Board of Studies approved the syllabus of B.Tech(CSE).

Dr. Rakesh Singh Jadon

Dr. Anshul Gangele

Mr. Vivek Parashar

Mrs. Rinkoo Bhatia

Dr. Sanjay Gomasta

Mr. Mohan Kantharia

Dr. Manisha Singh

Dr. Rachana Kathal

Dr. Manisha Jain

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# Amity School of Engineering & Technology

## Department of Computer Science & Engineering

## Board of Studies for Session 2016-2017

## Approval by Board of Studies

The board of studies of Amity School of Engineering & Technology, Amity University ,Madhya Pradesh held on 28/01/2016,approved the syllabus of B.Tech., M.Tech. Ph.D. (Computer Science & Engineering) along with courses of choice based credit system (CBCS) before the board of studies.

**Point discussed and Approved are as under**

1. Updates/changes desired in the scheme and syllabus.
2. Replacing/Adding of new subjects in scheme
3. Approval of course in PhD.
4. Review of Previous syllabus and schemes.
5. Review of credits in schemes.

**Agenda 1**: Updates/changes desired in the scheme and syllabus.

A. Project BTC-760 having no credit can be dropped.

**Resolution:** Dropping BTC760 will not make any difference because no credit is assigned for project in the scheme.

B. Modification in the Contents of Computer Architecture Lab (BTC 522) and System Programming Lab (BTC 621).Addition in the Programming language/Simulator for Digital Image Processing Lab (BTC 820) is to be changed to Java/MATLAB/OpenCV.

**Resolution:** The previous listed of experiments require kits, which are now a days not available in market and are not related to theory. Considering these aspects, experiments of BTC 522 are modified which are in line with other reputed academic institutions. Similarly in BTC 621 TSR programming language is outdated and not used now a days. The experiments are modified based on the student needs and in line with other reputed universities.

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**Agenda 2**: Replacing/Adding of new subjects in scheme

A. Introduction of new subject from industry point of view

**Resolution:** A practical oriented course **"Introduction to Android Application Development (BTC 607)"** and **"Introduction to Android Application Development Lab (BTC 624)"** of the same credit will proposed in B.Tech(CSE) 6th semester, that may enhanced the technical skills of the students as number of companies visiting in campus drive focus on Android Application.

B. BTC – 501- VHDL Programming, and BTC – 520- VHDL Programming Lab is a course for programming for Electronic Engineering. It is not relevant for the students of CSE.

**Resolution:** To create more relevancy with industry needs, and placement trends in last few years a new course "Introduction to Open Source Technologies (PHP, MySql) (BTC 501) "and "Introduction to Open Source Technologies Lab (BTC 520) "of the same credit proposed.

C. To increase the employability of the CSE students, some new and advanced course will be added.

**Resolution:** Introducing a new Course in 5th & 6th in B.Tech (CSE) as mentioned below:

5th Semester **"Programming Paradigm and Data Analytics (BTC 506)"**
6th Semester **"Problem Solving and Placement Practices (BTC 606)"**

**Agenda 3:** Approval of course in PhD.

**Resolution:** An already approved course Software testing and quality assurance (PhDEC 110) is to be incorporated since it has an approval of Honorable Vice Chancellor

**Agenda 4:** Review of Previous syllabus and schemes.

**Resolution:** The entire scheme and syllabus of B.Tech (CSE), M.Tech (CSE) and PH.D. Course work has been reviewed. Different suggestions received from all the members of board and some of them are incorporated with unanimously consent.

**Agenda 5:** A. Review of credits in schemes.

**Resolution:** To incorporate the new courses and/or change in the courses and to maintain the total credits of the entire scheme, the following changes has been proposed

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| Course Code | Course Title | Lecture (L) Hours Per week | Tutorial (T) Hours Per week | Practical (P) Hours Per week | Total Credits |
|---|---|---|---|---|---|
| BTC 502 | Software Engineering | 2 | 1 | - | 3 |
| BTC 503 | Computer Architecture | 2 | 1 | - | 3 |
| BTC 601 | Microprocessor | 2 | 1 | - | 3 |
| BTC 605 | Advanced Java programming | 2 | 1 | - | 3 |

B. Credits summery before and after changes made

**Resolution:** We have increased the credits in 5th and 6th Semester

| S.No. | Semester | Before Change | After Change | Remark |
|---|---|---|---|---|
| 1 | 5th | 30 | 31 | |
| 2 | 6th | 25 | 31 | |

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Dr. Rakesh Singh Jadon

Dr. Anshul Gangele

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## FIFTH SEMESTER

| | | | | | |
|---|---|---|---|---|---|
| BTC 501 | Introduction to Open Source Technologies (PHP, MySql) | 2 | 1 | - | 3 |
| BTC 502 | Software Engineering | 2 | 1 | - | 3 |
| BTC 503 | Computer Architecture | 2 | 1 | - | 3 |
| BTC 504 | Data Communication & Computer Networks | 2 | 1 | - | 3 |
| BTC 505 | Java Programming | 2 | 1 | - | 3 |
| BTC 506 | Programming Paradigm and Data Analytics | 3 | 1 | | 4 |
| BTC 520 | Introduction to Open Source Technologies (PHP, MySql) Lab | - | - | 2 | 1 |
| BTC 521 | Software Engineering Lab | - | - | 2 | 1 |
| BTC 522 | Computer Architecture Lab | - | - | 2 | 1 |
| BTC 523 | Data Communication & Computer Networks Lab | - | - | 2 | 1 |
| BTC 524 | Java Programming Lab | - | - | 2 | 1 |
| BTC 541 | Communication Skills - III | 1 | - | - | 1 |
| BTC 543 | Behavioural Science - V | 1 | - | - | 1 |
| BTC 544<br>BTC 545<br>BTC 546<br>BTC 547<br>BTC 548 | Foreign Language – V<br>French<br>German<br>Spanish<br>Japanese<br>Chinese | 2 | - | - | 2 |
| BTC 550 | Industrial Practical Training - I (Evaluation) | - | - | - | 3 |
| | TOTAL | | | | 31 |

## SIXTH SEMESTER

| | | | | | |
|---|---|---|---|---|---|
| BTC 601 | Microprocessor | 2 | 1 | - | 3 |
| BTC 602 | System Programming | 2 | 1 | - | 3 |
| BTC 603 | E-Commerce and ERP | 2 | 1 | - | 3 |
| BTC 604 | Advanced Networking | 2 | 1 | - | 3 |
| BTC 605 | Advanced Java programming | 2 | 1 | - | 3 |
| BTC 606 | Problem Solving and Placement Practices | 3 | 1 | | 4 |
| BTC 607 | Introduction to Android Application Development | 2 | 1 | | 3 |
| BTC 620 | Microprocessor Lab | - | - | 2 | 1 |
| BTC 621 | System Programming Lab | - | - | 2 | 1 |
| BTC 622 | Advanced Networking Lab | - | - | 2 | 1 |
| BTC 623 | Advanced Java Programming Lab | - | - | 2 | 1 |
| BTC 624 | Introduction to Android Application Development Lab | | | 2 | 1 |
| BTC 641 | Communication Skills - IV | 1 | - | - | 1 |
| BTC 643 | Behavioural Science - VI | 1 | - | - | 1 |
| BTC 644<br>BTC 645<br>BTC 646<br>BTC 647<br>BTC 648 | Foreign Language – VI<br>French<br>German<br>Spanish<br>Japanese<br>Chinese | 2 | - | - | 2 |
| | TOTAL | | | | 31 |

PRACTICAL TRAINING – ~~II~~ 8 = 8 WEEKS

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## SEVENTH SEMESTER

| | | | | | |
|---|---|---|---|---|---|
| BTC 701 | Compiler Construction | 3 | - | - | 3 |
| BTC 702 | Artificial Intelligence | 3 | - | - | 3 |
| BTC 703 | Analysis and Design of Algorithm | 3 | - | - | 3 |
| BTC 704 | Information Storage & Management (EMC²) | 3 | - | - | 3 |
| BTC 720 | Compiler Construction Lab | - | - | 2 | 1 |
| BTC 721 | Artificial Intelligence Lab | - | - | 2 | 1 |
| BTC 722 | Analysis and Design of Algorithm Lab | - | - | 2 | 1 |
| BTC 741 | Communication Skills - V | 1 | - | - | 1 |
| BTC 743 | Behavioural Science -VII | 1 | - | - | 1 |
| BTC 744<br>BTC 745<br>BTC 746<br>BTC 747<br>BTC 748 | Foreign Language – VII<br>French<br>German<br>Spanish<br>Japanese<br>Chinese | 2 | - | - | 2 |
| BTC 750 | Practical Training – II Evaluation) | - | - | - | 6 |
| ELECTIVES (Any one from each category) | | | | | |
| A (With Practical) | | | | | |
| BTC 705 | Advanced DBMS | 3 | - | - | 3 |
| BTC 706 | Programming with ASP.Net | 3 | - | - | 3 |
| BTC 707 | Website Design | 3 | - | - | 3 |
| BTC 708 | Distributed Operating System | 3 | - | - | 3 |
| BTC 709 | Operational Research | 3 | - | - | 3 |
| BTC 723 | Advanced DBMS Lab | - | - | 2 | 1 |
| BTC 724 | Programming with ASP.Net Lab | - | - | 2 | 1 |
| BTC 725 | Website Design Lab | - | - | 2 | 1 |
| BTC 726 | Distributed Operating System Lab | - | - | 2 | 1 |
| BTC 727 | Operational Research Lab | - | - | 2 | 1 |
| ELECTIVES (Any one from each category) | | | | | |
| B (Without Practical) | | | | | |
| BTC 710 | Mobile Computing | 3 | - | - | 3 |
| BTC 711 | Object Oriented Analysis and Design | 3 | - | - | 3 |
| BTC 712 | Grid Computing | 3 | - | - | 3 |
| BTC 713 | Numerical Methods & Statistical Techniques | 3 | - | - | 3 |
| BTC 714 | Marketing Management | 3 | - | - | 3 |
| | TOTAL | | | | 22 |

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## EIGHTH SEMESTER

| | | | | | |
|---|---|---|---|---|---|
| BTC 801 | Digital Image Processing | 3 | - | - | 3 |
| BTC 802 | Advanced Computer Architecture | 3 | - | - | 3 |
| BTC 803 | Cryptography & Network Security | 2 | - | - | 2 |
| BTC 820 | Digital Image Processing Lab | - | - | 2 | 1 |
| BTC 841 | Communication Skills - VI | 1 | - | - | 1 |
| BTC 843 | Behavioural Science - VIII | 1 | - | - | 1 |
| BTC 844<br>BTC 845<br>BTC 846<br>BTC 847<br>BTC 848 | Foreign Language – VIII<br>French<br>German<br>Spanish<br>Japanese<br>Chinese | 2 | - | - | 2 |
| BTC 860 | Project | - | - | - | 15 |
| **ELECTIVES (Any One With Practical )** | | | | | |
| BTC 804 | Windows Programming using VC++ | 3 | - | - | 3 |
| BTC 805 | Network Operating System | 3 | - | - | 3 |
| BTC 806 | Software Testing & Quality Assurance | 3 | - | - | 3 |
| BTC 807 | Interface Programming | 3 | - | - | 3 |
| BTC 808 | VLSI Design | 3 | - | - | 3 |
| BTC 821 | Windows Programming using VC++ Lab | - | - | 2 | 1 |
| BTC 822 | Network Operating System Lab | - | - | 2 | 1 |
| BTC 823 | Software Testing & Quality Assurance Lab | - | - | 2 | 1 |
| BTC 824 | Interface Programming Lab | - | - | 2 | 1 |
| BTC 825 | VLSI Design Lab | - | - | 2 | 1 |
| | TOTAL | | | | 32 |

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## Approval by Board of Studies

A meeting of board of studies of Amity School of Engineering and Technology, Amity University Madhya Pradesh was held on 28th January 2016 and the members of the Board of studies approved the syllabus of B.Tech(ECE) and M. Tech(ECE) .

Dr. Aditya Trivedi

Dr .Anshul Gangele

Mrs. Rinkoo Bhatia

Dr. Sanjay Gomasta

Mr. Mohan Kantharia

Dr. Manisha Singh

Dr. Rachana Kathal

Dr. Manisha Jain

Mr. Vivek Parashar

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# AMITY UNIVERSITY
## MADHYA PRADESH
(Established by Ritnand Balved Education Foundation)

Date : 28/01/2016

**BOARD OF STUDIES**
**MINUTES OF THE MEETING**
**( Pages Only)**

1. A meeting of board of studies of Amity School of Engineering and Technology, Amity University Madhya Pradesh was organized on 28th January 2016 at 11:00 hrs.

2. The members present in the meeting are:

| Sl.No. | Name | Designation | Post |
|---|---|---|---|
| (a) | Dr.Anshul Gangele | Dy. Director – ASET | Chairperson |
| (b) | Mrs. Rinkoo Bhatia | Asst. Prof. - ASET(ECE) | Member |
| (c) | Mr. Vivek Parashar | Asst. Prof. – ASET(CSE) | Member |
| (d) | Dr. Sanjay Gomasta | Associate Prof. – ASET (MAE) | Member |
| (e) | Mr. Mohan Kantharia | Asst. Prof. – ASET (CIVIL) | Member |
| (f) | Dr. Manisha Singh | Asst. Prof. – ASET (Physics) | Member |
| (g) | Dr. Rachana Kathal | Asst. Prof. – ASET (Chemistry) | Member |
| (h) | Dr. Manisha Jain | Asst. Prof. – (Mathematics) | Member |
| (i) | Dr. Aditya Trivedi | Professor, ABV-IIITM, Gwalior | Nominated Member |

3. The agenda of the meeting included the following:
   (a) Approval of the syllabus of new subjects to be offered in B.TECH(ECE)
   (b) Approval of the revised syllabus of the subjects BTE 502:Microprocessor Systems
   (c) Approval of the revised Scheme of the B.Tech(ECE).
   (d) Approval of the Choice based Credit Courses to be undertaken and their scheme and syllabus.
   (e) Any other point with due permission of the chair person.

4. Discussions/Approvals:
   i. Subject of Signals and Systems with code BTE304 in the III semester needs the prerequisites of Mathematics-III which is also in the same semester. So this subject to be included in the IV semester and Electromagnetic Field theory with Code BTE 404 to be taught in III semester. New subject codes shall be

      BTE 304 - Electromagnetic Field theory
      BTE 404 - Signals and Systems

   The scheme and syllabus of both subjects to be same as in previous curriculum.

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ii. In Microprocessor Systems with code BTE 502, Changes to be made in the last module V. Old contents to be replaced with new one as per enclosure1.

iii. In semester VIII the subject of Digital Image Processing(BTE801) and Image Processing lab(BTE820) to be replaced by Information Theory and Coding(BTE801) and Information Theory and Coding lab(BTE820). The Scheme and syllabus of this new subject is given in Enclosure 2. Now New subject codes to be

BTE 801 Information Theory and Coding
BTE 820 Information Theory and Coding Lab

iv. In semester VIII , an elective subject of Digital Image Processing(BTE810) and Digital Image Processing lab(BTE829) to be added. The Scheme and syllabus to be followed of this to be same as in old scheme and syllabus(Enclosure4) . Now New subject codes to be

BTE 810 Digital Image Processing
BTE 829 Digital Image Processing Lab

v. A New lab of Electronic Workshop(BTE424) to be included in the IV semester carrying 2 credits. The Scheme and syllabus of this new subject is given in Enclosure 3.

vi. Project(BTE706) to be deleted since it does not carry any credit.

vii. Subject of Control Systems (BTE 505) and Control systems Lab(BTE 523) in the V semester to be interchanged with subjects Microwave Engineering(BTE603) and Microwave lab(BTE622) in the VI semester.New Subject codes shall be

BTE 505 Microwave Engineering
BTE 523 Microwave Engineering lab
BTE 603 Control Systems
BTE622 Control Systems lab

The scheme and syllabus of both subjects to be same as in previous curriculum.

viii. Following Choice based Credit courses and their syllabus was discussed and approved. Syllabus is given in Appendix A

a)Embedded Systems
b)Signal Processing
c)Wireless Communication
d)Instrumentation Engineering

ix. In M.Tech IV semester the subject code MTE 450, **Industrial Training with Progress Report & Comprehensive Viva to be replaced by Dissertation, MTE 450.** (Enclosure 5)

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x. All the aforesaid points have been approved by all the board members present in the meeting.

Dr.Anshul Gangele

Dr. Aditya Trivedi

Mrs. Rinkoo Bhatia

Dr. Sanjay Gomasta

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Enclosure 1

# MICROPROCESSOR SYSTEMS(Old syllabus)

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

## Course Objective:

This course deals with the systematic study of the Architecture and programming issues of 8085-microprocessor family. The aim of this course is to give the students basic knowledge of the above microprocessor needed to develop the systems using it.

## Course Contents:

**Module I: Introduction to Microcomputer Systems**

Introduction to Microprocessors and microcomputers, Study of 8 bit Microprocessor, 8085 pin configuration, Internal Architecture and operations, interrupts, Stacks and subroutines, various data transfer schemes.

Module II: ALP and timing diagrams

Introduction to 8085 instruction set, advance 8085 programming, Addressing modes, Counters and time Delays, Instruction cycle, machine cycle, T-states, timing diagram for 8085 instruction.

Module III: Memory System Design & I/O Interfacing

Memory interfacing with 8085. Interfacing with input/output devices (memory mapped, peripheral I/O), Cache memory system. Study of following peripheral devices 8255, 8253, 8257, 8259, 8251.

*Module IV: Architecture of 16-Bit Microprocessor*

Difference between 8085 and 8086, Block diagram and architecture of 8086 family, pin configuration of 8086, minimum mode & maximum mode Operation, Bus Interface Unit, Register Organization, Instruction Pointer, Stack & Stack pointer, merits of memory segmentation, Execution Unit, Register Organization.

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**Module V: Pentium Processors**

.Internal architecture of 8087, Operational overview of 8087, Introduction to 80186, 80286, 80386 & 80486 processors, Pentium processor (P-II, P-III, P-IV).

**Examination Scheme:**

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

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

**Text & References:**


- Ramesh. S. Gaonkar, "Microprocessor architecture Programming and Application with 8085" Penram International Publishing, 4th Edition
- B. Ram, "Fundamentals of microprocessors and microcomputer" Dhanpat Rai, 5th Edition. ]
- Douglas V Hall.
- M. Rafiquzzaman, "Microprocessor Theory and Application" PHI – 10th Indian Reprint.
- Naresh Grover, "Microprocessor comprehensive studies Architecture, Programming and Interfacing" Dhanpat Rai. 2003.
- Gosh," 0000 to 8085" PHI.


## MICROPROCESSOR SYSTEMS(New)

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

**Course Objective:**

This course deals with the systematic study of the Architecture and programming issues of 8085-microprocessor family. The aim of this course is to give the students basic knowledge of the above microprocessor needed to develop the systems using it.

**Course Contents:**

**Module I: Introduction to Microcomputer Systems**

Introduction to Microprocessors and microcomputers, Study of 8 bit Microprocessor, 8085 pin configuration, Internal Architecture and operations, interrupts, Stacks and subroutines, various data transfer schemes.

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**Module II: ALP and timing diagrams**

Introduction to 8085 instruction set, advance 8085 programming, Addressing modes, Counters and time Delays, Instruction cycle, machine cycle, T-states, timing diagram for 8085 instruction.

**Module III: Memory System Design & I/O Interfacing**

Memory interfacing with 8085. Interfacing with input/output devices (memory mapped, peripheral I/O), Cache memory system. Study of following peripheral devices 8255, 8253, 8257, 8259, 8251.

***Module IV: Architecture of 16-Bit Microprocessor***

Difference between 8085 and 8086, Block diagram and architecture of 8086 family, pin configuration of 8086, minimum mode & maximum mode Operation, Bus Interface Unit, Register Organization, Instruction Pointer, Stack & Stack pointer, merits of memory segmentation, Execution Unit, Register Organization.

**Module V: Microprocessor 8086 Programming**

Instruction set of 8086, Addressing Modes, Assembler directives , Assembly language programming, Subroutine Call and returns, Stack structure and programming, Interrupt and Interrupt service routines, Timings and Delays.

**Examination Scheme:**

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

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

**Text & References:**


- Ramesh. S. Gaonkar, "Microprocessor architecture Programming and Application with 8085" Penram International Publishing, 4th Edition
- B. Ram, "Fundamentals of microprocessors and microcomputer" Dhanpat Rai, 5th Edition. ]
- Douglas V Hall.
- M. Rafiquzzaman, "Microprocessor Theory and Application" PHI – 10th Indian Reprint.
- Naresh Grover, "Microprocessor comprehensive studies Architecture, Programming and Interfacing" Dhanpat Rai, 2003.
- Gosh," 0000 to 8085" PHI.


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Enclosure: 2

## INFORMATION THEORY AND CODING

**Course Code: BTE801** **Credit Units:3**

### Module I:Information Theory

Introduction to uncertainty, information, entropy and its properties, entropy of binary memory less source and its extension to discrete memory less source, coding theorem, data compression, prefixcoding, HUFFMAN coding, Lempel-Ziv Coding

### Module II:Channels and Capacity

Discrete memory less channels, Binary symmetric channel, mutual information & its properties,channel capacity, channel coding theorem, and its application to BSC, Shannon's theorem on channelcapacity, capacity of channel of infinite bandwidth, Bandwidth signal to noise Trade off, Practicalcommunication system in light of shannon's theorem, Fading Channel.

### Module III:Galois Fields

Group and field of Binary system Galois field and its construction in GF (2m) and its basic properties,vector spaces and matrices in GF(2), Linear Block Codes. Systematic codes, and its encodingcircuits, syndrome and error detection ,minimum distance, error detecting and correcting capabilitiesof block code, Decoding circuits, Probability of undetected error for linear block code in BSC,Hamming code and their applications.

### Module IV:Cyclic Codes

Cyclic codes and its basic properties, Generator & parity check matrix of cyclic codes, encoding & decoding circuits, syndrome computation & error detection, cyclic Hamming codes.

### Module V:BCH and Convolution codes

Introduction to BCH codes, its encoding & decoding, error location & correction.
Introduction to convolution codes, its construction & viterbi algorithm for maximum likelihood decoding.

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**Examination Scheme:**

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

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

**Text and Reference Books:**

1. Digital Communication by Haykins Simon Wiley Publ.
2. Error control Coding: Theory and Application, by Shu Lin and Cosstlello,PHI
3. Modern analog and Digital Communication system, by B.P. Lathi
4. Digital Communication by Sklar, Pearson Education
5. Principal of Communication system by Taub & Schilling, TMH
6. Error Correcting Codes by Peterson W., MIT Press
7. Digital Communication By Das , Mullick, Chatterjee,

## INFORMATION THEORY AND CODING LAB

**Course Code: BTE820** **Credit Units:1**

**Contents:**

Lab to be conducted using Matlab. Programs to include basics of field theory, coding theory and applications of various coding techniques.

Coding concepts to implementedin hardware using shift registers , decoders, multiplexers, othe digital ICs etc.

**Examination Scheme:**

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

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

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Enclosure:3

# ELECTRONICS WORKSHOP LAB

**Course Code: BTE424** **Credit Units:2**

**List Of Exercises / Experiments:**

Familiarization/Identification of electronic components with specification :Functionality, type, size, colour coding, package, symbol, cost etc. [Active, Passive, , Electronic, Electro-mechanical, Wires, Cables, Connectors, Fuses, Switches, Relays, Crystals, Displays, Fasteners, Heat sink etc.)

1. Drawing of electronic circuit diagrams using BIS/IEEE symbols and introduction to EDA tools. Interpret data sheets of discrete components and IC's. Familiarization/Application of testing instruments and commonly used tools. [Multimeter, Function generator, Power supply, CRO etc.] [Soldering iron, De-soldering pump, Pliers, Cutters, Wire strippers, Screw drivers, Tweezers, Crimping tool, Hot air soldering and de- soldering station etc.]
2. Testing of electronic components [Resistor, Capacitor, Diode, Transistor, UJT and JFET using multimeter.]
3. Inter-connection methods and soldering practice. [Bread board, Wrapping, Crimping, Soldering - types - selection of materials and safety precautions, soldering practice in connectors and general purpose PCB, Crimping.]
4. Printed circuit boards (PCB) [Types, Single sided, Double sided, PTH, Processing methods, Design and fabrication of a single sided PCB for a simple circuit with manual etching (Ferric chloride) and drilling.]
5. Assembling of electronic circuit/system on general purpose PCB, test and show the functioning(Any two circuits)

- Fixed voltage power supply with transformer, rectifier diode, capacitor filter, zener/IC regulator.
- LED blinking circuit using a stable multi-vibrator with transistor BC 107.
- Square wave generation using IC 555 timer in IC base.
- Sine wave generation using IC 741 OP-AMP in IC base.
- RC coupled amplifier with transistor BC 107. 6. AND and NAND gates in diode transistor logic.

7.Familiarization of electronic systems :

- Setting up of a PA system with different microphones, loud speakers, mixer etc.
- Introduction to robotics- Familiarization of components (motor, sensors, battery etc.) used in robotics.

**Examination Scheme:**

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

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

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# Enclosure:4

# DIGITAL IMAGE PROCESSING

**Course Code: BTE 810** **Credit Units: 03**

## Course Objective:

The syllabus is divided into four parts, the first one deal with introduction and fundamental concepts of digital image processing and image enhancement in spatial domain. Second module of the syllabus deals with image processing operations like image enhancement in frequency domain, image restoration respectively. Third and fourth module deals with applications like Image Compression and Object recognition respectively The syllabus helps a student perfect image processing fundamentals. Apart from it image processing application are discussed in detail.

## Course Contents:

### Module I: Introduction and Digital Image Fundamentals

The origins of Digital Image Processing, Examples of Fields that Use Digital Image Processing, Fundamentals Steps in Image Processing, Elements of Digital Image Processing Systems, Image Sampling and Quantization, Some basic relationships like Neighbors, Connectivity, Distance Measures between pixels, Linear and Non Linear Operations.

**Image Enhancement in the Spatial Domain:** Some basic Gray Level Transformations, Histogram Processing, Enhancement Using Arithmetic and Logic operations, Basics of Spatial Filters, Smoothening and Sharpening Spatial Filters, Combining Spatial Enhancement Methods.

### Module II: Image Enhancement in the Frequency Domain

Introduction to Fourier Transform and the frequency Domain, Smoothing and Sharpening Frequency Domain Filters, Homomorphic Filtering.

**Image Restoration:** A model of The Image Degradation / Restoration Process, Noise Models, Restoration in the presence of Noise Only Spatial Filtering, Pereodic Noise Reduction by Frequency Domain Filtering, Linear Position Invarient Dedradations, Estimation of Degradation Function, Inverse filtering, Wiener filtering, Constrained Least Square Filtering, Geometric Mean Filter, Geometric Transformations.

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### Module III: Image Compression

Coding, Interpixel and Psychovisual Redundancy, Image Compression models, Elements of Information Theory, Error free comparison, Lossy compression, Image compression standards.

*Image Segmentation:* Detection of Discontinuities, Edge linking and boundary detection, Thresholding, Region Oriented Segmentation, Motion based segmentation

**Module IV: Representation and Description**

Representation, Boundary Descriptors, Regional Descriptors, Use of Principal Components for Description, Introduction to Morphology, Some basic Morphological Algorithms.

**Object Recoginition:** Patterns and Pattern Classes, Decision-Theoretic Methods, Structural Methods.

## Examination Scheme:

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

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

## Text & References:

***Text:***

- Rafael C. Conzalez & Richard E. Woods, 2002, "Digital Image Processing", 2nd edition, Pearson Education.
- A.K. Jain, 1989, "Fundamental of Digital Image Processing", PHI.

***References:***

- Bernd Jahne, 2002, "Digital Image Processing", 5th Ed., Springer.
- William K Pratt, 2001, "Digital Image Processing: Piks Inside", John Wiley & Sons.

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# DIGITAL IMAGE PROCESSING LAB

**Course Code: BTE 828** **Credit Units: 01**

**Course Contents:**

**Note:** Simulate all the programs using MATLAB

1. To study about the basic image processing tools.

2. To write program for Histogram processing.

3. To write program for lossy compression.

4. To write program for lossless compression.

5. To write algorithm for different morphology operations and generate programs.

6. To write program for inverse filtering.

7. To write program for least square filtering.

**Examination Scheme:**

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| 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.

# Enclosure:5

# DISSERTATION

**Course Code: MTE 450** **Credit Units: 30**

**GUIDELINES FOR DISSERTATION**

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.

The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

**In general, the File should be comprehensive and include**

A short account of the activities that were undertaken as part of the project;

A statement about the extent to which the project has achieved its stated goals.

A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;

Any activities planned but not yet completed as part of the DISSERTION, or as a future initiative directly resulting from the project;

Any problems that have arisen that may be useful to document for future reference.

- Report Layout

The report should contain the following components:

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- **Title or Cover Page**

The title page should contain the following information: Project Title; Student's Name; Course; Year; Supervisor's Name.

➢ **Acknowledgements** (optional)
Acknowledgment to any advisory or financial assistance received in the course of work may be given.

➢ **Abstract**
A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project

➢ **Table of Contents**

Titles and subtitles are to correspond exactly with those in the text.

## ➢ Introduction

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

➢ **Materials and Methods**
This section should aim at experimental designs, materials used. Methodology should be mentioned in details including modifications if any.

➢ **Results and Discussion**
Present results, discuss and compare these with those from other workers, etc. In writing these section, emphasis should be given on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various secions, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary never write in "point" form.

➢ **Conclusion**
A conclusion should be the final section in which the outcome of the work is mentioned briefly.

➢ **Future prospects**

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➢ **Appendices**
The Appendix contains material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

➢ **References / Bibliography**

This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

## Examples

**For research article**
Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichia coli* O157: H7. *Clin Microbiol Infect*, **8** (suppl 1): 116–117.

**For book**
Kowalski,M.(1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), 7: 63-67

**ASSESSMENT OF THE DISSERTATION FILE**

Essentially, marking will be based on the following criteria: the quality of the report, the technical merit of the project and the project execution.

Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project.

Project execution is concerned with assessing how much work has been put in.

The File should fulfill the following ***assessment objectives:***

**Range of Research Methods used to obtain information**

**Execution of Research**

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**Data Analysis**

Analyse Quantitative/ Qualitative information

Control Quality

**Draw Conclusions**

Examination Scheme:

| | |
|---|---|
| Dissertation | 50 |
| Viva Voce | 50 |
| **Total** | **100** |

ata, leading to production of a structured report.

## Selecting the Dissertation Topic

It is usual to give you some discretion in the choice of topic for the dissertation and the approach to be adopted. You will need to ensure that your dissertation is related to your field of specialization.

Deciding this is often the most difficult part of the dissertation process, and perhaps, you have been thinking of a topic for some time.

It is important to distinguish here between 'dissertation topic' and 'dissertation title'. The topic is the specific area that you wish to investigate. The title may not be decided until the dissertation has been written so as to reflect its content properly.

Few restrictions are placed on the choice of the topic. Normally we would expect it to be:

- relevant to business, defined broadly;
- related to one or more of the subjects or areas of study within the core program and specialisation stream;
- clearly focused so as to facilitate an in-depth approach, subject to the availability of adequate sources of information and to your own knowledge;
- of value and interest to you and your personal and professional development.

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## Planning the Dissertation

This will entail following:

- Selecting a topic for investigation.

- Establishing the precise focus of your study by deciding on the aims and objectives of the dissertation, or formulating questions to be investigated. Consider very carefully what is worth investigating and its feasibility.
- Drawing up initial dissertation outlines considering the aims and objectives of the dissertation. Workout various stages of dissertation
- Devising a timetable to ensure that all stages of dissertation are completed in time. The timetable should include writing of the dissertation and regular meetings with your dissertation guide.

**The Dissertation plan or outline**

It is recommended that you should have a dissertation plan to guide you right from the outset. Essentially, the dissertation plan is an outline of what you intend to do, chapter wise and therefore should reflect the aims and objectives of your dissertation.

There are several reasons for having a dissertation plan

- It provides a focus to your thoughts.
- It provides your faculty-guide with an opportunity, at an early stage of your work, to make constructive comments and help guide the direction of your research.
- The writing of a plan is the first formal stage of the writing process, and therefore helps build up your confidence.
- In many ways, the plan encourages you to come to terms with the reading, thinking and writing in a systematic and integrated way, with plenty of time left for changes.
- Finally, the dissertation plan generally provides a revision point in the development of your dissertation report in order to allow appropriate changes in the scope and even direction of your work as it progresses.

## Keeping records

This includes the following:

- Making a note of everything you read; including those discarded.
- Ensuring that when recording sources, author's name and initials, date of publication, title, place of publication and publisher are included. (You may consider starting a card index or database from the outset). Making an accurate note of all quotations at the time you read them.
- Make clear what is a direct a direct quotation and what is your paraphrase.

## Dissertation format

All students must follow the following rules in submitting their dissertation.

- Front page should provide title, author, Name of degree/diploma and the date of submission.
- Second page should be the table of contents giving page references for each chapter and section.
- The next page should be the table of appendices, graphs and tables giving titles and page references.
- Next to follow should be a synopsis or abstract of the dissertation (approximately 500 words)
- Next is the 'acknowledgements'.
- Chapter I should be a general introduction, giving the background to the dissertation, the objectives of the dissertation, the rationale for the dissertation, the plan, methodological issues and problems. The limitations of the dissertation should also be hinted in this chapter.
- Other chapters will constitute the body of the dissertation. The number of chapters and their sequence will usually vary depending on, among others, on a critical review of the previous relevant work relating to your major

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findings, a discussion of their implications, and conclusions, possibly with a suggestion of the direction of future research on the area.

- After this concluding chapter, you should give a list of all the references you have used. These should be cross - references with your text. For articles from journals, the following details are required e.g.

Draper P and Pandyal K. 1991, The Investment Trust Discount Revisited, Journal of Business Finance and Accounting, Vol18, No6, Nov, pp 791-832.

For books, the following details are required:

Levi, M. 1996, International Financial Management, Prentice Hall, New York, 3rd Ed, 1996

- Finally, you should give any appendices. These should only include relevant statistical data or material that cannot be fitted into the above categories.

**The Layout Guidelines for the Dissertation**

- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

## Guidelines for the assessment of the Dissertation

While evaluating the dissertation, faculty guide will consider the following aspects:

1. Has the student made a clear statement of the objective or objective(s).
2. If there is more than one objective, do these constitute parts of a whole?
3. Has the student developed an appropriate analytical framework for addressing the problem at hand.
4. Is this based on up-to-date developments in the topic area?
5. Has the student collected information / data suitable to the frameworks?
6. Are the techniques employed by the student to analyse the data / information appropriate and relevant?
7. Has the student succeeded in drawing conclusion form the analysis?
8. Do the conclusions relate well to the objectives of the project?
9. Has the student been regular in his work?
10. Layout of the written report.

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**Assessment Scheme:**

| | | |
|---|---|---|
| **Continuous Evaluation:** | | 40% |
| (Based on Abstract, Regularity, | | |
| Adherence to initial plan, Records etc.) | | |
| **Final Evaluation:** Based on, | | 60% |
| Contents & Layout of the Report, | 20 | |
| Conceptual Framework, | 05 | |
| Objectives & Methodology and | 05 | |
| Implications & Conclusions | 10 | |
| Viva & Presentation | 20 | |

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# INDUSTRIAL TRAINING WITH PROGRESS REPORT AND COMPREHENSIVE VIVA

**Course Code:** **MTE 450** **Credit Units: 30**

1. Dissertation
2. Seminar & Progress Report
3. Comprehensive Viva

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** |

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# PROGRAMME STRUCTURE

## FIRST SEMESTER

| Course Code | Course Title | Lecture (L) Hours Per week | Tutorial (T) Hours Per week | Practical (P) Hours Per week | Total Credits | Page No. |
|---|---|---|---|---|---|---|
| BTE 101 | Applied Mathematics - I | 3 | 1 | - | 4 | |
| BTE 102 | Applied Physics - I – Fields & Waves | 2 | 1 | - | 3 | |
| BTE 103 | Applied Chemistry | 2 | 1 | - | 3 | |
| BTE 104 | Element of Mechanical Engineering | 2 | - | - | 2 | |
| BTE 105 | Introduction to Computers & Programming in C | 2 | 1 | - | 3 | |
| BTE 106 | Electrical Science | 2 | 1 | - | 3 | |
| BTE 120 | Applied Physics Lab – I | - | - | 2 | 1 | |
| BTE 121 | Applied Chemistry Lab | - | - | 2 | 1 | |
| BTE 122 | Element of Mechanical Engineering Lab | - | - | 2 | 1 | |
| BTE 123 | Programming in C Lab | - | - | 2 | 1 | |
| BTE 124 | Electrical Science Lab | - | - | 2 | 1 | |
| | English | 1 | - | - | - | |
| BTE 143 | Behavioural Science - I | 1 | - | - | 1 | |
| | Foreign Language – I | 2 | - | - | 2 | |

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| | | | | | | |
|---|---|---|---|---|---|---|
| BTE 144<br>BTE 145<br>BTE 146<br>BTE 147<br>BTE 148 | French<br>German<br>Spanish<br>Japanese<br>Chinese | | | | | |
| | **TOTAL** | | | | **26** | |

**SECOND SEMESTER**

| | | | | | | |
|---|---|---|---|---|---|---|
| BTE 201 | Applied Mathematics – II | 3 | 1 | - | 4 | |
| BTE 202 | Applied Physics - II – Modern Physics | 2 | 1 | - | 3 | |
| BTE 203 | Environmental Studies | 4 | - | - | 4 | |
| BTE 204 | Object Oriented Programming using $C^{++}$ | 2 | 1 | - | 3 | |
| BTE 205 | Engineering Mechanics | 2 | 1 | - | 3 | |
| BTE 220 | Applied Physics Lab – II | - | - | 2 | 1 | |
| BTE 221 | Object Oriented Programming using $C^{++}$ Lab | - | - | 2 | 1 | |
| BTE 222 | Engineering Mechanics Lab | - | - | 2 | 1 | |
| BTE 223 | Engineering Graphics Lab | - | - | 2 | 1 | |
| BTE 240 | English | 1 | - | - | 3 | |
| BTE 243 | Behavioural Science - II | 1 | - | - | 1 | |
| BTE 244<br>BTE 245<br>BTE 246<br>BTE 247<br>BTE 248 | Foreign Language – II<br>French<br>German<br>Spanish<br>Japanese<br>Chinese | 2 | - | - | 2 | |
| | **TOTAL** | | | | 27 | |

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**TERM PAPER DURING SUMMER BREAK**

**THIRD SEMESTER**

| | | | | | | |
|---|---|---|---|---|---|---|
| BTE 301 | Applied Mathematics - III | 3 | 1 | - | 4 | |
| BTE 302 | Analog Electronics - I | 3 | 1 | - | 4 | |
| BTE 303 | Circuits and Systems | 3 | 1 | - | 4 | |
| BTE 304 | Electromagnetic Field Theory | 3 | - | - | 3 | |
| BTE 305 | Java Programming | 3 | 1 | - | 4 | |
| BTE 320 | Analog Electronics Lab - I | - | - | 2 | 1 | |
| BTE 321 | Circuits & Systems Lab | - | - | 2 | 1 | |
| BTE 322 | Java Programming Lab | - | - | 2 | 1 | |
| BTE 341 | Communication Skills - I | 1 | - | - | 1 | |
| BTE 343 | Behavioural Science - III | 1 | - | - | 1 | |
| | Foreign Language – III | 2 | - | - | 2 | |
| BTE 344 | French | | | | | |
| BTE 345 | German | | | | | |
| BTE 346 | Spanish | | | | | |
| BTE 347 | Japanese | | | | | |
| BTE 348 | Chinese | | | | | |

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| | | | | | | |
|---|---|---|---|---|---|---|
| BTE 330 | Term Paper (Evaluation) | - | - | - | 2 | |
| | **TOTAL** | | | | **28** | |

## FOURTH SEMESTER

| | | | | | | |
|---|---|---|---|---|---|---|
| BTE 401 | Digital Circuits & Systems - I | 3 | 1 | - | 4 | |
| BTE 402 | Communication Systems | 3 | 1 | - | 4 | |
| BTE 403 | Analog Electronics - II | 3 | 1 | - | 4 | |
| BTE 404 | Signals & Systems | 3 | 1 | - | 4 | |
| | | | | | | |
| BTE 405 | Operating Systems | 2 | 1 | - | 3 | |
| BTE 420 | Digital Circuits & Systems Lab - I | - | - | 2 | 1 | |
| BTE 421 | Communication Systems Lab | - | - | 2 | 1 | |
| BTE 422 | Analog Electronics Lab - II | - | - | 2 | 1 | |
| BTE 423 | Operating Systems Lab | - | - | 2 | 1 | |
| BTE424 | Electronics Workshop Lab | | | | 2 | |
| BTE 441 | Communication Skills - II | 1 | - | - | 1 | |
| BTE 443 | Behavioural Science - IV | 1 | - | - | 1 | |
| BTE 444<br>BTE 445<br>BTE 446<br>BTE 447<br>BTE 448 | Foreign Language – IV<br>French<br>German<br>Spanish<br>Japanese<br>Chinese | 2 | - | - | 2 | |
| | **TOTAL** | | | | **29** | |

## PRACTICAL TRAINING: 6 – 8 WEEKS

## FIFTH SEMESTER

| | | | | | | |
|---|---|---|---|---|---|---|
| BTE 501 | Digital Circuits & Systems - II | 3 | 1 | - | 4 | |
| BTE 502 | Microprocessor Systems | 3 | 1 | - | 4 | |
| BTE 503 | Telecommunication Networks | 3 | - | - | 3 | |
| BTE 504 | Digital Communications | 3 | - | - | 3 | |

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| | | | | | | |
|---|---|---|---|---|---|---|
| BTE 505 | Microwave Engineering | 3 | - | - | 3 | |
| BTE 520 | Digital Circuits & Systems Lab - II | - | - | 2 | 1 | |
| BTE 521 | Microprocessor Systems Lab | - | - | 2 | 1 | |
| BTE 522 | Telecommunication Networks Lab | - | - | 2 | 1 | |
| BTE 523 | Microwave Engineering Lab | - | - | 2 | 1 | |
| BTE 541 | Communication Skills - III | 1 | - | - | 1 | |
| BTE 543 | Behavioural Science -V | 1 | - | - | 1 | |
| <br>BTE 544<br>BTE 545<br>BTE 546<br>BTE 547<br>BTE 548 | Foreign Language – V<br>French<br>German<br>Spanish<br>Japanese<br>Chinese | 2 | - | - | 2 | |
| BTE 550 | Practical Training (Evaluation) | - | - | - | 3 | |
| | **TOTAL** | | | | **28** | |

**SIXTH SEMESTER**

| | | | | | | |
|---|---|---|---|---|---|---|
| BTE 601 | VLSI Design | 3 | 1 | - | 4 | |
| BTE 602 | Digital Signal Processing | 3 | 1 | - | 4 | |
| BTE 603 | Control Systems | 3 | 1 | - | 4 | |
| BTE 604 | Antenna & Wave Propagation | 3 | 1 | - | 4 | |
| BTE 605 | Measurement & Measuring Instruments | 3 | - | - | 3 | |
| BTE 620 | VLSI Design Lab | - | - | 2 | 1 | |
| BTE 621 | Digital Signal Processing Lab | - | - | 2 | 1 | |
| BTE 622 | Control Systems Lab | - | - | 2 | 1 | |
| BTE 623 | MATLAB Lab | - | - | 4 | 2 | |

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| | | | | | | |
|---|---|---|---|---|---|---|
| BTE 641 | Communication Skills - IV | 1 | - | - | 1 | |
| BTE 643 | Behavioural Science - VI | 1 | - | - | 1 | |
| | Foreign Language – VI | 2 | - | - | 2 | |
| BTE 644 | French | | | | | |
| BTE 645 | German | | | | | |
| BTE 646 | Spanish | | | | | |
| BTE 647 | Japanese | | | | | |
| BTE 648 | Chinese | | | | | |
| | **TOTAL** | | | | **28** | |

**INDUSTRIAL TRAINING**

**SEVENTH SEMESTER**

| | | | | | | |
|---|---|---|---|---|---|---|
| BTE 701 | Radar & Satellite Communications | 3 | 1 | - | 4 | |
| BTE 702 | Data Communications & Networking | 3 | - | - | 3 | |
| BTE 720 | Radar & Satellite Communications Lab | - | - | 2 | 1 | |
| BTE 721 | Data Communications & Networking Lab | - | - | 2 | 1 | |
| BTE 722 | ORCAD Lab | - | - | 2 | 1 | |
| BTE 741 | Communication Skills - V | 1 | - | - | 1 | |
| BTE 743 | Behavioural Science - VII | 1 | - | - | 1 | |
| | Foreign Language – VII | 2 | - | - | 2 | |
| BTE 744 | French | | | | | |
| BTE 745 | German | | | | | |
| BTE 746 | Spanish | | | | | |
| BTE 747 | Japanese | | | | | |
| BTE 748 | Chinese | | | | | |

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| | | | | | | |
|---|---|---|---|---|---|---|
| BTE 750 | Industrial Training (Evaluation) | - | - | - | 6 | |
| **ELECTIVE I (Any one from the following)** | | | | | | |
| **(Courses with Lab)** | | | | | | |
| BTE 703 | Analog CMOS IC Design | 3 | 1 | - | 4 | |
| BTE 704 | Optical Communications | 3 | 1 | - | 4 | |
| BTE 705 | Software Engineering | 3 | 1 | - | 4 | |
| BTE 723 | Analog CMOS IC Design Lab | - | - | 2 | 1 | |
| BTE 724 | Optical Communications Lab | - | - | 2 | 1 | |
| BTE 725 | Software Engineering Lab | - | - | 2 | 1 | |
| **ELECTIVE II (Any one from the following)** | | | | | | |
| **(Courses without Lab)** | | | | | | |
| BTE 706 | Mobile Communications | 3 | - | - | 3 | |
| BTE 707 | Power Electronics | 3 | - | - | 3 | |
| BTE 708 | Bio-Medical Engineering | 3 | - | - | 3 | |
| BTE 709 | Television Principle | 3 | - | - | 3 | |
| BTE 710 | Computer Architecture | 3 | - | - | 3 | |
| | **TOTAL** | | | | **28** | |

## EIGHTH SEMESTER

| | | | | | | |
|---|---|---|---|---|---|---|
| BTE 801 | Information theory and Coding | 3 | - | - | 3 | |
| BTE 802 | C based Embedded System Design | 3 | - | - | 3 | |
| BTE 820 | Information theory and Coding | - | - | 2 | 1 | |
| BTE 821 | C based Embedded System Design Lab | - | - | 2 | 1 | |
| BTE 841 | Communication Skills - VI | 1 | - | - | 1 | |
| BTE 843 | Behavioural Science - VIII | 1 | - | - | 1 | |
| | Foreign language – VIII | 2 | - | - | 2 | |

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|---|---|---|---|---|---|---|
| BTE 844<br>BTE 845<br>BTE 846<br>BTE 847<br>BTE 848 | French<br>German<br>Spanish<br>Japanese<br>Chinese | | | | | |
| BTE 860 | Project | - | - | - | 15 | |
| **ELECTIVE I (Any one of the following)** | | | | | | |
| **(Courses with Lab)** | | | | | | |
| BTE 803 | Instrumentation | 3 | - | - | 3 | |
| BTE 804 | Artificial Neural Networks | 3 | - | - | 3 | |
| BTE 805 | RTOS Programming | 3 | - | - | 3 | |
| BTE 806 | Verilog Programming | 3 | - | - | 3 | |
| BTE 807 | Advanced Networking | 3 | - | - | 3 | |
| BTE 808 | Database Management Systems | 3 | - | - | 3 | |
| BTE 809 | Advanced Java Programming | 3 | - | - | 3 | |
| BTE 810 | Digital Image Processing | 3 | - | - | 3 | |
| BTE 822 | Instrumentation Lab | - | - | 2 | 1 | |
| BTE 823 | Artificial Neural Networks Lab | - | - | 2 | 1 | |
| BTE 824 | RTOS Programming Lab | - | - | 2 | 1 | |
| BTE 825 | Verilog Programming Lab | - | - | 2 | 1 | |
| BTE 826 | Advanced Networking Lab | - | - | 2 | 1 | |
| BTE 827 | Database Management Systems Lab | - | - | 2 | 1 | |
| BTE 828 | Advanced Java Programming Lab | - | - | 2 | 1 | |
| BTE 829 | Digital Image Processing Lab | - | - | 2 | 1 | |
| | **TOTAL** | | | | **31** | |

**Notes:**

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A student can opt for one course of BSI/ EMC$^2$/ Campus Connect/ Professional Elective Courses as an alternative to one of the elective courses.

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# APPENDIX 'A'

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## SIGNAL PROCESSING

**SP4901:** Signals & Systems

**SP4902:** Digital signal Processing-I

**SP4903:** Digital signal Processing-II

**SP4904:** Digital Speech & Audio Signal Processing

**SP4905:** Digital Image Processing

**SP4906:** Project (Signal Processing)

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# SIGNALS AND SYSTEMS

**Course Code: SP4901** **Credit Units: 03**

**Course Objective:**
The objective of the course is to provide knowledge of Signals and Systems to students of ECE. This Course includes good insight of types of signals and types of systems, various operations performed on them through the use of Fourier series, Fourier transform, z transform.

**Course Contents:**

**Module I: Signals and Systems**
Introduction of signals and systems; classification of signal, continuous time and discrete time signals, operations performed on them, even and odd signals, periodic and non periodic signals, deterministic and random signals, energy signals, power signals, elementary signals: impulse, step, ramp and exponentials, classification of systems.

**Module II: LTI system**
Response of LTI system for continuous and discrete time systems, Impulse response, Step response, properties of continuous LTI and discrete LTI systems, LTI systems described by differential and difference equation, analysis of LTI Systems, interconnection of systems.

**Module III: Fourier series**
Representation of continuous time periodic signal, properties of continuous time Fourier series, representation of discrete time periodic signals, convergence of the Fourier series, properties of discrete time Fourier series, Fourier series and LTI systems.

**Module IV: Fourier Transform**
Continuous time Fourier transform, properties of continuous time Fourier transform, discrete time Fourier transform, properties of discrete time Fourier transform; applications; Bandwidth determination of signals and systems.

**Examination Scheme:**

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

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

**Text & References**

*Text:*

- Alan.V Oppenheim, Signals and Systems, 4th Edition 2007, Pearson Prentice Hall Publication.
- K.M. Soni, Signals and Systems; 3rd Edition, S.K. Kataria & Sons Publication.
- P.Ramesh Babu, Signal and Systems, 3rd Edition, Scitech Publications (INDIA) Pvt. Ltd.

*References:*

- Simon Haykin, Signals and Systems, 2nd Edition, Willy Publications.
- B.P.Lathi, Linear Systems & Signals, 2nd Edition, Oxford Publication.
- Roberts, Fundamentals of Signals and Systems, TMH Publication.

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# DIGITAL SIGNAL PROCESSING-I

**Course Code: SP4902** **Credit Units: 03**

**Course Objective:**
The objective of the course in Digital signal processing is to provide the student with significant skills in general as well as advanced theories and methods for modification, analysis, detection and classification of analog and digital signals. Furthermore the objective is to give the student a broad knowledge of central issues regarding design, realisation and test of analog and in particular digital signal processing systems consisting of hardware and/or software components. The specialization in signal processing makes it possible to study practical or theoretic fields, ranging from mathematics/signal theory over algorithmic design to development of instruments based on hardware and/or software for real time signal

**Course Contents:**

**Module I: Z Transform**
Definition of z-transform, region of convergence, properties of z-transform, first order system, second order system, inverse z-transform, analysis of LTI system using z-transform.

**Module II: Discrete time signals in transform domain**
Inverse DTFT, DFT, properties, applications, inverse DFT, frequency response, transfer function, Fast Fourier transform algorithms: DIT algorithm, DIF algorithm.

**Module III: Filters**
Discrete time processing of continuous time signals: sampling, analog filter design, antiliasing filter design.

**Module IV: Discrete time processing of discrete- time signals**
Digital filters: Digital filter structure: FIR filter structure, IIR filter structure
Digital filter design: Impulse invariance method, bilinear transform method of IIR filter design, FIR filter design.

**Examination Scheme:**

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

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

**Text & References:**

- Prokis, Manolakis: Digital signal processing
- Oppenheim & Schaffer : Digital Signal Processing
- Fafael C. Gonzalez, Richrd E. Woods: Digital Image Processing
- Anil Kumar Jain Fundamentals of Digital Image Processing

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# DIGITAL SIGNAL PROCESSING-II

**Course Code: SP4903** **Credit Units: 03**

**Course Objectives:**
This course presents the fundamentals of digital signal processing with particular emphasis on practical problems. This course introduces various advance estimation, detection and filtering methods. The objective of this course is to make the students conversant with the design and implementation aspects of Advanced Digital Signal Processing

**Course Contents:**

**Module I: Linear Optimum Filtering:**
Principle of Orthogonality, Wiener Filter and Discrete Wiener Hoff Equations, Whitening Filter, Inverse Filter, Levinson Recursion.

**Module II: Adaptive Filter** :
Forward and backward linear prediction WIENER filters, Adaptive channel equalization, Adaptive echo cancellation, Adaptive noise cancellation, FIR adaptive filters, RLS algorithm, Steepest Descent Methods.

**Module III: Power Spectrum Estimation:**
Nonparametric method for power spectrum estimation-Barllet method and Welch method, Power spectrum estimation- Periodogram, parametric method for power spectrum estimation- Yule-Walker and Burg method, Estimators and its Performance Analysis

**Module IV: Introduction To Multirate DSP:**
Introduction to multirate DSP, Decimation and interpolation, Multiresolution analysis, wavelet filter banks, subband coding algorithm and applications, Wavelet Transform, Polyphase Filter structures, Two channel Quadrature mirror filter bank

**Examination Scheme:**

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

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

**Text & References:**

1. Digital Signal Processing, Principles, Algorithms And Applications By John G.Proakis, Dimitris G.Manobakis, Pearson Education, 4th Edition,

2. Digital Signal Processing, Principles, Algorithms And Applications By John G.Proakis, Dimitris G.Manobakis, 2. Prentice Hall, 3rd Edition,

3. Statistical Digital Signal Processing And Modeling By Monson By H.Hayes, Wiley, 3rd Edition,

4. Digital Signal Processing- A Computer Based Approach By S.K.Mitra, Tata Mcgraw Hill, 3rd Edition,

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# DIGITAL SPEECH AND AUDIO SIGNAL PROCESSING

**Course Code: SP4904** **Credit Units: 03**

**Course Objectives:**
To introduce model of speech production and to develop time and frequency domain techniques for estimating speech parameters, understand speech recognition and synthesis

**Module I: Mechanics of speech:**
Speech production: mechanism of speech production, Acoustic theory of speech production, Formant frequency, Pitch frequency, Masking, Absolute threshold, Digital models for speech signals, Human auditory system, Classification of speech coding- parametric, waveform and hybrid coding, Requirements for speech codecs- quality, coding delays and robustness.

**Module II: Representation of speech waveform:**
Sampling speech signal, Basics of quantization, Uniform quantizer, Logarithmic quantizer, linear delta modulation, Adaptive delta modulation, Differential PCM, Adaptive DPCM

**Module III: Time domain methods for speech processing:**
Methods for extracting the parameters- Energy, Average Magnitude, Zero crossing Rate, Silence Discrimination using ZCR and energy, Short Time Auto Correlation Function, Pitch period estimation using Auto Correlation Function

**Module IV: Short Time Fourier analysis for speech analysis & Homomorphic speech analysis:**
Fourier transform and linear filtering interpretation, Sampling rates, Pitch and formant extraction, Spectrographic Displays Cepstal analysis of speech, Low time liftering, High time liftering, Formant and pitch estimation, homomorphic vocoder

**Module V: Linear predictive coding of speech:**
Basics principles of linear predictive coding, Error minimization, Auto correlation method, Covariance Method, Solution of LPC equations: Cholesky method, Durbin Recursive algorithm, Prediction schemesinternal and external prediction, Prediction gain, Long time linear prediction

**Module V: Applications of audio and speech signal processing:**
Algorithm: Dynamic time warping, Gaussian mixture modeling, Hidden Markov modeling, Voice response system: speech synthesis, Speaker recognition system: speaker verification system, Speaker identification system.

**Examination Scheme:**

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

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

**Text & References:**

1. Digital Processing Of Speech Signals By L. R. Rabiner And R. W. Schaffer, Pearson, 8th Edition,
2. Speech And Audio Signal Processing By Ben Gold And Nelson Morgan, John Wiley & Sons, 2nd Edition,
3. Digital Speech By A.M.Kondoz, Wiley, 2nd Edition, (2004)
4. Speech Coding Algorithms: Foundation And Evolution Of Standardized Coders By W.C. Chu, Wiley Interscience, New York., 2nd Edition, (2003)


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# DIGITAL IMAGE PROCESSING

**Course Code: SP4905** **Credit Units: 03**

**Course Objective:**
The syllabus is divided into four parts, the first one deal with introduction and fundamental concepts of digital image processing and image enhancement in spatial domain. Second module of the syllabus deals with image processing operations like image enhancement in frequency domain, image restoration respectively. Third and fourth module deals with applications like Image Compression and Object recognition respectively The syllabus helps a student perfect image processing fundamentals. Apart from it image processing application are discussed in detail.

**Course Contents:**

**Module I: Introduction and Digital Image Fundamentals**
The origins of Digital Image Processing, Examples of Fields that Use Digital Image Processing, Fundamentals Steps in Image Processing, Elements of Digital Image Processing Systems, Image Sampling and Quantization, Some basic relationships like Neighbors, Connectivity, Distance Measures between pixels, Linear and Non Linear Operations.
**Image Enhancement in the Spatial Domain:** Some basic Gray Level Transformations, Histogram Processing, Enhancement Using Arithmetic and Logic operations, Basics of Spatial Filters, Smoothening and Sharpening Spatial Filters, Combining Spatial Enhancement Methods.

**Module II: Image Enhancement in the Frequency Domain**
Introduction to Fourier Transform and the frequency Domain, Smoothing and Sharpening Frequency Domain Filters, Homomorphic Filtering.
**Image Restoration:** A model of The Image Degradation / Restoration Process, Noise Models, Restoration in the presence of Noise Only Spatial Filtering, Pereodic Noise Reduction by Frequency Domain Filtering, Linear Position-Invarient Dedradations, Estimation of Degradation Function, Inverse filtering, Wiener filtering, Constrained Least Square Filtering, Geometric Mean Filter, Geometric Transformations.

**Module III: Image Compression**
Coding, Interpixel and Psychovisual Redundancy, Image Compression models, Elements of Information Theory, Error free comparison, Lossy compression, Image compression standards.
*Image Segmentation:* Detection of Discontinuities, Edge linking and boundary detection, Thresholding, Region Oriented Segmentation, Motion based segmentation

**Module IV: Representation and Description**
Representation, Boundary Descriptors, Regional Descriptors, Use of Principal Components for Description, Introduction to Morphology, Some basic Morphological Algorithms.
**Object Recoginition:** Patterns and Pattern Classes, Decision-Theoretic Methods, Structural Methods.

**Examination Scheme:**

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

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

**Text & References:**

*Text:*
- Rafael C. Conzalez & Richard E. Woods, 2002, "Digital Image Processing", 2nd edition, Pearson Education.
- A.K. Jain, 1989, "Fundamental of Digital Image Processing", PHI.

*References:*
- Bernd Jahne, 2002, "Digital Image Processing", 5th Ed., Springer.
- William K Pratt, 2001, "Digital Image Processing: Piks Inside", John Wiley & Sons.

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# PROJECT (SIGNAL PROCESSING)

**Course Code: SP4906** **Credit Units: 03**

**Methodology:**

Topics of project are to be based on the latest trends, verifying engineering concepts /principals and should involve elementary research work based on Signal Processing. The projects may involve design, fabrications, testing, computer modeling, and analysis of any engineering problem. On completion of Project the students are to present a report covering various aspects learnt by them and give a presentation on same.

**Examination Scheme:**

| | |
|---|---|
| Literature study/ Fabrication/ Experimentation | 40 |
| Written Report | 20 |
| Viva | 15 |
| Presentation | 25 |
| **Total** | **100** |

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# EMBEDDED SYSTEMS

**Semester 1 :** Digital Electronics

Semester 2 : Microprocessor Systems

Semester 3 : Microcontrollers

Semester 4 : Embedded Systems

Semester 5 : Embedded C

Semester 6 : Project( Embedded systems)

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# DIGITAL ELECTRONICS

**Course Code: ES4101** **Credit Units: 03**

**Course Objective:**

This course is an introduction to the basic principles of digital electronics. At the conclusion of this course, the student will be able to quantitatively identify the fundamentals of computers, including number systems, logic gates, logic and arithmetic subsystems, and integrated circuits. They will gain the practical skills necessary to work with digital circuits through problem solving and hands on laboratory experience with logic gates, encoders, flip-flops, counters, shift registers, adders, etc. The student will be able to analyze and design simple logic circuits using tools such as Boolean Algebra and Karnaugh Mapping, and will be able to draw logic diagrams.

**Module I: Number System**
Decimal, Binary, Octal, Hexadecimal Number Systems and Conversion of the bases. Introduction to logic systems.Positive and negative logic, Logic functions - NOT, AND, OR, NOR, EX-OR, EX NOR Truth tables Boolean algebra, De Morgan's theorems Standard forms for Logical Expressions - Sum of Products, Product of Sums Specification of Logical functions in terms of Minterms and Maxterms, Karnaugh Maps, Simplification of Logical functions, Introduction of "don't care" states.

**Module II: Combinational Building Blocks**
Multiplexers, Decoders, Encoders Arithmetic circuits Half Adders and Full Adders, Half Subtractor and Full Subtractor, Representation of negative numbers

**Module III: Flip-flops**
The RS latch, the clocked RS flip-flop, JK Flip Flop,the Master-Slave JK flip-flop, Delay and Toggle flip-flops Flip-flops in counter circuits Asynchronous (ripple) Counters (UP/DOWN), Synchronous Counter design (UP/DOWN), Non Sequential Counting

**Module IV: Shift Registers**
Shift registers in general, Ring Counters, Johnson Counter .Introduction to Memory Primary: RAM, Static RAM, Dynamic RAM, ROM, PROM, EAPROM, Secondary: Floppy Disk, Hard Disk, CDROM

**Module V: DACs and ADCs:** Binary weighted resistor DAC, Resolution, linearity and settling time of DACs, Successive approximation ADC

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

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

Text:

- R.P Jain, Mordern Digital Electronics

References:

- Malvino & Leach, Digital Electronics
- Floyd, Digital Fundamentals
- M.M Mano, Digital Logic and Computer Design
- Gothman ,Digital Electronics

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# MICROPROCESSOR SYSTEMS

**Course Code: ES4102** **Credit Units:03**

**Course Objective:**

This course deals with the systematic study of the Architecture and programming issues of 8085-microprocessor family. The aim of this course is to give the students basic knowledge of the above microprocessor needed to develop the systems using it.

**Module I: Introduction to Microcomputer Systems**
Introduction to Microprocessors and microcomputers, Study of 8 bit Microprocessor, 8085 pin configuration, Internal Architecture and operations, interrupts, Stacks and subroutines, various data transfer schemes.

**Module II: ALP and timing diagrams**
Introduction to 8085 instruction set, advance 8085 programming, Addressing modes, Counters and time Delays, Instruction cycle, machine cycle, T-states, timing diagram for 8085 instruction.

**Module III: Memory System Design & I/O Interfacing**
Memory interfacing with 8085. Interfacing with input/output devices (memory mapped, peripheral I/O), Cache memory system. Study of following peripheral devices 8255, 8253, 8257, 8259, 8251.

**Module IV: Architecture of 16-Bit Microprocessor**
Difference between 8085 and 8086, Block diagram and architecture of 8086 family, pin configuration of 8086, minimum mode & maximum mode Operation, Bus Interface Unit, Register Organization, Instruction Pointer, Stack & Stack pointer, merits of memory segmentation, Execution Unit, Register Organization.

**Module V:** 8086 Instructions set , addressing modes, programming, application programming

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

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

**Text & References:**


- Ramesh. S. Gaonkar, "Microprocessor architecture Programming and Application with 8085" Penram International Publishing, 4th Edition
- B. Ram, "Fundamentals of microprocessors and microcomputer" Dhanpat Rai, 5th Edition. ]
- Douglas V Hall.
- M. Rafiquzzaman, "Microprocessor Theory and Application" PHI – 10th Indian Reprint.
- Naresh Grover, "Microprocessor comprehensive studies Architecture, Programming and Interfacing" Dhanpat Rai, 2003.
- Gosh," 0000 to 8085" PH


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# MICROCONTROLLERS

**Course Code: ES4103** **Credit Units: 03**

**Course Objective:**

The syllabus deals with the basic of microcontrollers . A microcontroller is an integrated circuit that is programmable. The syllabus makes student perfect in assembly language programming, addressing modes etc apart from it input-output programming is discussed in detail .8051 C programming is also incorporated in the syllabus.

**Module I: Overview of Microcontroller:** Microcontroller and Embedded Processors, Overview of 8051 Microcontroller family: Architecture, basic assembly language programming concepts, The program Counter and ROM Spaces in the 8051, Data types, 8051 Flag Bits ad PSW Register, 8051 Register Banks and Stack Instruction set, Loop and Jump Instructions, Call Instructions, Time delay generations and calculations, I/O port programming Addressing Modes, accessing memory using various addressing modes, Arithmetic instructions and programs, Logical instructions, BCD and ASCII application programs, Single-bit instruction programming, Reading input pins vs. port Latch, Programming of 8051 Timers, Counter Programming.

**Module II: Communication with 8051**
Basics of Communication, Overview of RS-232, I2C Bus, UART, USB, IEEE 488 (GPIB). Parallel input output applications. (Stepper motor Sequencer program, Strobed input/output). Interrupt driven applications (real time clock, serial input/output with interrupt). Analog-digital interfacing (Pulse width modulator, 8-bit ADC).

**Module III: Basics of 8051 C Programming**
Introduction to 8051 C, 8051 memory constitution, Constants, variables and data types. Arrays structures and unions, pointers, Loops and decisions, Functions, Modules and programs.

**Module IV: 8051 C Programming**
Data interface, Timer control, Interrupt operations, Digital operations, A/D and D/A conversions, Common control problem examples (Centronics parallel interface, Printer interace, Memory access, Key matrix scanning, Stepper motor control and digital clock. ).

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

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

**Text & References:**

*Text:*

- Raj Kamal, 2004, "Embedded Systems", TMH.
- James W. Stewart and Kai X. Miao, 2en Edition. "The 8051 microcontroller" Pearson Edu. Prentice Hall.
- M.A. Mazidi and J. G. Mazidi, 2004 "The 8051 Microcontroller and Embedded Systems", PHI.

*References:*

- David E. Simon,1999, "An Embedded Software Primer", Pearson Education
- K.J. Ayala, 1991, "The 8051 Microcontroller", Penram International.
- Dr. Rajiv Kapadia, "8051 Microcontroller & Embedded Systems", Jaico Press
- Dr. Prasad, 2004, "Embedded Real Time System", Wiley Dreamtech

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# EMBEDDED SYSTEMS

**Course Code: ES4104** **Credit Units: 03**

## Course Objective:

The syllabus is deals with Embedded systems and it's application is discussed. syllabus deals with the basic embedded system and it's design.

**Module I: Introduction to Embedded Systems**
Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification, Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems.

**Module II: Typical Embedded System:**
Core of the Embedded System: General Purpose and Domain Specific Processors, ASICs, PLDs, Commercial Off-The-Shelf Components (COTS), Memory: ROM, RAM, Memory according to the type of Interface, Memory Shadowing, Memory selection for Embedded Systems, Sensors and Actuators, Communication Interface: Onboard and External Communication Interfaces.

**Module III: Embedded Firmware:**
Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time Clock, Watchdog Timer, Embedded Firmware Design Approaches and Development Languages.

**Module IV :RTOS Based Embedded System Design:**
Operating System Basics, Types of Operating Systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling.

**Module V: Task Communication:** Shared Memory, Message Passing, Remote Procedure Call and Sockets, Task Synchronization: Task Communication/Synchronization Issues, Task Synchronization Techniques, Device Drivers, How to Choose an RTOS.

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

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

**TEXT BOOKS:**
1. Introduction to Embedded Systems - Shibu K.V, Mc Graw Hill.

**REFERENCE BOOKS:**
1. Embedded Systems - Raj Kamal, TMH.
2. Embedded System Design - Frank Vahid, Tony Givargis, John Wiley.
3. Embedded Systems – Lyla, Pearson, 2013
4. An Embedded Software Primer - David E. Simon, Pearson Education

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# EMBEDDED C

**Course Code:** ES4105 **Credit Units: 03**

## Course Objective:

The syllabus makes student perfect in assembly language programming, addressing modes etc apart from it input-output programming is discussed in detail. In this syllabus Embedded systems and it's application is discussed. Real Time Operating System is also explained at length.8051 C programming is also incorporated in the syllabus.

**Module I : Programming Embedded Systems in C :**
Introduction ,What is an embedded system, Which processor should you use, Which programming language should you use, Which operating system should you use, How do you develop embedded software

**Module II : Reading Switches :**
Introduction, Basic techniques for reading from port pins, Example: Reading and writing bytes, Example: Reading and writing bits (simple version), Example: Reading and writing bits (generic version), The need for pull-up resistors, Dealing with switch bounce, Example: Reading switch inputs
(basic code), Example: Counting goats, Conclusions

**Module III : Adding Structure to the Code :**
Introduction, Object-oriented programming with C, The Project Header (MAIN.H), The Port Header (PORT.H), Example: Restructuring the 'Hello Embedded World' example, Example: Restructuring the goat-counting example, Further examples, Conclusions

**Module IV : Meeting Real-Time Constraints :**
Introduction, Creating 'hardware delays' using Timer 0 and Timer 1, Example: Generating a precise 50 ms delay, Example: Creating a portable hardware delay, Why not use Timer 2?, The need for 'timeout' mechanisms, Creating loop timeouts, Example: Testing loop timeouts, Example: A more reliable switch interface, Creating hardware timeouts, Example: Testing a hardware timeout,
Conclusions

**Module V5 : Case Study: Intruder Alarm System :**
Introduction, The software architecture, Key software components used in this example, running theprogram, the software, Conclusions

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

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

**TEXT BOOKS:**
1. Embedded C - Michael J. Pont, 2nd Ed., Pearson Education, 2008

**REFERENCE BOOKS:**
1. PICmicro MCU C-An introduction to programming, The Microchip PIC in CCS C - Nigel Gardner

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# PROJECT (EMBEDDED SYSTEMS)

**Course Code: ES4106** **Credit Units: 03**

**Methodology:**

Topics of project are to be based on the latest trends, verifying engineering concepts /principals and should involve elementary research work based on Signal Processing. The projects may involve design, fabrications, testing, computer modeling, and analysis of any engineering problem. On completion of Project the students are to present a report covering various aspects learnt by them and give a presentation on same.

**Examination Scheme:**

| | |
|---|---|
| Literature study/ Fabrication/ Experimentation | 40 |
| Written Report | 20 |
| Viva | 15 |
| Presentation | 25 |
| **Total** | **100** |

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# INSTRUMENTATION ENGINEERING

| | |
|---|---|
| **Semester-1** | **Instrumentation and Measurement Techniques** |
| **Semester-2** | **Principles of Sensors** |
| **Semester-3** | **Biomedical Instrumentation** |
| **Semester-4** | **Industrial Instrumentation** |
| **Semester-5** | **Environmental Instrumentation** |
| **Semester-6** | **Instrumental Analysis** |

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# Instrumentation And Measurement Techniques

**Course Code: IE4801** **Credit Units: 03**

**Course Objective:**

The objective of the course is to provide a brief knowledge of measurements and measuring instruments related to engineering. The basic idea of this course is to give the sufficient information of measurements in any kind of industry viz. electrical, electronics, mechanical etc.

**Course Contents:**

**Module 1: General measurement systems:**
Specifications of instruments, their static and dynamic characteristics

**Module 2: Transducers:**
Sensing elements and measurements:A. Transducers:Resistance type - potentiometer, strain gauge; Inductive type – LVDT

**Module 3: Sensing elements:**
Temperature sensing elements – RTD, thermistor, thermocouple, semiconductor IC sensors;Pressure sensing elements – manometers, elastic elements, Bourdon tube, diaphragm, bellows, electrical type, McLeod gauge, Pirani gauge;Flow sensing type – head meters (orifice, venturi), area meters, rotameters, electromagnetic flowmeter, Coriolis flow meter, Ultrasonic flowmeter; Analytical sensors – pH measurement C. Measurement circuits:Deflection bridge, Instrumentation amplifier

**Module 4: Principles of Process control:**
A. Process control: process systems block diagram, transfer function, stability criteria
B. Types of control: Proportional, Proportional- Integral (PI), Proportional-Derivative(PD), PID
C. Control elements: controller, final control elements, control systems
D. Introduction to PLC and DCS

**Module 5 :Signal Conditioning:**
Switching devices – relays (electromagnetic), contactor, transistor switches
Opamp – inverting, non-inverting, differential configurations ,Power amplification, active filters (LP, HP, BP and Notch), constant current and voltage sources.
Wired signal transmission in industry (voltage 1-5V, current 4-20mA loop), F-V, V-F converters, V-I, I-V converters, A/D and D/A converters.

**Examination Scheme:**

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

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

**Text & References:**

***Text:***

- Electronic Instrumentation Technology by MMS Anand, PHI Pvt. Ltd., New Delhi Ed. 2005.
- Electronics Instrumentation by H.S. Kalsi TMH Ed. 2004.

***References:***

- Electronics Instrumentation & Measurement Techniques by W.D. Cooper & A.D. Helfrick, PHI 3rd Ed.
- Electronics Measurement & Instrumentation by Oliver & Cage Mc-Graw Hill.

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# PRINCIPLES OF SENSORS

**Course Code: IE4802** **Credit Units: 03**

**Course Objective:**

The objective of the course is to provide a brief knowledge of sensors and sensor based technology instruments related to engineering. The basic idea of this course is to give the sufficient information of sensors in any kind of industry viz. electrical, electronics, mechanical etc.

**Course Contents:**

**Module 1 : Principles of Physical and Chemical Sensors:**
Sensor classification, Sensing mechanism of Mechanical, Electrical, Thermal, Magnetic, Optical, Chemical and Biological Sensors. Sensor Characterisation and Calibration: Study of Static and Dynamic Characteristics, Sensor reliability, aging test, failure mechanisms and their evaluation and stability study.

**Module 2 :Sensor Modeling:**
Numerical modeling techniques, Model equations, Different effects on modeling (Mechanical, Electrical, Thermal, Magnetic, Optical, Chemical and Biological) and examples of modeling.

**Module 3 :Sensor Design and Packaging:**
Partitioning, Layout, technology constraints, scaling,compatibility study.

**Module 4 :Sensor Technology:**
Thick and thin films fabrication process, Micro machining, IOC (Integrated Optical circuit) fabrication process, Ceramic material fabrication process,Wire bonding, and Packaging.

**Module 5 : Sensor Interfaces:**
Signal processing, Multi sensor signal processing, Smart Sensors Interface Systems. Sensor Applications: Process Engineering, Medical Diagnostic and Patient monitoring,Environmental monitoring etc

**Examination Scheme:**

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

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

**Text & References:**

*Text:*

- E. DOEBELIN and D. N. Manik, "Measurement systems application and design", 5th Ed.,
- Sensors And Transducers 2011 by Ian Sinclair

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# BIOMEDICAL INSTRUMENTATION

**Course Code: IE4803** **Credit Units: 03**

**Course Objective:**

The objective of the course is to provide a brief knowledge of medical instruments related to medical science. The basic idea of this course is to give the sufficient information of medical based equipments and technology in any kind of disease and developing low cost devices.

**Module 1: Introduction**
General introduction of medical instrumentation, its problems and specialty. Sensing devices for biomedical instruments: general requirements and special considerations.

**Module 2: Cardio Instrumentation**
Equipment standards and patient safety. Diagnostic equipment: vector cardiograph, echocardiograph, comparison of ECG, VCG and ECHO, monitoring and transmission of ECG, IR imaging and its diagnostic criteria,

**Module 3: Measurement of Blood Flow**
Measurement of blood flow - electromagnetic flow meters and its specialty, plethysmography – impedance plethysmography, discussion of other blood flow meters, their advantages and
disadvantages over these methods

**Module 4 : Ultrasonography**
Ultrasonography - principles, different scanning modes, its instrumentation.

**Module 5 : Clinical instrumentation**
Clinical instrumentation - body fluid content determination, bio-analytical sensors and its uses. Assistive devices: hearing aid and its problems, contact lens and its problems, artificial heart and its viability. Therapeutic devices: chemotherapy.

**Examination Scheme:**

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 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. R. S. Khandpur, "Biomedical Instrumentation", TMH

2. S. K. Venkata Ram, "Bio-Medical Electronics &Instrumentation (Revised)", Galgotia.

3. J. G. Webster (editor), "Medical Instrumentation Application & Design", 3rd Ed WILEY, India

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# INDUSTRIAL INSTRUMENTATION

**Course Code: IE4804** **Credit Units: 03**

**Course Objective:**

The objective of the course is to provide a brief knowledge of Industrial instruments on low as well as large scale of production dependent. The basic idea of this course is to give the sufficient information of Instrumentation in any kind of industry viz. electrical, electronics, mechanical etc.

**Module 1: Introduction**
Basics of process control systems, process instrumentation diagram for different process control loops.

**Module 2: Instrumentation Systems**
Instrumentation system design for different units:- Deaerator of power plant Safety Interlock instrumentation system of a turbine driven boiler feed water pump. Control of Distillation Column Control of Furnace

**Module 3: Process Plant Instrumentation**
Process Plant Instrumentation: Ammonia Production in a Fertilizer, Instrumentation System Design for Carbon, Sulphur and Hydrogen Sulphide gas removal process.

**Module 4: Measurement of Process Parameters**
Studies of different Units related to process plant: Annunciator, Transmitter

**Module 5: Industrial Instrumentation Analysis**
Comparative study of PLC, DCS and SCADA.

**Examination Scheme:**

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 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.Doeblin/Measurements systems: Applications and Design, 4th ed. / Mc.Graw Hill.
2. Beckwith & Beck/Mechanical Measurements/Narona Publishers, 1988.
3. Eckman/Industrial Instrumentation/Wiley Eastern Ltd.
4. Nakra/Instrumentation: Measurements & Analysis/Tata Mc. Graw Hill

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# ENVIRONMENTAL INSTRUMENTATION

**Course Code: IE4805** **Credit Units: 03**

**Course Objective:**

The objective of the course is to provide a brief knowledge environmental safety related equipments. The basic idea of this course is to give the sufficient information of environmental instrumentation in any field in any kind of situation.

**Module 1: Introduction**
General introduction to pollution and its classification

**Module 2: Air pollution Measurement**
Air pollution: its effect on environment, its classification, meteorological factors responsible for pollution, method of sampling and measurement.

**Module 3: Instrumentation and Control of Air Pollution**
Air pollution control methods and equipment: basics of fluid properties, cleaning of gaseous effluents, particulate emission equipments and control, particulate collector selection and gaseous emission control. Specific gaseous pollutants analysis and control

**Module 4: Instrumentation and Control of Water Pollution**
Water pollution: its sources and classification, wastewater sampling and analysis, wastewater treatment. Solid waste management and Hazardous waste management.

**Module 5: Instrumentation and Control of Sound Pollution**
Sound pollution: basics of sound pollution, its effect to environment. Acoustic noise measurement, monitoring and 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:*

1. Environment and Instrumentation (English) by Arvind Kumar , M M Prakash

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# INSTRUMENTAL ANALYSIS

**Course Code: IE4806** **Credit Units: 03**

**Course Objective:**

The objective of the course is to provide a brief knowledge of Spectroscopy and its basic idea to give the sufficient information of experimental analysis in any kind of industry viz. electrical, electronics, mechanical etc.

**Module 1: Introduction**
Absorption Spectroscopy: Quantitative aspects, photometer and spectrophotometer designs. Molecular UV and V absorption Spectroscopy, Absorbing Species, Application in qualitative and quantitative analysis,

**Module 2: Spectroscopy**
Photo acoustic spectroscopy. Molecular fluorescence, phosphorescence and chemiluminescence spectroscopy. Atomic spectroscopy, Atomic absorption types, Atomic fluorescence types. Emission spectroscopy with Plasma, Arc, Spark, Flame emission type. IR absorption spectroscopy qualitative and quantitative analysis, IR emission spectroscopy. Raman spectroscopy

**Module 3:Spectroscopy Types**
Various types of the spectroscopy and their applications, NMR - application to Proton and other isotopes, environmental effects, ESR. X-ray spectroscopy, fluorescence, absorption, diffraction.

**Module 4: Electron Spectroscopy**
The electron microscope. Electron spectroscopy and its applications. Mass spectroscopy - identification of pure compounds, Molecular secondary ion mass spectrometry.

**Module 5:**
Chromatography : Plate theory, qualitative and quantitative analysis, Computerized system; Gas-liquid chromatography, Gas solid type, HPLC, Partition Chromatography, Absorption chromatography, Ion-exchange chromatography, Size exclusion chromatography, Superficial type. Planer chromatography: Thin layer, paper

**Examination Scheme:**

| Components | A | CT | S/V/Q | HA | EE |
|---|---|---|---|---|---|
| Weightage (%) | 5 | 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. Applications of Absorption Spectroscopy of Organic Compounds (English) 1st Edition by Jhon R Dayer
2. The Basics Of Spectroscopy by Ball David W
3. Molecular Structure And Spectroscopy 2nd Edition (English) G. Aruldhas


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# WIRELESS COMMUNICATIONS

Semester-1: BASIC ELECTRONICS

Semester-2: COMMUNICATION SYSTEMS

Semester-3: WIRELESS COMMUNICATIONS

Semester-4: RADAR AND SATELLITE COMMUNICATIONS

Semester-5: MICROWAVE ENGINEERING

Semester-6: ANTENNA AND WAVE PROPAGATION

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# BASIC ELECTRONICS

**Course Code: WC4301** **Credit Units: 03**

## Course Objective:

Basic knowledge of Electronics is very essential for an engineer; it will help in building up the electronics & automation skills in interdisciplinary learning.

## Course Contents:

**Module I: Introduction**
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,Review of Diodes, LED, Zener and Tunnel Diode and their characteristics, Applications of diodes-Rectifiers (Half and full wave, Bridge).

**Module II: Transistor and MOSFET**
BJT-construction and characteristics, Transistor as an amplifier, CE, CB and CC configurations, Introduction to MOSFET.

**Module III:** Coupling
Coupling, RC coupled Amplifiers, Transformer coupling,, Introduction to feedback-Positive and negative, Introduction to oscillators.

**Module IV: Operational Amplifier**
Introduction to OPAMP characteristics and specifications, OPAMP as adder, subtractor. Integrator, differentiator.

**Module V: Introduction to digital electronics**
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.

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# COMMUNICATION SYSTEM

**Course Code: WC4302** **Credit Units: 03**

## Course Objective:

The purpose of this course is to provide a thorough introduction to analog and digital communications with an in depth study of various modulation techniques, Random processes are discussed, and information theory is introduced.

## Course Contents:

**Module I: Introduction**

Communication Process, Source of Information, base-band and pass-band signals, Review of Fourier transforms, Random variables, different types of PDF, need of modulation process, analog versus digital communications

**Module II: Amplitude Modulation**

Amplitude modulation with full carrier, suppressed carrier systems, single side band transmission, switching modulators, synchronous detection, envelope detection, effect of frequency and phase errors in synchronous detection, comparison of various AM systems, vestigial side band transmission.

**Module III: Angle Modulation**

Narrow and wide band FM, BW calculations using Carson rule, Direct & Indirect FM generations, phase modulation, Demodulation of FM signals, noise reduction using pre & de-emphasis.

**Module IV: Pulse Modulation**

Pulse amplitude, width & position modulation, generation & detection of PAM, PWM & PPM, Comparison of frequency division and time division multiplexed systems.

Basics of Digital Communications: ASK, PSK, FSK, QPSK basics & waveform with brief mathematical introduction

**Module V: Noise**

Different types of noise, noise calculations, equivalent noise band width, noise figures, effective noise temperature, noise figure.

## Examination Scheme:

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

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

## Text & References:


- B. P. Lathi: "Modern analog & digital communication", OXFORD Publications
- Wayne Tomasi: "Electronic Communication systems", Pearson Education, 5th edition
- Simon Haykin, "Communication Systems", John Wiley & Sons, 1999, Third Edition.
- Taub and schilling, "Principles of Communication Systems" TMH


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# WIRELESS COMMUNICATIONS

**Course Code: WC4303** **Credit Units: 03**

## Course Objective:

This course introduce about global system for mobile, 2.5G, 3G technologies, how wireless communication system works and what is FDMA, TDMA. This course also introduce some facts about propagation models.

## Course Contents:

**Module I: Introduction to Wireless Communication System**
Evolution of mobile radio communication, Mobile radiotelephony in U.S., Mobile radio system around the world, second generation (2G) cellular network, evolution to 2.5G wireless network, evolution for 2.5G TDMA standards, third generation (3G) wireless network.

**Module II: The Cellular Concept**
System design fundamentals, frequency reuse channel assignment strategies, Hand off strategies, Interference and system capacity, improving coverage and capacity in cellular system.

**Module III: Propagation Model and Spread Spectrum Modulation Techniques**
Longley rice model, okumara model, hata model, pcs extension to hata model, wolfish and bertoni model, Pseudo Noise (PN) sequence, Direct sequence spread spectrum (DSSS), frequency hopped spread spectrum (FHSS).

**Module IV: Multiple Access Techniques for Wireless Communication**
Introduction to multiple access, Frequency division multiple access (FDMA), Time division Multiple access (TDMA), Spread spectrum multiple access, Packet Radio.

**Module V: Global System for Mobile**
Global system for mobile (GSM), GSM system architecture, GSM radio subsystem, GSM channel types, Example of a GSM cell, Frame structure of GSM.

## Examination Scheme:

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

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

## Text & References:

*Text:*

- Wireless Communications, Theodore S. Rappaport

*References:*

- Wireless Communications & Networks by William Stallings.
- Wireless Intelligent Networking by Gerry Christensen, Robert Duncan, Paul G. Florack

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# RADAR AND SATELLITE COMMUNICATIONS

**Course Code: WC4304** **Credit Units: 03**

## Course Objective:

This course builds basic knowledge of different types of Radar systems and satellite communication along with link designing & application. It also covers different modulation schemes & channels used.

## Course Contents:

**Module I: Introduction to Radar**
Principle of detection and ranging, Radar frequencies and bands. Applications, Radar block diagram and operation. Radar Range Equation : Range prediction, Minimum detectable signal, Receiver noise SNR, Integration of radar pulses, Radar cross section of targets, Transmitter Power, PRF and system losses & Propagation effects.

**Module II: CW FM Radar**
Doppler effect, CW Radar, Frequency-modulated CW Radar, Multiple-frequency CW Radar. MTI and Pulse Doppler Radar: MTI delay lines, Delay line Cancellers, Coherent and Non-Coherent MTI, Pulse Doppler Radar.

**Module III: Introduction to Satellite**
Communication satellites, Orbiting satellites, Frequencies and bands, Satellite multiple access formats. Satellite Channel: Power flow, Polarization, Atmospheric losses, Receiver noise, CNR, Satellite link analysis for uplinks and downlinks. Overview of Coaxial cable system and optical Network (SONET); Overview of WLL (Wireless loop)

**Module IV: Satellite Transponder**
Transponder model, Satellite signal processing RF-RF translation, IF demodulation.

**Module V: Multiple-Access**
FDMA; amplification with multiple FDMA carriers, AM/FM Conversion with FDMA, Switched FDMA, Synchronization, SS-TDMA; CDMA; DS CDMA, Frequency- hopped, CDMA. Carrier recovery & bit timing. Satellite link budget analysis

## Examination Scheme:

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

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

## Text & References:


- Introduction to Radar Systems - M.I. Skolnik
- Radar Fundamentals - G.J. Wheeler.
- Radar Engineering - D.G. Rink
- Satellite Communication - R.M. Gagliardi
- Satellite Communication - T. Pratt & C.W. Boston
- Satellite Communication System Design Principles - M. Richharia


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# MICROWAVE ENGINEERING

**Course Code: WC4305** **Credit Units: 03**

## Course Objective:

This course deals with the microwaves. Microwaves are important when we are going to the high frequency regime. By studying this course students will be able to know about the microwave components and devices, microwave generators and their characteristics, microwave applications and measurement. Also they will be familier about the rectangular and circular waveguides, their equations and the modes existing in these waveguides.

## Course Contents:

**Module I: Introduction**
Microwave frequencies, standard frequency bands, behaviour of circuits at conventional and microwave frequencies, microwave application.

**Module II: Waveguide**
Overview of guided waves, TE, TM and TEM modes, rectangular and cylindrical wave guide resonators, choice of the type of waveguide, waveguide problems.

**Module III: Microwave Components and Devices**
Scattering matrix and its properties, coupling probes, coupling loops, windows, waveguide tuners, termination, E-plane Tee, H-plane Tee, Magic Tee, Phase-Shifter, attenuators, Directional Coupler, Gunn diode, Resonator and circulators, IMPATT devices, TRAPATT.

**Module IV: Microwave tubes**
Transit-time effect, limitations of conventional tubes, Two-cavity and multi-cavity Klystrons, Reflex Klystron, TWT and Magnetrons.

## Examination Scheme:

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

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

## Text & References:

- Microwave Devices and Circuits, Liao
- Microwave Principles, Herbert J Reich
- Microwaves, K.C. Gupta
- Microwave Techniques, D C Agrawal
- Elements of Microwave Engg, Chatterjee

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# ANTENNA AND WAVE PROPAGATION

**Course Code: WC4306** **Credit Units: 03**

## Course Objective:

The purpose of this course is to provide a thorough introduction to antenna systems with an in depth study of various types & performance parameters for antenna.

## Course Contents:

**Module I: Antenna**

Antenna Principles: Potential Functions & Electromagnetic Field, Current Elements, Radiation from Monopole & Half Wave Dipole, power radiated by current element, radiation resistance. Network Theorems, Directional Properties of Dipole Antenna. Antenna Gain, Effective Area, Antenna Terminal Impedance, Practical Antennas and Methods of Excitation, Antenna Temperature and Signal to Noise Ratio.

**Module II: Antenna Arrays**

Antennas Arrays: Two Element Array, Horizontal Patterns in Broadcast Arrays, Linear Arrays, Multiplication of patterns, effect of the earth on vertical patterns, Binomial array

**Module III: Wave Propagation**

Modes of Propagation, Plane Earth Reflection, Space wave and Surface Wave, Reflection and refraction waves by the Ionosphere Tropospheric Wave. Ionosphere Wave Propagation in the Ionosphere, Virtual Height, MUF Critical frequency, Skip Distance, Duct Propagation, Space wave

**Module IV: Practical Antennas**

VLF and LF transmitting antennas, effect of antenna height, Field of short dipole, electric field of small loop antenna, Directivity of circular loop antenna with uniform current, Yagi-Uda array: Square corner yagi-uda hybrid, circular polarization Rhombic Antenna: Weight and Leg length Parabolic Reflectors: Properties, Comparison with corner reflectors Horn Antenna: Length and Aperture. Introduction to Turstile Antenna Effect of ground on antenna performance.

Broadband Antenna: Frequency independent concept, RUMSEY's Principle, Frequency independent planar log spiral antenna, Frequency independent conical spiral Antenna.

**Module V: Antenna Measurements**

Radiation Pattern measurement, Distance requirement for uniform phase, uniform field amplitude requirement, Introduction to phase measurement; Gain Measurement: Comparison method, Near field method, Introduction to current distribution measurement, Measurement of antenna efficiency, measurement of Noise figure and noise temperature of an antenna polarization measurement.

## Examination Scheme:

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

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

## Text & References:

*Text:*


- Jordan Edwards C. and Balmain Keith G.S "Electromagnetic Waves and Radiating Systems"/ Prentice Hall (India)
- Kraus, John D. & Mashefka, Ronald J. / "Antennas: For All Applications" / Tata McGraw Hill, 3rd Ed.


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*References:*


- Prasad, K.D./ "Antennas and Wave Propagation"/ Khanna Publications
- Collin, R. / "Antennas and Radiowave Propagation" / Tata McGraw-Hill
- Hayt Jr. William H./ "Engineering Electromagnetic "/ Tata McGraw-Hill
- Das, Annaparna & Das, Sisir K. / "Microwave Engineering"/ Tata McGraw Hill.
- Roy, Sitesh Kumar & Mitra, Monojit / "Microwave Semiconductor Devices" / Prentice Hall (India).


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# Minutes of Meetings

**Date: 25/ 01/ 2016**

1. A meeting was held in the office of Officiating H.o.I – A.S.E.T, on 25 January 2016 at 4:15 P.M.
2. The following changes were suggested to be incorporated in the syllabus of B.Tech. Mechanical and Automation Engineering.
3. Some of the changes are in credit units and some subjects were replaced by others subjects.
4. The details of changes are enclosed in Annexure – I
5. The following members of the departments were present

| Members | Signature |
|---|---|
| 1. Dr. Sanjay Gomasta | |
| 2. Mr. Nasir Khan | |
| 3. Mr. Ashish Dixit | |
| 4. Mr. Arvind Singh Tomar | |
| 5. Mr. Nishant Sharma | |
| 6. Mr. Mahendra Agrawal | |
| 7. Mr. Rohit Pandey | |

**Dr. Sanjay Gomasta**
**Associate Professor**
**Head of the Department**
**Mechanical & Automation Engineering**
**Amity School of Engineering & Technology**
**Amity University Madhya Pradesh, Gwalior**

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**Encl.:**

1. **Annexure – I**

# AMITY UNIVERSITY

MADHYA PRADESH

*Established vide Government of Madhya Pradesh Act No. 27 of 2010*

## APPROVAL OF BOARD OF STUDIES

The board of studies of Amity School of Engineering & Technology, Amity University Madhya Pradesh held on 28 January 2016, approved the changes in the existing syllabus of B.Tech. (Mechanical & Automation Engineering)

Dr. AnshulGangele

Dr. Sanjay Gomasta

Ms. Rinkoo Bhatia

Mr. VivekParashar

Mr. Mohan Kantharia

Dr. Manisha Singh

Dr. RachanaKathal

Dr. Manisha Jain

Dr. Manoj Kumar

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# Annexure - I

**THIRD SEMESTER**

| Subject Code | Existing Subject | Proposed Subject |
|---|---|---|
| BTM - 324 | **Thermodynamics Lab** | **To be Introduced** |

**FOURTH SEMESTER**

| Subject Code | Existing Subject | Proposed Subject |
|---|---|---|
| BTM – 405 | Electrical Machine | **Changes to be proposed** |
| BTM – 424 | **Heat & Mass Transfer Lab** | **To be Introduced** |

**FIFTH SEMESTER**

| Subject Code | Existing Subject | Proposed Subject |
|---|---|---|
| BTM - 505 | Micro-Processor System | **Changes to be Proposed** |
| BTM - 523 | Microprocessor System Lab | **Changes to be proposed** |

**SIXTH SEMSETR**

| Subject Code | Existing Subject | Proposed Subject |
|---|---|---|
| BTM – 622 | Metal Cutting & Tool Design Lab | **I.C. Engine & Gas Turbine Lab** |

**SEVENTH SEMESTER**

| Subject Code | Existing Subject | Proposed Subject |
|---|---|---|
| BTM – 760 | Project Dissertation | **To be Deleted** |

**Changes in allotted Credits:**

| Subject Code | Existing Subject | Existing Credits | Proposed Credits |
|---|---|---|---|
| BTM - 301 | Numerical Analysis & Programming | **3** | **2** |
| BTM - 324 | **Thermodynamics Lab** | **0** | **1** |

| Subject Code | Existing Subject | Existing Credits | Proposed Credits |
|---|---|---|---|
| BTM - 424 | Heat & Mass Transfer Lab | **0** | **1** |

| Subject Code | Existing Subject | Existing Credits | Proposed Credits |
|---|---|---|---|
| BTM - 503 | Measurement & Control | **4** | **3** |

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# Thermodynamics Lab

**Course Code:BTM - 322** **Credits: 01**

**List of Experiments**:

1. To study of various types of boilers.
2. To study various types of Boiler mountings and accessories.
3. To study the working of two stroke petrol Engine.
4. To study the working of four stroke petrol Engine.
5. To study the working of two stroke Diesel Engine.
6. To study the working of four stroke Diesel Engine.
7. To study of Velocity & Pressure compounded steam turbine.
8. To study of Impulse & Reaction turbine.
9. To study of steam Engine model.
10. To study of gas turbine model.
11. To study of First law of Thermodynamics.
12. Study of Bomb calorimeter (Determination of Calorific Value of Given Fuel).
13. Validation of Zeroth law/ Temperature measurement.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| A | PR | LR | V | PR | V |
| 5 | 10 | 10 | 5 | 60 | 10 |

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

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# ELECTRICAL MACHINES

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

## Course Objective:

Electrical Machines provides the backbone for successful and uninterrupted smooth functioning of any industry. Knowledge of this subject in any engineering branch is vital in process industry. The course covers the machines e.g. Motors & generators characteristics and classifications related to mechanical & automation as well as recent development engineering applications. Successful completion of this course will be very helpful for the students who wish to join challenging industry.

## Course Contents:

**Module I**
Introduction to Subject, Some important fundamentals, Electrical Power generation, Utilization & distribution facts & figures. Simple Loop Generator, D C Machines, Construction Features, Principle of Operation.

**Module II**
DC Generator Analysis & DC Motor, Classification & Characteristics & Analysis. Speed Torque Characteristics, Speed control of D C Motor. Application of D C Motor. Starters.

**Module III**
A C Machines, 3 phase IM, Revolving Magnetic field theory, IM as a transformer, Equivalent Circuit. 3 phase Synchronous Machines, Synchronous Motor, Synchronous Generator, Equivalent Ckt.

**Module IV**
Single phase Induction Motor, Double Revolving Field theory, Different types of 3 phase IM. Characteristics & typical Applications., Stepper Motor, Hysterisis Motor, A C Series Motors

## Examination Scheme:

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

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# HEAT AND MASS TRANSFER LAB

**Course Code: BTM - 424** **Credit Units: 01**

**List of Experiments:**

1. To determine the thermal conductivity of a Metal Bar
2. To determine the convective heat transfer co-efficient for a vertical cylinder by free or natural convection.
3. To determine the convective heat transfer co-efficient for a Horizontal Pipe by forced convection.
4. To determine the value of Stefan – Boltzman constant for radiation heat transfer
5. To determine the heat transfer coefficient under forced condition using Pin Fin apparatus
6. To determine the effectiveness & overall heat transfer coefficient for parallel & counter parallel flow heat exchanger
7. To determine the emissivity of a Grey surface at different temperatures.
8. To determine the overall heat transfer co-efficient for the composite wall and to compare the same with that calculated from the equations.
9. Determination of effectiveness of temperature distribution plotted for the temperature.
10. To determine the effectiveness of temperature distribution of Pin Fin
11. Determination of thermal effectiveness of insulating Powder

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| **A** | **PR** | **LR** | **V** | **PR** | **V** |
| 5 | 10 | 10 | 5 | 60 | 10 |

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

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# MICROPROCESSOR AND MICROCONTROLLER SYSTEMS

**Course Code: BTM - 505** **Credit Units: 04**

## Course Objective:

This course deals with the systematic study of the Architecture and programming issues of 8085-microprocessor and 8051microcontroller family. The aim of this course is to give the students basic knowledge of the above microprocessor needed to develop the systems using it.

## Course Contents:

**Module I: Microprocessor 8086**

Introduction to 16 bit Microprocessors, Block diagram of 8086 family, architecture and pin configuration of 8086, minimum mode & maximum mode Operation, Bus Interface Unit, Register Organization, Instruction Pointer, Stack & Stack pointer, merits of memory segmentation, Execution Unit, Register Organization.

**Module II: Microprocessor 8086 Programming**

Instruction set of 8086, Addressing Modes, Assembler directives, Assembly language programming, Subroutine Call and returns, Stack structure and programming, Interrupt and Interrupt service routines, Timings and Delays.

**Module III: Memory System Design & I/O Interfacing**

Memory interfacing with 8085. Interfacing with input/output devices like ADC and DAC, Traffic light controller etc. (memory mapped, peripheral I/O), Cache memory system. Study of following peripheral devices 8255, 8253, 8257, 8259, 8251.

**Module IV: 8051 Microcontroller**

Features, architecture, Pin Diagram, Interrupts, Interrupt structure and priorities, Port structure and operation, memory organization, external memory interfacing, instruction syntax, data types, subroutines, addressing Modes, instruction set, ALP of 8051

**Module IV: 8051 Microcontroller Interfacing and Applications**

Programming 8051 Timers and Serial port programming, 8051 interfacing to ADC and DAC, stepper motor and Sensors. Serial Communication, Modes and Programming

## Examination Scheme:

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

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

## Text & References:


- 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.
- M. Rafiquzzaman, "Microprocessor Theory and Application" PHI – 10th Indian Reprint.
- Naresh Grover, "Microprocessor comprehensive studies Architecture, Programming and Interfacing" Dhanpat Rai, 2003.
- K.J. Ayala, 1991, "The 8051 Microcontroller", Penram International.
- Raj Kamal, 2004, "Embedded Systems", TMH.
- James W. Stewart and Kai X. Miao, 2en Edition. "The 8051 microcontroller" Pearson Edu. Prentice Hall.
- M.A. Mazidi and J. G. Mazidi, 2004 "The 8051 Microcontroller and Embedded Systems", PHI.
- Dr. Rajiv Kapadia, "8051 Microcontroller & Embedded Systems", Jaico Press


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# MICROPROCESSORS AND MICROCONTROLLER LAB

**BTM 523** **Credit: 01**

## List of Experiments

1. Programs for 16 bit arithmetic operations for 8086 (using Various Addressing Modes).
2. Program for sorting an array for 8086.
3. Program for string manipulations for 8086.
4. Interfacing ADC and DAC to 8086.
5. Interfacing to 8086 and programming to control stepper motor.
7. Programming using arithmetic, logical and bit manipulation instructions of 8051.
8. Program and verify Timer/Counter in 8051.
9. Program and verify Interrupt handling in 8051.
10. UART Operation in 8051.
11. Interfacing LCD to 8051.
12. Interfacing Matrix/Keyboard to 8051.

**Examination Scheme:**

| IA | | | | EE | |
|---|---|---|---|---|---|
| A | PR | LR | V | PR | V |
| 5 | 10 | 10 | 5 | 60 | 10 |

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

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# IC ENGINE AND GAS TURBINE LAB

**Course Code: BTM - 622** **Credit Units: 01**

## List of Experiments:

1. Load test on Diesel Engine
2. Testing and performance of IC engines using Morse Test.
3. Prepare the heat balance sheet for Diesel Engine test rig / 4 Stroke / 2 Stroke
4. Prepare the heat balance sheet for Petrol Engine test rig
5. Study of Fuel Injection system in SI Engine
6. Study of lubricating system in CI Engines
7. Study of Battery Ignition system and Electronic Ignition System
8. Study of a Carburetors.
9. Study of Gas Turbine Model

## Examination Scheme:

| IA | | | | EE | |
|---|---|---|---|---|---|
| A | PR | LR | V | PR | V |
| 5 | 10 | 10 | 5 | 60 | 10 |

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# NUMERICAL ANALYSIS AND PROGRAMMING

**Course Code:** **BTM 301** **Credit Units: 02**

## Course Objective:

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

## Course Contents:

**Module I: Solution of Algebraic and Transcendental Equation**
Error in a series approximation, Bisection Method, Iteration method, Method of false position, Newton-Raphson method
**Solutions of Simultaneous equation**
Gauss elimination method, Jacobi iteration method, Gauss Seidal method

**Module II: Interpolation**
Finite Differences, Difference tables
Polynomial Interpolation: Newton's forward and backward formula
Central Difference Formulae: Gauss forward and backward formula.
Interpolation with unequal intervals: Lagrange's Interpolation, Newton Divided difference formula

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

**Module IV: Solution of differential Equations**
Euler's Method, Runga-Kutta Methods.

**Module V: Statistical Computation**
Frequency chart, Curve fitting by method of least squares, fitting of straight lines, polynomials, exponential curves etc, Data fitting with Cubic splines.

## Examination Scheme:

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

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

## Text & References:

*Text:*

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

*References:*

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

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# MEASUREMENTS AND CONTROLS

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

## Course Objective:

Knowledge of Measurement & Control in any engineering branch is vital in designing and industrial production/application. The course covers the characteristics and classifications of measurement related to mechanical & automation as well as recent development in measurement & control engineering applications. Successful completion of this course will be very helpful for the students who wish to join challenging industry.

## Course Contents:

**Module I**
Introduction to generalized measurement system and their functional elements. Basic characteristics of measuring devices, Standards & Calibration. Accuracy, Precision, Sensitivity, Resolution, Linearity & Errors in measurement.

**Module II**
Transducers, Stages & their classification, Resistive transducers, Strain gauges, Rosettes, Inductive transducers, Displacement measurement, LVDT.

**Module III: Applications**
Miscellaneous instruments in Industrial & Environmental Applications, Measurement of viscosity & flow, Transient Time & Doppler's flow meter, Measurement of liquid level, humidity, hair hygrometers.

**Module IV**
Control engineering applications, Introduction to type of control Systems, Open loop & close loop Control Systems; Examples & their block diagrams. Transfer function, Hurwitz Polynomial& Routh Hurwitz Criterian. Block diagram representation & reduction.

## Examination Scheme:

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

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

## Text & References:

*Text:*

- 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.

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