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**GYAN VIHAR SCHOOL OF ENGINEERING and TECHNOLOGY**

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

**CURRICULUM FOR ACADEMIC SESSION 2015-2016 FOR THE FOLLOWING PROGRAMME-**

1. B.Tech I year ( Common to all branches of Engineering)
2. B.Tech Electronics and Communication Engineering
3. B.Tech E&C + M.Tech VLSI Engineering DD
4. B.Tech E&C + M.Tech DWCE Engineering DD
5. M.Tech VLSI Engineering
6. M.Tech Digital and Wireless Communication Engineering
7. Diploma Electronics and Communication Engineering

|  |  |  |
| --- | --- | --- |
| S.No | Programs | Remarks |
| 1 | B.Tech I Year (Common to all branches of Engineering) | I Sem to II Sem |
| 2 | B.Tech Electronics and Communication Engg. | III Sem to VIII Sem |
| 3 | B.Tech E&C + M.Tech VLSI Engineering DD | III sem. to X sem. |
| 4 | B.Tech E&C + M.Tech DWCE Engineering DD | III sem. to X sem. |
| 5 | M.Tech VLSI Engineering | I sem. to IV sem. |
| 6 | M.Tech Digital and Wireless Communication Engineering | I sem. to IV sem. |
| 7 | Diploma Electronics and Communication Engineering | III Sem to VI sem |

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**GYAN VIHAR SCHOOL OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF ELECTRONICS AND COMMMUNICATION ENGINEERING**

**HIGH LIGHTS OF THE SYLLABI**

**A. COURSE NUMBER CODING SCHEME**

Coding for all the papers has been done so as to make syllabi more systematic and easy to locate.

**1.** A course is identified by a course code designated by a string of six alphanumeric characters and a course title.

**2.** In a course code, first letter indicates the type of course whether CORE or ELECTIVE, next two letters of the string indicate the Department/School offering the course and the later three numerals designate a particular course number. The letters symbolizing various Academic Department offering a course are:

**CY Chemistry**

**EN English**

**HS Humanities and Social Sciences**

**MA Mathematics**

**PY Physics**

**CA Computer Application**

**CE Civil Engineering**

**CP Computer Engineering**

**EC Electronics and Communication Engineering**

**EE Electrical Engineering**

**IT Information Technology**

**ME Mechanical Engineering**

**BM Business Management**

**HM Hotel Management**

**PH Pharmacy**

**SC Sciences**

**3. Course number**

**a.** First Numerical digit denotes the level of the course that corresponds to the Year of Study.

**b.** Next two Numerical digits denote the number of the course, which will usually be odd for courses offered in the Odd Semester and even for

courses offered in the Even Semester.

**c.** Lower levels corresponds the UG courses, while higher level the PG courses. Suggested levels will be as follows :-

|  |  |  |
| --- | --- | --- |
| **All UG Programmes** | **All PG programmes** | **PG Diploma** |
| Level 1 to 4 | Level 5 to 7 | Level 8, 9 |

**EXAMPLES:**

|  |  |
| --- | --- |
| **UG Programmes** | **PG programmes** |
| For e.g. EC 203  EC denotes Electronics and Communication  2 denoted second Year  03 represent Course | For e.g. EC 503  EC denotes Electronics Engineering  5 denoted First Year of Pg Programme  03 represent Course |

**B. CREDIT SYSTEM**

Each academic year consists of two semesters and a summer term. The education system is organized around a credit system, which ensures continuous evaluation of the student's performance and provides at an optimum pace suited to one's ability or of credits depending upon the class contact hours. A minimum number of credits are to be completed in order to qualify for the award of degree. A minimum level of performance is necessary for satisfactory progress. SGVU has revised its curriculum with effect from the academic session 2015-2016. The revised curriculum emphasizes on self-learning, project activity and laboratory work. It leaves sufficient time for the student to take part in other activities like sport and recreation as well as to think and to be creative and innovative.

Each course, except for a few special courses, has a certain number of credits assigned to it depending on its lecture, tutorial and laboratory work contact hours in a week. Each course is coordinated by a member of the faculty called the course coordinator. He/she has the full responsibility for coordinating the course, faculty involved in the course, holding tests and awarding grades. In case of any difficulty, students are expected to approach the course coordinator for advice and clarification.

A letter grade with a specified number of grade points is awarded in each course for which a student is registered. A student's performance is measured by the number of credits that he/she has earned and by the weighted grade point average maintained by him/her. A minimum grade point average is necessary in order to qualify for the degree.

A total of minimum 180 credit points are necessary for the student enrolled to get B.Tech. degree, out of total 220 teaching credits offered overall in various courses.

**C. COURSE OUTLOOK:**

The course of B.Tech. in Electronics and Communication Engineering is of 4 years. These 4 years are divided in 8 semesters, each of 6 months. After every semester an examination is conducted so that the teachers as well as students get to know their strengths and weakness and work on their weak points to have an overall development. Subjects are divided into two main categories- CORE and ELECTIVES, which are further classified as PROGRAM and UNIVERSITY.

**ELIGIBILITY**

Eligibility for Admission 10+2 with 70 % and AIEEE/RPET score Credit system based syllabi

**OBJECTIVES OF THE SYLLABI**

• To advance, evolve and enhance Electronics fundamentals

• To build the interest in students for greater research

• To guide students in the development of newer languages

• To create the ability in students for better hardware production

• Choice based credit system

**SIGNIFICANCE AND CARRER OPTIONS OF B.TECH. ECE**

Electronics and Communication Engineering is one of the fastest growing branches of studies which are being carried out all over India. It is one of the most developing and in demand trades of engineering. B.Tech in Electronics and Communication Engineering includes study of various aspects of Electronics and Communication to meet the requirements of the various industries. The course contains study of the basic Electronics and its application, as well as the detailed study of the various aspects of its working.

Today Computers have not only assumed strategic importance in the corporate world, they are also being effectively used in almost every field of human endeavour, ranging from space exploration to food processing and banking to communication etc.

B.Tech (Electronics and Communication Engineering), a study of the theoretical foundations of information and computation, offers a foundation which permits the students to adapt new technologies and ideas. This branch of engineering has many sub-fields for e.g. Electronics, Communication, Information theory and coding, TV Engineering Radar, Digital Communication, Satellite Communication, Digital signals Processing and much more. After doing B.Tech (Electronics and Communication Engineering) from the SGVU, an individual can find a good job in the renowned Electronics and Communication Company. He can work in various areas such as:-

**Career Options in B.Tech (Electronics and Communication Engineering):**

* Electronic Scientist
* DRDO
* ISRO
* BEL
* BSNL
* HAL
* GAIL
* SAIL
* BHEL
* Railway
* Telecommunication
* Networking Engineer
* Software Developer
* RSEB as a JEN

Consumer Electronics Company, etc…………

**Changes in the Teaching Scheme and Syllabus of B.TECH before B.O.S. of 14 May 2015**

1. Earlier subjects were divided into two main categories- CORE and ELECTIVES, which are now classified as PROGRAM and UNIVERSITY- CORE and ELECTIVES.

2. Earlier in 2014-15 Semester III and IV were according to the IIT Roorkee norms and rest as per 2013-14 scheme but now the whole curriculum has been revised as per the above new classification.

3. Names of the following subjects have been changed and the codes are same as they appear in the syllabus versions before 2014-15.

|  |  |  |
| --- | --- | --- |
| S.No. | Old Name of the Subject | New Name of the Subject |
|  | Fundamental of Electronics | Electronic Devices and Circuits |
|  | Linear Circuits | Circuit Analysis and Synthesis |
|  | Electric and Electronic Materials | Electronic Materials and Processes |
|  | Digital hardware Design | Digital Electronics |
|  | Data Structures | Data Structures and Algorithms |
|  | Humanities and Social Sciences | Economics and Social Sciences |
|  | Data Structures Lab | Data Structures and Algorithms Lab |
|  | Telecommunication Engineering | Transmission Line and Networks |
|  | Electronics Lab | Industry Oriented Electronic Devices and Circuits Project Lab |
|  | Electronic Workshop | Electronic Workshop Lab |
|  | Advanced Electronics Lab | Industry Oriented Analog Electronics Project Lab |
|  | Engineering Electromagnetics | Electromagnetic Field Theory |
|  | Fundamentals of Object Oriented Programming | Object Oriented Programming |
|  | Advanced Computer Programming lab | Object Oriented Programming Lab |
|  | Digital Hardware Lab | Digital Electronics Lab |
|  | Advanced Communication Lab | Digital Communication Lab |
|  | Discipline and Co-curricular Activities | Proficiency in Co-curricular Activities |
|  | Electronic Engineering Design Lab | Industry Oriented Electronic Engineering Design Project Lab |
|  | Signal Processing Lab | Industry Oriented MATLAB Project Lab |
|  | VHDL | Digital System Design using VHDL |
|  | Image Processing & Pattern Recognition | Image and Video Processing |
|  | Communication System lab | Communication Lab |
|  | Networking lab | Computer Network Lab |
|  | Industrial Economics & Management | Industrial Economics & Management Lab |

4. Shifting of several elective subject has been done from one to different semester as per the requirement of the scheme.

5. Three Industry Oriented Project labs have been introduced in the semester III, IV and V which are named as Industry Oriented Electronic Devices and Circuits Project Lab, Industry Oriented MATLAB Project Lab, Industry Oriented Electronic Engineering Design Project Lab respectively.

6. Practical Training Seminar has been introduced as UNIVERSITY CORE In semester V and VII.

7. A UNIVERSITY CORE Employability Skills numbering from II to VI has been started from Semester III to Semester VII with the credits 0-2-0-1.

8. Credits of University Elective has been changed from 3-0-0-3 to 3-0-0-2 i.e. three lectures will now carry 2 credits only.

9. Several new subjects have been introduced in B.Tech. and their codes need to be assigned.

|  |  |  |
| --- | --- | --- |
| S.No. | Name of the Subject | Semester |
|  | Industrial Management | III |
|  | Remote Sensing | VI |
|  | Nanoelectronics | VI |
|  | Database Management System | VII |

10. Contents of the Following Subjects have been changed as given below-

|  |  |
| --- | --- |
| S.No. | Subjects Name |
|  | Circuit Analysis and Synthesis |
|  | Microwave Lab |
|  | VLSI & Optical Fiber Lab |

**Changes in the Teaching Scheme and Syllabus of M.TECH before B.O.S. of 14 May 2015**

**DD B.Tech EC+M.Tech VLSI**

1. Employability Skills VII and VIII have been introduced in M.Tech VLSI and M.Tech DWCE in semester II and III.

2. Employability Skills VII and VIII have been introduced in DD VLSI and M.Tech DWCE in semester VIII and XI.

3. Remove Soft Skills training II and adding new subject Digital Image Processing in Elective I with code EC 523

4. Adding new subject Real Time System and software in Elective I with code EC 521

5. Elective III Remove Soft Skills Training III

**DD B.Tech EC+M.Tech DWCE**

**1.** Employability Skills VII and VIII have been introduced in M.Tech VLSI and M.Tech DWCE in semester II and III.

2. Semester IX Sem communication system lab are shifted to VIII Sem (Summer) and Modeling and simulation lab are shifted to IX Sem

3. Remove two subject in elective I Design of MIC & MNIC and ACC and adding New Subject Advanced Signal Theory with code EC 525 and Advanced Microwave Engg. With code EC 527

4. Elective II microelectronics Devices and circuit and soft Skills Training I are Removed and Adding Biomedical Instrumentation with code EC 209 are added.

**M.Tech VLSI**

1. Employability Skills VII and VIII have been introduced in M.Tech VLSI in semester II and III.

2. Soft Skills Training I Are replaced by Real Time System and Software EC 521

3. In Sem II Soft Skills Training II are replaced by Digital Image Processing with code EC 523

4. In sem III Soft Skills Training III are Removed.

**M.Tech DWCE**

**1.** Employability Skills VII and VIII have been introduced in M.Tech DWCE in semester II and III.

2. In Elective II Microelectronic Device and circuit and soft skills Training II are replaced by Biomedical Instrumentation with code EC 209

**VLSI Technology :** Whole syllabus are changed

Advanced Digital Signal Processing : First Two unit are changed.

Telecommunication Switching Network : Whole syllabus are Revised.

Microelectronics : Syllabus are redesigned.

**Changes in the Teaching Scheme and Syllabus of M.TECH after B.O.S of 14 May 2015**

1. Several new subjects have been introduced in Semester I M.Tech. DWCE as

a. Digital Image Processing in Program Core with code EC 523

b. Advanced Signal Theory EC 525 and Advanced Microwave Engineering EC 527 as Program Elective.

2. In semester II, both in M.Tech DWCE and M.Tech VLSI two new subjects have been introduced in University Electives.

a. Optimization Techniques EC 529

b. Statistical Modeling EC 531

3. In semester III, both in M.Tech DWCE and M.Tech VLSI two new subjects have been introduced in University Electives.

a. Research Methodology EC 617

b. Estimation Theory EC 619

4. 5. In M.Tech VLSI, Semester III, Optimization Techniques EC 529 has been introduced as University Elective.

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**GYAN VIHAR SCHOOL OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF ELECTRONICS AND COMMMUNICATION ENGINEERING**

**Teaching and Examination Scheme for B.Tech./Dual Degree I Year (Common to all Branches of Engineering)**

**Semester I to II**

**Effective from the academic session 2015-16**

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**GYAN VIHAR SCHOOL OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF ELECTRONICS AND COMMMUNICATION ENGINEERING**

**Teaching and Examination Scheme for B.Tech./Dual Degree I Year (Common to all Branches of Engineering)**

**EFFECTIVE FROM ACADEMIC SESSION 2015-2016**

**Year: I Semester: I**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | | | **Exam Hrs.** | **Weightage (in%)** | |
| **L** | **T/S** | **P** | **CE** | **ESE** |
| **A** |  | **University Core** |  |  |  |  |  |  |  |
|  | **MA 101** | Math’s – I | 4 | 3 | 1 | 0 | 3 | 40 | 60 |
|  | **EN 105** | Professional Communication-I | 2 | 3 | 0 | 0 | 3 | 40 | 60 |
|  | **CP 103** | Fundamentals of Computer & IT | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  | **PY 101/CY 101** | Engg. Physics / Engg. Chemistry | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  |  | Environmental Sciences | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  |  | English lab I | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
|  | **PY 151/CY 151** | Physics Lab/ Chemistry lab | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
|  | **PC 101** | Proficiency in Co-curricular Activities | 2 | 0 | 0 | 0 | 0 | - | 100 |
| **B** |  | **Program Core** |  |  |  |  |  |  |  |
|  | **EE 101/ME 101** | EEE/ Engg. Mechanics | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  | **EE 151/ME 153** | EEE Lab/ Workshop Practice | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
|  |  | Engineering Drawing Lab | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
| **C** |  | **University Elective** |  |  |  |  |  |  |  |
|  |  | Remedial Maths (Audit Course) | 0 | 0 | 0 | 0 | 0 | - | - |
|  |  | Remedial Physics(Audit Course) | 0 | 0 | 0 | 0 | 0 | - | - |
|  |  | Foreign Language (German/French. Etc.) | 2 | 2 | 0 | 0 | 3 | 40 | 60 |
|  |  | History of Engineering & Science | 2 | 2 | 0 | 0 | 3 | 40 | 60 |
|  |  | **TOTAL** | **27** | **20** | **1** | **8** |  |  |  |
|  |  | **TOTAL TEACHING LOAD** | **29** |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |

**L= Lecture T=Tutorial CE=Continuous Evaluation**

**S= Seminar P= Practical ESE= End Semester Examination**

**Members of BoS, ECE Convener, BoS Engg.**

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**GYAN VIHAR SCHOOL OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF ELECTRONICS AND COMMMUNICATION ENGINEERING**

**Teaching and Examination Scheme for B.Tech./Dual Degree I Year (Common to all Branches of Engineering)**

**EFFECTIVE FROM ACADEMIC SESSION 2015-2016**

**Year: I Semester: II**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | | | **Exam Hrs.** | **Weightage (in%)** | |
| **L** | **T/S** | **P** | **CE** | **ESE** |
| **A** |  | **University Core** |  |  |  |  |  |  |  |
|  | **MA 102** | Math’s – II | 4 | 3 | 1 | 0 | 3 | 40 | 60 |
|  | **EN 102** | Communication Techniques | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  |  | Computer Programming | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  |  | English lab -II | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
|  | **PY 102/CY 102** | Engg. Chemistry/ Engg. Physics | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  | **CP 152** | Computer Programming Lab | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
|  | **CY 152/PY 152** | Chemistry Lab/Physics Lab | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
|  | **EM 102** | Employability Skills–I | 1 | 0 | 2 | 0 | - | 60 | 40 |
|  | **PC 102** | Proficiency in Co-curricular Activities | 2 | 0 | 0 | 0 | - | - | 100 |
| **B** |  | **Program Core** |  |  |  |  |  |  |  |
|  |  | Engg. Mechanics/ EEE | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  |  | Workshop Practice/ EEE Lab | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
|  |  | Basics of MATLAB | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
| **C** |  | **University Elective** |  |  |  |  |  |  |  |
|  |  | Remedial Maths (Audit Course) | 0 | 0 | 0 | 0 | 3 | - | - |
|  |  | Remedial Physics (Audit Course) | 0 | 0 | 0 | 0 | 3 | - | - |
|  |  | Professional Ethics and Human Values | 2 | 2 | 0 | 0 | 3 | 40 | 60 |
|  |  | **TOTAL** | **28** | **20** | **3** | **8** |  |  |  |
|  |  | **TOTAL TEACHING LOAD** | **31** |  |  |  |  |  |  |

**L= Lecture T=Tutorial CE=Continuous Evaluation**

**S= Seminar P= Practical ESE= End Semester Examination**

**Members of BoS, ECE Convener, BoS Engg.**

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**GYAN VIHAR SCHOOL OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF ELECTRONICS AND COMMMUNICATION ENGINEERING**

**Teaching and Examination Scheme for B.Tech./Dual Degree ( Electronics and Communication Engineering)**

**Semester III to VIII**

**Effective from the academic session 2015-16**

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**GYAN VIHAR SCHOOL OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF ELECTRONICS AND COMMMUNICATION ENGINEERING**

**Teaching and Examination Scheme for B.Tech./Dual Degree (Electronics and Communication Engineering 4 Year Course)**

**EFFECTIVE FROM ACADEMIC SESSION 2015-2016**

**Year: II Semester: III**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | | | **Exam Hrs.** | **Weightage (in%)** | |
| **L** | **T/S** | **P** | **CE** | **ESE** |
| **A** |  | **University Core** |  |  |  |  |  |  |  |
|  | **EM 201** | 1.Employability Skills- II | 1 | 0 | 2 | 0 |  |  |  |
|  | **PC 201** | 2. Proficiency in Co-curricular Activities | 2 | 0 | 0 | 0 |  |  | 100 |
|  | **MA 201** | 3.Integral Transforms and Complex Analysis | 4 | 3 | 1 | 0 | 3 | 40 | 60 |
|  | **HS 203** | 4.Economics and Social Sciences | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
| **B** |  | **Program Core** |  |  |  |  |  |  |  |
|  | **EC 201** | 1.Electronic Devices and Circuits | 4 | 3 | 1 | 0 | 3 | 40 | 60 |
|  | **EC 203** | 2.Circuit Analysis and Synthesis | 4 | 3 | 1 | 0 | 3 | 40 | 60 |
|  | EC 207 | 3. Electronic Materials And Processes | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  | **EC 251** | 4.Electronics Workshop Lab | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
|  | **EC 253** | 5.Industry Oriented Electronic Devices and Circuit Project lab | 2 | 0 | 0 | 2+2 | 2 | 60 | 40 |
|  | BM 248 | 6.Industrial Economics and Management Lab | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
| **C** |  | **University Elective** |  |  |  |  |  |  |  |
|  | **CP 201**  **CP 251** | 1(a) Data Structures and Algorithms  (b) Data Structures and Algorithms Lab | 2  1 | 2  0 | 0  0 | 0  2 | 3  2 | 40  60 | 60  40 |
|  |  | 2.Industrial Management | 2 | 2 | 0 | 0 | 3 | 40 | 60 |
| **D** |  | **Program Elective** |  |  |  |  |  |  |  |
|  | **EC 208** | 1.Transmission Line and Networks | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  | **EC 209** | 2. Biomedical Instrumentation | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  |  | **TOTAL** | **28** | **17/18** | **5** | **10** |  |  |  |
|  |  | **TOTAL TEACHING LOAD** | **32/33** |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |

**L= Lecture T=Tutorial CE=Continuous Evaluation**

**S= Seminar P= Practical ESE= End Semester Examination**

**Members of BoS, ECE Convener, BoS Engg.**

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**GYAN VIHAR SCHOOL OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF ELECTRONICS AND COMMMUNICATION ENGINEERING**

**Teaching and Examination Scheme for B.Tech./Dual Degree (Electronics and Communication Engineering 4 Year Course)**

**EFFECTIVE FROM ACADEMIC SESSION 2015-2016**

**Year: II Semester: IV**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | | | **Exam Hrs.** | **Weightage (in%)** | |
| **L** | **T/S** | **P** | **CE** | **ESE** |
| **A** |  | **University Core** |  |  |  |  |  |  |  |
|  | **MA 202** | 1. Numerical Analysis and Statistics | 4 | 3 | 1 | 0 | 3 | 40 | 60 |
|  | **EM 202** | 2. Employability Skills- III | 1 | 0 | 2 | 0 |  |  |  |
|  | **PC 202** | 3. Proficiency in Co-curricular Activities | 2 | 0 | 0 | 0 |  |  | 100 |
| **B** |  | **Program Core** |  |  |  |  |  |  |  |
|  | **EC 202** | 1.Analog Electronics | 4 | 3 | 1 | 0 | 3 | 40 | 60 |
|  | **EC 204** | 2.Digital Electronics | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  | **EC 206** | 3.Electromagnetic Field Theory | 4 | 3 | 1 | 0 | 3 | 40 | 60 |
|  | EC 205 | 4.Electronic Measurement and Instrumentation | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  | **EC 254** | 5.Digital Electronics Lab | 1 | 0 | 0 | 2 | 3 | 60 | 40 |
|  | **EC 252** | 6. Industry Oriented Analog Electronics Project Lab | 2 | 0 | 0 | 2+2 | 3 | 60 | 40 |
|  | EC 255 | 7. Electronic Measurement and Instrumentation Lab | 1 | 0 | 0 | 2 | 3 | 60 | 40 |
| **C** |  | **University Elective** |  |  |  |  |  |  |  |
|  | **CP 216**  **CP 260** | a) Object Oriented Programming  b) Object Oriented Programming lab | 2  1 | 2  0 | 0  0 | 0  2 | 3  3 | 40  60 | 60  40 |
|  | EC 245 | Dynamic Systems & Optimization | 2 | 2 | 0 | 0 | 3 | 40 | 60 |
| **D** |  | **Program Elective** |  |  |  |  |  |  |  |
|  | **EC 234** | 1. RF Packaging And Electromagnetic Compatibility | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  | **EC 235** | 2.Fuzzy Control | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  |  | **TOTAL** | **28** | **17/18** | **5** | **10** |  |  |  |
|  |  | **TOTAL TEACHING LOAD** | **32/33** |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |

**L= Lecture T=Tutorial CE=Continuous Evaluation**

**S= Seminar P= Practical ESE= End Semester Examination**

**Members of BoS, ECE Convener, BoS Engg.**

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**GYAN VIHAR SCHOOL OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF ELECTRONICS AND COMMMUNICATION ENGINEERING**

**Teaching and Examination Scheme for B.Tech./Dual Degree (Electronics and Communication Engineering 4 Year Course)**

**EFFECTIVE FROM ACADEMIC SESSION 2015-2016**

**Year: III Semester: V**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | | | **Exam Hrs.** | **Weightage (in%)** | |
| **L** | **T/S** | **P** | **CE** | **ESE** |
| **A** |  | **University Core** |  |  |  |  |  |  |  |
|  | **EM 301** | 1.Employability Skills- IV | 1 | 0 | 2 | 0 |  |  |  |
|  | **PC 301** | 2. Proficiency in Co-curricular Activities | 2 | 0 | 0 | 0 |  |  | 100 |
|  | **PT 301** | 3.Practical Training and Seminar-I | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
| **B** |  | **Program Core** |  |  |  |  |  |  |  |
|  | **EC 307** | 1.Analog Communication | 4 | 3 | 1 | 0 | 3 | 40 | 60 |
|  | **EC 309** | 2.Microprocessor | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  | **EC 303** | 3.Microwave Engineering-I | 4 | 3 | 1 | 0 | 3 | 40 | 60 |
|  | **EC 305** | 4.Linear Integrated Circuits | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  | EC 301 | 5.Signals and Systems | 4 | 3 | 1 | 0 | 3 | 40 | 60 |
|  | **EC 351** | 6.Microwave Engineering Lab. | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
|  | **EC 353** | 7. Industry Oriented Electronic Engineering Design Project Lab | 2 | 0 | 0 | 2+2 | 2 | 60 | 40 |
|  | **EC 355** | 8.Microprocessor Lab | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
|  | **EC 357** | 9.Communication Lab | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
| **C** |  | **University Elective** |  |  |  |  |  |  |  |
|  | CP 315 | Advanced Data Structures | 2 | 2 | 0 | 0 | 3 | 40 | 60 |
|  | MA 301 | Computer Oriented Mathematical Methods | 2 | 2 | 0 | 0 | 3 | 40 | 60 |
| **D** |  | **Program Elective** |  |  |  |  |  |  |  |
|  | CP302 | Computer System Architecture | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  | **EC 209** | 1.Biomedical Instrumentation | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  | **EC 211** | 2.Audio Video System | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  |  | **TOTAL** | **30** | **17/18** | **5** | **12** |  |  |  |
|  |  | **TOTAL TEACHING LOAD** | **34/35** |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |

**L= Lecture T=Tutorial CE=Continuous Evaluation**

**S= Seminar P= Practical ESE= End Semester Examination**

**Members of BoS, ECE Convener, BoS Engg.**

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**GYAN VIHAR SCHOOL OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF ELECTRONICS AND COMMMUNICATION ENGINEERING**

**Teaching and Examination Scheme for B.Tech./Dual Degree (Electronics and Communication Engineering 4 Year Course)**

**EFFECTIVE FROM ACADEMIC SESSION 2015-2016**

**Year: III Semester: VI**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | | | **Exam Hrs.** | **Weightage (in%)** | |
| **L** | **T/S** | **P** | **CE** | **ESE** |
| **A** |  | **University Core** |  |  |  |  |  |  |  |
|  | **EM 302** | 1.Employability Skills- V | 1 | 0 | 2 | 0 |  |  |  |
|  | **PT 302** | 2. Proficiency in Co-curricular Activities | 2 | 0 | 0 | 0 |  |  | 100 |
| **B** |  | **Program Core** |  |  |  |  |  |  |  |
|  | **EC 302** | 1.Microwave Engineering-II | 4 | 3 | 1 | 0 | 3 | 40 | 60 |
|  | **EC 306** | 2.Digital Communication | 4 | 3 | 1 | 0 | 3 | 40 | 60 |
|  | **EC 308** | 3.Control Systems | 4 | 3 | 1 | 0 | 3 | 40 | 60 |
|  | **EC 310** | 4.Industrial Electronics | 4 | 3 | 1 | 0 | 3 | 40 | 60 |
|  | EC 304 | Advanced Microprocessor | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  | **EC 352** | 5.Digital Communication Lab | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
|  | **EC 356** | 6.Industrial Electronics Lab | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
|  | **PE 302** | 7.B. Tech Project (Stage – 1) | 3 | 0 | 0 | 5 | 2 | 60 | 40 |
|  | EC 354 | Signal Processing Lab-I | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
| **C** |  | **University Elective** |  |  |  |  |  |  |  |
|  | **CP 318** | 1.Information Protection and Security | 2 | 2 | 0 | 0 | 3 | 40 | 60 |
|  | **CP 232** | 2.Multimedia System | 2 | 2 | 0 | 0 | 3 | 40 | 60 |
|  | **CP 242** | 3.Operating System | 2 | 2 | 0 | 0 | 3 | 40 | 60 |
| **D** |  | **Program Elective** |  |  |  |  |  |  |  |
|  |  | 1. Remote Sensing | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  |  | 2.Nanoelectronics | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  |  | **TOTAL** | **31** | **17/18** | **6** | **11** |  |  |  |
|  |  | **TOTAL TEACHING LOAD** | **34/35** |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |

**L= Lecture T=Tutorial CE=Continuous Evaluation**

**S= Seminar P= Practical ESE= End Semester Examination**

**Members of BoS, ECE Convener, BoS Engg.**

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**GYAN VIHAR SCHOOL OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF ELECTRONICS AND COMMMUNICATION ENGINEERING**

**Teaching and Examination Scheme for B.Tech./Dual Degree (Electronics and Communication Engineering 4 Year Course)**

**EFFECTIVE FROM ACADEMIC SESSION 2015-2016**

**Year: IV Semester: VII**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | | | **Exam Hrs.** | **Weightage (in%)** | |
| **L** | **T/S** | **P** | **CE** | **ESE** |
| **A** |  | **University Core** |  |  |  |  |  |  |  |
|  | **EM 401** | 1.Employability Skills- VI | 1 | 0 | 2 | 0 |  |  |  |
|  | **PC 401** | 2. Proficiency in Co-curricular Activities | 2 | 0 | 0 | 0 |  |  | 100 |
|  | **PT 401** | 3.Practical and Training Seminar-II | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
| **B** |  | **Program Core** |  |  |  |  |  |  |  |
|  | **EC 401** | 1.Antenna and Wave Propagation | 4 | 3 | 1 | 0 | 3 | 40 | 60 |
|  | **EC403** | 2.Wireless Communication | 4 | 3 | 1 | 0 | 3 | 40 | 60 |
|  | **EC 405** | 3.Microcontroller and Embedded Systems | 4 | 3 | 1 | 0 | 3 | 40 | 60 |
|  | **EC 409** | 4.Digital Signal Processing | 4 | 3 | 1 | 0 | 3 | 40 | 60 |
|  | **EC 407** | 1.VLSI Design | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  | **EC 451** | 5.Signal Processing Lab-II | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
|  | **EC 453** | 6.Microcontroller Lab | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
|  | **PE- 401** | 7.B. Tech Project (Stage – 2) | 4 | 0 | 0 | 7 | 2 | 60 | 40 |
| **C** |  | **University Elective** |  |  |  |  |  |  |  |
|  | **MA 301** | 1. Computer Oriented Mathematical Methods | 2 | 2 | 0 | 0 | 3 | 40 | 60 |
|  |  | 2. Database Management System | 2 | 2 | 0 | 0 | 3 | 40 | 60 |
| **D** |  | **Program Elective** |  |  |  |  |  |  |  |
|  | **EC 411** | 2.IC technology | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  | **EC 246** | 3. Speech and Audio Processing | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  |  | **TOTAL** | **32** | **17/18** | **6** | **13** |  |  |  |
|  |  | **TOTAL TEACHING LOAD** | **36/37** |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |

**L= Lecture T=Tutorial CE=Continuous Evaluation**

**S= Seminar P= Practical ESE= End Semester Examination**

**Members of BoS, ECE Convener, BoS Engg.**

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**GYAN VIHAR SCHOOL OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF ELECTRONICS AND COMMMUNICATION ENGINEERING**

**Teaching and Examination Scheme for B.Tech./Dual Degree (Electronics and Communication Engineering 4 Year Course)**

**EFFECTIVE FROM ACADEMIC SESSION 2015-2016**

**Year: IV**

**Semester: VIII**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | | | **Exam Hrs.** | **Weightage (in%)** | |
| **L** | **T/S** | **P** | **CE** | **ESE** |
| **A** |  | **University Core** |  |  |  |  |  |  |  |
|  | **PC 402** | 1. Proficiency in Co-curricular Activities | 2 | 0 | 0 | 0 |  |  | 100 |
| **B** |  | **Program Core** |  |  |  |  |  |  |  |
|  | **EC 402** | 1.Optical Communication | 4 | 3 | 1 | 0 | 3 | 40 | 60 |
|  | **EC 404** | 2.Radar and TV Engineering | 4 | 3 | 1 | 0 | 3 | 40 | 60 |
|  | CP430 | 3.Computer Network | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  | **EC 454** | 4.Wireless Communication Lab | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
|  | **EC 452** | 5.VLSI & Optical Fiber Lab | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
|  | **SM 402** | 6. B.Tech. Seminar | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
|  | CP 457 | 7. Computer Networks Lab | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
| **C** |  | **University Elective** |  |  |  |  |  |  |  |
|  | **CP 419** | 1.Artificial Intelligence | 2 | 2 | 0 | 0 | 3 | 40 | 60 |
|  | **CP 242** | 2.Operating System | 2 | 2 | 0 | 0 | 3 | 40 | 60 |
| **D** |  | **Program Elective** |  |  |  |  |  |  |  |
|  | **EC 415** | 1.Image and Video Processing | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  | **EC 246** | 2. Speech and Audio Processing | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  | **EC 406** | 3.Digital System Design using VHDL | 4 | 3 | 1 | 0 | 3 | 40 | 60 |
|  |  | **TOTAL** | **21** | **12** | **3** | **6** |  |  |  |
|  |  | **TOTAL TEACHING LOAD** | **21** |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |

**L= Lecture T=Tutorial CE=Continuous Evaluation**

**S= Seminar P= Practical ESE= End Semester Examination**

**Members of BoS, ECE Convener, BoS Engg.**

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**GYAN VIHAR SCHOOL OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF ELECTRONICS AND COMMMUNICATION ENGINEERING**

**Teaching &Examination scheme for Dual Degree (B. Tech Electronics & Communication Engineering + M. Tech. VLSI Engg)**

**(5 Year Course)**

**EFFECTIVE FROM ACADEMIC SESSION 2015-2016**

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**GYAN VIHAR SCHOOL OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF ELECTRONICS AND COMMMUNICATION ENGINEERING**

**Teaching & Examination scheme for Dual Degree (B. Tech Electronics & Communication Engineering + M. Tech. VLSI Engg)**

**(5 Year Course)**

**EFFECTIVE FROM ACADEMIC SESSION 2015-2016**

**Year: IV Semester: VII**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | | | **Exam Hrs.** | **Weightage (in%)** | |
| **L** | **T/S** | **P** | **CE** | **ESE** |
| **A** |  | **University Core** |  |  |  |  |  |  |  |
|  | **EM 401** | 1.Employability Skills- VI | 1 | 0 | 2 | 0 |  |  |  |
|  | **PC 401** | 2. Proficiency in Co-curricular Activities | 2 | 0 | 0 | 0 |  |  | 100 |
|  | **PT 401** | 3.Practical and Training Seminar-II | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
| **B** |  | **Program Core** |  |  |  |  |  |  |  |
|  | **EC 401** | 1.Antenna and Wave Propagation | 4 | 3 | 1 | 0 | 3 | 40 | 60 |
|  | **EC403** | 2.Wireless Communication | 4 | 3 | 1 | 0 | 3 | 40 | 60 |
|  | **EC 405** | 3.Microcontroller and Embedded Systems | 4 | 3 | 1 | 0 | 3 | 40 | 60 |
|  | **EC 409** | 4.Digital Signal Processing | 4 | 3 | 1 | 0 | 3 | 40 | 60 |
|  | **EC 407** | 1.VLSI Design | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  | **EC505** | System Level Design and Modelling of Digital Circuits | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  | **EC 451** | 5.Signal Processing Lab-II | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
|  | **EC 453** | 6.Microcontroller Lab | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
|  | **PE- 401** | 7.B. Tech Project (Stage – 2) | 4 | 0 | 0 | 7 | 2 | 60 | 40 |
| **C** |  | **University Elective** |  |  |  |  |  |  |  |
|  | **MA 301** | 1. Computer Oriented Mathematical Methods | 2 | 2 | 0 | 0 | 3 | 40 | 60 |
|  |  | 2. Database Management System | 2 | 2 | 0 | 0 | 3 | 40 | 60 |
| **D** |  | **Program Elective** |  |  |  |  |  |  |  |
|  | **EC 411** | 2.IC technology | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  | **EC 246** | 3. Speech and Audio Processing | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  |  | **TOTAL** | **35** | **20/21** | **6** | **13** |  |  |  |
|  |  | **TOTAL TEACHING LOAD** | **39/40** |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |

**L= Lecture T=Tutorial CE=Continuous Evaluation**

**S= Seminar P= Practical ESE= End Semester Examination**

**Members of BoS, ECE Convener, BoS Engg.**

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**GYAN VIHAR SCHOOL OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF ELECTRONICS AND COMMMUNICATION ENGINEERING**

**Teaching & Examination scheme for Dual Degree (B. Tech Electronics & Communication Engineering + M. Tech. VLSI Engg)**

**(5 Year Course)**

**EFFECTIVE FROM ACADEMIC SESSION 2015-2016**

**Year: IV**

**Semester: VIII**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | | | **Exam Hrs.** | **Weightage (in%)** | |
| **L** | **T/S** | **P** | **CE** | **ESE** |
| **A** |  | **University Core** |  |  |  |  |  |  |  |
|  | **PC 402** | 1. Proficiency in Co-curricular Activities | 2 | 0 | 0 | 0 |  |  | 100 |
| **B** |  | **Program Core** |  |  |  |  |  |  |  |
|  | **EC 402** | 1.Optical Communication | 4 | 3 | 1 | 0 | 3 | 40 | 60 |
|  | **EC 404** | 2.Radar and TV Engineering | 4 | 3 | 1 | 0 | 3 | 40 | 60 |
|  | CP430 | 3.Computer Network | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  | EC 506 | 4. Advanced Digital Signal Processing | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  | **EC 454** | 4.Wireless Communication Lab | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
|  | **EC 452** | 5.VLSI & Optical Fiber Lab | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
|  | **SM 402** | 6. B.Tech. Seminar | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
|  | CP 457 | 7. Computer Networks Lab | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
| **C** |  | **University Elective** |  |  |  |  |  |  |  |
|  | **CP 419** | 1.Artificial Intelligence | 2 | 2 | 0 | 0 | 3 | 40 | 60 |
|  | **CP 242** | 2.Operating System | 2 | 2 | 0 | 0 | 3 | 40 | 60 |
| **D** |  | **Program Elective** |  |  |  |  |  |  |  |
|  | **EC 415** | 1.Image and Video Processing | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  | **EC 246** | 2. Speech and Audio Processing | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  | **EC 406** | 3.Digital System Design using VHDL | 4 | 3 | 1 | 0 | 3 | 40 | 60 |
|  |  | **TOTAL** | **24** | **15** | **3** | **6** |  |  |  |
|  |  | **TOTAL TEACHING LOAD** | **24** |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |

**L= Lecture T=Tutorial CE=Continuous Evaluation**

**S= Seminar P= Practical ESE= End Semester Examination**

**Members of BoS, ECE Convener, BoS Engg.**

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**GYAN VIHAR SCHOOL OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF ELECTRONICS AND COMMMUNICATION ENGINEERING**

**Teaching & Examination scheme for Dual Degree (B. Tech Electronics & Communication Engineering + M. Tech. VLSI Engg)**

**(5 Year Course)**

**Year: IV Semester: IX ( Summer)**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | | | **Exam Hrs.** | **Weightage (in%)** | |
| **L** | **T/S** | **P** | **CE** | **ESE** |
| **A** |  | **Program Core** |  |  |  |  |  |  |  |
|  | **EC502** | Computer Aided VLSI Design | 3 | 3 | - | - | 3 | 40 | 60 |
|  | **EC 653** | VLSI Design Lab | 1 | - | - | 2 | 3 | 60 | 40 |
| **B** |  | **Program Elective** | 3 | 3 | - | - | 3 | 40 | 60 |
|  | **EC 508** | Synthesis of Digital System |  |  |  |  |  |  |  |
|  | **EC 510** | Issues in Deep Sub-micron CMOS IC Design |  |  |  |  |  |  |  |
|  | **EC 523** | Digital Image Processing |  |  |  |  |  |  |  |
|  | **EC 512** | Advanced IC Technology |  |  |  |  |  |  |  |
|  |  | **Total** | **7** | **6** | **0** | **2** |  |  |  |
|  |  | **Total Teaching Load** |  | **8** |  |  |  |  |  |

**NOTE:-** Since Summer Semester IX is of shorter duration each summer course shall be double the teaching hours/week i.e. the above courses shall be of 6 hours/week

**Year:V Semester: IX (Regular)**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | | | **Exam Hrs.** | **Weightage (in%)** | |
| **L** | **T/S** | **P** | **CE** | **ESE** |
| **A** |  | **University Core** |  |  |  |  |  |  |  |
|  | **EM 501** | 1.Employability Skills- VIII | 1 | 0 | 2 | 0 |  |  |  |
|  | **PC 501** | 2. Proficiency in Co-curricular Activities | 2 | 0 | 0 | 0 |  | 100 |  |
|  |  | **University Elective I** |  |  |  |  |  |  |  |
|  | **EC 529** | Optimization technique | 2 | 2 | 0 | 0 | 3 | 40 | 60 |
|  | **EC 531** | Statistical modeling | 2 | 2 | 0 | 0 | 3 | 40 | 60 |
|  |  | **University Elective II** |  |  |  |  |  |  |  |
|  | **EC 617** | Research methodology | 2 | 2 | 0 | 0 | 3 | 40 | 60 |
|  | **EC 619** | Estimation Theory | 2 | 2 | 0 | 0 | 3 | 40 | 60 |
| **B** |  | **Program Core** |  |  |  |  |  |  |  |
|  | **EC 501** | MOS VLSI | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  | **EC 503** | VLSI Technology | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  | **EC 601** | Embedded System Design | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  | **EC 605** | Microelectronics | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  | **EC 504** | Analog ICs | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  | **EC 552** | Modeling and Simulation Lab | 1 | 0 | 0 | 2 | 3 | 60 | 40 |
|  | **EC 551** | Digital system design lab | 1 | 0 | 0 | 2 | 3 | 60 | 40 |
| **C** |  | **Program Elective I** |  |  |  |  |  |  |  |
|  | **EC 507** | Advanced Computer Communication | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  | **EC** | Real Time Systems and Software | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  | **EC 511** | Memory design and testing | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  | **EC 509** | Testing And Fault Tolerance | **3** | **3** | **0** | **0** | 3 | 40 | 60 |
| **D** |  | **Program Elective II** |  |  |  |  |  |  |  |
|  | **EC 603** | Reconfigurable Computing | **3** | **3** | **0** | **0** | 3 | 40 | 60 |
|  | **EC 607** | Combinatorial Optimization | **3** | **3** | **0** | **0** | 3 | 40 | 60 |
|  | **EC 615** | Micro-Electro-Mechanical-Systems | **3** | **3** | **0** | **0** | 3 | 40 | 60 |
|  |  | **TOTAL** | **30** | **25** | **2** | **4** |  |  |  |
|  |  | **TOTAL TEACHING LOAD** | **31** |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |

**Year: V Semester: X**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | | | **Exam Hrs.** | **Weightage (in%)** | |
| L | T/S | P | CE | ESE |
|  |  | **University Core** |  |  |  |  |  |  |  |
| 1 | **EC 651** | M Tech Seminar | 5 | - | - | 9 | 3 | 60 | 40 |
| 2 | **DI 602** | M. Tech. Dissertation / Thesis | 16 | 0 | 0 | - |  | 60 | 40 |
|  |  | **Total** | **21** | **0** | **0** | **9** |  |  |  |
|  |  | **Total Teaching Load** | **9** |  |  |  |  |  |  |

**L= Lecture T=Tutorial CE=Continuous Evaluation**

**S= Seminar P= Practical ESE= End Semester Examination**

**Members of BoS, ECE Convener, BoS Engg.**

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**GYAN VIHAR SCHOOL OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF ELECTRONICS AND COMMMUNICATION ENGINEERING**

**Teaching & Examination scheme for Dual Degree (B. Tech Electronics & Communication Engineering + M. Tech. Digital and Wireless Communication Engineering)**

**(5 Year Course)**

**EFFECTIVE FROM ACADEMIC SESSION 2015-2016**

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**GYAN VIHAR SCHOOL OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF ELECTRONICS AND COMMMUNICATION ENGINEERING**

**Teaching & Examination scheme for Dual Degree (B. Tech Electronics & Communication Engineering + M. Tech. Digital and Wireless Communication Engineering)**

**(5 Year Course)**

**EFFECTIVE FROM ACADEMIC SESSION 2015-16**

**Year: IV Semester: VII**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | | | **Exam Hrs.** | **Weightage (in%)** | |
| **L** | **T/S** | **P** | **CE** | **ESE** |
| **A** |  | **University Core** |  |  |  |  |  |  |  |
|  | **EM 401** | 1.Employability Skills- VI | 1 | 0 | 2 | 0 |  |  |  |
|  | **PC 401** | 2. Proficiency in Co-curricular Activities | 2 | 0 | 0 | 0 |  |  | 100 |
|  | **PT 401** | 3.Practical and Training Seminar-II | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
| **B** |  | **Program Core** |  |  |  |  |  |  |  |
|  | **EC 401** | 1.Antenna and Wave Propagation | 4 | 3 | 1 | 0 | 3 | 40 | 60 |
|  | **EC403** | 2.Wireless Communication | 4 | 3 | 1 | 0 | 3 | 40 | 60 |
|  | **EC 405** | 3.Microcontroller and Embedded Systems | 4 | 3 | 1 | 0 | 3 | 40 | 60 |
|  | **EC 409** | 4.Digital Signal Processing | 4 | 3 | 1 | 0 | 3 | 40 | 60 |
|  | **EC 407** | 1.VLSI Design | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  | **EC 523** | Digital Image Processing | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  | **EC 451** | 5.Signal Processing Lab-II | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
|  | **EC 453** | 6.Microcontroller Lab | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
|  | **PE- 401** | 7.B. Tech Project (Stage – 2) | 4 | 0 | 0 | 7 | 2 | 60 | 40 |
| **C** |  | **University Elective** |  |  |  |  |  |  |  |
|  | **MA 301** | 1. Computer Oriented Mathematical Methods | 2 | 2 | 0 | 0 | 3 | 40 | 60 |
|  |  | 2. Database Management System | 2 | 2 | 0 | 0 | 3 | 40 | 60 |
| **D** |  | **Program Elective** |  |  |  |  |  |  |  |
|  | **EC 411** | 2.IC technology | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  | **EC 246** | 3. Speech and Audio Processing | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  |  | **TOTAL** | **35** | **20/21** | **6** | **13** |  |  |  |
|  |  | **TOTAL TEACHING LOAD** | **39/40** |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |

**L= Lecture T=Tutorial CE=Continuous Evaluation**

**S= Seminar P= Practical ESE= End Semester Examination**

**Members of BoS, ECE Convener, BoS Engg.**

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**GYAN VIHAR SCHOOL OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF ELECTRONICS AND COMMMUNICATION ENGINEERING**

**Teaching & Examination scheme for Dual Degree (B. Tech Electronics & Communication Engineering + M. Tech. Digital and Wireless Communication Engineering)**

**(5 Year Course)**

**EFFECTIVE FROM ACADEMIC SESSION 2015-16**

**Year: IV**

**Semester: VIII**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | | | **Exam Hrs.** | **Weightage (in%)** | |
| **L** | **T/S** | **P** | **CE** | **ESE** |
| **A** |  | **University Core** |  |  |  |  |  |  |  |
|  | **PC 402** | 1. Proficiency in Co-curricular Activities | 2 | 0 | 0 | 0 |  |  | 100 |
| **B** |  | **Program Core** |  |  |  |  |  |  |  |
|  | **EC 402** | 1.Optical Communication | 4 | 3 | 1 | 0 | 3 | 40 | 60 |
|  | **EC 404** | 2.Radar and TV Engineering | 4 | 3 | 1 | 0 | 3 | 40 | 60 |
|  | CP430 | 3.Computer Network | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  | EC 506 | 4. Advanced Digital Signal Processing | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  | **EC 454** | 4.Wireless Communication Lab | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
|  | **EC 452** | 5.VLSI & Optical Fiber Lab | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
|  | **SM 402** | 6. B.Tech. Seminar | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
|  | CP 457 | 7. Networking Lab | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
| **C** |  | **University Elective** |  |  |  |  |  |  |  |
|  | **CP 419** | 1.Artificial Intelligence | 2 | 2 | 0 | 0 | 3 | 40 | 60 |
|  | **CP 242** | 2.Operating System | 2 | 2 | 0 | 0 | 3 | 40 | 60 |
| **D** |  | **Program Elective** |  |  |  |  |  |  |  |
|  | **EC 415** | 1.Image and Video Processing | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  | **EC 246** | 2. Speech and Audio Processing | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  | **EC 406** | 3.Digital System Design using VHDL | 4 | 3 | 1 | 0 | 3 | 40 | 60 |
|  |  | **TOTAL** | **24** | **15** | **3** | **6** |  |  |  |
|  |  | **TOTAL TEACHING LOAD** | **24** |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |

**L= Lecture T=Tutorial CE=Continuous Evaluation**

**S= Seminar P= Practical ESE= End Semester Examination**

**Members of BoS, ECE Convener, BoS Engg.**

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**GYAN VIHAR SCHOOL OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF ELECTRONICS AND COMMMUNICATION ENGINEERING**

**Teaching & Examination scheme for Dual Degree (B. Tech Electronics & Communication Engineering + M. Tech. Digital and Wireless Communication Engineering)**

**(5 Year Course)**

**EFFECTIVE FROM ACADEMIC SESSION 2015-16**

**Year: IV Semester: IX ( Summer)**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | | | **Exam Hrs.** | **Weightage (in%)** | |
| **L** | **T/S** | **P** | **CE** | **ESE** |
| **A** |  | **Program Core** |  |  |  |  |  |  |  |
|  | **EC 516** | Information Theory, Coding and Communication Theory | 3 | 3 | - | - | 3 | 40 | 60 |
|  | **EC 553** | Communication Lab | 1 | - | - | 2 | 3 | 60 | 40 |
| **B** |  | **Program Elective** | 3 | 3 | - | - | 3 | 40 | 60 |
|  | **EC 518** | Telecommunication Switching & Networks |  |  |  |  |  |  |  |
|  | **EC 209** | Biomedical Instrumentation |  |  |  |  |  |  |  |
|  | EC 522 | Microstrip Antennas For Wireless Systems |  |  |  |  |  |  |  |
|  |  | **Total** | **7** | **6** | **0** | **2** |  |  |  |
|  |  | **Total Teaching Load** |  | **8** |  |  |  |  |  |

**NOTE:-** Since Summer Semester IX is of shorter duration each summer course shall be double the teaching hours/week i.e. the above courses shall be of 6 hours/week

**Year:V Semester: IX (Regular)**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | | | **Exam Hrs.** | **Weightage (in%)** | |
| **L** | **T/S** | **P** | **CE** | **ESE** |
| **A** |  | **University Core** |  |  |  |  |  |  |  |
|  | **EM 501** | 1.Employability Skills- VIII | 1 | 0 | 2 | 0 |  |  |  |
|  | **PC 501** | 2. Proficiency in Co-curricular Activities | 2 | 0 | 0 | 0 |  | 100 |  |
|  |  | **University Elective I** |  |  |  |  |  |  |  |
|  | **EC 529** | Optimization technique | 2 | 2 | 0 | 0 | 3 | 40 | 60 |
|  | **EC 531** | Statistical modeling | 2 | 2 | 0 | 0 | 3 | 40 | 60 |
|  |  | **University Elective II** |  |  |  |  |  |  |  |
|  | **EC 617** | Research methodology | 2 | 2 | 0 | 0 | 3 | 40 | 60 |
|  | **EC 619** | Estimation Theory | 2 | 2 | 0 | 0 | 3 | 40 | 60 |
| **B** |  | **Program Core** |  |  |  |  |  |  |  |
|  | **EC 513** | Wireless Digital Communication System | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  | **EC 515** | Mobile and Cellular Communication | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  | **EC 514** | Antenna Theory and Technique | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  | **EC 609** | Satellite Communication | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  | **EC 613** | Advanced Optical Communication Systems | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  | **EC 552** | Modelling and Simulation Lab | 1 | 0 | 0 | 2 | 3 | 60 | 40 |
|  | **EC 655** | CAD of RF and Microwave Circuits | 1 | 0 | 0 | 2 | 3 | 60 | 40 |
| **C** |  | **Program Elective- I** |  |  |  |  |  |  |  |
|  | **EC 517** | Mobile Computing | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  | **EC 525** | Advanced Signal Theory | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  | **EC 527** | Advanced Microwave Engineering | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
| **D** |  | **Program Elective- II** |  |  |  |  |  |  |  |
|  | **EC 611** | Wireless Sensor Networks | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  | **EC 615** | Micro-Electro-Mechanical-Systems | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  | **HS 501** | Soft Skills Training-I | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  |  | **TOTAL** | **30** | **25** | **2** | **4** |  |  |  |
|  |  | **TOTAL TEACHING LOAD** | **31** |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |

**Year: V Semester: X**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | | | **Exam Hrs.** | **Weightage (in%)** | |
| L | T/S | P | CE | ESE |
| A |  | **University Core** |  |  |  |  |  |  |  |
| 1 | **EC 651** | M Tech Seminar | 5 | - | - | 9 | 3 | 60 | 40 |
| 2 | **DI 602** | M. Tech. Dissertation / Thesis | 16 | 0 | 0 | - |  | 60 | 40 |
|  |  | **Total** | **21** | **0** | **0** | **9** |  |  |  |
|  |  | **Total Teaching Load** | **9** |  |  |  |  |  |  |

**L= Lecture T=Tutorial CE=Continuous Evaluation**

**S= Seminar P= Practical ESE= End Semester Examination**

**Members of BoS, ECE Convener, BoS Engg.**

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**GYAN VIHAR SCHOOL OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF ELECTRONICS AND COMMMUNICATION ENGINEERING**

**Teaching & Examination scheme for M. Tech Full-Time (Core) (VLSI ENGINEERING) (2 Year Course)**

**EFFECTIVE FROM ACADEMIC SESSION 2015-2016**

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**GYAN VIHAR SCHOOL OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF ELECTRONICS AND COMMMUNICATION ENGINEERING**

**Teaching & Examination scheme for M. Tech Full-Time (Core) (VLSI ENGINEERING) (2 Year Course)**

**EFFECTIVE FROM ACADEMIC SESSION 2015-2016**

**Year I Semester – I**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Course Code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | | | **Exam Hrs.** | **Weightage (in%)** | |
| **L** | **T/S** | **P** | **CE** | **ESE** |
| **A** | **University Core** |  |  |  |  |  |  |  |
| **PC 501** | Proficiency in Co-Curricular Activities | 2 | 0 | 0 | 0 | 0 | 100 |  |
| **B** | **Program Core** |  |  |  |  |  |  |  |
| **EC 501** | MOS VLSI | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
| **EC 503** | VLSI Technology | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
| **EC505** | System Level Design and Modeling of Digital system | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
| **EC 551** | Digital System Design Lab | 1 | - | - | 2 | 2 | 60 | 40 |
| **C** | **Program elective I** | **3** | **3** | **-** | **-** | **3** | **40** | **60** |
| **EC 507** | Advanced Computer Communication |  |  |  |  |  |  |  |
| **EC 521** | Real Time Systems and Software |  |  |  |  |  |  |  |
| **EC 511** | Memory design and testing |  |  |  |  |  |  |  |
| EC 509 | Testing And Fault Tolerance |  |  |  |  |  |  |  |
|  | **Total** | **15** | **12** | **0** | **2** |  |  |  |
|  | **Total Teaching Load** | **14** |  |  |  |  |  |  |

**Year I Semester – II**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Course Code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | | | **Exam Hrs.** | **Weightage (in%)** | |
| **L** | **T/S** | **P** | **CE** | **ESE** |
| **A** | **University Core** |  |  |  |  |  |  |  |
| **PC 502** | Proficiency in Co-Curricular Activities | 2 | 0 | 0 | 0 | 0 | 100 |  |
| **EM 502** | Employability Skills VII | 1 | 0 | 2 | 0 | 2 | 60 | 40 |
|  | **University Elective** |  |  |  |  |  |  |  |
| **EC 529** | Optimization technique | 2 | 2 | 0 | 0 | 3 | 40 | 60 |
| **EC 531** | Statistical modeling | 2 | 2 | 0 | 0 | 3 | 40 | 60 |
| **B** | **Program Core** |  |  |  |  |  |  |  |
| **EC 502** | Computer-Aided VLSI Design | 3 | 3 | - | - | 3 | 40 | 60 |
| **EC 504** | Analog ICs | 3 | 3 | - | - | 3 | 40 | 60 |
| **EC 506** | Advanced Digital Signal Processing | 3 | 3 | - | - | 3 | 40 | 60 |
| **EC 552** | Modeling and Simulation Lab | 1 | - | - | 2 | 2 | 60 | 40 |
| **C** | **Program elective II** | 3 | 3 | - | - | 3 | 40 | 60 |
| **EC 508** | Synthesis of Digital System |  |  |  |  |  |  |  |
| **EC 510** | Issues in Deep Sub-micron CMOS IC Design |  |  |  |  |  |  |  |
| **EC 523** | Digital Image Processing |  |  |  |  |  |  |  |
| **EC 512** | Advanced IC Technology |  |  |  |  |  |  |  |
|  | **Total** | **18** | **14** | **2** | **2** |  |  |  |
|  | **Total Teaching Load** | **18** |  |  |  |  |  |  |

**L= Lecture T=Tutorial CE=Continuous Evaluation**

**S= Seminar P= Practical ESE= End Semester Examination**

**Members of BoS, ECE Convener, BoS Engg.**

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**GYAN VIHAR SCHOOL OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF ELECTRONICS AND COMMMUNICATION ENGINEERING**

**Teaching & Examination scheme for M. Tech Full-Time (Core) (VLSI ENGINEERING) (2 Year Course)**

**EFFECTIVE FROM ACADEMIC SESSION 2015-2016**

**Year II Semester – III**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Course Code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | | | **Exam Hrs.** | **Weightage (in%)** | |
| **L** | **T/S** | **P** | **CE** | **ESE** |
| **A** | **University Core** |  |  |  |  |  |  |  |
| PC 601 | Proficiency in Co-Curricular Activities | 2 | 0 | 0 | 0 | 0 | 100 |  |
| EM 601 | Employability Skills VIII | 1 | 0 | 2 | 0 | 2 | 60 | 40 |
|  | **University Elective** |  |  |  |  |  |  |  |
| EC 617 | Research methodology | 2 | 2 | 0 | 0 | 3 | 40 | 60 |
| EC 619 | Estimation Theory | 2 | 2 | 0 | 0 | 3 | 40 | 60 |
| **B** | **Program Core** |  |  |  |  |  |  |  |
| **EC 601** | Embedded System Design | 3 | 3 | - | - | 3 | 40 | 60 |
| **EC 605** | Microelectronics | 3 | 3 | - | - | 3 | 40 | 60 |
| **EC 653** | VLSI Design Lab | 1 |  |  | 2 | 3 | 60 | 40 |
| **EC 651** | Seminar | 5 | - | - | 9 | 3 | 60 | 40 |
| **C** | **Program elective** | 3 | 3 | - | - | 3 | 40 | 60 |
| **EC 603** | Reconfigurable Computing |  |  |  |  |  |  |  |
| **EC 607** | Combinatorial Optimization |  |  |  |  |  |  |  |
| **EC 615** | Micro-Electro-Mechanical-Systems |  |  |  |  |  |  |  |
|  | **Total** | **20** | **11** | **2** | **11** |  |  |  |
|  | **Total Teaching Load** | **24** |  |  |  |  |  |  |

**Year II Semester – IV**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Course Code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | | | **Exam Hrs.** | **Weightage (in%)** | |
| **L** | **T/S** | **P** | **CE** | **ESE** |
| **A** | **Program Core** |  |  |  |  |  |  |  |
| **DI 602** | M. Tech. Dissertation / Thesis | 16 | 0 | 0 | - |  | 60 | 40 |
|  | **Total** | **16** |  |  |  |  |  |  |
|  | **Total Teaching Load** | **16** |  |  |  |  |  |  |

**L= Lecture T=Tutorial CE=Continuous Evaluation**

**S= Seminar P= Practical ESE= End Semester Examination**

**Members of BoS, ECE Convener, BoS Engg.**

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**GYAN VIHAR SCHOOL OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF ELECTRONICS AND COMMMUNICATION ENGINEERING**

**Teaching & Examination scheme for M. Tech Full-Time (Core) (Digital and Wireless Communication Engineering)**

**(2 Year Course)**

**EFFECTIVE FROM ACADEMIC SESSION 2015-2016**

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**GYAN VIHAR SCHOOL OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF ELECTRONICS AND COMMMUNICATION ENGINEERING**

**Teaching & Examination scheme for M. Tech Full-Time (Core) (Digital and Wireless Communication Engineering)**

**(2 Year Course)**

**EFFECTIVE FROM ACADEMIC SESSION 2015-2016**

**Year I Semester – I**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Course Code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | | | **Exam Hrs.** | **Weightage (in%)** | |
| **L** | **T/S** | **P** | **CE** | **ESE** |
| **A** | **University Core** |  |  |  |  |  |  |  |
| PC 501 | Proficiency in Co-Curricular Activities | 2 | 0 | 0 | 0 | 0 | 100 |  |
| **B** | **Program Core** |  |  |  |  |  |  |  |
| **EC 513** | Wireless Digital Communication System | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
| **EC 523** | Digital Image Processing | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
| **EC 515** | Mobile and Cellular Communication | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
| **EC 553** | Communication System Lab | 1 | - | - | 2 | 2 | 60 | 40 |
| **C** | **Program elective** | 3 | 3 | - | - | 3 | 40 | 60 |
| **EC 517** | Mobile Computing |  |  |  |  |  |  |  |
| **EC 525** | Advanced Signal Theory |  |  |  |  |  |  |  |
| **EC 527** | Advanced Microwave Engineering |  |  |  |  |  |  |  |
|  | **Total** | **15** | **12** | **0** | **2** |  |  |  |
|  | **Total Teaching Load** | **14** |  |  |  |  |  |  |

**Year I Semester – II**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Course Code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | | | **Exam Hrs.** | **Weightage (in%)** | |
| **L** | **T/S** | **P** | **CE** | **ESE** |
| **A** | **University Core** |  |  |  |  |  |  |  |
| PC 502 | Proficiency in Co-Curricular Activities | 2 | 0 | 0 | 0 | 0 | 100 |  |
| EM 502 | Employability Skills | 1 | 0 | 2 | 0 | 2 | 60 | 40 |
|  | **University Elective** |  |  |  |  |  |  |  |
| EC 529 | Optimization technique | 2 | 2 | 0 | 0 | 3 | 40 | 60 |
| EC 531 | Statistical modeling | 2 | 2 | 0 | 0 | 3 | 40 | 60 |
| **B** | **Program Core** |  |  |  |  |  |  |  |
| **EC 514** | Antenna Theory and Technique | 3 | 3 | - | - | 3 | 40 | 60 |
| **EC 516** | Information Theory, Coding and Communication Theory | 3 | 3 | - | - | 3 | 40 | 60 |
| **EC 506** | Advanced Digital Signal Processing | 3 | 3 | - | - | 3 | 40 | 60 |
| **EC 552** | Modeling and Simulation Lab | 1 | - | - | 2 | 2 | 60 | 40 |
| **C** | **Program elective** | 3 | 3 | - | - | 3 | 40 | 60 |
| **EC 518** | Telecommunication Switching and Networks |  |  |  |  |  |  |  |
| **EC 209** | Biomedical Instrumentation |  |  |  |  |  |  |  |
| **EC 522** | Microstrip Antennas For Wireless Systems |  |  |  |  |  |  |  |
|  | **Total** | **18** | **14** | **2** | **2** |  |  |  |
|  | **Total Teaching Load** | **18** |  |  |  |  |  |  |

**L= Lecture T=Tutorial CE=Continuous Evaluation**

**S= Seminar P= Practical ESE= End Semester Examination**

**Members of BoS, ECE Convener, BoS Engg.**

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**GYAN VIHAR SCHOOL OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF ELECTRONICS AND COMMMUNICATION ENGINEERING**

**Teaching & Examination scheme for M. Tech Full-Time (Core) (Digital and Wireless Communication Engineering)**

**(2 Year Course)**

**EFFECTIVE FROM ACADEMIC SESSION 2015-2016**

**Year II Semester – III**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Course Code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | | | **Exam Hrs.** | **Weightage (in%)** | |
| **L** | **T/S** | **P** | **CE** | **ESE** |
| **A** | **University Core** |  |  |  |  |  |  |  |
| PC 601 | Proficiency in Co-Curricular Activities | 2 | 0 | 0 | 0 | 0 | 100 |  |
| EM 601 | Employability Skills | 1 | 0 | 2 | 0 | 2 | 60 | 40 |
|  | **University Elective** |  |  |  |  |  |  |  |
| EC 617 | Research methodology | 2 | 2 | 0 | 0 | 3 | 40 | 60 |
| EC 619 | Estimation Theory | 2 | 2 | 0 | 0 | 3 | 40 | 60 |
| **B** | **Program Core** |  |  |  |  |  |  |  |
| **EC 609** | Satellite Communication | 3 | 3 | - | - | 3 | 40 | 60 |
| **EC 613** | Advanced Optical Communication Systems | 3 | 3 | - | - | 3 | 40 | 60 |
| **EC 655** | CAD of RF and Microwave Circuits | 1 |  |  | 2 | 2 | **60** | **40** |
| **EC 651** | Seminar | 5 | - | - | 9 |  | 60 | 40 |
| **C** | **Program elective III** | 3 | 3 | - | - | 3 | 40 | 60 |
| **EC 611** | Wireless Sensor Networks |  |  |  |  |  |  |  |
| **EC 615** | Micro-Electro-Mechanical-Systems |  |  |  |  |  |  |  |
| **HS 501** | Soft Skills I |  |  |  |  |  |  |  |
|  | **Total** | **20** | **11** | **2** | **11** |  |  |  |
|  | **Total Teaching Load** | **24** |  |  |  |  |  |  |

**Year II Semester – IV**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Course Code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | | | **Exam Hrs.** | **Weightage (in%)** | |
| **L** | **T/S** | **P** | **CE** | **ESE** |
| **A** | **Program Core** |  |  |  |  |  |  |  |
| **DI 602** | M. Tech. Dissertation / Thesis | 16 | 0 | 0 |  |  | 60 | 40 |
|  | **Total** | **16** |  |  |  |  |  |  |
|  | **Total Teaching Load** | **16** |  |  |  |  |  |  |

**L= Lecture T=Tutorial CE=Continuous Evaluation**

**S= Seminar P= Practical ESE= End Semester Examination**

**Members of BoS, ECE Convener, BoS Engg.**

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**GYAN VIHAR SCHOOL OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF ELECTRONICS AND COMMMUNICATION ENGINEERING**

**Teaching & Examination scheme for Diploma (Electronics and Communication Engineering)**

**(3 Year Course)**

**EFFECTIVE FROM ACADEMIC SESSION 2015-2016**

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**GYAN VIHAR SCHOOL OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF ELECTRONICS AND COMMMUNICATION ENGINEERING**

**Teaching & Examination scheme for Diploma (Electronics and Communication Engineering)**

**(3 Year Course)**

**EFFECTIVE FROM ACADEMIC SESSION 2015-2016**

**Salient features in proposed Curriculum**

1. The curriculum is structured to have 3 years (6 semesters) including Industrial training in an Organization / Industry relevant to the field of specialization. This is mainly aimed to improve the practical skills in the students to make them ready to cater to the needs of Industry with hands on experience and with a very good practical vision.
2. An effort has been made to improve the communication skills and personality development of the students, by restructuring the English Language / communication subject.
3. Primarily to develop verbal communication skills in English among students.
4. The main intention behind this is to improve their communication / presentation skills and to develop their personality to enable them to stand as a useful product in the global market.
5. Practicals on Information Technology are introduced in the I year curriculum itself. This enables the student to have good acquaintance with computers, internet and e-Mailing from First year onwards. It also enables the student to keep pace with latest trends of the present day technology.
6. Their knowledge and skills in computers are continued by introducing practical.
7. Developing reading & writing skills in students, especially among students who lack confidence in communicating in English.
8. Every effort has been made while restructuring the curriculum to mould the students to become very good Technicians with more practical visualization. This has been done by deleting unnecessary and extra information and regrouping the subjects to impart theoretical inputs to the students up to sufficient depth. This saving in time has been utilized in slightly improving on the practical inputs during in-house training itself.
9. Seminars also form a part of the curriculum in all the three years. This will surely improve the abilities of the students in communication / presentation skills.
10. Training to isolate important information from a written text and represent the same in note form.
11. Increase ability to write short paragraphs and to write technical reports.
12. To improve speaking skill of students through active listening & speaking practice.
13. Visualization and analytical approach towards the subject is necessary
14. To increase power of comprehending a written text.
15. Basic Mathematics knowledge to solve the problems.
16. Knowledge of basic concepts of sciences such as physics, chemistry and mathematics
17. Much emphasis has been given for practical subjects in both the semester by allotment of separate subject codes. Also the examination time for all practical subjects is common and is fixed as 3 hrs duration. This allows the examiners (both internal and external) to pay much attention towards the examinee during practicals.

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**GYAN VIHAR SCHOOL OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF ELECTRONICS AND COMMMUNICATION ENGINEERING**

**Teaching & Examination scheme for Diploma (Electronics and Communication Engineering)**

**(3 Year Course)**

**EFFECTIVE FROM ACADEMIC SESSION 2015-2016**

**Year I Semester - I**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Course Code** | Nature of Course (UC/  PC/  UE/PE) | **Course Name** | **Credits** | **Contact Hrs/Wk.** | | | **Exam Hrs.** | **Weightage (in%)** | |
| **L** | **T/S** | **P** |  | **CE** | **ESE** |
| EN-131 | **UC** | English and Communication Skills-I | 2 | 2 | - | - | 3 | 40 | 60 |
| PY- 131 | Physics-I | 3 | 3 | - | - | 3 | 40 | 60 |
| MA- 131 | Mathematics-I | 4 | 3 | 1 | - | 3 | 40 | 60 |
| EN- 171 | Communication Skills - I Lab | 1 | - | - | 2 | 3 | 60 | 40 |
| PY- 171 | Physics-I Lab | 1 | - | - | 2 | 3 | 60 | 40 |
| PC- 101 | Proficiency in Co Curricular Activities | 2 |  |  |  |  |  | 100 |
| CP- 131 | **PC** | Computer & Information Technology Fundamentals | 3 | 3 | - | - | 3 | 40 | 60 |
| CP- 171 | Computer & Information Technology Fundamentals Lab | 1 | - | - | 2 | 3 | 60 | 40 |
| CY-131 | **UE** | Chemistry-I | 3 | 3 | - | - | 3 | 40 | 60 |
| CY-171 | Chemistry-I Lab | 1 | - | - | 2 | 3 | 60 | 40 |
|  | Foreign Language (German/French. Etc.) |  |  |  |  |  | 40 | 60 |
| ME- 171 | Engineering Drawing –I Lab | 2 | - | - | 3 | 3 | 60 | 40 |
| ME 154 | **PE** | Workshop Practice | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
| ME 152 | Auto CAD Lab | 1 | 0 | 0 | 2 | 2 | 60 | 40 |

**L= Lecture T=Tutorial CE=Continuous Evaluation**

**S= Seminar P= Practical ESE= End Semester Examination**

**Members of BoS, ECE Convener, BoS Engg.**

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**GYAN VIHAR SCHOOL OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF ELECTRONICS AND COMMMUNICATION ENGINEERING**

**Teaching & Examination scheme for Diploma (Electronics and Communication Engineering)**

**(3 Year Course)**

**EFFECTIVE FROM ACADEMIC SESSION 2015-2016**

**Year I Semester - II**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Course Code** | Nature of Course (UC/  PC/ | **Course Name** | **Credits** | **Contact Hrs/Wk.** | | | **Exam Hrs.** | **Weightage (in%)** | |
| **L** | **T/S** | **P** |  | **CE** | **ESE** |
| EN-132 | **UC** | English and Communication Skills –II (Dev of like Skill & Professional Practices) | 2 | 2 | - | - | 3 | 40 | 60 |
| PY-132 | Physics-II | 3 | 3 | - | - | 3 | 40 | 60 |
| MA-132 | Mathematics-II | 4 | 3 | 1 | - | 3 | 40 | 60 |
| EM – 201 | Employability Skills - I | 1 | - | - | 2 | 3 | 60 | 40 |
| PY-172 | Physics-II Lab | 1 | - | - | 2 | 3 | 60 | 40 |
| PC- 101 | Proficiency in Co Curricular Activities |  |  |  |  |  |  |  |
| ME-174 | **PC** | Work Shop Practice | 1 | - | - | 2 | 3 | 60 | 40 |
| ME-134 | Applied Mechanics | 3 | 3 | - | - | 3 | 40 | 60 |
| ME-172 | **UE** | Engineering Drawing- II Lab | 2 | - | - | 3 | 3 | 60 | 40 |
| CY-172 | Chemistry –II Lab | 1 | - | - | 2 | 3 | 60 | 40 |
| EE-172 | Basic Electrical and Electronics Engg. Lab | 1 | - | - | 2 | 3 | 60 | 40 |
| CY-132 | Chemistry-II | 3 | 3 | - | - | 3 | 40 | 60 |
| CY-172 | Chemistry –II Lab | 1 | - | - | 2 | 3 | 60 | 40 |
|  | **PE** | Python Lab | 1 | - | - | 2 | 3 | 60 | 40 |

**L= Lecture T=Tutorial CE=Continuous Evaluation**

**S= Seminar P= Practical ESE= End Semester Examination**

**Members of BoS, ECE Convener, BoS Engg.**

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**GYAN VIHAR SCHOOL OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF ELECTRONICS AND COMMMUNICATION ENGINEERING**

**Teaching & Examination scheme for Diploma (Electronics and Communication Engineering)**

**(3 Year Course)**

**EFFECTIVE FROM ACADEMIC SESSION 2015-2016**

**Year: II Semester: III**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Code** | **Course Name** | **SUBJECTS** | **L** | **T** | **P** | **C** | **Exam Hrs.** | **Weightage (%)** | |
| **CE** | **ESE** |
| **A** |  | **University Core** | 1. Proficiency in Co-curricular Activities | 0 | 0 | 0 | 2 |  | 100 |  |
|  | 2. Employability Skills- II | 0 | 2 | 0 | 1 | 3 | 40 | 60 |
| **B** |  | **Program Core** | 1.Electronic Components & shop Practice | 3 | 0 | 0 | 3 | 3 | 40 | 60 |
|  | 2.Circuit Analysis | 3 | 0 | 0 | 3 | 3 | 40 | 60 |
|  | 3.Electronic Measurements and Instrumentation | 3 | 0 | 0 | 3 | 3 | 40 | 60 |
|  | 4. Electronic Devices and Circuits | 3 | 0 | 0 | 3 | 3 | 40 | 60 |
|  | 5.Electronics Workshop Lab | 0 | 0 | 2 | 1 | 3 | 60 | 40 |
|  | 6. Electronic Devices and Circuit lab | 0 | 0 | 2 | 1 | 3 | 60 | 40 |
|  | 7.Electronic Measurement and Instrumentation Lab | 0 | 0 | 2 | 1 | 3 | 60 | 40 |
| **C** |  | **University Elective** | 1. C Programming 2. C Programming Lab | 3  0 | 0  0 | 0  2 | 2  1 | 3  3 | 40  60 | 60  40 |
|  | 1. Economics and Social Sciences | 3 | 0 | 0 | 2 | 3 | 40 | 60 |
| **D** |  | **Program Elective** | 1.Audio and Video Systems | 3 | 0 | 0 | 3 | 3 | 40 | 60 |
|  | 2.Transmission Line and Networks | 3 | 0 | 0 | 3 | 3 | 40 | 60 |
| **TOTAL** | | | | **15** | **0** | **8** | **20/21** |  |  |  |

**Year: II Semester: IV**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Code** | **Course Name** | **SUBJECTS** | **L** | **T** | **P** | **C** | **Exam Hrs.** | **Weightage (%)** | |
| **CE** | **ESE** |
| **A** |  | **University Core** | 1. Proficiency in Co-curricular Activities | 0 | 0 | 0 | 2 |  | 100 |  |
|  | 2. Employability Skills- III | 0 | 2 | 0 | 1 | 3 | 40 | 60 |
| **B** |  | **Program Core** | 1.Analog Communication | 3 | 0 | 0 | 3 | 3 | 40 | 60 |
|  | 2.Microprocessor | 3 | 0 | 0 | 3 | 3 | 40 | 60 |
|  | 3.Digital Electronics | 3 | 0 | 0 | 3 | 3 | 40 | 60 |
|  | 4. Analog Electronics | 3 | 0 | 0 | 3 | 3 | 40 | 60 |
|  | 5.Microprocessor Lab | 0 | 0 | 2 | 1 | 3 | 60 | 40 |
|  | 6.Analog Electronics Lab | 0 | 0 | 2 | 1 | 3 | 60 | 40 |
|  | 7. Digital Electronics Lab | 0 | 0 | 2 | 1 | 3 | 60 | 40 |
|  | 8. Communication Lab | 0 | 0 | 2 | 1 | 3 | 60 | 40 |
| **C** |  | **University Elective** | 1a) Object Oriented Programming  b) Object Oriented Programming lab | 3  0 | 0  0 | 0  2 | 2  1 | 3  3 | 40  60 | 60  40 |
| **D** |  | **Program Elective** | 1. Telecommunication Fundamentals | 3 | 0 | 0 | 3 | 3 | 40 | 60 |
|  | 1. Biomedical Instrumentation | 3 | 0 | 0 | 3 | 3 | 40 | 60 |
| **TOTAL** | | | | **15** | **0** | **10** | **21/22** |  |  |  |

**L= Lecture T=Tutorial CE=Continuous Evaluation**

**S= Seminar P= Practical ESE= End Semester Examination**

**Members of BoS, ECE Convener, BoS Engg.**

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**GYAN VIHAR SCHOOL OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF ELECTRONICS AND COMMMUNICATION ENGINEERING**

**Teaching & Examination scheme for Diploma (Electronics and Communication Engineering)**

**(3 Year Course)**

**EFFECTIVE FROM ACADEMIC SESSION 2015-2016**

**Year: III Semester: V**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Code** | **Course Name** | **SUBJECTS** | **L** | **T** | **P** | **C** | **Exam Hrs.** | **Weightage (%)** | |
| **CE** | **ESE** |
| **A** |  | **University Core** | 1. Proficiency in Co-curricular Activities | 0 | 0 | 0 | 2 |  |  |  |
|  | 2. Employability Skills- III | 0 | 2 | 0 | 1 |  |  |  |
|  | 3.Practical Training and Seminar-I | 0 | 0 | 2 | 1 | 3 | 60 | 40 |
| **B** |  | **Program Core** | 1.Digital Communication | 3 | 0 | 0 | 3 | 3 | 40 | 60 |
|  | 2. Control Systems | 3 | 0 | 0 | 3 | 3 | 40 | 60 |
|  | 3.Microwave Engineering | 3 | 0 | 0 | 3 | 3 | 40 | 60 |
|  | 4.Linear Integrated Circuits | 3 | 0 | 0 | 3 | 3 | 40 | 60 |
|  | 5.Microwave Lab. | 0 | 0 | 2 | 1 | 3 | 60 | 40 |
|  | 6. Electronics Engineering Design Lab | 0 | 0 | 2 | 1 | 3 | 60 | 40 |
|  | 7.Digital Communication Lab | 0 | 0 | 2 | 1 | 3 | 60 | 40 |
| **C** |  | **University Elective** | 1.Computer Communication | 3 | 0 | 0 | 2 | 3 | 40 | 60 |
|  | 2. Entreprenuership | 3 | 0 | 0 | 2 | 3 | 40 | 60 |
| **D** |  | **Program Elective** | 1. Antenna and Wave Propagation | 3 | 0 | 0 | 3 | 3 | 40 | 60 |
|  | 2. IC Technology | 3 | 0 | 0 | 3 | 3 | 40 | 60 |
| **TOTAL** | | | | **15** | **0** | **8** | **21/22** |  |  |  |

**Year: III Semester: VI**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Code** | **Course Name** | **SUBJECTS** | **L** | **T** | **P** | **C** | **Exam Hrs.** | **Weightage (%)** | |
|  | **CE** | **ESE** |
| **A** |  | **University Core** | 1. Proficiency in Co-curricular Activities | 0 | 0 | 0 | 2 |  |  |  |
| **B** |  | **Program Core** | 1.Advance Microprocessor and Microcontroller | 3 | 0 | 0 | 3 | 3 | 40 | 60 |
|  | 2.Mobile and Cellular Communication | 3 | 0 | 0 | 3 | 3 | 40 | 60 |
|  | 3.Optical Fiber Communication | 3 | 0 | 0 | 3 | 3 | 40 | 60 |
|  | 4.Industrial Electronics | 3 | 0 | 0 | 3 | 3 | 40 | 60 |
|  | 5.Wireless Communication Lab | 0 | 0 | 2 | 1 | 3 | 60 | 40 |
|  | 6.Industrial Electronics Lab | 0 | 0 | 2 | 1 | 3 | 60 | 40 |
|  | 7. Project | 0 | 0 | 2 | 1 | 3 | 60 | 40 |
| **C** |  | **University Elective** | 1. Industrial Management | 3 | 0 | 0 | 2 | 3 | 40 | 60 |
|  | 2. Computer Networks | 3 | 0 | 0 | 2 | 3 | 40 | 60 |
| **D** |  | **Program Elective** | 1.Image and Video Processing | 3 | 0 | 0 | 3 | 3 | 40 | 60 |
|  | 2.VLSI design and technology | 3 | 0 | 0 | 3 | 3 | 40 | 60 |
| **TOTAL** | | | | **15** | **0** | **6** | **19/20** |  |  |  |

**L= Lecture T=Tutorial CE=Continuous Evaluation**

**S= Seminar P= Practical ESE= End Semester Examination**

**Members of BoS, ECE Convener, BoS Engg.**

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**GYAN VIHAR SCHOOL OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF ELECTRONICS AND COMMMUNICATION ENGINEERING**

**Teaching and Examination Scheme for B.Tech. ( Electronics and Communication Engineering)**

**Semester III to VIII**

**Effective from the academic session 2015-16**

**DETAILED SYLLABUS**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **MA 101** |  | **ENGINEERING MATHEMATICS – I** | **C (L, T, P) = 4 (3, 1, 0)** |  |
| **Units** | **Contents of the Course** | |  | **Hours** |
|  |  | |  |  |
| I | **Differential Calculus** | |  |  |
|  |  | Curvature, Concavity and Convexity and Point of inflexion (Cartesian Coordinates | |  |
|  |  | only) |  | 6 |
|  |  | Partial Differentiation, Euler’s Theorem on Homogeneous Functions. | |  |
| II | **Differential Calculus** | |  |  |
|  |  | Maxima and Minima of Two and more Independent Variables, Lagrange’s method of | |  |
|  |  | undetermined multipliers. |  |  |
|  |  | Asymptotes (Cartesian coordinates only), Intersection of the curve and its asymptotes. | | 7 |
|  |  | Multiple points, Curve tracing of simple curves (Cartesian and Polar) including | |  |
|  |  | cardioids, Lemniscates of Bernoulli, Limacon, Equiangular Spiral, Folium of | |  |
|  |  | Descartes. |  |  |
| III | **Integral Calculus** | |  | 7 |
|  |  Double integral, Change of order of integration, Triple integral ,Beta function and Gamma function. To find areas by using double integrals. | | |  |
|  |  | |  |  |
| IV | **Differential Equations** | |  |  |
|  |  Differential Equations of first order and first degree. | |  |  |
|  |  | Linear Differential Equations of Higher Order with Constant Coefficients. | | 7 |
|  |  Homogeneous Linear Differential Equations. | |  |  |
| V | **Differential Equations** | |  |  |
|  |  Linear Differential Equations of Second Order with Variable Coefficients:Exact differential equations Method of | | |  |
|  |  | Change of Dependent and Independent Variables. |  | 7 |
|  |  Method of Variation of Parameters. | |  |  |
|  | **Total** |  |  | **34** |
| **Books Recommended:** | | |  |  |

1. Advanced Mathematics for Engineers by Erwin Kreszig.
2. Advanced Mathematics for Engineers by B.S. Griwal.
3. Advanced Mathematics for Engineers by Chandrika Prasad.
4. Engg. Mathematics I by Y.N. Gaur & C.L. Koul
5. Engg. Mathematics I by D.N. Vyas
6. Engg. Mathematics I by RBD Publication

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| **PY 101/102** | | | |  | **ENGINEERING PHYSICS** | | **C (L, T, P) = 4 (3, 1, 0)** | | |
|  |  |  |  | | |  |  |  |  |
| **Units** |  |  | **Contents of Course** | | |  |  |  | **Hours** |
|  |  |  | **Interference of light** | | |  |  |  |  |
|  |  |  |  |  Newton’s Rings: Theory and determination of diameters of dark and bright rings. | | | |  |  |
|  |  |  |  |  | Michelson’s interferometer: | Construction and working, Determination of wavelength | |  | **8 hrs,** |
| **I** |  |  |  |  | of light and wavelength separation of two nearby wavelengths. | |  |  |  |
|  |  |  | **Polarization of Light** | | |  |  |  |  |
|  |  |  |  | Production of Plane, circular and elliptically polarized, Phase retardation plates, | | | |  |  |
|  |  |  |  | Specific rotation and its measurement using the half shade and Bi-Quartz polarimeters. | | | |  |  |
|  |  |  | **Diffraction of Light :** | | |  |  |  |  |
|  |  |  |  |  | Fraunhofer’s diffraction due to single Slit, | |  |  | **6 hrs.** |
| **II** |  |  |  | Theory of plane transmission grating and determination of wavelength of light | | | |  |  |
|  |  |  |  | Resolving power: Reyliegh criterion, Resolving power of diffraction grating. | | | |  |  |
|  |  |  | **Lasers , Holography and Optical fiber** | | | |  |  |  |
|  |  |  |  | Theory , design and application of Ruby, He- Ne and semiconductor lasers | | | |  |  |
|  |  |  |  |  | Construction and Reconstruction of Hologram | |  |  | **6 hrs.** |
| **III** |  |  |  |  | Introduction of optical fiber as wave guide | |  |  |  |
|  |  |  |  | Numerical Apeture of an optical fiber | | |  |  |  |
|  |  |  | **Special Theory of Relativity** | | |  |  |  |  |
|  |  |  |  |  | Postulates of special theory of relativity, Lorentz Transformations | |  |  | **6 hrs.** |
| **IV** |  |  |  |  | Relativity of length , mass, and time. | |  |  |  |
|  |  |  |  |  | Relativistic velocity addition , Mass- Energy relation | |  |  |  |
|  |  |  | **Electricity & Magnetism** | | |  |  |  |  |
|  |  |  |  |  Scalar and Vector Fields, | | Concepts of Gradient, Divergence | and Curl, Maxwell’s |  |  |
| **V** |  |  |  |  | electromagnetic Equations. |  |  |  |  |
|  |  |  | **Nuclear Radiation Detectors** | | |  |  |  | **7 hrs.** |
|  |  |  |  |  | Nuclear Binding Energy, Construction , working and properties of | | proportional , G.eiger |  |  |
|  |  |  |  |  | M.uller and Scintillation counter | |  |  |  |
|  |  |  |  |  |  |  | **Total** |  | **33** |
| **Books Recommended** | | | | | |  |  |  |  |
| Optics | by A.K. Ghatak (Tata McGraw-Hill) | | | | |  |  |  |  |
| Introductory Quantum Mechanics by Liboff (Pearson’s Publication) | | | | | | |  |  |  |
| Quantum Mech. by A.Ghatak & S. Lokhathan (Tata McGraw-Hill | | | | | | |  |  |  |
| A textbook of Optics: Brijlal and Subramanium. S. Chand Co. Ltd. | | | | | | |  |  |  |
| Introduction to Modern Optics by G.R. Fowels | | | | | |  |  |  |  |
| An introduction to Fiber Optics by R. Allen Shotwell, PHI | | | | | | |  |  |  |
| Elements of Electromagnetic Fields: S P Seth, Dhanpat Rai & Company. | | | | | | |  |  |  |
| Lasers Theory and Applications by Thyagarajan and Ghatak, Macmillan India Ltd. | | | | | | |  |  |  |
| Elements of Electromagnetic by Mathew N.O. Sadiku, Oxford University Press. | | | | | | |  |  |  |
| Introductory University optics: Beynon, Prentice Hall of India Pvt. Ltd. | | | | | | |  |  |  |
| An introduction to Fiber Optics by John M. Senior, PHI | | | | | | |  |  |  |
| Nuclear Physics by Burchem (Addision Weisly) | | | | | |  |  |  |  |

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| **PY 151/152** | | | |  | **ENGINEERING PHYSICS LAB** | | **C (L, T, P) = 1 (0, 0, 2)** | | |
|  |  |  |  | | |  |  |  |  |
| **S.** |  |  | **LIST OF PRACTICALS** | | |  |  |  |  |
| **No.** |  |  |  |  |  |  |  |  |  |
| 1 |  |  | To determine the dispersive power of material of prism | | | |  |  |  |
| 2 |  |  | To determine the wavelength of sodium light by Newton’s rings experiment | | | |  |  |  |
| 3 |  |  | To | determine the specific rotation of glucose / cane sugar solution using polarimeter | | | | |  |
| 4 |  |  | To | determine the wavelength of prominent lines of white light by plane diffraction grating | | | | |  |
| 5 |  |  | To determine the wavelength of sodium light with the help of Michelson interferometer | | | | | |  |
| 6 |  |  | To study the profile of He-Ne Laser | | |  |  |  |  |
| 7 |  |  | To determine the Numerical Aperture of optical fiber | | | |  |  |  |
| 8 |  |  | To determine the fringe width and distance between coherent sources by Fresnel’s bi-prism experiment | | | | | |  |
| 9 |  |  | To determine the band gap in a semiconductor using a P.N. junction diode | | | |  |  |  |
| 10 |  |  | To convert a galvanometer into an ammeter. | | | |  |  |  |
| 11 |  |  | To convert a galvanometer into a voltmeter | | | |  |  |  |
| 12 |  |  | To draw the plateau characteristic of a Geiger Muller Counter using a radio active source. | | | | | |  |
| 13 |  |  | To | determine the height of an object with the help of sextant | | |  |  |  |
| 14 |  |  | To determine high resistance by method of leakage with the help of ballistic galvanometer | | | | | |  |
| 15 |  |  | To | determine the specific resistance of a given of a wire with the help of Carry Foster’s Bridge | | | | |  |

|  |  |  |  |  |
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| **EE 101/102** | | **ELECTRICAL AND ELECTRONICS ENGINEERING** | **C (L, T, P) = 4 (3, 1, 0)** | |
|  |  | |  |  |
| **UNIT** | **CONTENTS OF THE COURSE** | |  | **Hours** |
| **1** | DC Networks: Kirchoff’s Laws, Node Voltage and Mesh Current Analysis;Delta-Star and Star-Delta | | | **7** |
|  | Transformation, Source Conversion. Classification of Network Elements, Superposition Theorem, Thevenin’s | | |  |
|  | Theorem. |  |  |  |
| **II** | Single Phase AC Circuits: Generation of Single Phase AC Voltage, EMF Equation, Average, RMS and | | | **7** |
|  | Effective Values. RLC Series, Parallel and Series-Parallel Circuits, Complex Representation of Impedances. | | |  |
|  | Phasor Diagram, Power and Power Factor. | |  |  |
|  | • Three Phase A.C. Circuits: Generation of Three-Phase AC Voltage, Delta and Star-Connection, Line & | | |  |
|  | Phase Quantities, 3-Phase Balanced Circuits, Phasor Diagram, Measurement of Power in Three Phase | | |  |
|  | Balanced Circuits. |  |  |  |
| **III** | • Transformer: Faraday’s Law of Electromagnetic Induction, Construction and Operation of Single Phase | | | **7** |
|  | Transformer, EMF Equation, Voltage & Current | |  |  |
|  | Relationship and Phasor Diagram of Ideal Transformer. | |  |  |
|  | • Electrical DC Machine: Principle of DC Machines, Types, Different Parts of DC Machines. | | |  |
| **IV** | •Diode: PN junction diode, formation of depletion layer and diode characterstics. Transistor: Bipolar Junction | | | **7** |
|  | Transistor, Transistor Current Components, Characteristics of CE, CB and CC Transistor Amplifiers. | | |  |
|  | • Thyristors: The four layer diode, Bi-directional thyristors, the uni-junction transistor and its application in | | |  |
|  | thyristor circuits. |  |  |  |
| **V** | • Communication System: Introduction to modulation (AM, FM & PM) demodulation, multiplexing. | | | **7** |
|  | Superhetrodyne radio receiver, television. | |  |  |
|  | Elementary concepts of optical, satellite & mobile communication. | |  |  |
|  | Total |  |  | 35 |

**Recommended Books**

1. BL Theraja, Electrical Engineering
2. Niazi, Electrical and Electronics Engineering
3. Network Synthesis by Heytt Kamerly
4. Network Theory by Van Valkenburg



|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **E 151/152** | | **ELECTRICAL AND ELECTRONICS ENGG. LAB** | **C (L, T, P) = 1 (0, 0, 2)** |  |
|  |  |  |  |  |
| **S.** |  | **List of Experiments** |  |  |
| **No.** |  |  |  |  |
|  | **A. ELECTRICAL LAB** | |  |  |
| 1. | To verify:Kirchhoff’s Current and Voltage Laws, Superposition Theorem and Thevenin Theorem. | | |  |
| 2. | Make house wiring including earthing for 1-phase energy meter, MCB, ceiling fan, tube light, three pin socket and a | | |  |
| lamp operated from two different positions. Basic functional study of components used in house wiring. | | |  |
|  |  |
| 3. | Study the construction and basic working of single phase induction motor and | | ceiling fan along with regulator. |  |
| 4. | Basic functional study and connection of moving coil & moving iron ammeters and voltmeters, dynamometer, wattmeter | | |  |
| and energy meter. |  |  |  |
|  |  |  |  |
| 5. | Study the construction, circuit, working and application of the following lamps: (i) Fluorescent lamp, (ii) Sodium vapour | | |  |
| lamp and (iii) Mercury vapour lamp | |  |  |
|  |  |  |
| 6. | Study the construction and connection of single phase transformer and auto-transformer. | | |  |
| Measure input and output voltage and find turn ratio. | |  |  |
|  |  |  |
|  | **ELECTRONICS LAB** | |  |  |
| 7. | Identification, testing and applications of resistors, inductors, capacitors, PN-diode, Zener diode, LED, LCD, BJT, SCR, | | |  |
| Photo diode and Photo transistor. | |  |  |
|  |  |  |
| 8. | Functional study of CRO, analog & digital multi-meters and function / signal generator. | | |  |
|  |  |  |  |
|  |  | | |  |
| 9. | Study the BJT amplifier in common emitter configuration and measure voltage gain. | | |  |
| 10. | Measurement of power in 3Phase circuit using Two Wattmeters and finding Power Factor. | | |  |

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| **ME 101/102** | | **ENGINEERING MECHANICS** | **C (L, T, P) = 4 (3, 1, 0)** | |
|  |  |  |  |  |
| **Units** |  | **Contents of the Course** |  | **Hours** |
| I | System of forces, Fundamental laws of mechanics, Composition of forces : Free body diagram, | | | 6 |
|  | Lamis’s theorem : Moments and couple, Varignon’s theorem, condition of equilibrium : Types of | | |  |
|  | support and loading, reaction, Analysis of simple trusses by methods of joints and method of sections. | | |  |
| II | Law of Coulomb friction, Ladder, Wedges: Belt friction and rolling: Principle of virtual work and its | | | 6 |
|  | application. |  |  |  |
| III | Location of centroid and center of gravity,area moment of inertia, mass moment of machine : Law of | | | 7 |
|  | machines, Variation of mechanical advantages, efficiency, reversibility of machine : Pulleys, wheel | | |  |
|  | and axle,wheel and differential axle : Transmission of power through belt and rope. | |  |  |
| IV | **Kinematics of Particle: -** Rectilinear motion,plane curvilinear motion : Projectile motion : | | | 6 |
|  | Constrained motion of connected particles. **Dynamics of Particle and Rigid Body: -** Newton’s law of | | |  |
|  | motion: D’Alembert’s principle. | |  |  |
| V | **Work and Energy: -** Work,energy (potential, Kinetic and Spring) : Work-Energy relation : Law of | | | 7 |
|  | conservation of energy. **Impulse and Momentum: -** Impulse, momentum: Impulse-Momentum | | |  |
|  | relation, Impact. **Vibration: -** Un-damped Free vibrations. | |  |  |
|  |  |  | **Total** | **32** |

**Recommended Books:**

1. Engineering Mechanics by Domkundwar & Domkundwar, Dhanpat Rai & Co.
2. Engineering Mechanics by D.S.Kumar.
3. Engineering Mechanics by R.K.Rajput.
4. Classical Mechanics by R. Douglas Gregory University of Manchester
5. Engineering Mechanics by Bhattacharya Oxford University Press.

**ME 153/154 WORKSHOP PRACTICE C (L, T, P) = 1 (0, 0, 2)**

|  |
| --- |
| **CARPENTRY SHOP**  Timber, definition, engineering applications, seasoning and preservation Plywood and ply boards.  **List of jobs to be made in the Carpentryshop**   1. T – Lap joint 2. Bridle joint   **FOUNDRY SHOP**  Moulding Sands, constituents and characteristics,  Pattern definition, materials types, core prints,Role of gate, runner, riser, core and chaplets, Causes and remedies of some common casting defects like blow holes, cavities, inclusions  **List of jobs to be made in the Foundryshop**   1. Mould of any pattern 2. Casting of any simple pattern   **WELDING SHOP**  Definition of welding, brazing and soldering processes and their applications  Oxyacetylene gas welding process, equipment and techniques, types of flames and their  Applications. Manual metal arc welding technique and equipment, AC and DC welding  Electrodes: Constituents and functions of electrode coating, welding positions  Types of welded joints, common welding defects such as cracks, undercutting, slag  inclusion and boring  **List of jobs to be made in the Weldingshop**   1. Gas welding practice by students on mild steel flat 2. Lap joint by gas welding 3. MMA welding practice by students 4. Square butt joint by MMA welding 5. Lap joint by MMA welding 6. Demonstration of brazing   **MACHINE SHOP PRACTICE**  Study Of Machine Tools:-  Lathe Machine : Parts Of lathe description ,operations on lathe, tools used on lathes, attachments ,Specifications of lathe ,types of lathe  Shaper Machine:- Parts of shaper, description of parts ,Operations on shaper ,tools used on Shaper ,Mechanisms in shaper, specification of shaper  **List of jobs to be made in the Machineshop**   1. Job on lathe with one step turning and chamfering operations 2. Job on shaper for finishing two sides of a job 3. Drilling two holes of size 5 and 12 mm diameter on job used / to be used for shaping 4. Grinding a corner of above job on bench grinder   **FITTING AND SMITHY SHOP**  Files, materials and classification.  Forging, forging principle, materials, Operations like drawing, upsetting, bending and forge welding,Use of forged parts.  **List of jobs to be made in the Fitting And SmithyShop**   1. Finishing of two sides of a square piece by filing 2. Tin smithy for making mechanical joint and soldering of joint 3. To cut a square notch using hacksaw and to drill three holes on PCD and tapping |

**List of Recommended Books:-**

1. Workshop Technology And Practice By Hazara Chowdhary Vol I & Vol II
2. Workshop Technology And Practice By B.S. Raghuvanshi
3. Production Technology By R.K. Jain
4. Manufacturing Process By :Begman
5. Workshop Technology By : Chapman Vol I ,II & III

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|  | **CY 101/102** | **ENGINEERING CHEMISTRY** | **C (L, T, P) = 4 (3, 1, 0)** |  |
|  |  |  |  |  |
| **Units** | **Contents of the Subject** |  |  | **Hours** |
|  |  | | |  |
| **I** | **Water:** Common impurities, Hardness, Determination of hardness by Clark’s and Complexmetric (EDTA) | | | **7 hrs.** |
|  | method, Degree of Hardness. **Municipal Water Supply**: Requisites of drinking water, Purification of water. | | |  |
|  | Sedimentation, coagulation, filtration, sterilization. Break point chlorination. **Water for Steam Preparation:** | | |  |
|  | Boiler Trouble, Carryover, Corrosion, Scale & Sludge and caustic embrittlement. **Methods of Boiler Water** | | |  |
|  | **Treatment:** Preliminary treatments, Preheating. Lime-Soda Process, Permutite or Zeolite process, | | |  |
|  | Deionization or demineralization. Feed water Conditioning, Internal treatment, Blow down. Problems based | | |  |
|  | on water treatment (Lime-Soda Process).Sanitation. | |  |  |
|  |  | | |  |
| **II** | **Corrosion:** Definition and its significance, Theories of corrosion. Galvanic Cell and concentration Cell, | | | **9 hrs.** |
|  | Pitting and Stress Corrosion. Protection against Corrosion, Protective Metallic Coating. **Lubricants:** | | |  |
|  | Classification, Types, Properties: Viscosity, Viscosity Index, Flash and Fire point, Cloud and Pour point and | | |  |
|  | Emulsification. **Pollution:** Elementary idea of air and water pollution, Effect of air pollution. Depletion of | | |  |
|  | ozone layer and its environmental impact. Greenhouse effect. **Phase Rule:** Statement, Definitions. | | |  |
|  | Application to one component system: Water and Sulphur. Study of two components: Lead-Silver. | | |  |
|  |  | | |  |
| **III** | **New & Advanced Engineering Materials:** Materials and Chemistry of Engineering materials **Software &** | | | **7 hrs.** |
|  | **Hardware** industry: chip and integrated circuit manufacturing. Chemistry of **Electrical** Engineering | | |  |
|  | materials. Metals Alloys, polymers. **Electronics and Communication** industries: Semiconductor Materials | | |  |
|  | for**, Mechanical** industries Materials for **Civil and building constructions**. | |  |  |
|  |  | | |  |
| **IV** | **Plastics:** Classification and constituents of plastics and their uses, preparation, properties and uses of | | | **7 hrs.** |
|  | Polyethylene. Bakelite, Terylene and Nylon. **Rubber :** Natural rubber, vulcanization, synthetic rubbers. | | |  |
|  | **Cement:** Manufacture of Portland cement, vertical shaft kiln technology, Chemistry of setting and | | |  |
|  | hardening. **Refractories:** Definition, properties, classification, Manufacturing and Properties of Silica and | | |  |
|  | Fireclay Refractories. **Glass:** Preparation, varieties and uses, **Explosive:** | | Introduction, classification, |  |
|  | requisites of explosives. Plastic explosives, blasting fuses, application. | |  |  |
|  |  | | |  |
| **V** | **Chemicals Fuels:** Origin and classification fuels. **Solid Fuels:** Coal**,** Calorific value ,Proximate and Ultimate | | | **7 hrs.** |
|  | analysis Determination of calorific value by Bomb Calorimeter. **Liquid Fuel: Advantages**, petroleum and | | |  |
|  | refining of petroleum, synthetic petrol, Cracking and Reforming, Knocking –Ant knocking Octane number, | | |  |
|  | Cetane number. **Gaseous Fuels:** Advantages, Manufacture, composition and calorific value of coal gas and | | |  |
|  | oil gas, Determination of calorific value by Junker’s Calorimeter. **Advanced fuel systems:** Elementary Non- | | |  |
|  | conventional Energy Materials. | |  |  |
|  |  |  |  |  |
| **Books:** |  |  |  |  |
| **1.A Text book of engineering chemistry:Dr. Sunita Rattan ,S.K. Kataria** | | |  |  |
| **2.A Text book of Engineering chemistry:P.C. Jain & Monika Jain,Dhanpat Rai Publication** | | | |  |
| **3.VLSI Technology :S.M. Sze Tata Mc Graw Hill Publication company Ltd.** | | |  |  |
| **4.VLSI fabrication Principles ,Sorab K. Gandhi,John Wilay & Sons Inc.** | | |  |  |
| **5 .Semiconductor Devices,Basic Principles :Jasprit Singh.** | | |  |  |
| **6.Materials sciences:MS Vijaya & G Rangarajan,Tata Mc Graw Hill pub.. House** | | |  |  |
| **7.Materials Sciences and Engineering:Willams D Callister Jr. Wiley India(p)Ltd.** | | |  |  |
| **8.Materials Sciences:G.K. Narula ,K.S. Narula** | | |  |  |
| **9.Engineering Chemistry:R. Gopalan ,D. Venkappaya,Vikas Publication** | | |  |  |
| **10.Air Pollution :MN Rao,HVN Rao,Tata Mc Graw Hill Publication Company.** | | |  |  |

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|  | **CY 151/152** | **CHEMISTRY LAB** | **C (L, T, P) = 1 (0, 0, 2)** |
|  |  |  |  |
| **S. No.** | **Name of Experiment** |  | **No. of** |
|  |  |  | **Practical** |
|  |  |  | **Turns** |
| **I** | **Physical Methods of** | **Analysis** |  |

1. Conduct metric Analysis

|  |  |  |
| --- | --- | --- |
| a. | Determination of strength Acid and Bases | 01 |
| b. | Determination of Solubility of Barium sulphate | 01 |
| c. | Determination of equivalent conductivity | 01 |

1. pH Analysis

|  |  |  |  |
| --- | --- | --- | --- |
| a. | Determination of | strength of Acids and Bases | 01 |
| b. | Determination of | PH of various Water Sample and its Analysis | 01 |
| 3. | Determination of Viscosity of a given sample of oil at various temperature by Redwood Viscometer | | 01 |
|  | No.1 |  |  |
| 4. | Determination of Flash and Fire point of a given sample using Pensky Marten apparatus | | 01 |
| 5. | Determination of | Cloud and Pour point of a sample | 01 |
| **II** | **Volumetric Analysis** | |  |
| 1. | To study kinetics of acetone iodine reactions | | 02 |
| 2. | Determination of | available chorine in Bleaching Powder | 01 |
| 3. | Determination of free chlorine in a Water sample | | 01 |
| 4. | To study hydrolysis of ester | | 01 |
| 5. | Determination of B.O.D Value of Water sample | | 01 |
| 6. | Determination of C.O.D Value of Water sample | | 01 |
| 7. | Determination of hardness of water | | 01 |
| 8. | Determination of Dissolved Oxygen or Ammonia or Carbon Dioxide | | 02 |
| 9. | Determination of total suspended dissolved and fixed solids in Sewage and Water sample | | 01 |
| **III** | **REDOX Titrations** | |  |
| 1. | Determination of Copper sulphate Idometrically | | 01 |
| 2. | Determine Potassium dichromate idometrically | | 01 |
| 3. | Determination Potassium dichromate by retreating it against ferrous ammonium sulphate ( Using | | 02 |
|  | internal indictor) |  |  |
| 4. | Estimation of Iron in plain Carbon steel | | 01 |
| 5. | Estimation of Copper in brass | | 01 |
| **IV** | **Gravimetric Analysis** | |  |
| 1. | Barium as Barium sulphate gravimetrically | | 02 |
| 2. | Silver as Silver Nitrate gravimetrically | | 02 |
| 3. | Copper as Copper thiocynate gravimetrically | | 02 |

 As per availability of experiment

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| --- |
| **1.A Text book of engineering chemistry:Dr. Sunita Rattan ,S.K. Kataria** |
| **2.A Text book of Engineering chemistry:P.C. Jain & Monika Jain,Dhanpat Rai Publication** | |
| **3.VLSI Technology :S.M. Sze Tata Mc Graw Hill Publication company Ltd.** |
| **4.VLSI fabrication Principles ,Sorab K. Gandhi,John Wilay & Sons Inc.** |

**MA 102 ENGINEERING MATHEMATICS – II C (L, T, P) = 4 (3, 1, 0)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Units** | **Contents of the Course** | | **Hours** |
| I | **Algebra**   * Convergence and Divergence of infinite series: Comparison test, Cauchy’s nth root test, D’alemberts ratio test,   logarithmic ratio test, Raabi’s test, De’Morgan and Bertrand’s test, Gauss test (without proof)   * Fourier Series: Expansion of simple function’s in Fourier Series, Fourier Series of even and odd functions. Half range series, change of intervals, Harmonic Analysis. | | 6 |
| II | **Matrices**   * Rank of a matrix, inverse of a matrix by elementary transformations. * Solution of simultaneous linear equations by matrix method. * Eigen values and Eigen vectors, Cayley- Hamilton theorem (without proof). * Diagonalization of matrix. | | 6 |
| III | **Coordinate Geometry of Three Dimensions**   * Equation of a sphere. * Intersection of a sphere and a plane, tangent plane, normal lines. * Right circular cone. * Right circular cylinder. | | 6 |
| IV | **Vector Calculus**   * Scalar and vector point functions, differentiation & integration of vector functions. * Gradient, Divergence, Curl and Differential Operator. * Line, Surface and volume integrals. . | | 7 |
| V | **Partial Differential Equations**   * Partial Differential Equations of the First Order. * Non-linear Partial Differential Equations of order one: Standard forms. * Charpit’s Method. | | 7 |
| **Total** | | **32** | |

**Books Recommended:**

1. 1. Advanced Mathematics for Engineers by Erwin Kreszig.
2. 2. Advanced Mathematics for Engineers by B.S. Griwal
3. 3. Advanced Mathematics for Engineers by Chandrika Prasad
4. 4. Engg. Mathematics Book 2 by Y.N. Gaur & C.L. Koul
5. 5. Engg. Mathematics II by K.C. Jain & M.L. Rawat
6. 6. Engg. Mathematics I by RBD Publication
7. 7. Engg. Mathematics II by RBD Publication

**EN 102 COMMUNICATION TECHNIQUES C (L, T, P) = 3 (3, 0, 0)**

|  |  |
| --- | --- |
| **UNIT** | **CONTENTS** |
| UNIT-I GRAMMAR | * Active & passive * Nouns and Articles * Conditionals |
| UNIT-II COMPOSITION | * Letter Writing * .Application Writing * Technical proposal writing |
| UNIT-III COMMUNICATION | * Definition, Meaning * Objectives & its significance * Characteristics, principles & purpose |
| UNIT- IV MODERN COMMUNICATION | * Communication devices * Communication structure in an organization * Email messages & Etiquettes |
| UNIT –V SKILLS OF COMMUNICATION | * Professional communication * Interpersonal Communication * Methods to improve it |

***Recommended books***

1. Modern English –N. Krishnaswamy, Macmillan publication
2. Oxford Guide to Writing and Speaking – John Selly Oxford University press
3. Communicative Grammar and Composition by Rajesh K. Lidiya,2008 Oxford Uni. Press,

New Delhi

4. Communicative Grammar and Composition, by Rajesh K. Lidiya,2013 OUP, New Delhi

5. Effective Technical Communication by M. Ashraf Rizvi 2005 ,Tata McGrew Hill New Delhi

6. Technical Communication by Meenakshi Raman & Sangeeta Sharma ,2008 OUP New Delhi

7. Business Communication by Meenakshi Raman & Prakash singh, OUP, New Delhi

8. A Practical Course for developing Writing Skills In English by J.K. Gangal PHI Learning Pvt. Ltd. New Delhi.

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| **CP - 103** | **Course Name:Fundamental of Computer & IT**  **(Common for B Tech, B. Pharm., BCA I year )** |
| Version | 1.0 |
| Prerequisite | Nil |
| Objectives: | This course aims to:  – give a general understanding of how a computer works   * Aware about operating system, various Computer Languages and number system * Give a general understanding of Internet, information technology, e-commerce and Networks |
|  |
| Expected  OutcomeOutcome: | The students will able to   * Understand what is computer and how is it works. * Understand what number system, operating system, computer language is. * Understanding the Role of Information Technology |
| outcome |
|  |
|  |
| UNIT-**I** | **8 hours** |
| **Introduction**  Types of computers and generations .Basic architecture of computers and its building blocks .Input-Output devices, Memories**Overview, definition and function of operating system**, need of operating , System,Batch processing, spooling, multi-programming, multi-processing, Time sharing, online processing, real time system | |
| UNIT-**II** | **8 hours** |
| **Classification of Computer Languages**  Machine, assembly and high level languages .Brief idea of operating system Assembler, compiler and interpreter  **Number Systems:** Binary, octal, decimal and hexadecimal representation of numbers. Integers and floating point numbers. Representation of characters, ASCII and EBCDIC codes. Binary Arithmetic: addition, subtraction, complements | |
| UNIT **–III** | **6 hours** |
| **An overview of information technology**, difference between data and information, quality, of information, Information system.  **Introduction to internet:** www, web browser, search engine, email, open source software’s, Search Engine optimization | |
| UNIT-**IV** | **7 hours** |
| **Introduction to e-commerce** and its advantage, security threats to e-commerce, Electronic payment system, E-governance, EDI and its benefits. Introduction to cryptography, digital signature and smart card technology, Steganography & Watermarking. | |
| UNIT-**V** | **7 hours** |
| **Introduction to LAN, WAN, MAN:** Transmission media**Data transmission type:** Introduction to OSI reference model, TCP/IP Model. Analog and digital signals, modulation, Network topologies, client-server architecture, ISDN, Broad Band, Firewalls, Virus & Worms | |
| Text Book | Computer Fundamentals: Architecture and Organization, by B Ram, New Age International Publisher |
| Reference Books | **Recommended Books:**   1. Computer Fundamentals: Architecture and Organization, by B Ram, New Age International Publisher 2. [Information Technology and the Networked Economy, Second Edition](http://www.infibeam.com/Books/info/Patrick-G-McKeown/Information-Technology-and-the-Networked-Economy-Second/003034851X.html) **By** [McKeown, Patrick G.](http://www.infibeam.com/Books/search?author=McKeown,%20Patrick%20G.) 3. Internet & Intranet Engineering, Tata McGraw Hill Company. 4. Information Technology by Ajit Poonia. 5. Information Technology by D.P. Sharma |
| Mode of Evaluation: (Percent Weightage) | Internal Evaluation: 40 Marks   1. Mid Term(10) – 1.30 hour Written Exam 2. Graded Assignment (10) – Online 3. Weekly Test(10) – Online Objective Exam   External Evaluation: 60 Marks   * 3 hour written exam   Ext |
| Recommended by BOS on : | 11 / 05 / 2015 |
| Approved by Academic Council on : |  |

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| --- | --- | --- | --- | --- |
| **EN - 105** | | **Professional Communication1** | | |
| **Version** | | 1.0 | | |
| **Prerequisite** | | 10+2 Level | | |
| **Anti-requisite/ Co-requisite** | | Nil | | |
| **Objectives :** | | The Objectives of the course are : | | |
| 1. To develop a professional orientation | | |
| **Expected Outcome :** | | The students will be able to | | |
| 1. Conduct themselves with professionalism in organizations | | |
| 1. To face interview with confidence. | | |
| 1. To improve the soft skills | | |
| **UNIT – I (4 Hours)** | | **Communication** | | |
| Communication: Meaning, Objectives and Functions; Communication in Organizational selling: Process: Types, Media and Networks of Communication. Foundations of Interpersonal Communication: Process Model of Communication Intrapersonal Variables of Communication. | | | | |
| **UNIT – II (4Hours)** | **Improving Communication Effectiveness** | | | |
| Improving Communication Effectiveness: Communication Barriers; Physical Noise; Semantic Noise; Selective Perception; Distortion and Filtering; communication Gateways; Interpersonal Trust; Listening, Feedback; Non Verbal Communication. | | | | |
| **UNIT – III (4Hours)** | **Spoken Communication** | | | |
| Spoken Communication: Listening; Active Listening ; Poor Listening ; Poor Speaking Good Listener ; Logical Traps ;Presentations ;Features of effective Presentations; Presentation Planning; Structure of Presentations; Delivery; Visual Support; Coping with Questions; Coping with Nervousness. | | | | |
| **UNIT – IV (6 Hours)** | **Managing Meetings** | | | |
| Effective Meetings: Preparation; Agenda; Conduct of Meetings; Preparation of Minutes of Meeting; Interviewing skills; Negotiating skills; Team building skills; Business skills; Client-Interfering skills; Liaison skills; E-Mail writing skills. | | | | |
| **UNIT-V (6 Hours)** | | | **Grammar** | |
| Subject –Verb agreement, preposition , Articles, Modals | | | | |
| **List of Expt.** | | | |  |
| **Text Book** | | | | 1. Patrica Hayes, Andrews Richard T. Herschel, Organization Communication, AITBS Pub. & Dist., New Delhi. |
| **Reference Books** | | | | 1. BoveeThillSchalzman, Business Communication Today, Pearson, New Delhi. 2. Vilanilam, J.V., More Effective Communication, Response Books, New Delhi. 3. Moripally, Matthukutty, Business Communication Strategies, Tata McGraw Hill Publishing Co. Ltd., New Delhi. |
| **Mode of Evaluation** | | | | Assignment/ Quiz/Viva- voce/Lab examination/Student seminar/ Written examination |
| **Recommended by BOS on :** | | | | **19.05.2015** |
| **Approved by Academic Council on :** | | | |  |

|  |  |
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|  | **MA 201 INTEGRAL TRANSFORMS AND COMPLEX ANALYSIS C(L,T,P) =4(3,1,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Maths-I, Maths-II |
| **Objective:** | The objective of the course are: |
|  | 1. To introduce Laplace transform analysis, which is central to many applications in engineering apart from its use in solving boundary value problems. |
|  | 2. To develop Z transform techniques for discrete time systems |
|  | 3. To acquaint the student with Fourier transform techniques used in wide variety of situations. |
|  | 4. To develop an understanding of the standard techniques of complex variable theory so as to enable the student to apply them with confidence, in application areas such as heat conduction, elasticity, fluid dynamics and flow the of electric current. |
|  |  |
| **Expected Outcome:** | The student will be able to |
|  | 1. Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering. |
|  | 2. understand the standard techniques of complex variable theory so as to enable the student to apply them with confidence, in application areas such as heat conduction, elasticity, fluid dynamics and flow the of electric current. |
|  |  |
| **Unit -1 (7 Hours)** | **BOUNDARY VALUE PROBLEMS: –** Method of sepeartion of variables in the solution of Boundary VALUE Problems (Wave equation, Diffusion and Laplace equation) |
|  |  |
| **Unit -2 (7 Hours)** | **LAPLACE TRANSFORM -** Laplace transform with its simple properties, applications to the solution of ordinary and partial differential equations having constant co-efficients with special reference to the wave and diffusion equations. |
|  |  |
| **Unit -3 (7 Hours)** | **FOURIER TRANSFORM -** Complex form of Fourier Transform and its inverse, Fourier sine and cosine transform and their inversion. Applications of Fourier Transform to solution of partial differential equations having constant co-efficient with special reference to heat equation and wave equation. |
|  |  |
| **Unit -4 (7 Hours)** | **COMPLEX VARIABLES -** Analytic functions, Cauchy-Riemann equations, Elementary conformal mapping with simple applications, Line integral in complex domain, Cauchy;s theorem. Cauchy’s integral formula |
|  |  |
| **Unit -4 (7 Hours)** | **COMPLEX VARIABLES -**Taylor’s series Laurent’s series poles, Residues, Evaluation of simple definite real integrals using the theorem of residues. Simple contour integration |
|  |  |
| **List of Expt.** | nil |
| **Text Book** | Advanced Mathematics for Engineers by Chandrika Prasad |
| **Reference book** | 1. Higher Engineering Mathematics by BS Grewal |
|  | 1. Higher Engineering Mathematics by YN Gaur |
| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

|  |  |
| --- | --- |
|  | **HS 203 ECONOMICS & SOCIAL SCIENCES C(L,T,P) = 3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The objective of the course are: |
|  | 1. To learn about the history of India in brief. |
|  | 2. To learn law and concepts of economics. |
|  | 3. To understand the psychology of various kind of industries. |
| **Expected Outcome:** | The student will be able to |
|  | 1. Prepare himself for various kind of responsibilities and duties related to his society. |
|  | 2. Apply the law and concepts of economics on his job place. |
|  | 3. Interact with various kinds of industries and various kinds of communities. |
| **Unit -1 (6 Hours)** | **Introduction: Definition meaning, nature and scope of economics.** |
|  |  |
| **Unit -2 (6 Hours)** | **Micro Economics**: Definition, meaning and scope of Micro Economics. Importance and limitations. |
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| **Unit -3 (7 Hours)** | **Concept of Demand and supply** :Utility Analysis, Law of Demand, Demand determinants, Demand Distinctions. Law of Supply, Elasticity |
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| **Unit -4 (7 Hours)** | **Introduction to social Sciences**: impact of british rule on India(Economic Social and Cultural). Indian National movement, Psysography of India. |
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| **Unit -4 (7 Hours)** | **Political Economy**: Agriculture, Socio-Economic development, Challenges to Indian Decomcracy, Polical Parties and pressure groups. |
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| **List of Expt.** | nil |
| **Text Book** | Microeconomics by M. L. Sethi |
| **Reference book** | Advanced Microeconomics by M.L. Shingham |
|  |  |
| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **EC 201 ELECTRONIC DEVICES AND CIRCUITS C(L,T,P) =4(3,1,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Engineering Physics, Basic Electrical & Electronics Engineering |
| **Objective:** | The objective of the course are: |
|  | 1. To create the understanding of physic of semiconductors and semiconductor devices. |
|  | 1. To impart the knowledge of PN junction diode, current flow physical process and their mathematical formulation. |
|  | 1. To create the understanding of BJT, operation under various operating conditions and its modeling. |
|  | 1. To impart the knowledge of FET, operation, physical process of current flow and its modeling and circuit design. |
|  | 1. To impart the knowledge of transistor based circuit design such as amplifier, oscillator etc. and their analysis. |
| **Expected Outcome:** | The student will be able to |
|  | 1. Characterize the semiconductor under various given operating condition. |
|  | 1. Model and analyze the PN junctions. |
|  | 1. Design and analyze the transistor based circuits. |
| **Unit -1 (7 Hours)** | **REVIEW :** Mobility and conductivity, Conductors, semiconductors, and insulators; Drift and diffusion currents; p-n junction; junction under forward and reverse bias charge densities in a semiconductor, Fermi Dirac distribution, carrier concentrations and Fermi levels in semiconductor, Generation and recombination of charges, diffusion and continuity equation, Mass action Law, Hall effect. |
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| **Unit -2 (7 Hours)** | **SEMICONDUCTOR DIODES:** Introduction to Junction diodes, Diode as a ckt. Element, load line concept, Zener diode regulator, clipping and clamping circuits, Voltage multipliers. |
|  |  |
| **Unit -3 (7 Hours)** | **BIPOLAR JUNCTION TRANSISTOR:** Transistor characteristics, Current components, Current gains: alpha and beta. Operating point. Hybrid model, h-parameter equivalent circuits. CE, CB and CC configuration. DC and AC analysis of CE, CC and CB amplifiers. Ebers-Moll model. Biasing and stabilization techniques. Thermal runaway, Thermal stability. |
|  |  |
| **Unit -4 (7 Hours)** | **FIELD EFFECT TRANSISTORS:** JFET, MOSFET, Equivalent circuits and biasing of JFET's and MOSFET’s. Low frequency CS and CD JFET amplifiers. FET as a voltage variable resistor. |
|  |  |
| **Unit -4 (7 Hours)** | **SMALL SIGNAL AMPLIFIERS AT LOW FREQUENCY:** Analysis of BJT and FET, DC and RC coupled amplifiers. Frequency response, midband gain, gains at low and high frequency. Analysis of DC and differential amplifiers, Miller's Theorem. Cascading Transistor amplifiers, Darlington pair. Emitter follower, source follower. |
|  |  |
| **List of Expt.** | 10 |
| **Text Book** | Millman, J. and Halkias, C.C., “Electronic Devices and Circuits”,  McGraw-Hill. |
| **Reference book** | Boylestad, R.L. and Nashelsky, L., “Electronic Devices and Circuit Theory”, 9th Ed., Pearson Education Asia |
|  | Nagrath, I.J., “Electronics – Analog and Digital”, PHI. |
| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **CIRCUIT ANALYSIS & SYNTHESIS EC 203 (3-1-0-4)** |
| **Version** | 1.0 |
| **Prerequisite** | Basic Electrical and Electronics Engineering |
| **Objective:** | The objective of the course are: |
|  | 1. To make the students capable of analyzing any given electrical network. |
|  | 1. To make the students learn how to synthesize an electrical network from a given impedance/admittance function. |
|  | 1. To introduce the concept of circuit elements, lumped circuits, circuit laws and reduction. |
|  | 1. To study the concept of coupled circuits and two port networks. |
| **Expected Outcome:** | The student will be able to |
|  | 1. Students will be able to analyze the various electrical and electronic networks using the techniques they learn. |
|  | 1. Students will be able to construct a circuit to suit the need. |
|  | 1. Analyze two port networks. |
|  | 1. Analyze simple DC circuits. |
| **Unit -1 (7 Hours)** | **NETWORK THEOREMS AND ELEMENTS** |
|  | Thevenin’s, Norton’s, Reciprocity, Superposition, Compensation, Miller’s, Tellegen’s and maximum power transfer theorems. Networks with dependent sources. Inductively coupled circuits – mutual inductance, coefficient of coupling and mutual inductance between portions of same circuits and between parallel branches. Transformer equivalent, inductively and conductively coupled circuits. |
| **Unit -2 (7 Hours)** | **TRANSIENTS ANALYSIS** |
|  | Impulse, step, ramp and sinusoidal response Analysis of first order and second order circuits. Time domain & transform domain (frequency, Laplace) analysis. Initial and final value theorems. Complex periodic waves and their analysis by Fourier analysis. Different kind of symmetry. Power in a circuit. |
| **Unit -3 (4 Hours)** | **Network topology** |
|  | Concept of Network graph, Tree, tree branches and links, cut set and tie set  schedules. |
| **Unit -4 (10 Hours)** | **NETWORK FUNCTIONS & Two port parameters** |
|  | Terminals and terminal pairs, driving point impedance transfer functions, poles and zeros. Procedure of finding network functions for general two terminal pair networks. Stability & causality. Hurwitz polynomial, positive real function.  Z, Y, ABCD, hybrid parameters, their inverse and image parameters, relationship  between parameters. Interconnection of two port networks, Terminated two port networks. |
| **Unit -5 (7 Hours)** | **NETWORK SYNTHESIS** |
|  | RL & RC networks synthesis, Foster First & Second form, Cauer forms. |
| **List of Expt.** | nil |
| **Text Book** | Chakraborti: Circuit Theory, Dhanpat Rai. |
| **Reference book** | 1. M.E. Van Valkenburg: Network Analysis, PHI |
|  | 1. Hayt W.H. & J.E. Kemmerly: Engineering Circuit Analysis, TMH India. |
| **Mode of Evaluation** | Assignment/ examination//written examination |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **EC 207 ELECTRONIC MATERIALS AND PROCESSES C(L,T,P) =3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The objective of the course are: |
|  | 1. The course intends to provide an overview of the principles, basics and application of electronic materials. |
|  | 1. To provide the basic skills required to understand, develop, and design various engineering applications involving magnetic fields |
|  | 1. To introduce the concepts and techniques seeking understanding of semiconductor material structures and to measure and characterize materials properties. |
|  | 1. To help in predicting and evaluating the performance of materials as structural or functional elements including mechanical, electrical, optical, magnetic, thermal, and chemical properties in engineering systems with respect to conductor and superconductors |
|  | 1. The main objective of this course is to obtain physical and chemical phenomena underlying the electronic properties of solids from macroscopic to nano properties of engineering materials. |
| **Expected Outcome:** | The student will be able to |
|  | 1. The students will be able to define the terms piezo, pyroand ferroand antiferroelectric and explain the interrelationships between the same and will be able to describe the polarisation behavior of a ferroelectric material as a function of temperature and of applied stress. This will include an understanding of the Curie temperature. |
|  | 1. The students will be able to explain the meaning of physical quantities related to magnetism, magnetic field, magnetic induction, magnetic moment, magnetization, magnetic susceptibility, and discuss their interrelations. |
|  | 1. The students will be able to explain the origin of bandgaps within the nearly free electron model and illustrate the difference between insulators, semiconductors and metals based on the value of the Fermi energy. |
|  | 1. The students will be able to describe the characteristics of different classes of superconducting materials, different theories of conductive, superconductivity and their ranges of validity in detail describing the difference between good conductors, perfect conductors and superconductor. |
|  | 1. An understanding of the structureproperty, relationships in nanomaterials as well as the concepts, not applicable at larger length scales, that need to be taken into consideration for nanoscience and nanotechnology. Introduce the student to synthesis, identification and characterization, properties, functionalization and use of solid materials and nanomaterials such as nanoparticles, carbon nanotubes and nanoporous materials. |
| **Unit -1 (7 Hours)** | **DIELECTRIC MATERIALS:** Polarisation phenomenon, spontaneous polarisation, dielectric constant and loss, piezo and ferro electricity. |
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| **Unit -2 (7 Hours)** | **MAGNETIC MATERIALS:** Dia, para, ferro-ferrimagnetism; soft and hard magnetic materials and their applications. |
|  |  |
| **Unit -3 (7 Hours)** | **SEMI CONDUCTOR MATERIALS:** Crystal growth, zone refining, Degenerate and nondegenerate semiconductors, Direct and indirect band gap semiconductors. Electronic properties of silicon, Germanium, Compound Semiconductor, Gallium Arsenide, gallium phosphide and Silicon carbide. |
|  |  |
| **Unit -4 (7 Hours)** | **CONDUCTIVE and SUPERCONDUCTIVE MATERIALS:** Electrical properties of conductive and resistive materials. Important characteristics and electronic applications of specific conductor and resistance materials. Superconductor phenomenon, Type I and Type II superconductors and their applications. |
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| **Unit -4 (7 Hours)** | **PASSIVE COMPONENETS and PCB FABRICATION:** Brief study of fabrication methods of fixed and variable type of resistors; capacitors, Inductors, solenoid and toroid, air core, iron core and Ferro core conductors. Printed Circuit Boards – Types, Manufacturing of copper clad laminates, PCB Manufacturing process, Manufacturing of single and double sided PCBs. Surface mount devices – advantages and limitations |
|  |  |
| **List of Expt.** | nil |
| **Text Book** | S.O. Kasap-Principle of electric Engineering materials and devices, Mc Graw Hill. |
| **Reference book** | S.P. Seth and P.V. Gupta-A course of Electrical Engineering Materials, Dhanpat Rai and Sons. |
|  | C.S. Indulkar and S. Thiruvengadam An Introduction to Electrical Engineering Materials, S.Chand and Co. |
| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **ELECTRONIC MEASUREMENTS AND INSTRUMENTATION EC 205 (3-0-2-4)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
|  | The objective of the course are: |
|  | 1. Help the learner to understand error in instrument, measurement and electronic instruments. |
|  | 1. Understand basic signal generation and analysis of signals |
|  | 1. Understand of transducer device. How to convert physical quantity into electrical quantity. |
|  | 1. Learn about oscilloscope, operation , construction and types. |
| **Expected Outcome:** | The student will be able to |
|  | 1. Find the type of error in instruments |
|  | 1. Design the electronics instruments |
|  | 1. Operate on Oscilloscope |
|  | 1. Generate different signals and analyse them |
|  | 1. Design transducers to convert physical quantity into electrical quantity. |
| **Unit -1 (7 Hours)** | **Theory of errors** |
|  | Accuracy and precision, Repeatability, Limits of errors, Systematic and random errors Modelling of errors, Probable error and standard deviation, Gaussian error analysis, Combination of errors. |
| **Unit -2 (7 Hours)** | **Electronic instruments for measuring basic parameters** |
|  | Electronic Voltmeter, Electronic Multimeters, Digital Voltmeter, Component Measuring Instruments, Q meter, Vector Impedance meter, Measurement of frequency. Introduction to shielding and grounding. |
| **Unit -3 (7 Hours)** | **Oscilloscopes** |
|  | CRT Construction, Basic CRO circuits, CRO Probes, Oscilloscope Measurement Techniques of frequency, Phase Angle and Time Delay, Multibeam, multi trace, storage and sampling Oscilloscopes. Curve tracers. |
| **Unit -4 (7 Hours)** | **Signal generation** |
|  | Sine wave generators, Frequency synthesized signal generators, Sweep frequency generators. Signal Analysis **-** Measurement Technique, Wave Analyzers, Frequency - selective wave analyser, Heterodyne wave analyser, Harmonic distortion analyser, Spectrum analyser. |
| **Unit -4 (7 Hours)** | **Transducers** |
|  | Classification, Selection Criteria, Characteristics, Construction, Working Principles, Application of following Transducers- RTD, Thermocouples, Thermistors, LVDT, RVDT, Strain Gauges, Bourdon Tubes, Bellows. Diaphragms, Seismic Accelerometers, Tachogenerators, Load Cell, Piezoelectric Transducers, Ultrasonic Flow Meters |
| **List of Expt.** | 10 |
| **Text Book** | A.K. Sawhney - "Electrical and Electronic Measurement and Inst., Dhanpat Raj and Sons. |
| **Reference book** | H.S. Kalsi - "Electronic Inst. and Measurement, Tata Me. Hill |
|  | W.D. Cooper - "Electronic Inst. and Measurement Techniques, Prentice Hall of India. |
| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **EC 251 ELECTRONICS WORKSHOP LAB C(L,T,P) =1(0,0,2)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The objective of the course are: |
|  | 1. To know about different electronic component used as amplifiers, switching circuits, light Conversion, conversion of AC into DC |
|  | 2. To know about CRO and its different components as cathode ray tubes. Different resistors, Transistor, capacitors acting as multimeter, generation and identification of different waves. |
|  | 3. To design and fabricate PCB and its different steps. To know about its different components and their connection using physical and chemical methods with the help of rectifier for Regulated AC supply. |
|  | 4. To know about the different optoelectronic devices and conversion of energy from one Form to another switching action using light. To know that transmit information via a radio carrier wave. |
|  | 5. Electronic sound amplification and distribution system having the loud speakers, generally Used to address large public places. SMPS offer not only higher efficiency but also greater flexibility to the designer. Magnetic and passive technologies make the SMPS |
|  | 6.To know liquid crystal which is active element with in LCD is unable to change its orientation And transmission rapidly enough when the picture changes from to the next. |
| **Expected Outcome:** | The student will be able to |
|  | 1. Able to understand switching circuits, storage of charge, amplification of signal, conversion of Energy, amplification of signal one form to another, operation of digital signal through IC. |
|  | 2. Able to understand CRO. And generate the signal waves from the signal generator. |
|  | 3. Able to understand and joining of electronic component for the formation of PCB using Regulated power supply. |
|  | 4. Able to understand the optoelectronic device and connection in circuit and their functioning. Able to understand AM and FM kit |
|  | 5. Able to understand public address system and various parts as amplifier .Able to understand SMPS using IC, and know the principal and use in power conversion area. |
|  | 6. Able to understand LED and LCD and manufacture and use of it. |
| **S.No.** | List of Experiments |
|  | Identification, Study and Testing of various electronic components: (a) Resistances-Various types, Colour coding (b) Capacitors-Various types, Coding, (c) Inductors (d) Diodes (e) Transistors (f) SCRs (g) ICs (h) Photo diode (i) Photo transistor (j) LED (k) LDR (l) Potentiometers |
|  | Study of symbols for various Electrical and Electronic Components, Devices, Circuit functions etc. |
|  | To study and perform experiment on CRO demonstration kit. |
|  | Soldering and de-soldering practice. |
|  | (a) To Design and fabricate a PCB for a Regulated power supply. |
|  | (b) Assemble the Regulated power supply using PCB and test it. |
|  | To study and plot the characteristics of following Opto-Electronic devices – |
|  | (a) LED |
|  | (b) LDR |
|  | (C) Photovoltaic cell |
|  | (d) Opto-coupler |
|  | (e) Photo diode |
|  | (f) Photo transistor |
|  | (g) Solar cell |
|  | To study the specifications and working of a Transistor radio kit and perform measurements on it. |
|  | To study the specifications and working of a Tape Recorder kit. |
|  | To fabricate PCB and testing of electronics circuit on PCB. |
|  | To design and test regulated power supply using ICs |
|  | To study the specifications and working of a DVD Player. |
| **List of Expt.** | 10 |
| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **EC 253 INDUSTRY ORIENTED ELECTRONIC DEVICES AND CIRCUITS PROJECT LAB C(L,T,P) =2(0,0,2+2)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The objective of the course are: |
|  | 1. Describe physical models of basic components. |
|  | 2. To provide an overview of the principles, operation, and application of diode, BJT, FET etc. for performing various functions |
|  | 3. Design and construct simple electronic circuits to accomplish a specific function, e.g., Designing amplifiers. |
| **Expected Outcome:** | The student will be able to |
|  | 1. Students will be able to use basic electronics devices like CRO, multimeter, function generator. |
|  | 1. Verify the working of diodes, transistors and their applications. |
|  | 1. Explore the operation and advantages of amplifiers like BJT and FET. |
| **S.No.** | List of Experiments |
| 1. | Study the following devices: |
|  | (a) Analog and digital multimeters |
|  | (b) Function/ Signal generators |
|  | (c) Regulated d. c. power supplies (constant voltage and constant current operations) |
|  | (d) Study of analog CRO, measurement of time period, amplitude, frequency and phase angle using Lissajous figures. |
| 2. | Plot V-I characteristic of P-N junction diode and calculate cut-in voltage, reverse saturation current and static and dynamic resistances. |
| 3. | Plot V-I characteristic of zener diode and study of zener diode as voltage regulator. Observe the effect of load changes and determine load limits of the voltage regulator. |
| 4. | Plot frequency response curve for single stage amplifier and to determine gain bandwidth product. |
| 5. | Plot drain current - drain voltage and drain current – gate bias characteristics of field effect transistor and measure of Idss and Vp |
| 6. | Application of Diode as clipper and clamper |
| 7. | Plot gain- frequency characteristic of two stage RC coupled amplifier and calculate its bandwidth and compare it with theoretical value. |
| 8. | Plot gain- frequency characteristic of emitter follower and find out its input and output resistances. |
| 9. | Plot input and output characteristics of BJT in CB, CC and CE configurations. Find their h parameters. |
| 10. | Study half wave and bridge rectifier and effect of filters on wave. Also calculate theoretical and practical ripple factor. |
| **List of Expt.** | 10 |
| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **DATA STRUCTURES and ALGORITHMS (CP 201) (3-0-2-4)** |
| **Version** | 1.0 |
| **Prerequisite** | C |
| **Objective:** | The objective of the course are: |
|  | 1. Help the learner to understand basic concept of data and different structure approach |
|  | 1. Understand basic concept of searching |
|  | 1. Understand the concept of efficiency and notation |
|  | 1. Understand the factor affect the program efficiency |
| **Expected Outcome:** | The student will be able to |
|  | 1. Calculate the complexity of algorithm. |
|  | 1. Design the algorithm for different problem |
|  | 1. Implementation of data structure |
|  | 1. Generate different type of data structure |
|  | 1. Application of data structure |
| **Unit -1 (7 Hours)** | **Complexity Analysis** |
|  | Time and Space complexity of algorithms, asymptotic analysis, big O and other notations, importance of efficient algorithms, program performance measurement, data structures and algorithms. |
| **Unit -2 (7 Hours)** | **Linear Lists** |
|  | sequential and linked representations, comparison of insertion, deletion and search operations for sequential and linked lists, list, doubly linked lists, circular lists, radix sort, linear search,binary search |
| **Unit -3 (7 Hours)** | **Stacks and Queues** |
|  | Abstract data types, sequential and linked implementations of stack and queue, , representative applications such as parenthesis matching, towers of Hanoi, type of queue,sorting:bubble sort,insertion sort,selection sort,merge sort |
| **Unit -4 (7 Hours)** | **Trees**: |
|  | Binary trees and their properties, terminology, sequential and linked implementations, tree traversal methods and algorithms, heaps as priority queues, heap implementation, insertion and deletion operations, heapsort, Search Trees: Binary search trees, search efficiency, insertion and deletion operations, , AVL trees, searching insertion and deletions in AVL trees, red-black trees, comparison with AVL trees, search insert and delete operations. Multiway Trees: Issues in large dictionaries, m-way search trees, Btrees, search insert and delete operations, height of B-tree, 2-3 trees, |
| **Unit -5(7 Hours)** | **Graphs**: |
|  | Definition, terminology, directed and undirected graphs, properties, connectivity in graphs, applications, implementation – adjacency matrix and linked adjacency chains, graph traversal – breadth first and depth first, spanning trees. |
| **List of Expt.** | 10 |
| **Text Book** | Sahni, S., “Data Structures, Algorithms, and Applications in C++”, WCB/McGraw-Hill. |
| **Reference book** | 1. Sahni, S., “Data Structures, Algorithms, and Applications in Java”, WCB/McGraw-Hill. |
|  | 1. Lafore, R., “Data Structures and Algorithms in Java”, 2nd Ed., Dorling Kindersley. |
| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** |  |
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|  | **CP 251 DATA STRUCTURES and ALGORITHM LAB C(L,T,P) =1(0,0,2)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The objective of the course are: |
|  | 1. Learn the organization of a digital computer. Be exposed to the number systems. |
|  | 2. Learn to think logically and write pseudo code or draw flow charts for problems |
|  | 3. Be exposed to the syntax of C. |
|  | 4. Be familiar with programming in C. |
|  | 5. Learn to use arrays, strings, functions, pointers, structures and unions in C. |
| **Expected Outcome:** | The student will be able to |
|  | 1. Design C Programs for problems. |
|  | 2. Write and execute C programs for simple applications |
| S. No. | List of Experiments |
| 1. | Program on array searching, sorting (Bubble sort, Quick sort, Marge sort etc.) |
| 2. | Program to insert element at desire position, replacing element, deletion in array. |
| 3. | Various matrices operations. |
| 4. | Various strings programs. |
| 5. | Implementation of stack and queue using array |
| 6. | Implementation of stack and queue using link lists |
| 7. | Implementation of circular queue using link lists. |
| 8. | Polynomial addition, multiplication. |
| 9. | Two-way link lists programs. |
| 10. | Infix to postfix/prefix conversion. |
| **List of Expt.** | 10 |
| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **INDUSTRIAL MANAGEMENT C (L, T, P) =2(3 ,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The objective of the course are: |
|  | 1. To be able to describe the most well-known theories and perspectives on management. |
|  | 1. To basic understanding the relationship between organizational structure, technology and the conditions of the organizational environment |
|  | 1. To be able to desribe the dynamics of change management |
|  | 1. To be able to pursuit a minor organizational analysis |
| **Expected Outcome:** | The student will be able to |
|  | 1. Students will be able to perform the Management Functions. |
|  | 1. Students will be able to compare selected Theories of Management. |
|  | 1. Students will be able to perform the functions in the Marketing Mix. |
|  | 1. Students will be able to use basic Business Application Software. |
|  | 1. Students will be able to assess ethical issues in Business situations |
| **Unit -1 (7 Hours)** | Introduction to Industrial management, Brief history of industries in India, Brief definition of management, organization and administration. Characteristics of management, Principle of management, Function of management like, planning, organization, direction, co-ordination etc. |
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| **Unit -2 (7 Hours)** | Level of management, skills of management, inter relation between skills and levels of management, scientific management, Introduction to Schools of Management thoughts, |
|  |  |
| **Unit -3 (7 Hours)** | introduction to organization, study of basic type of organization for ex. Line and staff organization, project organization, metrics organization, Informal organization, |
|  |  |
| **Unit -4 (7 Hours)** | Introduction to industrial Psychology, Motivation theory and study of Maxlow, Need, Hierarchy Theory, Planned Location, Planned Layout. Study of different forms of  layout like line layout, process layout, product layout, combinational layout, sixth position layout etc. |
|  |  |
| **Unit -5(7 Hours)** | Objective of planned layout, introduction to material management, scope of material management, study of inventory control method, introduction to different types of inventory control techniques, introduction to work study, motion study etc, introduction to conflict management. |
| **List of Expt.** | 10 |
| **Text Book** | Khanna O.P. : Industrial Engineering |
| **Reference book** | T.R. Banga : Industrial Engineering and Management |
|  | Mahajan : Industrial and Process Management |
| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **BM 248 INDUSTRIAL ECONOMICS & MANAGEMENT LAB** **C (L, T, P) =1(0,0,2)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The objective of the course are: |
|  | 1. To provide the analytical skills required for understanding problems in industrial economics, including applications of game theory |
|  | 1. To examine the key questions on the internal organization of firms |
|  | 1. To analyze various aspects of strategic interaction between firms and the determinants of industrial structure |
|  | 1. To provide the ability to apply economic models of firm behaviour to analyse questions in business strategy, competition policy and regulation |
| **Expected Outcome:** | The student will be able to |
|  | 1. describe and explain the determinants of the size and structure of firms and the implications of the separation of ownership and control |
|  | 1. describe and explain the pricing behavior by firms with market power and its welfare implications |
|  | 1. apply analytical models of firm behavior and strategic interaction to evaluate various business practices, including tacit collusion, entry deterrence, product differentiation, price discrimination and vertical restraints |
|  | 1. recognize and explain the basic determinants of market structure and the key issues in competition policy and regulation. |
| S. No. | List of Experiments |
| 1. | To study Organizational forms, Profit maximization and other objectives of industrial firms. |
| 2. | To study Theory of profitability, Economies of scale. |
| 3. | To study Financing of Industries- Need and sources of finance, Role of special financial institutions, Investment criteria-NPV, IRR. |
| 4. | To study Approaches to industrial location analysis, Productivity analysis, Input-Output analysis. |
| 5. | To study Concentration of economic power. New Industrial Policy – Critical analysis |
| 6. | To study Role of technology and entrepreneurship in industrial development |
| 7. | To study Management – Principles of management, functions-planning, Organization staffing, Directing, Controlling, Coordination, Decision making. |
| 8. | To study Production Management – Total quality management, JIT |
| 9. | To study Quality circle, Quality-ISO9000, ISO14000, KANBAN, Bench marking, Effective communication. |
| 10. | To study Labour Legislations. |
| **List of Expt.** | 10 |
| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **EC 208 TRANSMISSION LINE AND NETWORKS C(L,T,P) =3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The objective of the course are: |
|  | 1. Review of network filters, attenuator, static electric and magnetic fields and applications, Maxwell’s equations, transmission lines, propagation and reflection of plane waves, Introduction to guided waves |
|  | 1. To become familiar with propagation of signals through lines |
|  | 1. Understand signal propagation at Radio frequencies and analyze the Rectangular and circular waveguide |
| **Expected Outcome:** | The student will be able to |
|  | 1. Analyze the transmission lines, |
|  | 1. Analyze the waveguides, |
|  | 1. Analyze the Network filters and attenuators |
|  | 1. At the end of the course, the students would be aware of the different parameters and constraints in high frequency transmission of information. |
|  | 1. Comprehensive understanding of ideal transmission line behavior in transient and steady state conditions. |
| **Unit -1 (7 Hours)** | **TRANSMISSION LINE:** Types of transmission lines, general transmission line equation, line constant, equivalent circuits, infinite line, and reflection on a line, SWR of line with different type of terminations. Distortion less and dissipation less lines, Coaxial cables, Transmission lines at audio and radio frequencies, Losses in transmission line,. Characteristics of quarter wave, half wave and lines of other lengths, |
|  |  |
| **Unit -2 (7 Hours)** | **TRANSMISSION LINE APPLICATIONS:** Smith chart and its application. Transmission line applications, Impedance matching Network. Single and double Stub matching. Measurement of parameters of transmission line, measurement of attenuation, insertion loss, reflection coefficient and standing wave ratio. |
|  |  |
| **Unit -3 (7 Hours)** | **ATTENUATORS and FILTERS:** Elements of telephone transmission networks, symmetrical and Asymmetrical two port networks. Different Attenuators, ð-section and T-section attenuators, stub matching, Transmission equalizers Filters, constant K-section, Ladder type, ð-section, T-section filter, m-derived filter sections, Lattics filter section. |
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| **Unit -4 (7 Hours)** | **TELEPHONE TRANSMISSION:** Telephone set, Touch tone dial types, two wire/ four wire transmission, Echo suppressors and cancellors, cross talk. Multi-channel systems: Frequency division and time division multiplexing. |
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| **Unit -5(7 Hours)** | **AUTOMATIC TELEPHONY and TELEGRAPHY:** Trunking concepts, Grade of service, Traffic definitions, Introduction to switching networks, classification of switching systems. Principle of Electronic Exchange, EPABX and SPC Digital telephone Exchange,Numberig Plan, Fascimile services. |
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| **List of Expt.** | nil |
| **Text Book** | W. Fraser-Telecommunications (BPB Publication) |
| **Reference book** | I. Vishvanathan- Telecommunication switching systems & Networks. Prentice Hall of India. |
|  | 2. Cole- Introduction to Telecommunication. Pearson Education |
| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **EC 246 SPEECH AND AUDIO PROCESSING C (L,T,P) =3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The objective of the course are: |
|  | 1. Aquire the concept of speech production mechanism Identify the importance of speech processing lable the types of speech signal. |
|  | 2 Define speech coding Discuss speech coding principles Illustrate speech coding hierarchy Label quantization methods and Indicate mobile communication speech coder |
|  | 3 Identify quantization Know quantization methods Decide on the quality of the quantized signal |
|  | 4 Lable the components of speech coder used in mobile communications |
|  | 5 Aquire why speech compression. Know the concept of Analysis-synthesis Aquire the Analysis- by-synthesis Clasify subjective test / objective test |
| **Expected Outcome:** | The student will be able to |
|  | 1. Analyze and design algorithms for extracting parameters from the speech signal. |
|  | 1. Analyze and design algorithms for speech and audio coding. |
|  | 1. Prepare related research |
| **Unit -1 (7 Hours)** | Digital speech processing and its applications, production and classification of speech sounds, lossless tube models, digital models for speech signals; Analysis and synthesis of pole-zero speech models, Levinson recursion, lattice synthesis filter. |
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| **Unit -2 (7 Hours)** | Time dependent processing of speech, pitch period estimation, frequency domain pitch estimation; Discrete-time short-time Fourier transform and its application, phase vocoder, channel vocoder. |
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| **Unit -3 (7 Hours)** | Homomorphic speech processing, waveform coders, hybrid coders and vector quantization of speech; Model based coding: Linear predictive, RELP, MELP, CELP; Speech synthesis. |
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| **Unit -4 (7 Hours)** | Principles of speech recognition, spectral distance measures, dynamic time warping, word recognition using phoneme units, hidden Markov models and word recognition, speech recognition systems, speaker recognition. |
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| **Unit -4 (7 Hours)** | Ear physiology, psychoacoustics, perception model and auditory system as filter bank; Filter bank design and modified discrete cosine transform algorithm for audio compression in MP3 and AAC coders; Standards for high fidelity audio coding. |
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| **List of Expt.** | nil |
| **Text Book** | Rabiner, L.R. and Schafer, R.W., “Digital Processing of Speech Signals”, Pearson Education. |
| **Reference book** | Quatieri, T.F., “Discrete-Time Speech Signal Processing: Principles and Practice”, Pearson Education. |
|  | Spanias, A., Painter, T. and Venkatraman, A., “Audio Signal Processing and Coding”, John Wiley & Sons. |
| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **MA 202 NUMERICAL ANALYSIS AND STATISTICS C(L,T,P) =4(3,1,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The objective of the course are: |
|  | 1. To learn the different method of numerical analysis using finite differences. |
|  | 1. To learn the different method of numerical analysis using integration differences |
|  | 1. To aware and learn about the Bessels function of various kind and use of them. |
|  | 1. To acquire knowledge about Probability and Random variables |
| **Expected Outcome:** | The student will be able to |
|  | 1. Apply these various numerical analysis methods for complex problems. |
|  | 1. Apply the various functions in various problems. Also able to short out these problems . |
|  | 1. lve the complex problem of Probability and Random variables using the concepts of this course. |
| **Unit -1 (7 Hours)** | **Numerical Analysis:** Finite differences - Forward backward and central difference. Newton’s forward and backward differences interpolation formulae. Sterling’s formulae, Lagrange’s interpolation formula. Solution of non-linear equations in one variable by Newton Raphson and Simultaneous algebraic equation by Gauss and Regula Falsi method. Solution of simultaneous equations by Gauss elimination and Gauss Seidel methods. Fitting of curves (straight line and parabola of second degree) by method of least squares. |
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| **Unit -2 (7 Hours)** | **Numerical Analysis:** Numerical differentiation, numerical integration trapezoidal rule, Simpson’s one-third and one eighth rule. Numerical Integration of ordinary differential equations of first order, Picard’s method, Euler’s and modified Euler’s methods. Miline’s method and Runga Kutta fourth order method. Simple linear difference equations with constant coefficients |
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| **Unit -3 (7 Hours)** | **Special Functions:** Bessel’s function of first and second kind, simple recurrence relations, orthogonal property of Bessel functions, Transformation, Generating functions, Legendre’s function of first kind, simple recurrence relations, orthogonal property, Generating functions. |
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| **Unit -4 (7 Hours)** | **Statistics and Probability-I:** Elementary theory of probability, Baye’s theorem with simple applications, Expected value. Theoretical probability distributions – Binomial, Poisson and Normal distributions. |
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| **Unit -5 (7 Hours)** | **Statistics and Probability-II:** Lines of regression, co-relation and rank correlation. **Transforms**: Z-transforms, its inverse, simple properties and application to difference equations. |
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| **List of Expt.** | nil |
| **Text Book** | 1. Advanced Engg. Mathematics, Irvin Kreyszig, Wiley .(2007) |
| **Reference book** | 1. Datta – Mathematical methods of science & engineering, Cengage learning 2012 |
|  | 1. O’neil – Advanced Engineering mathematics, Cengage learning 2007 |
| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **EC 202 ANALOG ELECTRONICS C (L,T,P) =4(3,1,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Electronic Devices and Circuits |
| **Objective:** | The objective of the course are: |
|  | 1.To develop the understanding of feedback concept, topologies and analysis under various feedback conditions |
|  | 2.. To create the knowledge of wave shaping circuits and the design of oscillators and multivibrators |
|  | 3.lve the complex problem of Probability and Random variables using the concepts of this course. |
|  | 4. To model and analyze the transistor based circuits under high frequency operating conditions. |
|  | 5.To create the knowledge frequency selective amplifiers |
| **Expected Outcome:** | The student will be able to |
|  | 1. 1. Model analyse and design of feedback amplifier. |
|  | 2. Analyse and design wave shaping circuit such as amplifier oscillators |
|  | 3 To classify the amplifier and design of amplifier for various ranges of frequency of operation and operating point (Qpoint). |
| **Unit -1 (7 Hours)** | **FEEDBACK AMPLIFIERS:** Concept of feedback; Topologies: Voltage-voltage, current voltage, voltage-current, current-current; Stability and compensation. Transfer gain with feedback, General characteristics of negative feedback amplifiers. |
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| **Unit -2 (7 Hours)** | **OSCILLATORS:** Classification. Barkhausen criterion, damped oscillations in LC circuits, audio and rf oscillators. Tuned collector, Hartley, Colpitts, RC Phase shift, Wien bridge and crystal oscillators, Blocking oscillators. |
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| **Unit -3 (7 Hours)** | **HIGH FREQUENCY AMPLIFIERS:** High frequency models of BJT and FET, hybrid-π model, Gummel Poon model, generalized high frequency response of CE amplifier, gain-bandwidth product. Emitter follower at high frequencies. |
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| **Unit -4 (7 Hours)** | **TUNED AMPLIFIER -** Band Pass Amplifier, Parallel resonant Circuits, Band Width of Parallel resonant circuit. Analysis of Single Tuned Amplifier, Primary and Secondary Tuned Amplifier with BJT and FET. Double Tuned Transformer Coupled Amplifier. Stagger Tuned Amplifier. Pulse Response of such Amplifier. Shunt Peaked Circuits for Increased Bandwidth. |
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| **Unit -5 (7 Hours)** | **POWER AMPLIFIERS:** Power amplifier circuits, Class A output stage, class B output stage and class AB output stages, class C amplifiers, pushpull amplifiers with and without transformers. Complementary symmetry and quasi complimentary symmetry amplifiers |
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| **List of Expt.** | nil |
| **Text Book** | Millman, Integrated Electronics, TMH.(1972) |
| **Reference book** | 1. M. H. Rashid, Microelectronic Circuits Analysis and Design, Cengage Learning 2010 |
|  | 2 Electronic Devices and Circuits–II, R.Tiwari, Genius publications 2013 |
| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **DIGITAL ELECTRONICS EC 204 (3-0-2-4)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The objective of the course are: |
|  | 1. To provide an overview of the different number systems, their representation, basic logic gates & Boolean algebra. |
|  | 2.To provide the method of implementation of different logic families and comparison on basis of their characteristics |
|  | 3.To demonstrate the SOP/POS representation of Boolean functions. The minimization of these functions can be done by using various properties or using Kmap approach. |
|  | 4.To provide basis of the designing of various combinational circuits using basic gates. |
| **Expected Outcome:** | The student will be able to |
|  | 1.Students will be able to know the basics of digital electronics which are used in digital system applications and determine the philosophy of number systems and codes. |
|  | 2. Students will understand the implementation of different gates. |
|  | 3. Students will be able to simplify the logic expressions using Boolean laws and postulates and design them by using logic gates and minimize the logic expressions using map method and tabular method. |
|  | 4. Students will be able to design combinational logic circuits using conventional gates |
|  |  |
| **Unit -1 (7 Hours)** | |  | | --- | | **NUMBER SYSTEMS, BASIC LOGIC GATES and BOOLEAN ALGEBRA** | | Introduction to Boolean algebra, Boolean identities; Basic logic functions, combinational logic, standard forms of logic expressions. Features of logic algebra. Boolean function. Derived logic gates: Exclusive-OR, Nand, NOR gates, their block diagrams and truth tables. Logic diagrams from Boolean expressions and vica-versa. Converting logic diagrams to universal logic. Positive, negative and mixed logic. Logic gate conversion. | |
|  |  |
| **Unit -2 (7 Hours)** | **MINIMIZATION TECHNIQUES**  Minterm, Maxterm, Karnaugh Map, K map upto 4 variables. Simplification of logic functions with K-map, conversion of truth tables in POS and SOP form. Incomplete specified functions. Variable mapping. Quinn-Mc Klusky minimization techniques |
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| **Unit -3 (7 Hours)** | |  | | --- | | **COMBINATIONAL SYSTEMS** | | Multiplexers, demultiplexers and their use in logic synthesis; Arithmetic circuits like half and full adder, subtractor. Binary serial and parallel adders. BCD adder. Binary multiplier. Decoder: Binary to Gray code decoder, BCD to decimal, BCD to 7-segment decoder. Encoder- Octal to binary, BCD to excess-3 encoder. Diode switching matrix. | |
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| **Unit -4 (7 Hours)** | |  | | --- | | **SEQUENTIAL SYSTEMS** | | Operation and excitation tables of RS, JK, Master Slave, D, and T flip flops; Latch, shift register; Counters: Ripple, synchronous, ring and up-down; Design of counters, design of other sequential circuits. | |
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| **Unit -5 (7 Hours)** | |  | | --- | | **DIGITAL LOGIC GATE CHARACTERISTICS** | | Transistor as a switch, Schottky transistor; Logic gate characteristics: Propagation delay, speed, noise margin, fan-out and power dissipation.Analysis and characteristics of standard TTL, Schottky TTL, advanced TTL and ECL logic; MOS inverter and gate, CMOS logic, operation and characteristics of MOS and CMOS logic. Comparison of logic families, interfacing of various logic families; Tri-state logic. | |
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| **List of Expt.** | 10 |
| **Text Book** | 1. Herbert Taub, Donald L. Schilling , “Digital integrated electronics”, TMH (2004) |
| **Reference book** | 1. Ghoshal, “Digital Electronics”, Cengage Learning(2012) |
|  | 2 Millman Taub, “Pulse and digital Switching waveforms” ,TMH(1984) |
| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **ELECTROMAGNETIC FIELD THEORY EC 206 C(L,T,P) =4(3,1,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The objective of the course are: |
|  | 1.To get the knowledge of vectors and different coordinate systems, Understand the meaning of divergence and curl; be able to calculate line  integrals, surface and volume integrals |
|  | 2. To understand the properties of static electric field, Use Gauss Law, Coulombs law and Poisson’s Equation to find fields and potentials for a  variety of situations including charge distributions and capacitors. Electric fields in the presence of dielectrics. |
|  | 3. Understand the properties of static magnetic field, use of Ampere’s law for calculate magnetic field in different situations. |
|  | 4. To find the Maxwell’s Equations in integral and differential form for static field and their modifications in dynamic conditions. To  Understand Maxwell’s Equations for timeharmonic  fields and the boundary conditions across media boundaries. To Analyze electromagnetic  wave propagation and attenuation in various medium and propagation through boundaries between media |
|  |  |
| **Expected Outcome:** | The student will be able to |
|  | 1. Understand the meaning of divergence and curl; be able to calculate line integrals, surface and volume integrals in all coordinate systems. |
|  | 2. Understands the Use of Gauss Law, Coulombs law and Poissons’s Equation to find fields and potentials for a variety of situations including  different charge distributions. Use boundary conditions to find electric field in different mediums |
|  | 3. Understands the Use of Ampere’s Law, to find magnetic fields and magnetic vector potentials for a variety of situations including different  current distributions. Use boundary conditions to find magnetic field in different mediums. |
|  | 4. Understand the different Maxwell’s equations (both in integral and differential form) in static field. Modifications of these equations in dynamic  cases. |
|  |  |
| **Unit -1 (7 Hours)** | **VECTOR ANALYSIS** |
|  | Fundamental Concepts, Scalar and vector fields; Physical interpretation of gradient, divergence and curl; Vector Relation in rectangular, cylindrical, spherical and general curvilinear coordinates system, Green’s and Stoke’s theorems. |
| **Unit -2 (7 Hours)** | **ELECTROSTATICS** |
|  | Electric field intensity and flux density. Electric field due to various charge configurations. The potential functions and displacement vector. Gauss’s law. Poisson’s and Laplace’s equation and their solution. Uniqueness theorem. Continuity equation. Capacitance and electrostatics energy. Field determination by method of images. Boundary conditions, Field mapping and concept of field cells |
| **Unit -3 (7 Hours)** | **MAGNETOSTATICS** |
|  | Magnetic field intensity, flux density and magnetization, Faraday’s Law, Bio-Savart’s law, Ampere’s law, Magnetic scalar and vector potential, self and mutual inductance, Energy stored in magnetic field, Boundary conditions, Analogy between electric and magnetic field, Field maping and concept of field cells. |
| **Unit -4 (7 Hours)** | **TIME VARYING FIELDS** |
|  | Displacement currents and equation of continuity. Maxwell’s equations, Uniform plane wave in free space, dielectrics and conductors, skin effect sinusoidal time variations, reflection and refraction of Uniform Plane Wave, standing wave ratio. Pointing vector and power considerations. |
| **Unit -5 (7 Hours)** | **RADIATION, EMI and EMC** |
|  | Retarded Potentials and concepts of radiation, Radiation from a small current element. Radiation resistance**:** Introduction to Electromagnetic Interference and Electromagnetic compatibility, EMI coupling modes, Methods of eliminating interference, shielding, grounding, conducted EMI, EMI testing: emission testing, susceptibility testing. |
| **List of Expt.** | nil |
| **Text Book** | 1. Sadiku, Electromagnetic Field Theory, Oxford .(2000)  2. Mahapatra, Principles of Electromagnetics, TMH.(2011) |
| **Reference book** | 1 Kshetrimeyum – Electromagnetic field theory, Cengage learning 2012 |
|  | 2 Hayt, Engineering Electromagnetics, TMH 2007 |
| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **EC 255 ELECTRONIC MEASUREMENT AND INSTRUMENTATION LAB C(L,T,P) =1(0,0,2)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The objective of the course are: |
|  | 1. To know about the fall of potential test method is used to measure the ability of an earth Ground system.. To know about various parameters and to study modal of solar cell. |
|  | 2. To know about the inductance of a coil using capacitor and resistor and Maxwell bridge, To understand Wien bridge oscillator is a type of electronic oscillator that generates sine waves.. |
|  | 3. To know about the measurement of the distance with the help of ultrasonic transmitter and Receiver. And application is based upon the reflection of sound wave. |
|  | 4. To know about the Resistance Transducer and thermistor and magnitude of the output voltage |
|  | 5. To know about the ammeter using D.C. slide wire potentiometer and has intect become the Standard calibration of this instrument. To understand the strain gauge load cell continue to improve in term of sensitivity Responsiveness. |
|  |  |
| **Expected Outcome:** | The student will be able to |
|  | 1. Able to understand the fall of test method and measure the ability of an earth ground system. Able to understand V I characteristic |
|  | 2 Able to know required values of unknown inductance , capacitance and resistance are obtained. Able to understand the operation of the wien bridge circuit |
|  | 3Able to understand the measurement the distance object and source and to about the process of Find out distance Able to read the value of displacement with the help of LVDT |
|  | 4 Able to know the output voltage depends on the temperature difference between junction and material. |
| S. No. | List of Experiments |
| 1. | Measure earth resistance using fall of potential method. |
| 2. | Plot V-I characteristics and measure circuit voltage and short circuit current of a solar panel. |
| 3. | Measure unknown inductance capacitance resistance using following bridges  (a) anderson Bridge  (b) Maxwell Bridge |
| 4. | To measure unknown frequency and capacitance using Wein’s bridge. |
| 5. | Measurement of the distance with the help of ultrasonic transmitter and receiver. |
| 6. | Measurement of displacement with the help of LVDT. |
| 7. | Draw the characteristics of the following temperature transducers:  (a) RTD (Pt-100)  (b) Thermistors  (c) Thermocouple |
| 8. | Draw the characteristics between temperature and voltage of a K type thermocouple. |
| 9. | Measure the speed of a Table Fan using stroboscope. |
| 10. | Measurement of strain/ force with the help of strain gauge load cell. |
| **List of Expt.** | 10 |
| **Text Book** | 1. Electronic Instrument and Measurment, Bell, Oxford .(2007)  2. Electronic Measurements & Instrumentation, Bernard Oliver, TMH.(1971) |
| **Reference book** | 1. Electronic Instrumentation, H S Kalsi, TMH 2012  2. Instrumentation Measurement & Analysis, B.C.Nakra,K.K. Chaudhry, TMH 2004 |
| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **OBJECT ORIENTED PROGRAMMING (CP 216) C(L,T,P) =3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The objective of the course are: |
|  | 1. Help the learner to understand basic concept of object |
|  | 1. Understand basic concept of applet |
|  | 1. Understand the concept of overloading |
|  | 1. Understand the concept of class |
| **Expected Outcome:** | The student will be able to |
|  | 1. Create program using class |
|  | 1. Understand the concept of java |
|  | 1. Implementation of exception handling |
|  | 1. Generate different form of java |
|  | 1. Application of java |
| **Unit -1 (7 Hours)** | |  |  | | --- | --- | | **Introduction to Java** | | | Programming Environment, Java compiler and virtual machine: Structure of a Java program, standalone programs and applets; concepts of portability. Basic Programming Elements in Java: Data types, variables and array operators, assignment and selection statements iterative structures, nested loops.. | |
|  |  |
| **Unit -2 (7 Hours)** | **Classes in Java:** |
|  | General form of a class, creating objects, access control in classes; Constructors, methods, finalization, parameters, method overloading, recursive methods, returning objects, static members, final qualifier, nested and inner classes, string handling in Java, I/O mechanism, command line arguments. |
| **Unit -3 (7 Hours)** | **Inheritance:** |
|  | Basics super classes and subclasses, the keyword extends, multilevel hierarchy, method overriding; run time polymorphism, abstract classes, final in inheritance, the object class. Packages and Interfaces: Defining package, access protection, importing classes and packages, defining and implementing interfaces, nested interfaces, use of interfaces, variables in interfaces. |
| **Unit -4 (7 Hours)** | **Exception Handling** |
|  | Fundamentals, types of exceptions catching exceptions, multiple catching, nested try statements, uncaught exceptions, throw and throws, finally mechanism, built-in exceptions, creating exception subclasses, using exceptions. |
| **Unit -5 (7 Hours)** | **Applets:** |
|  | **Applets:** Applet fundamentals, native methods, static import, the applet class, applet display method, requesting repainting, a banner applet, passing parameters to applets, uses of applets. |
| **Reference book** | David Flanagan, “Java in a Nutshell”, 5th Ed., O’Reilly Media, Inc. |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **CP 260 OBJECT ORIENTED PROGRAMMING LAB C(L,T,P) =1(0,0,2)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The objective of the course are: |
|  | 1. To get a clear understanding of objectoriented  concepts. |
|  | 2. To understand object oriented programming through C++ & JAVA. |
|  | 3. To understand and learn various predefined functions and command used in C++ and JAVA |
| **Expected Outcome:** | The student will be able to |
|  | 1. Gain the basic knowledge on Object Oriented concepts. |
|  | 2. Ability to develop applications using Object Oriented Programming Concepts. |
|  | 3. Ability to implement features of object oriented programming to solve real world problems |
|  |  |
| S. No. | List of Experiments |
|  | PART I: Programs in C++ |
|  | Write a program to perform the complex arithmetic. |
|  | Write a program to perform the rational number arithmetic. |
|  | Write a program to perform the matrix operations. (Transpose, addition, subtraction, multiplication, test if a matrix is symmetric/ lower triangular/ upper triangular) |
|  | Implement Morse code to text conversion and vice-versa. |
|  | To calculate Greatest Common Divisor of given numbers. |
|  | To implement tower of Hanoi problem. |
|  | PARET II: Program in Java |
|  | To implement spell checker using dictionary. |
|  | To implement a color selector from a given set of colors. |
|  | To implement a shape selector from a given set of shapes. |
| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **EC 252 INDUSTRY ORIENTED ANALOG ELECTRONICS PROJECT LAB C(L,T,P) =2(0,0,2+2)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The objective of the course are: |
|  | 1. To analyze the basic working facts related to various electronics circuits. |
|  | 2. To have hands on experience on gain frequency characteristics of BJT and characteristics of UJT, MOSFET. |
|  | 3. To strengthen the concepts of series and shunt voltage regulators and measurement of line and load regulation and ripple factor. |
|  | 4. To prepare graduates to analyze different types of amplifiers eg. Small signal FET amplifier , pushpull amplifiers. |
|  | 5. To analyze the basic working facts and the critical aspects of various types of oscillators. |
| **Expected Outcome:** | The student will be able to |
|  | 1. Apply knowledge of basic circuit building blocks to create more advanced circuits within the scope and to the extent of the information presented. |
|  | 2. Ability to transform gain frequency characteristics of BJT and characteristics of UJT, MOSFET. |
|  | 3. Ability to apply knowledge of line and load regulation |
|  | 4. Ability to understand the basic concepts of different amplifiers and oscillators and use the advantage of these basic circuits to create more advanced circuits. |
| S. No. | List of Experiments |
|  | Plot gain-frequency characteristics of BJT amplifier with and without negative feedback in the emitter circuit and determine bandwidths, gain bandwidth products and gains at 1kHz with and without negative feedback. |
|  | Study of series and shunt voltage regulators and measurement of line and load regulation and ripple factor. |
|  | Plot and study the characteristics of small signal amplifier using FET. |
|  | Study of push pull amplifier. Measure variation of output power and distortion with load. |
|  | Study Wein bridge oscillator and observe the effect of variation in R and C on oscillator frequency |
|  | Study transistor phase shift oscillator and observe the effect of variation in R and C on oscillator frequency and compare with theoretical value. |
|  | Study the following oscillators and observe the effect of variation of C on oscillator frequency: (a) Hartley (b) Colpitts |
|  | Study of a Digital Storage CRO and store a transient on it. |
|  | To plot the characteristics of UJT and UJT as relaxation. |
|  | To plot the characteristics of MOSFET and CMOS. |
| **List of Expt.** | 10 |
| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **EC 254 DIGITAL ELECTRONICS LAB C(L,T,P) = 1(0,0,2)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The objective of the course are: |
|  | 1. To familiarize students with the fundamental concepts of basic logic gates and universal logic gates and their realization. |
|  | 2. To make students aware about the SOP & POS and digital combinational circuits and their realization using universal logic gates. |
|  | 3. To make students aware about ripple adder/ Subtractor, multiplexer and demultiplexer and their realization using basic logic gates. |
|  | 4. To make students aware about the seven segment displays. |
|  | 5. To make students aware about the sequential circuits like flip flops, counters and registers and their realization using basic logic gates. |
| **Expected Outcome:** | The student will be able to |
|  | Design basic logic gates and their realization using universal logic gates(NOR & NAND) |
|  | Analyze SOP & POS and design digital combinational circuits like decoders, encoders, including arithmetic circuits (half adder, full adder, and multiplier. |
|  | 3. Design ripple adder/ Subtractor, multiplexer and demultiplexer and their realization using basic logic gates. |
|  | 4. Design the seven segment displays. |
|  | 5. Design sequential digital circuits like flipflops, registers, counters. |
| S. No. | List of Experiments |
| 1. | To study and perform experiment of Compound logic function and various combinational circuits based on AND/NAND and OR/NOR logic blocks. |
| 2. | To study and perform experiments based EX-NOR and EX-OR. |
| 3. | To study and perform experiment of BINARY to DECIMAL ENCODER. |
| 4. | To study and perform experiment of HALF ADDER and FULL ADDER using NAND gates. |
| 5. | To study and perform operation of MULTIPLEXER and DEMULTIPLEXER. |
| 6. | To study and perform the following experiment:-   1. Decimal to BCD encoder 2. Binary to Gray code Converter 3. BCD to Seven segment Decoder |
| 7. | To perform and verify truth table of various FLIP-FLOP. |
| 8. | To study and perform experiment:-   1. Digital to Analog Converter 2. Analog to Digital Converter |
| 9. | To study and perform various types of shift registers and counters. |
| 10. | To study and perform experiments of Interfacing of CMOS to TTL and TTL to CMOS ICs. |
| **List of Expt.** | 10 |
| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **EC 234 RF PACKAGING AND COMPATIBILTY C(L,T,P) =3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | (1) Overview of electromagnetic compatibility (EMC) and EMI that covers the history of EMI occurrence and the development of worldwide EMC regulatory requirements. |
|  | (2) Discussion of behaviors of passive components at high frequencies and their impacts on EMC.. |
|  | (3) Concepts of grounding and shielding. Design and implementation of grounding and  shielding. |
|  | (4) Fundamental mechanisms of crosstalk, radiation and conduction that lead to EMI problems. Design techniques to suppress these EMI problems. |
|  | (5) Discussion on non-linear phenomena of active devices and electrostatic discharge (ESD). Design techniques to avoid EMI problems resulted from non-linear phenomena and ESD. |
|  | (6) Discussion on test methods and procedures for both emission and immunity EMC tests |
| **Expected Outcome:** | The student will be able to |
|  | 1. Understand EMC regulatory requirements in North America, European Community and Asia Pacific region. |
|  | 1. Be able to select proper passive components at high frequencies to minimize unwanted EMI behaviors. |
|  | 1. Be able to apply the correct grounding and shielding methodologies for specific product groups and operating frequencies. |
|  | 1. Be able to apply the correct circuit layout and design techniques to resolve EMI problems arising from crosstalk, radiation and conduction. |
|  | 1. Be able to avoid non-linear phenomena and (ESD) with good design practices. |
|  | 1. Understand the basic setup for a product-under-test to meet a specific EMC standard. |
|  |  |
| **Unit -1 (7 Hours)** | **EMC Requirements for Electronic Systems:** Sources of EMI; Aspects of EMC; Radiated susceptibility; Conducted susceptibility; Electrostatic discharge; Design constraints for products; Advantages of EMC design; Transmission line per-unit-length parameters: Wiretype structures, PCB structures; High-speed digital interconnects and signal integrity. |
|  |  |
| **Unit -2 (7 Hours)** | **Non-ideal Behavior of Components:** Spurious effects of wires, PCB, component leads, resistors, capacitors, inductors, ferromagnetic materials, electromagnetic devices, MMIC components, digital circuit devices, and mechanical switches. |
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| **Unit -3 (7 Hours)** | **Conducted and Radiated Emissions:** Measurement of conducted emissions; Power supply filters; Power supply and its placement; Conducted susceptibility; Simple emission models for wires and PCB leads; Simple radiated susceptibility models for wires and PCB leads. |
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| **Unit -4 (7 Hours)** | **Crosstalk:** Three-conductor transmission lines, shielded wires, twisted wires, shielding. |
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| **Unit -5 (7 Hours)** | **System Design for EMC:** Safety ground; PCB design; System configuration and design. |
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| **List of Expt.** | nil |
| **Text Book** | C. R. Paul, Introduction to electromagnetic compatibility, 2nd Edition, John Wiley & Sons, 2006. |
| **Reference book** | H. W. Ott, Noise reduction techniques in electronic systems, 2nd Edition, John Wiley & Sons, 1988. |
|  | E. L. Bronaugh, and W. L. Lambdin, Electromagnetic interference test methodology and procedures, Interference Control Technologies Inc., 1988. |
| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **EC 245 DYNAMIC SYSTEMS AND OPTIMIZATION C(L,T,P) =3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The primary goal of this course is to provide an overview of state-of-the-art optimization algorithms, the theoretical principles that underpin them, and to provide students with the modelling skills necessary to describe and formulate optimization problems and their use for solving several types of practically relevant optimization problems arising in process  systems engineering. |
| **Expected Outcome:** | The student will be able to |
|  | 1. Identify different types of optimization problems |
|  | 1. Understanding of different optimization technique |
|  | 1. Ability to solve various multivariable optimization problems |
|  | 1. Ability to solve optimization using software tools. |
|  | 1. Identify different types of test of Hypotheses. |
|  | 1. Ability to solve problems by using least square analysis. |
|  | 1. Understand Correlation and Regression |
| **Unit -1 (7 Hours)** | Introduction to optimum control, analytical and search methods. |
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| **Unit -2 (7 Hours)** | Idea of analytical design in the frequency domain – stochastic signals and their characterization; Fixed, free and semi-free configurations, concept of mean square error and its minimization. |
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| **Unit -3 (7 Hours)** | Constraints and their handling in frequency domain design, saturation avoiding, minimum bandwidth designs. |
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| **Unit -4 (7 Hours)** | Optimum control problem in time domain, performance index; Unconstrained and constrained optimization, variational calculus based solution, boundary conditions. Hamiltonian formulation, Pontryagin maximum principle, minimum-time, minimum fuel and other problems |
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| **Unit -5 (7 Hours)** | Dynamic programming and its relationship with other methods; Linear regulator problem and its solution. Optimum state estimation and Kalman filter. |
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| **List of Expt.** | nil |
| **Text Book** | Bryson, A.E. and Ho, C. H., “Applied Optimum Control”, Taylor and Francis. |
| **Reference book** | Sage, A. P. and White, C.C., “Optimum Systems Control", Prentice Hall. |
|  | McCausland, I.," Introduction to Optimal Control", Revised Ed., Krieger. |
| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **EC 235 FUZZY CONTROL C(L,T,P) =3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | To cater the knowledge of Neural Networks and Fuzzy Logic Control and use  these for controlling real time systems. |
| **Expected Outcome:** | The student will be able to |
|  | 1. To expose the students to the concepts of feed forward neural networks. |
|  | 1. To provide adequate knowledge about feedback neural networks. |
|  | 1. To teach about the concept of fuzziness involved in various systems. To provide   adequate knowledge about fuzzy set theory.. |
|  | 1. To provide comprehensive knowledge of fuzzy logic control and adaptive fuzzy logic and to design the fuzzy control using genetic algorithm. |
|  | 1. To provide adequate knowledge of application of fuzzy logic control to real time   systems |
| **Unit -1 (7 Hours)** | Knowledge based systems; Process monitoring, fault diagnosis, knowledge based controllers (KBC), knowledge representations in KBCs. Crispness, vagueness, uncertainty and fuzziness; Crisp and fuzzy sets, properties of fuzzy sets, operations on fuzzy sets, fuzzy relations, operations on fuzzy relations. |
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| **Unit -2 (7 Hours)** | Approximate reasoning, linguistic variables, fuzzy propositions, IfThen statements, inference rules; Representation and properties of a set of rules: Completeness, consistency, continuity. |
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| **Unit -3 (7 Hours)** | Structure of a fuzzy KBC (FKBC) and fuzzification module, knowledge base, inference engine, defuzzification module; Rule based variables, contents of rules, derivation of rules, choice of membership functions and scaling factors, composition based and individual rule based inference, inference with a set of rules. |
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| **Unit -4 (7 Hours)** | Methods of fuzzification and defuzzification, and their performance evaluation, examples. Adaptive fuzzy control design and performance evaluation, various approaches to design; Stability analysis of fuzzy controllers. |
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| **Unit -5 (7 Hours)** | Non-linear fuzzy control, FKBC as nonlinear transfer element, fuzzification and defuzzification, rule base representation of transfer element, PID like FKBC and its rule base, sliding mode FKBC, and its phase plane plots and rule base, Sugeno FKBC and its rule base. |
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| **List of Expt.** | nil |
| **Text Book** | Alavala, C.R., “Fuzzy Logic And Neural Networks: Basic Concepts & Application ”, New Age International |
| **Reference book** | Ganesh, M., “ Introduction to Fuzzy Sets and Fuzzy Logic”, Prentice-Hall of India. |
|  | Pedrycz, W. and Gomide, F., “ An Introduction to Fuzzy Sets Analysis and Design”, Prentice-Hall of India. |
| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **SIGNALS AND SYSTEMS (EC 301) C(L,T,P) =4(3,1,0) )** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The objective of the course are: |
|  | 1. Help the learner to understand the behavior of signals and systems. |
|  | 2. Understand basic of signals behaviors. |
|  | 3. Help to understand how to convert a signal in one form to another form. |
|  | 4. Learn about discrete and analog behaviors of signals and systems |
| **Expected Outcome:** | The student will be able to |
|  | 1. Calculate the convolution of two signals or systems. |
|  | 1. Design a project based on communication. |
|  | 1. Easily understand the properties of signals. |
|  | 1. Design a communication system. |
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| **Unit -1 (7 Hours)** | **BASICS OF SIGNALS AND SYSTEMS**  Continuous time and discrete time systems, Properties of systems. Linear time invariant systems - continuous time and discrete time. Properties of LTI systems and their block diagrams. Convolution, Discrete time systems described by difference equations. |
|  |  |
| **Unit -2 (7 Hours)** | **FOURIER SERIES REPRESENTATION OF SIGNALS**  Fourier series representation of continuous periodic signal and its properties, Fourier series representation of Discrete periodic signal and its properties, Continuous time filters and Discrete time filters described by Diff. equation. |
|  |  |
| **Unit -3 (7 Hours)** | **FOURIER TRANSFORM**  The continuous time Fourier transform for periodic and aperiodic signals, Properties of CTFT. Discrete time Fourier transform for periodic and aperiodic signals. Properties of DTFT. The convolution and modulation property. |
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| **Unit -4 (7 Hours)** | **Z-TRANSFORM and LAPLACE TRANSFORM**  Introduction. The region of convergence for the Z-transform. The Inverse Z-transform. Two dimensional Z-transform. Properties of Z transform. Laplace transform, Properties of Laplace Transform, Application of Laplace transform to system analysis. |
|  |  |
| **Unit -5 (7 Hours)** | **SAMPLING**  Mathematical theory of sampling. Sampling theorem. Ideal and Real sampling. Interpolation technique for the reconstruction of a signal from its samples. Aliasing. Sampling in freq. domain. Sampling of discrete time signals. |
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| **List of Expt.** | 10 |
| **Text Book** | A.V. Oppenheim, A.S. Willsky and I.J. Young-"Signals and Systems", Prentice Hall of India Ltd. |
| **Reference book** | 1. Taub and Schilling-"Principles of Communication System", Tata Mc-graw Hill.   2.Prokins and Manolakis-Digital Signal Processing: Principles algorithms \*Applications, Prentice Hall Pvt. Ltd |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **EC 303 MICROWAVE ENGINEERING-I C(L,T,P) =4(3,1,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The objective of the course are: |
|  | 1. 1. how to apply Maxwell’s equations to various canonical situations for free space, waveguides,  and cavity resonators. |
|  | 2. how to characterize microwave systems and components in terms of network theory (Scattering  matrix, ABCD matrix, impedance matrix, etc.) |
|  | 3. how to analyze and design tuning networks and matching transformers for microwave systems. |
|  | 4. how to make fundamental measurements related to microwave engineering (VSWR, S parameters,  etc.) |
|  | 5. how to interpret and manipulate graphical representations of microwave components and  systems via the Smith chart. |
| **Expected Outcome:** | The student will be able to |
|  | 1. Able to apply electromagnetic theory to calculations regarding waveguides and transmission lines. |
|  | 1. Able to describe, analyze and design simple microwave circuits and devices e g matching circuits, couplers, antennas and amplifiers. |
|  | 1. Able to describe and coarsely design common systems such as radar and microwave transmission links. |
|  | 1. Able to describe common devices such as microwave vacuum tubes, high-speed transistors and ferrite devices. |
|  | 1. Able to handle microwave equipment and make measurements. |
| **Unit -1 (7 Hours)** | **WAVE GUIDES:** Introduction of Microwaves and their applications. Rectangular Waveguides, Solution of Wave equation in TE and TM modes. Power transmission and Power losses. Excitation of modes in Rectangular waveguides, circular waveguides: Basic idea of TE and TM modes, field patterns, TEM mode of propagation. |
|  |  |
| **Unit -2 (7 Hours)** | **WAVEGUIDE COMPONENTS:** Scattering matrix representation of networks. Rectangular cavity and circular cavity resonators. Waveguide Tees, Magic Tees. Hybrid rings. Waveguide corners, Bends and twists. Directional couplers, Circulators and isolators. |
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| **Unit -3 (7 Hours)** | **KLYSTRONS:** Limitation of conventional vacuum tubes, Construction and operation of two cavity and multicavity klystrons. Velocity modulation and electron bunching (analytical treatment), Applegate diagram and applications of two cavity klystrons. Construction, working and operation of Reflex klystron. Applications and practical considerations. Velocity modulation, power output and frequency characteristics of a Reflex klystron. Electron admittance. |
|  |  |
| **Unit -4 (7 Hours)** | **TRAVELLING WAVE TUBES (TWT):** Construction, operation and practical consideration of helix type TWT. Introduction to CW power, pulsed dual mode TWT. Coupled cavity TWT. Applications of TWT. |
|  |  |
| **Unit -5 (7 Hours)** | **MAGNETRON:** Types of Magnetron. Construction, operation, analysis and practical consideration of cavity or traveling wave magnetron. Introduction to coaxial, frequency angle and voltage tunable magnetrons. Backward cross field oscillator, Forward wave cross field amplifier. |
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| **List of Expt.** | 10 |
| **Text Book** | Foundations For Microwave Engineering – R.E. Collin, R.E. Collin, Wiley |
| **Reference book** | S.Y. Laio - 'Microwave devices and Circuits', Prentice-Hall of India.  H.J. Reich - 'Microwave Principles', East-West Press |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **EC 305 LINEAR INTEGRATED CIRCUITS C(L,T,P) =3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The objective of the course are: |
|  | 1. To introduce the basic structure and operation of operational amplifiers. |
|  | 2. To teach the most common applications of operational amplifiers including converters and oscillators. |
|  | 3. To design different types of filters |
|  | 4. To introduce application specific linear ICs such as multipliers, data converters, Voltage regulators and 555 timer |
|  | 5. To introduce some non linear applications of operational amplifiers giving emphasis on Phase Locked Loop (PLL) |
| **Expected Outcome:** | The student will be able to |
|  | 1. The students will have a thorough understanding of operational amplifiers. |
|  | 2.They will have enough knowledge to design circuits using operational amplifiers for various applications. |
|  | 3. It will make them a clear understanding of linear and nonlinear  applications of operational amplifiers. |
|  | 4. Student will be familiarized with application specific ICs such as Voltage regulators, PLL and 555 timer. |
|  | 5. They will be able to implement theoretical concepts practically |
| **Unit -1 (7 Hours)** | **OPERATIONAL AMPLIFIERS**: Basic differential amplifier analysis, Single ended and double ended configurations, Op-amp configurations with feedback, Op-amp parameters, Inverting and Non- Inverting configuration, Comparators, Adder**.** |
|  |  |
| **Unit -2 (7 Hours)** | **OPERATIONAL AMPLIFIER APPLICATIONS:** Integrator, Differentiator, Voltage to frequency and Frequency to voltage converters. Oscillators: Phase shift, Wein bridge, Quadrature, square wave, triangular wave, saw tooth oscillators. Voltage controlled oscillators. |
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| **Unit -3 (7 Hours)** | **ACTIVE FILTERS:** Low pass, high pass, band pass and band reject filters, All pass filter, Switched capacitor filter, Butterworth filter design, and Chebyshev Filter design. |
|  |  |
| **Unit -4 (7 Hours)** | **PHASE-LOCKED LOOPS**: Operating Principles of PLL, Linear Model of PLL, Lock range, Capture range, Applications of PLL as FM detector, FSK demodulator, AM detector, frequency translator, phase shifter, tracking filter, signal synchronizer and frequency synthesizer, Building blocks of PLL, LM 565 PLL. |
|  |  |
| **Unit -5 (7 Hours)** | **LINEAR IC’s**: Four quadrant multiplier and its applications, Basic blocks of linear IC voltage regulators, Three terminal voltage regulators, Positive and negative voltage regulators. The 555 timer as astable and monostable multivibrators. Zero crossing detector, Schmitt trigger. |
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| **List of Expt.** | 10 |
| **Text Book** | 1. OPAMP  and linear integrated circuits 2nd edition, PLHI by Ramakant A. Gayakwad. (1992)  2. Design with operation amplifiers and Analog Integrated circuits by Sergei Franco. (2007)  3. Integrated Electronics: Analog and Digital circuits & system by Millman & Halkias. (1972)  4. Linear Integrated Circuits by D.R.Chaudhary (WEL). (2007) |
| **Reference book** | R.A. Gayakwad-Op-amplifiers and Linear ICs, Prentice Hall of India.  Taubay-Operational Amplifiers.  K.R. Botkar-Integrated Circuits. Pearson Education |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **EC 307 ANALOG COMMUNICATION C(L,T,P) =4(3,1,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The objective of the course are: |
|  | 1. The course provides a foundation for the students to develop an appreciation and an understanding of the principles of communication Systems. To enable the students to understand the basic modulations, types of modulations. |
|  | 2. To understand the noise performance of AM & FM receivers and channel models. To understand the basic issues that pertains to the transmission of signals over an AWGN channel |
|  | 3. To understand basic Analog communication system theory and design, with an emphasis on system in presence of noise. |
| **Expected Outcome:** | The student will be able to |
|  | 1.Understand the basic concept of information |
|  | 2.Understand how information is put into electronic for storage and delivery. |
|  | 3.Have detailed understanding of amplitude and frequency modulation and demodulation methods including synchronous demodulation, nonlinear demodulation and phaselocked |
|  | 4. Have an understanding of design considerations for multiple access/use spectrums and multiplexing |
|  | 5. Have detailed understanding of Pulse modulation schemes with concept of Multiplexing and Sampling |
| **Unit -1 (7 Hours)** | **RANDOM VARIABLES AND OPERATIONS:** Introduction, distribution and density functions, discrete and continuous random variables, special distributions: binominal, Poisson, uniform, exponential, normal, rayleigh.conditional distribution and density functions. Mean and variance, moments, chebyshev’s inequality, Central limit theorem, characteristic functions and moment generating function, covariance and correlation coefficient of single Random variable. |
|  |  |
| **Unit -2 (7 Hours)** | **AMPLITUDE MODULATION:** Frequency translation, Recovery of base band signal, Spectrum and power relations in AM systems. Methods of generation and demodulation of AM-DSB, AM-DSB/SC and AM-SSB signals. Modulation and detector circuits for AM systems. AM transmitters and receivers. |
|  |  |
| **Unit -3 (7 Hours)** | **FREQUENCY MODULATION:** Phase and freq. modulation and their relationship, Spectrum and band width of a sinusoidally modulated FM signal, phasor diagram, Narrow band and wide band FM. Generation and demodulation of FM signals. FM transmitters and receivers.. Comparison of AM, FM and PM. Pre emphasis and deemphasis. Threshold in FM, PLL demodulator. |
|  |  |
| **Unit -4 (7 Hours)** | **NOISE EFFECTS IN COMMUNICATION SYSTEMS:** Resistor noise, Networks with reactive elements, Noise temperature, Noise bandwidth, effective input noise temperature, Noise figure. Noise figure and equivalent noise temperature in cascaded circuits. Calculation of signal-to-noise ratio in SSB-SC, DSB-SC, DSB with carrier, Noise calculation of square law demodulator and envelope detector. Calculation of S/N ratio in FM demodulators, Super heterodyne receivers. |
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| **Unit -5 (7 Hours)** | **NOISE EFFECTS IN COMMUNICATION SYSTEMS:** Resistor noise, Networks with reactive elements, Noise temperature, Noise bandwidth, effective input noise temperature, Noise figure. Noise figure and equivalent noise temperature in cascaded circuits. Calculation of signal-to-noise ratio in SSB-SC, DSB-SC, DSB with carrier, Noise calculation of square law demodulator and envelope detector. Calculation of S/N ratio in FM demodulators, Super heterodyne receivers. |
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| **List of Expt.** | 10 |
| **Text Book** | Modern Digital & Analog Communication Systems, Lathi, Oxford |
| **Reference book** | 1. Analog Communication, Chandrasekhar, Oxford   2.An Introduction To Analog & Digital Communications, Haykins , Wiley |
|  | 3. Analog Communication, K. N. Hari Bhat, Pearson |
| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **EC 309 MICROPROCESSOR C(L,T,P) =3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The objective of the course are: |
|  | 1. To learn the architecture of 8085 microprocessor |
|  | 2. To learn the assembly language programming of 8085 microprocessor |
|  | 3. To study the interrupt, InputOutput of 8085 microprocessor. |
| **Expected Outcome:** | The student will be able to |
|  | 1. Students will become familiar with 8085 microprocessor architecture and programming. |
|  | 2. Students get to know the interrupt I/O process of microprocessor. |
|  | 3. Students will be able to do interfacing with peripherals. |
| **Unit -1 (7 Hours)** | **INTRODUCTION**: CPU, address bus, data bus and control bus. Input/ Output devices, buffers,encoders, latches and memories. |
|  |  |
| **Unit -2 (7 Hours)** | **8085 MICROPROCESSOR ARCHITECTURE**: Internal data operations and registers, pins and signals, peripheral devices and memory organization, interrupts. CISC and RISC architecture overview. |
|  |  |
| **Unit -3 (7 Hours)** | **8085 MICROPROCESSOR INSTRUCTIONS**: Classification, format and timing. Instruction set.Programming and debugging, 8 bit and 16 bit instructions. |
|  |  |
| **Unit -4 (7 Hours)** | **8085 MICROPROCESSOR INTERFACING**: 8259, 8257, 8255, 8253, 8155 chips and their applications. A/D conversion, memory, keyboard and display interface (8279). |
|  |  |
| **Unit -5 (7 Hours)** | **8086/8088 MICROPROCESSOR:** Hardware specifications, architecture, address spaces, clock generator, bus controller and arbiter, Minimum and maximum mode. System Bus Timing. Assembly language programming, addressing mode and instructions of 8086/8088, linking and execution of programs. MACRO programming, assembler directives and operators. |
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| **List of Expt.** | 10 |
| **Text Book** | Microprocessors Architecture, Programming &Application, Ramesh S. Gaonkar, (2000) |
| **Reference book** | 1. Introduction to Microprocessors, A.P. Mathur, Mc Graw Hill 2002 |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **EC351 MICROWAVE ENGINEERING LAB C(L,T,P) =1(0,0,2)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The objective of the course are: |
|  | 1. To implement the theory concepts, which learnt in theory class. |
|  | 2.. To calculate the various parameters of different microwave components. |
|  | 3. To compare the theoretical data with practical data and to analysis the difference between them. |
|  | 4. For practice on different components of microwave. |
| **Expected Outcome:** | The student will be able to |
|  | 1. Measure the various properties of various components. |
|  | 1. Analysis the parameter of different components. |
|  | 1. Work on Spectrum Analyzer |
|  | 1. Work on different instruments which are used to perform the practical. |
| **S.No.** | List of Experiments |
| **Experiments 1** | Study of various microwave components and instruments like frequency meter, attenuator, detector and VSWR meter. |
| **Experiments 2** | To study mode characteristics of reflex klystron. |
| **Experiments 3** | Measurement of frequency and wavelength in a rectangular waveguide. |
| **Experiments 4** | Measurement of VSWR (small as well as large values) and reflection coefficient. |
| **Experiments 5** | Measurement of VSWR (small as well as large values) and reflection coefficient. |
| **Experiments 6** | To study V-I characteristics of Gunn Diode and depth of modulation of PIN diode |
| **Experiments 7** | To obtain the radiation pattern of an Horn antenna. |
| **Experiments 8** | To measure the gain of Horn antenna |
| **Experiments 9** | Study of Magic Tee, circulator, isolator |
| **Experiments 10** | To measure of Unknown load impedance. |
| **List of Expt.** | 10 |
| **Text Book** | A.V. Oppenheim, A.S. Willsky and I.J. Young-"Signals and Systems", Prentice Hall of India Ltd. |
| **Reference book** | S.Y. Laio - 'Microwave devices and Circuits', Prentice-Hall of India.  H.J. Reich - 'Microwave Principles', East-West Press. |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **EC 353 INDUSTRY ORIENTED ELECTRONIC ENGINEERING DESIGN PROJECT LAB C(L,T,P)= 2 (0,0,2+2)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The objective of the course are: |
|  | The objective of this lab is to study operational amplifier (op amp) and its parameters. |
|  | 2. To enable the students to assemble the op amp circuits for various applications on brade board and test them. |
|  | 3.To design different 555 timer circuits. |
|  | 4. To design amplifier using Bipolar Junction Transistor. |
|  | 5. Simulation of these circuits with the help of appropriate software tools such as Multisim. |
| **Expected Outcome:** | The student will be able to |
|  | 1. The students will have a thorough understanding of operational amplifiers. |
|  | 2. They will be able to design circuits to meet desired specifications for various applications. |
|  | 3.They will be familiarized with hardware as well as software simulation of circuits using active and passive elements. |
|  | 4. The students will have handson experience so that they are able to put theoretical concepts to practice. |
|  | 5. This Laboratory can also support many experiments and new ideas which are evolved in the mind of students. |
| **Experiments 1** | Op-Amp characteristics and get data for input bias current, measure the output-offset voltage and reduce it to zero and calculate slew rate. |
| **Experiments 2** | Op-Amp in inverting and non-inverting modes. |
| **Experiments 3** | Op-Amp as scalar, summer and voltage follower. |
| **Experiments 4** | Op-Amp as differentiator and integrator. |
| **Experiments 5** | Design LPF and HPF using Op-Amp 741 |
| **Experiments 6** | Design Band Pass and Band reject Active filters using Op-Amp 741. |
| **Experiments 7** | Design Oscillators using Op-Amp (i) RC phase shift (ii) Hartley (iii) Colpitts |
| **Experiments 8** | Design (i) Astable (ii) Monostable multivibrators using IC-555 timer |
| **Experiments 9** | Design Triangular and square wave generator using 555 timer. |
| **Experiments 10** | Design Amplifier (for given gain) using Bipolar Junction Transistor. |
| **List of Expt.** | 10 |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **EC 355 MICROPROCESSOR LAB C(L,T,P)=1(0,0,2)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The objective of the course are: |
|  | 1. To learn assembly language programming related to Arithmetic, logical operation and jump instruction. |
|  | 2. To learn assembly language programming related to Communication with memory and calling subroutine and conversion. |
|  | 3. To learn assembly language programming related to Display of data on address and data fields. |
| **Expected Outcome:** | The student will be able to |
|  | 1. Students will be able to do programming on 8085 microprocessor. |
|  | 2. Students will be able to do microprocessor based projects |
| **Experiments 1** | Study of 8085 microprocessor kit |
| **Experiments 2** | Addition of two 8 bit numbers with and without carry |
| **Experiments 3** | Subtraction of two 8 bit numbers with and without borrow |
| **Experiments 4** | Multiplication of two 8 bit number using successive addition and resistor shifting method |
| **Experiments 5** | Program to find ones compliment of 1 byte number |
| **Experiments 6** | Program to find ones compliment of 2 byte number |
| **Experiments 7** | Program to find MASK OFF for LSB and MSB compliment of 1 byte number |
| **Experiments 8** | Program to find out square of a number. |
| **Experiments 9** | Programs to find sum of first ten natural number involving data arrays |
| **Experiments 10** | Programs to Generating odd numbers. |
| **Experiments 11** | Programs to Data transfer schemes |
| **Experiments 12** | Programs to Sorting of odd/even numbers. |
| **Experiments 13** | Programs to Finding largest and smallest numbers. |
| **Experiments 14** | Programs to Arrange data array in ascending / descending order |
| **Experiments 15** | Programs using stack |
| **Experiments 16** | Programs using subroutine. |
| **Experiments 17** | Debugging of programs using single stepping on kit |
| **List of Expt.** | 17 |
| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **EC 357 COMMUNICATION LAB C(L,T,P) =1(0,0,2)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The objective of the course are: |
|  | 1.The purpose of the lab is to train the students to design and implement communication systems, function and responses of the each block. |
|  | 2. To study experimentally the working of modulation schemes using discrete electronic components. |
| **Expected Outcome:** | The student will be able to |
|  | 1. Understand the concept of Modulation and demodulation |
|  | 2. Provide the real time experience to the super heterodyne receiver and response of each stage. |
|  | 3. Provide the applications of Pulse modulation with concept of Multiplexing. |
| S. No. | List of Experiments |
| 1. | Harmonic analysis of a square wave of a modulated wave form. |
| 2. | Observe the Amplitude modulated wave form and measure modulation index. Demodulation of AM signal. |
| 3. | Generation and Demodulation of DSB – SC signal. |
| 4. | Modulate a sinusoidal signal with high frequency carrier to obtain FM signal. Demodulation of the FM signal. |
| 5. | To observe the following in a transmission line demonstrator kit:  (a) The propagation of pulse in non reflecting transmission line.  (b) The effect of losses in transmission line.  (c) Transmission with standing waves on a Transmission line.  (d) The resonance characteristics of a half-wave length long X-mission line. |
| 6. | (a) To observe the operation of sampling and sample and hold circuits.  (b) To study the effect of sampling time (sampling pulse width).  (c) To study the effects of changing the sampling frequency and observing aliasing phenomena. |
| 7. | To study and observe the operation of a super heterodyne receiver. |
| 8. | To study and observe the amplitude response of automatic gain controller (AGC ). |
| 9. | PAM, PWM and PPM: Modulation |
| 10. | PAM, PWM and PPM: Demodulation. |
| **List of Expt.** | 10 |
| **Text Book** | Modern Digital & Analog Communication Systems, Lathi, Oxford |
| **Reference book** | 1. Analog Communication, Chandrasekhar, Oxford   2.An Introduction To Analog & Digital Communications, Haykins , Wiley |
|  | 3. Analog Communication, K. N. Hari Bhat, Pearson |
| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **COMPUTER SYSTEM ARCHITECTURE (CP 302) (3-0-0-3)** |
| **Version** | 1.1 |
| **Prerequisite** | FUNDAMENTALS OF COMPUTERS |
| **Objective:** | The objective of the course are: |
|  | 1. Help the learner to understand concept of compuer architecture |
|  | 1. Understand basic concept of memory |
|  | 1. Understand different concept of addressing mode |
|  | 1. Learn about different architecture |
| **Expected Outcome:** | The student will be able to |
|  | 1. Understand different architecture of computer |
|  | 1. Desgin the electronics instruments |
|  | 1. Concept of I/O organization |
|  | 1. Application of computer |
| **Unit -1 (7 Hours)** | **REGISTER TRANSFER LANGUAGE** |
|  | **:** Data movement amount registers, Data movement from/to memory, arithmetic and logic micro operations. Concept of bus and timings in register transfer. |
| **Unit -2 (7 Hours)** | **CPU ORGANISATION:** |
|  | Addressing Modes, Instruction Format, CPU organization with large registers, stacks and handling of interrupts and subroutines Instruction pipelining. ARITHMATIC ALGORITHM**:** Array multiplier, Booth's algorithm, Adition/Subtraction for sign Magnitude and 2's complement numbers. |
| **Unit -3 (7 Hours)** | **MICROPROGRAMMED CONTROL Unit:** |
|  | Basic Organization of micro-programmed controller, Horizontal and Vertical formats, Address sequencer. |
| **Unit -4 (7 Hours)** | **MEMORY ORGANISATION** |
|  | Concept of RAM/ROM, basic cell of RAM, Associative memory, Cache memory organization, Vertical memory organization. |
| **Unit -4 (7 Hours)** | **I/O ORGANISATION** |
|  | Introduction to Peripherals and their interfacing Strobe based and handshake-based communication, DMA based data transfer, I/O processor. |
| **List of Expt.** | \*\*\*\* |
| **Text Book** | \*\*\*\* |
| **Reference book** | M. Morris manno- 'Computer Architecture and Organization', Mc-Graw Hill. |
|  | 1. Heuring-Computer System Design and Architecture, Pearson Education. |
| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **CP 315 ADVANCED DATA STRUCTURES C(L,T,P) =3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | 1. Be familiar with basic techniques of algorithm analysis |
|  | 1. Be familiar with writing recursive methods |
|  | 1. Master the implementation of linked data structures such as linked lists and binary trees |
|  | 1. Be familiar with advanced data structures such as balanced search trees, hash tables, priority queues and the disjoint set union/find data structure |
|  | 1. Be familiar with several sub-quadratic sorting algorithms including quicksort, mergesort and heapsort |
| **Expected Outcome:** | The student will be able to |
|  | 1. Basic ability to analyze algorithms and to determine algorithm correctness and time efficiency class. |
|  | 1. Master a variety of advanced abstract data type (ADT) and data structures and their implementations. |
|  | 1. Master different algorithm design techniques (brute‐force, divide and conquer, greedy, |
|  | 1. Ability to apply and implement learned algorithm design techniques and data structures |
| **Unit -1 (7 Hours)** | **ADVANCED TREES -** Definitions and operations on weight balanced trees (Huffman trees), 2-3 trees and Red-Black trees. Augmenting Red-Black trees to dynamic order statistics and interval tree applications. Operations on disjoint sets and its Union-Find problem. Implementing sets, discitionerics, priority queues and concatenable queues using 2-3 trees. |
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| **Unit -2 (7 Hours)** | **MERGEABLE HEAPS -** Mergeable Heap operations, binomial trees, implementing binomial heaps and its operations. 2-3-4- trees and 2-3-4 heaps. Structure and potential function of Fibonacci heap. Implementing Fibonacci Heap**.** |
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| **Unit -3 (7 Hours)** | **GRAPH THEORY DEFINITIONS** - Definitions of Isomorphism, Components, Circuits, Fundamental Circuits, Cut-sets, Cut-Vertices, Planer and dual graphs, Spanning trees, Kuratovski’s two graphs. |
|  |  |
| **Unit -4 (7 Hours)** | **GRAPH THEORETIC ALGORETHMS** - Algorithms for connectedness, finding all spanning trees in a weighted graph and planarity testing. Breadth first and depth first search, topological sort, strongly connected components and, articulation point. |
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| **Unit -5 (7 Hours)** | **APPLICATION OF GRAPHS**- Single source shortest path and all pair shortest path algorithms. Min-Cut Max-Flow theorem of network flows, Ford-Fulkerson Max Flow algorithms. |
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| **List of Expt.** | nil |
| **Text Book** | Narsingh Deo- Graph Theory with Applications to Engineering and Computer Sicience, Prentice Hall of India.  Cormen- Introduction to Algorithms, Prentice Hall of India. |
| **Reference book** | Aho A.V., Hopcrpft J.E. and Ullman J.D.-The Design and Analysis of Computer Algorithms, Addition-Wesley.  Horwitz and Sawhni-fundamentals of Data Structures, Galgotia Book source.  Wilson-Introduction to Graph Theory, Pearson Education. |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **MA 301 COMPUTER ORIENTED MATHEMATICAL METHODS C(L,T,P) =3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | 1. recognize that mathematics is an art as well as a powerful foundational tool of science with limitless applications. |
|  | 1. demonstrate an understanding of the theoretical concepts and axiomatic underpinnings of mathematics and an ability to construct proofs at the appropriate level. |
|  | 1. demonstrate competency in mathematical modeling of complex phenomena, problem solving and decision making. |
|  | 1. demonstrate a level of proficiency in quantitative and computing skills sufficient to meet the demands of society upon modern educated women as global leaders. |
| **Expected Outcome:** | The student will be able to |
|  | 1. Formulate and analyze mathematical and statistical problems, precisely define the key terms, and draw clear and reasonable conclusions |
|  | 1. Read, understand and construct correct mathematical and statistical proofs and use the library and electronic data-bases to locate information on mathematical problems |
|  | 1. Explain the importance of mathematics and its techniques to solve real life problems and provide the limitations of such techniques and the validity of the results |
| **Unit -1 (7 Hours)** | **MATRIX COMPUTATION:** Algebra of matrix, Inverse of a matrix, Rank of a matrix, Matrix inversion by Gauss elimination, Computer programs for matrix inversion. |
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| **Unit -2 (7 Hours)** | **SOLUTION OF LINEAR EQUATIONS:** Cramer’s rule, Gauss elimination, Gauss Jordan elimination and Gauss Seidal iterative method and their implementation in C. |
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| **Unit -3 (7 Hours)** | **SOLUTION OF NON-LINEAR EQUATIONS:** Interval bisection method, Secant method, Regula- Falsi method, Curve fitting, Method of least squares and their implementation in C. |
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| **Unit -4 (7 Hours)** | **SOLUTION OF DIFFERENTIAL EQUATIONS:** Euler’s method, Modified Euler’s method, Runge Kutta method of fourth order, Solution of partial differential equation with special reference to heat equation, Laplace equation and wave equation Milne’s and their implementation in C. |
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| **Unit -5 (7 Hours)** | **STATISTICAL METHODS:** Curve fitting methods – method of least squares, fitting a straight line, parabola. Correlation and Linear regression. |
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| **List of Expt.** | nil |
| **Text Book** | V.Rajaraman-Computer Oriented Numerical Methods, Prentice Hall of India. |
| **Reference book** | B.S. Grewal-Higher Engineering Mathematics  J.L. Bansal-Numerical Analysis  Balasubramanyam-Numerical Methods.  E.V. Krishnamurthy-Numerical Methods.  Gaur and Kaul-Higher Engineering Mathematics |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |
|  | **EC 209 BIOMEDICAL INSTRUMENTATION C(L,T,P) =3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | 1. To make the students understand that the human subsystems are analogous to engineering systems and the generation of bioelectric signals in the human body. To measure these signals and perform the processing for further use. |
|  | 2. The graduates gain the knowledge about various instruments used for biomedical applications. The basic principle, construction and working of instruments of prime importance for diagnostic and therapeutic use will be studied |
|  | 3 To make the students understand the importance of modern health monitoring systems and advanced imaging and scanning devices. |
|  | 4. To provide knowledge about biological problems that requires engineering expertise to solve them. |
| **Expected Outcome:** | The student will be able to |
|  | 1. Students will be imparted a basic understanding of biological mechanisms of living organisms from the perspective of engineers. In addition, the course is expected to encourage engineering students to think about solving biological problems with engineering tools. |
|  | 2. Students shall be able to understand the importance of instrumentation in the field of biomedical and apply its principles to measure variables of prime importance for the human health. |
|  | 3 Students will be able to understand the working and design of instruments used for biomedical applications. |
| **Unit -1 (7 Hours)** | Introduction: Specifications of bio-medical instrumentation system, Man-Instrumentation system Components, Problems encountered in measuring a living system. Basics of Anatomy and Physiology of the body. Bioelectric potentials: Resting and action potentials, propagation of action potential, The Physiological potentials – ECG, EEG, EMG, ERG, EOG and Evoked responses.  Electrodes and Transducers: Electrode theory, Biopotential Electrodes – Surface electrodes, Needle electrodes, Microelectrodes, Biomedical Transducer. |
|  |  |
| **Unit -2 (7 Hours)** | Cardiovascular Measurements: Electrocardiography – ECG amplifiers, Electrodes and Leads, ECG –Single channel, Three channel, Vector Cardiographs, ECG System for Stresses testing, Holter recording, Blood pressure measurement, Heart sound measurement. Pacemakers and Defibrillators. Patient Care and Monitoring: Elements of intensive care monitoring, displays, diagnosis, Calibration and Reparability of patient monitoring equipment. |
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| **Unit -3 (7 Hours)** | Respiratory system Measurements: Physiology of Respiratory system. Measurement of breathing mechanism – Spirometer. Respiratory Therapy equipments: Inhalators, Ventilators and Respirators, Humidifiers, and Nebulizers and Aspirators. Nervous System Measurements: Physiology of nervous system, Neuronal communication, Neuronal firing measurements. |
|  |  |
| **Unit -4 (7 Hours)** | Ophthalmology Instruments: Electroretinogram, Electro - oculogram, Ophthalmoscope, Tonometer for eye pressure measurement. Diagnostic techniques: Ultrasonic diagnosis, Eco - cardiography, Eco-encephalography, Ophthalmic scans, X-ray and Radio-isotope diagnosis and therapy, CAT-Scan, Emission computerized  tomography, MRI. |
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| **Unit -5 (7 Hours)** | Bio-telemetry: The components of a Bio-telemetry system, Implantable units, Telemetry for ECG measurements during exercise, for Emergency patient monitoring. Prosthetic Devices and Therapies: Hearing Aides, Myoelectric Arm, Dia-thermy, Laser applications in medicine. |
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| **List of Expt.** | nil |
| **Text Book** | 1. R. S. Khandpur, “Biomedical Instrumentation”, TMH |
| **Reference book** | 1. Cromwell, “Biomedical Instrumentation and Measurements” PHI  2. J. G. Webster, “Bio- Instrumentation”, Wiley  3. S. Ananthi, “A Text Book of Medical Instruments”, New Age International  4. Carr and Brown, “Introduction to Biomedical Equipment Technology”, Pearson  5. Pandey and Kumar, “Biomedical Electronics and Instrumentation”, Kataria |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **EC 211 AUDIO VIDEO SYSTEM C(L,T,P) =3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | 1. Identify the problem, formulate and analyze engineering alternatives, and solve the problem individually as well as in a team environment; |
|  | 1. Assume management and leadership roles in the audio technology industry |
|  | 1. Communicate effectively in a professional engineering environment; |
|  |  |
| **Expected Outcome:** | The student will be able to |
|  | 1. apply the knowledge, techniques, skills, and modern tools of their disciplines; |
|  | 1. apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology |
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| **Unit -1 (7 Hours)** | Fundamentals of Audio-Video Recording and Playback Techniques Methods of sound recording & reproduction, optical recording, CD recording, CD & DVDplayer, MP3 player, MPEG player, audio standards. |
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| **Unit -2 (7 Hours)** | Fundamentals of Studio Acoustics and Advancements in Audio Technology Studio acoustics & verberation, acoustic chambers, P.A. system for auditorium, Cordless microphone system, special types of speakers & microphones, satellite radio. |
|  |  |
| **Unit -3 (7 Hours)** | Elements of a television system Picture and sound transmission and reception, CCIR-B standards ,aspect ratio, horizontal and vertical resolution, video bandwidth and interlaced scanning , composite video, signal, H & V sync details, VSB transmission and channel bandwidth: Modulation of picture and sound signals, positive and negative modulation. |
|  |  |
| **Unit -4 (7 Hours)** | Colour signal transmission and reception TV camera tubes ,Composite color signals, compatibility considerations, frequency interleaving process, Low level IF modulated color TV transmitter block diagram & Color TV receiver ,color mixing theory, luminance, hue and saturation, color difference signals, chromaticity diagram , color signal transmission- bandwidth and modulation of color difference signals, coders and decoders of NTSC , PAL – D & SECAM, Color Picture Tubes, picture tubes purity & convergence, automatic degaussing |
|  |  |
| **Unit -5 (7 Hours)** | Digital television Introduction to Digital T.V., Principle of Digital T.V., Digital T.V. signals & parameters, Digital T.V. Receiver, MPEG2, JPEG H & G audio & video standards, Digital T.V.Recording/Broadcasting Technique. Component coding ,MAC signals ,MAC encoding format ,scanning frequencies D2-MAC Packet Signal ,Duobinary Coding ,HDTV Standards & Compatibility ,colorimetric characteristics & parameters of HDTV systems , LCD TV System :LCD Technology , LCD Matrix types & operations , LCD screen for TV LCD color Receiver, Plasma TV System : Plasma & conduction of charge ,Plasma TV screen ,Signal processing in Plasma TV, Plasma color Receiver, Satellite TV, DTH Receiver System, CCTV, CATV, working of block converter,: IR Remote control |
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| **List of Expt.** | nil |
| **Text Book** | **Modern Television Practice – Principles, Technology and Service – R.R. Gulati, NewAge International Publication, Edition III, 2006** |
| **Reference book** | **Monochrome and Color TV – R.R. Gulati, New Age International Publication, 2002.**  **3. Color Television Theory and Practice – S.P. Bali, TMH, 1994.**  **4. Television and Video Engineering - A.M. Dhake, 2nd Edition.**  **5. Basic Television and Video Systems – B. Grob and C.E. Herndon, McGraw Hill, 1999.**  **6.Audio-Video Engineering – R.C.Jaiswal.** |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **EC 302 MICROWAVE ENGINEERING-II C(L,T,P) =4(3,1,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The objective of the course are: |
|  | 1. To learn about the microwave measurements |
|  | 1. To introduce about the different microwave transmission lines. |
|  | 1. To analysis the different microwave network |
|  | 1. To study the different semiconductor devices this is used in microwave. |
|  | 1. To understand the concept of MIC technology. |
| **Expected Outcome:** | The student will be able to |
|  | 1. Measure the different parameters of different microwave components |
|  | 1. Analysis the different microwave transmission lines. |
|  | 1. Design and analysis the different microwave two/ multi port networks |
|  | 1. Analysis the semiconductor devices of microwave. |
|  | 1. Fabricate and measure the components using MIC technology. |
| **Unit -1 (7 Hours)** | **MICROWAVE MEASUREMENTS:** Detection of microwaves, Microwave power measurement, Impedance measurement, Measurement of scattering parameters, Frequency measurement, VSWR measurements. |
|  |  |
| **Unit -2 (7 Hours)** | Introduction to microstrip lines, Parallel striplines, Coplanar striplines, Shielded striplines, Slot lines, Integrated Fin line, Non-radiative guide, Transitions, Bends and Discontinuities. |
|  |  |
| **Unit -3 (7 Hours)** | **MICROWAVE NETWORK ANALYSIS:** Impedance and Admittance matrices, Scattering matrix, Reciprocal networks and Loss less networks parameters, ABCD Matrix, Equivalent circuits for Two port Network, Conversions between two port network Signal flow graphs, Discontinuities in waveguides and microstrip. |
|  |  |
| **Unit -4 (7 Hours)** | **MICROWAVE SEMICONDUCTOR DEVICES:** Construction, Operation and Practical applications of PIN diode, varactor and Tunnel diode, Gunn diode, IMPATT, TRAPTT diodes, BJT, JFET, MESFET, CCD, MASER and LASER. |
|  |  |
| **Unit -5 (7 Hours)** | **MONOLITHIC MICOWAVE INTEGRATED CIRCUITS:** Introduction, Materials, MMIC Growth,MOSFET fabrication, Thin film formation, Hybrid integrated circuit fabrication, Advantages and Difficulties of MICs. |
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| **List of Expt.** | 10 |
| **Text Book** | Microwave Engineering, Annapurna Das, Sisir Das, TMH |
| **Reference book** | 1. Microwave Devices And Circuits, Samuel Y. Liao, Pearson |
|  | 1. Microwave Engineering, Pozar, Wiley |
| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **EC 306 DIGITAL COMMUNICATION C(L,T,P) =4(3,1,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The objective of the course are: |
|  | 1. To develop understanding of the modulation and demodulation techniques, understanding the design and development of modulation systems.Different Carrier systems for transmission of signals. Error probability in Pulse code modulation system during transmission. |
|  | 2. To develop the understanding of different type of coding of signals, how the coding is done. Different systems of coding And to understand thespectrum. |
|  | 3. To design framework for different digital modulation techniques for signal processing and evaluation of these different techniques, what errors can occur during signal processing. |
|  | 4. To develop understanding about the influence of noise on communication signal capacity of different communication channel to transmit error free data and evaluate this with help of different theories |
|  | 5. To design different coding techniques and understand different coding techniques how the information is coded into digital signal and how they are decoded at receiver end. Analysis of different coding system |
| **Expected Outcome:** | The student will be able to |
|  | 1. After completion of this unit Student will able to understand modulation and demodulation systems, differentiate between PCM and DM and toknow their specific usage in specific application. how the data is transferred through different kinds of digital communication system . |
|  | 1. Students will able to understand different type of coding of signals distinguish between source coding and channel coding , how the coding is done. |
|  | 3. Able To compare and contrast the ASK, BPSK, BFSK, QPSK, MSK digital carrier modulation schemes in terms of occupied bandwidth and complexity. framework for different digital modulation techniques for signal processing |
|  | 4. Students will be able To apply the basics of Information Theory to calculate channel capacity and other measures. |
|  | 5. They will be proficient in applying the different coding techniques |
| **Unit -1 (7 Hours)** | **PCM and DELTA MODULATION SYSTEMS:** Uniform and Non-uniform quantization. PCM and delta modulation, Signal to quantization noise ratio in PCM and delta modulation. DPCM, ADM, T1 Carrier System, Matched filter detection. Error probability in PCM system |
|  |  |
| **Unit -2 (7 Hours)** | **BASE BAND TRANSMISSION:** Line coding (RZ, NRZ): Polar,Bipolar,Manchester,AMI. Inter symbol interference, Pulse shaping, Nyquist criterion, Raised cosine spectrum. |
|  |  |
| **Unit -3 (7 Hours)** | **DIGITAL MODULATION TECHNIQUES:** Geometric interpretation of signals,Orthogonalization. ASK, BPSK, BFSK, QPSK, MSK modulation techniques and Coherent detection of these techniques. Calculation of error probabilities |
|  |  |
| **Unit -4 (7 Hours)** | **INFORMATION THEORY:** Amount of Information, Average Information, Entropy, Information rate, Increase in Average information per bit by coding, Shannon's Theorem and Shannon's bound, Capacity of a Gaussian Channel, BW-S/N trade off, |
|  |  |
| **Unit -5 (7 Hours)** | **CODING**: Coding and decoding of Information, Hamming code, Single Parity-Bit Code, Linear Block code, cyclic code and convolutional code. |
|  |  |
| **List of Expt.** | 10 |
| **Text Book** | 1. Analog And Digital Communication, Hwei Hsu, Debjani Mitra, TMH  2. Digital Commnunication, Amitabha Bhattacharya, TMH |
| **Reference book** | 1. Analog And Digital Communication, Sudakshina Kundu, Pearson |
|  | 1. Digital Communication, Sklar & Ray, Pearson |
| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **EC 308 CONTROL SYSTEMS C(L,T,P) =4(3,1,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The objective of the course are: |
|  | 1. To understand the different type of systems and their properties.. |
|  | 1. To analyse a system response in time domain and its characteristics |
|  | 1. To analyse a system response in frequency domain and its characteristics |
|  | 1. To understand the concept of stability in different domain. |
|  | 1. To have a knowledge of state variables and concepts of controllability and observability |
| **Expected Outcome:** | The student will be able to |
|  | 1. Design a system which meets required specifications based on basic concept. |
|  | 1. Analyse errors in the system and have ability to reduce it using different techniques |
|  | 1. Design a stable system. |
|  | 1. check the controllability and observability of a system |
|  |  |
| **Unit -1 (7 Hours)** | **CONTROL SYSTEMS ANALYSIS and COMPONENTS:** Examples and application of loop and close loop systems. Brief idea of multivariable control system, Brief idea of Z-transform and digital control systems. Differential equations. Determination of transfer function by block diagram reduction technique and signal flow graph method |
|  |  |
| **Unit -2 (7 Hours)** | **TIME RESPONSE ANALYSIS OF FIRST ORDER and SECOND ORDER SYSTEMS:** Transient response analysis. Steady state error and error constants. Dynamic error and dynamic error coefficient, Performance Indices. |
|  |  |
| **Unit -3 (7 Hours)** | **FREQUENCY DOMAIN METHODS:** Bode plot, Design specification in frequency domain and their co-relation with time domain. |
|  |  |
| **Unit -4 (7 Hours)** | **STABILITY OF THE SYSTEM:** Absolute stability and relative stability. Routh’s stability criterion, Hurwitz criterion. Root locus method of analysis. Polar plots, Nyquist stability criterion. M and N loci, Nicholas charts. |
|  |  |
| **Unit -5 (7 Hours)** | **STATE VARIABLE ANALYSIS:** Concepts of state, state variable and state model. State models for linear continuous time systems. Brief idea of state variable analysis in discrete time domain. Transfer functions, Solution of state equation. Concepts of controllability and observability. |
|  |  |
| **List of Expt.** | 10 |
| **Text Book** | 1. Modern control Engineering, Ogata, Pearson.(2009)  2. Nise’s Control System Engineering, Rajeev Gupta, Wiley (2011) |
| **Reference book** | Control Systems: Principles & Design, M. Gopal, TMH 2002 |
|  | Singh & Janardhanan Modern control engineering, Cengage learning 2010 |
| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **EC 310 INDUSTRIAL ELECTRONICS C(L,T,P)=4(3,1,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The objective of the course are: |
|  | 1. To get an overview of different types of power semiconductor devices and their switching Characteristics |
|  | 1. To understand the operation, characteristics and performance parameters of controlled rectifiers |
|  | 1. To study the operation, switching techniques and basics topologies of DC-DC Switching Regulators. |
|  | 1. To learn the different modulation techniques of pulse width modulated inverters and to Understand harmonic reduction methods |
|  | 5. To study the operation of AC voltage controller and motors. |
| **Expected Outcome:** | The student will be able to |
|  | 1. understand the basics of power electronics devices |
|  | 1. design enhanced version of rectifier and inverters |
|  | 1. have a handful knowledge of power supplies and convertors |
|  | 1. understand the basic concepts of different types of motor controls |
|  | 1. utilise the stepper motor in different environment |
| **Unit -1 (7 Hours)** | **SEMICONDUCTOR POWER DEVICES -** Basic characteristics and working of Power Diodes, Diac, SCR, Triac, Power Transistor, MOSFETs, IGBT, and GTO. |
|  |  |
| **Unit -2 (7 Hours)** | **RECTIFIERS and INVERTERS -** Working principles of single and three phase bridge rectifiers, Voltage and current source inverters. |
|  |  |
| **Unit -3 (7 Hours)** | **POWER SUPPLIES:** Principle of operation of choppers. Step up, Step down, Switch Mode Power Supply: Fly back converter, forward/buck converter, Boost converter and buck-boost converter. Uninterruptible Power Supply. |
|  |  |
| **Unit -4 (7 Hours)** | **MOTOR CONTROL:** Introduction to speed control of DC motors using phase controlled converters and choppers, Basic idea of speed control of three phase induction motors using voltage and frequency control methods. |
|  |  |
| **Unit -5 (7 Hours)** | **STEPPER MOTOR**: Variable reluctance, Permanent magnet and hybrid stepper motors. Induction and dielectric heating control. |
|  |  |
| **List of Expt.** | 10 |
| **Text Book** | Power Electronics Principles & Applications, Joseph Vithayathil, TMH , (2010). |
| **Reference book** | Industrial Electronics And Control, Ttti, TMH 2001 |
|  | Power Electronics: Converters Applications., Mohan, Robbins, Wiley 1995 |
| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **EC304 ADVANCED MICROPROCESSORS C(L,T,P) =3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The objective of the course are: |
|  | 1. To learn the architecture and assembly language programming of 8086 microprocessor |
|  | 1. To study the analog interfacing of peripherals |
|  | 1. To study the digital interfacing of peripherals |
|  | 1. To get introduced to various processor configurations. |
|  |  |
| **Expected Outcome:** | The student will be able to |
|  | 1. Students will become familiar with 8086 microprocessor architecture and programming |
|  | 1. Students will be able to do analog interfacing of peripherals |
|  | 1. Students will be able to do digital interfacing of peripherals |
|  | 1. They will become familiar to do microprocessor based projects |
|  |  |
| **Unit -1 (7 Hours)** | **8086 ARCHITECTURE-** Hardware specifications, Pins and signals, Internal data operations and Registers, Minimum and maximum mode, System Bus Timing, Linking and execution of Programs,Assembler Directives and operators. |
|  |  |
| **Unit -2 (7 Hours)** | **SOFTWARE and INSTRUCTION SET-** Assembly language programming: addressing mode and instructions of 8086, MACRO programming, 8086 interrupts. |
|  |  |
| **Unit -3 (7 Hours)** | **ANALOG INTERFACING:** A/D and D/A converter interfacing, keyboard and display interfacing, RS 232 and IEEE 488 communication standards**.** |
|  |  |
| **Unit -4 (7 Hours)** | **DIGITAL INTERFACING:** Programmable parallel ports**,** Interfacing microprocessor to keyboard and alphanumeric displays, Memory interfacing and Decoding , DMA controller. |
|  |  |
| **Unit -5 (7 Hours)** | **MULTIPROCESSOR CONFIGURATIONS -** Multiuser / Multitasking operating system concepts, 8086 based Multiprocessor systems. Introduction and basic features of 286, 386, 486 and Pentium processors. |
|  |  |
| **List of Expt.** | 10 |
| **Text Book** | Douglas V. Hall “Microprocessors and Interfacing Programming and Hardware” Tata McGraw Hill.(2000). |
| **Reference book** | A. Ray & K. Bhurchandi. “Advanced Microprocessors and Peripherals. Tata Mc Graw Hill, 2012 |
|  | A Nagoor Kani “Microprocessors and Microcontrollers” Mc Graw Hill Education 2ed. 2012 |
| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **EC 352 DIGITAL COMMUNICATION LAB C(L,T,P) =1(0,0,2)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The objective of the course are: |
|  | 1. For students to be able to understand, analyze, and design fundamental digital communication systems. |
|  | 1. To prepare the graduates to understand the experimental skills to apply suitable modulation schemes and coding for various applications |
|  | 1. Interpretation of analog signaling aspects of digital systems and data communications through experience in using contemporary test instruments to generate and display signals in relevant laboratory setups. Use of oscilloscopes, pulse and function generators, baseband spectrum analyzers, desktop computers, terminals, modems, PCs, and workstations in experiments on pulse transmission impairments, waveforms and their spectra, modem and terminal characteristics, and interfaces.. |
| **Expected Outcome:** | The student will be able to |
|  | 1. The students will be able to define the terms piezo, Pyroand ferroand antiferroelectric and explain the interrelationships between the same and will be able to describe the polarisation behavior of a ferroelectric material as a function of temperature and of applied stress. This will include an understanding of the Curie temperature. |
|  | 1. The students will be able to explain the meaning of physical quantities related to magnetism, magnetic field, magnetic induction, magnetic moment, magnetization, magnetic susceptibility, and discuss their interrelations |
|  | 1. The students will be able to explain the origin of bandgaps within the nearly free electron model and illustrate the difference between insulators,semiconductors and metals based on the value of the Fermi energy. |
|  | 4. The students will be able to describe the characteristics of different classes of superconducting materials, different theories of conductive,superconductivity and their ranges of validity in detail describing the difference between good conductors, perfect conductors and superconductor |
|  | 5. An understanding of the structure property relationships in nanomaterials as well as the concepts, not applicable at larger length scales, that need to be taken into consideration for nanoscience and nanotechnology. Introduce the student to synthesis, identification and characterization,properties, functionalization and use of solid materials and nanomaterials such as nanoparticles, carbon nanotubes and nanoporous materials. |
| S. No. | List of Experiments |  |
| 1. | (a) To observe sampling of analog signal. Identify and solve the aliasing problem.  (b) To observe the Transmission of two signals over a single channel using sampling methods. |  |
| 2. | TDM-PAM: Modulation and demodulation. |  |
| 3. | Operation of a PCM encoder and decoder. |  |
| 4. | TDM-PCM: Modulation and demodulation. |  |
| 5. | Observe the performance of a Delta modulation system and to derive from it a delta sigma modulation system. |  |
| 6. | To generate and study the various data formatting schemes (Unipolar, Bi-polar, Manchester,AMI etc.). |  |
| 7. | Generate ASK signals, with and without carrier suppression. Demodulation of these two types of modulated signal. |  |
| 8. | Generate the FSK wave forms and demodulate the FSK signals based on the properties of (a) Tuned circuits (b) PLL |  |
| 9. | Generate the PSK signals and demodulate it. |  |
|  | Simulation using any virtual Instrumentation Software: |  |
| 10. | To carry out convolution in both continuous time and discrete time systems. |  |
| 11. | Companding and multiplexing of PCM signals. |  |
| 12. | Perform various keying Techniques: PSK, ASK, FSK and MSK. |  |
| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **EC 356 INDUSTRIAL ELECTRONICS LAB C(L,T,P) =1(0,0,2)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The objective of the course are: |
|  | 1. To analyse the working and different parameters of SCR and Diac |
|  | 1. To implement the theoretical concepts to the power devices in laboratory. |
|  | 1. To implement the performance of different inverters and converters. |
| **Expected Outcome:** | The student will be able to |
|  | 1. Design different inverters and converters using advanced techniques |
|  | 1. Utilize the SCR and Diac in industries and related area. |
|  | 1. Design the various components used in electronics area using power devices |
| **S.NO.** | EXPERIMENTS |
| **1.** | Study the characteristics of SCR. 1.1 Observe the terminal configuration. 1.2 Measure the breakdown voltage. 1.3Measure latching and holding current. 1.4 V-I characteristics |
| **2.** | Study the characteristics of SCR. 1.1 Observe the terminal configuration. 1.2 Measure the breakdown voltage. 1.3Measure latching and holding current. 1.4 V-I characteristics |
| **3.** | Study and obtain the waveforms for single-phase half-wave controlled converter |
| **4.** | Study and obtain the wave forms for single-phase half controlled symmetrical and asymmetrical bridge converters |
| **5.** | Study and obtain the waveforms for single-phase fully controlled bridge converter |
| **6.** | Study and obtain the waveforms for voltage-commutated chopper |
| **7.** | Study and obtain the wave forms for current-commutated chopper |
| 8. | Perform experiment of single phase PWM inverter. |
| 9. | Perform experiment on buck, boost and buck-boost regulators |
| **10.** | Perform experiment on Motor control- loop and closed loop. |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **EC 354 SIGNAL PROCESSING LAB-I C(L,T,P) =2(0,0,2)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The objective of the course are: |
|  | 1. To understand the generation of continuous as well as discrete types of periodic and aperiodic signals. Knowing output of LTI systems by application of any of this type of signal at the input. |
|  | 1. To enable the students to understand various Probability Distribution functions used in communication and signal processing area. |
|  | 1. . To enable the students to understand various Signal design concepts by writing programs in MATLAB |
| **Expected Outcome:** | The student will be able to |
|  | 1. Understanding MATLAB programming to solve practical problems |
|  | 1. Understanding modeling and simulation in MATLAB environment. |
| S. No. | List of Experiments |
|  | Simulation in MATLAB Environment: |
| 1. | Generation of continuous and discrete elementary signals (periodic and non-periodic) using  mathematical expression. |
| 2. | Generation of Continuous and Discrete Unit Step Signal. |
| 3. | Generation of Exponential and Ramp signals in Continuous & Discrete domain. |
| 4. | Continuous and discrete time Convolution (using basic definition). |
| 5. | Adding two given signals. (Continuous as well as Discrete signals) |
| 6 | Subtracting two signals (Continuous as well as Discrete signals) |
| 7 | To generate uniform random numbers between (0, 1). |
| 8 | To generate a random binary wave. |
| 9 | To generate random sequences with arbitrary distributions, means and variances for following : |
|  | (a) Rayleigh distribution |
|  | (b) Normal distributions: N(0,1). |
|  | (c) Gaussion distributions: N (mx, σx2) |
|  |  |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **CP 318 INFORMATION PROTECTION and SECURITY C(L,T,P) =2(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | 1. To     understand         intellectual property rights & law of trademarks |
|  | 1. To understand patent law &international patent law |
|  | 1. States intellectual property rights & law of trademarks |
|  | 1. Will be able to identify the infringement of different laws basing on ownership, transfers, duration, registration and searching |
| **Expected Outcome:** | The student will be able to |
|  | 1. how you select appropriate techniques to tackle and solve problems in the discipline of information security management; |
|  | 1. why security and its management are important for any modern organisation; |
|  | 1. how an information security management system should be planned, documented, implemented and improved, according to the BSi standard on information security management.how you select appropriate techniques to tackle and solve problems in the discipline of information security management; why security and its management are important for any modern organisation; how an information security management system should be planned, documented, implemented and improved, according to the BSi standard on information security management. |
| **Unit -1 (7 Hours)** | Introduction to security attacks, services and mechanism, introduction to cryptography. Conventional Encryption:Conventional encryption model, classical encryption techniques- substitution ciphers and transposition ciphers, cryptanalysis, stereography, stream and block ciphers. Modern Block Ciphers: Block ciphers principals, Shannon’stheory of confusion and diffusion, fiestal structure, data encryption standard(DES), strength of DES, differential and linear crypt analysis of DES, block cipher modes of operations, triple DES, IDEA encryption and decryption, strength of IDEA, confidentiality using conventional encryption, traffic confidentiality, key distribution, random number generation. |
|  |  |
| **Unit -2 (7 Hours)** | Introduction to graph, ring and field, prime and relative prime numbers, modular arithmetic, Fermat’s and Euler’stheorem, primality testing, Euclid’s Algorithm, Chinese Remainder theorem, discrete logarithms. Principals of publickey crypto systems, RSA algorithm, security of RSA, key management, Diffle-Hellman key exchange algorithm,introductory idea of Elliptic curve cryptography, Elganel encryption. |
|  |  |
| **Unit -3 (7 Hours)** | Message Authentication and Hash Function: Authentication requirements, authentication functions, message authentication code, hash functions, birthday attacks, security of hash functions and MACS, MD5 message digest algorithm, Secure hash algorithm(SHA). Digital Signatures: Digital Signatures, authentication protocols, digital signature standards (DSS), proof of digital signature algorithm. |
|  |  |
| **Unit -4 (7 Hours)** | Authentication Applications: Kerberos and X.509, directory authentication service, electronic mail security-pretty good privacy (PGP), S/MIME |
|  |  |
| **Unit -5 (7 Hours)** | IP Security: Architecture, Authentication header, Encapsulating security payloads, combining security associations, key management. Web Security: Secure socket layer and transport layer security, Secure ElectronicTransaction (SET). System Security: Intruders, Viruses and related threads, firewall design principals, trusted systems. |
|  |  |
| **List of Expt.** | nil |
| **Text Book** | 1. Daswarte.Y, Jajodia.S –Security and protection in Information Processing Systems, Springer |
| **Reference book** | 1. William Stalling – Cryptography and Network Security, Willey |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **CP 232 MULTIMEDIA SYSTEMS C(L,T,P) = 2(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | To study and develop a generic interactive distributed multimedia framework, which will take advantage of recent advances in a number of related areas such as: multimedia modelling and development, middleware platforms and coordination models, parallel and distributed software engineering, digital libraries, and networking techniques. |
|  | To tailor the functionality of this framework so that it is suitable for cultural exploration across national and regional boundaries. |
|  | To technologically build particular prototypes of these regional Electronic Roads. |
|  |  |
| **Expected Outcome:** | The student will be able to |
|  | . Apply soft skills in work and career related activities |
|  | To make use of fundamental concepts and formulate best practices |
|  | Apply technical concepts and practices in specialized areas |
| **Unit -1 (7 Hours)** | **Introduction to Multimedia Systems:** Architecture and components, multimedia distributed processing model, synchronization, orchestration and quality of service architecture. |
|  |  |
| **Unit -2 (7 Hours)** | **Audio and Speech:** Data acquisition, sampling and quantization, human speech production mechanism, digital model of speech production, analysis and synthesis, psycho-acoustics, low bit rate speech compression, MPEG audio compression. |
|  |  |
| **Unit -3 (7 Hours)** | **Images and Video:** Image acquisition and representation, composite video signal, NTSC, PAL and SECAM video standards; Bi-level image compression standards, JPEG and MPEG. |
|  |  |
| **Unit -4 (7 Hours)** | **Multimedia Communication:** Fundamentals of data communication and networking, bandwidth requirements of different media; Real time constraints: Audio latency, video data rate; Multimedia over LAN and WAN, multimedia conferencing. |
|  |  |
| **Unit -5 (7 Hours)** | **Hypermedia Presentation:** Authoring and publishing, linear and nonlinear presentation, structuring information, different approaches of authoring hypermedia documents, hypermedia data models and  standards. |
|  |  |
| **List of Expt.** | nil |
| **Text Book** | 1. Li, Z.N. and Drew, M.S., “Fundamentals of Multimedia”, Pearson Education. |
| **Reference book** | Hillman, D., “Multimedia Technology and Application”, Galgotia Publication. |
|  | Steinmetz, R., “Multimedia Computing, Communication and Applications”, Pearson Education. |
| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **CP 242 OPERATING SYSTEMS C(L,T,P) = 2(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | A program that is executed by the processor that frequently relinquishes control and must depend on the processor to regain control.  A program that mediates between application programs and the hardware  A set of procedures that enable a group of people to use a computer system.  A program that controls the execution of application programs  An interface between applications and hardware |
| **Expected Outcome:** | The student will be able to |
|  | 1. Disassemble and reassemble a working computer  2. Handle and repair components in a safe manor for both the student and the component  3. Evaluate a non-working computer system and suggest repairs or upgrades  4. Identify hardware in a computer system  5. Convert between decimal, binary, and hexadecimal numbering systems |
| **Unit -1 (7 Hours)** | **Fundamental Concepts of Operating System:** Operating system functions and characteristics, historical evolution of operating systems, issues in operating system design. Process abstraction, process address space, process management, system calls, threads, process hierarchy.. |
|  |  |
| **Unit -2 (7 Hours)** | **CPU Scheduling:** Levels of scheduling, comparative study of scheduling algorithms, multiple processor scheduling. Deadlocks: Characterization, prevention and avoidance, deadlock detection and recovery |
|  |  |
| **Unit -3 (7 Hours)** | **Concurrent Processes:** Critical section problem, semaphores, monitors, inter-process communication, message passing mechanisms. Memory Management: Storage allocation methods, virtual memory concept, demand paging, page replacement algorithms, segmentation, thrashing. |
|  |  |
| **Unit -4 (7 Hours)** | **File Systems:** Functions, file access and allocation methods, directory system, file protection mechanisms, implementation issues, file system hierarchy. |
|  |  |
| **Unit -5 (7 Hours)** | **Device Management:** Hardware organization, device scheduling policies, device drivers. |
|  |  |
| **List of Expt.** | nil |
| **Text Book** | 1. Silberscharz, A. and Galvin, P.B., “Operating System Concepts”, 7th Ed., Addison-Wesley. |
| **Reference book** | Tanenbaum, A., “Modern Operating Systems”, Prentice-Hall of India. |
|  | Nutt, G., “Operating Systems”, Addison-Wesley. |
| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **EC 415 IMAGE AND VIDEO PROCESSING   C(L,T,P) =3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | provide students with a broad set of skills in this rapidly growing area, |
|  | prepare students for further in-depth study of this field. |
| **Expected Outcome:** | The student will be able to |
|  | Apply principles and techniques of digital image processing in applications related to digital imaging system design and analysis |
|  | Analyze and implement image processing algorithms. |
|  | Gain hands |
| **Unit -1 (7 Hours)** | **INTRODUCTION:**Imaging in ultraviolet and visible band. Fundamental steps in image processing. Components in image processing. Image perception in eye, light and electromagnetic spectrum, Image sensing and acquisition using sensor array. |
|  |  |
| **Unit -2 (7 Hours)** | **DIGITAL IMAGE FUNDAMENTALS:**Image sampling and quantization, Representing digital images, Spatial and gray-level resolution, Aliasing and Moiré patterns, Zooming and Shrinking digital images. |
|  |  |
| **Unit -3 (7 Hours)** | **IMAGE RESTORATION:**Image restoration model, Noise Models, Spatial and frequency properties of noise, noise probability density functions, Noise - only spatial filter, Mean filter Statistic filter and adaptive filter, Frequency domain filters - Band reject filter, Band pass filter and Notch filter. |
|  |  |
| **Unit -4 (7 Hours)** | **IMAGE COMPRESSION:**Compression Fundamentals - Coding Redundancy, Interpixel redundancy, Psycho visual redundancy and Fidelity criteria. Image Compression models, Source encoder and decoder, Channel encoder and decoder, Lossy compression and compression standards. color space formats, scaling methodologies (like horizontal, vertical up/down scaling). Display format (VGA, NTSC, PAL). |
|  |  |
| **Unit -5 (7 Hours)** | **EXPERT SYSTEM AND PATTERN RECOGNITION:**Use of computers in problem solving, information representation, searching, theorem proving, and pattern matching with substitution. Methods for knowledge representation, searching, spatial, temporal and common sense reasoning, and logic and probabilistic inferencing. Applications in expert systems and robotics |
|  |  |
| **List of Expt.** | nil |
| **Text Book** | Rafael C. Gonzalez-Digital Image Processing, Pearson Education Asia |
| **Reference book** | Kenneth R. Castleman-Digital Image Processing, Pearson Education Asia.  Nick Effard-Digital Image Processing, Pearson Education Asia.  Jain A.K.-Digital Image Processing, Prentice hall of India.  Sonka, Hlavac and Boyle-Image Processing. analysis and machine Vision, Thomas Learning. |
|  |  |
| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **EC 401 ANTENNA AND WAVE PROPAGATION C(L,T,P) =4(3,1,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The objective of the course are: |
|  | To provide an introduction to the fundamental principles and basic parameters of antenna. |
|  | To study various antennas arrays. |
|  | To study different types of antennas and to understand antenna parameter measurements. |
|  | To understand the mechanism of radio wave propagation including ground and space waves. |
|  | To study ionospheric propagation and different factors affecting wave propagation. |
| **Expected Outcome:** | The student will be able to |
|  | The students will have a thorough understanding of antennas and their types. |
|  | Student will be able to distinguish the properties and parameters of antenna such as radiation pattern, radiation impedance, directivity, antenna  gain, effective area. |
|  | They will have enough knowledge to design an antenna system, including the shape of the antenna, feed property, the requirement on the arrangement of the radiating elements in an array, given the radiation parameters such as radia tion pattern, operating frequency, transmit/receive power. |
|  | It will make them a clear understanding of the mechanism involved in radio wave propagation. They will be able to implement theoretical concepts practically |
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| **Unit -1 (7 Hours)** | **ANTENNA FUNDAMENTALS** - Antenna parameters, Radiation from a current element in free space. Quarter and half wave antenna. Reciprocity theorem. Resonant and non-resonant antenna. Effective length and aperature, gain, beamwidth, directivity, radiation resistance, efficiency, polarization, impedance and directional characteristics of antenna, antenna temperature. |
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| **Unit -2 (7 Hours)** | **ANTENNAS -** V and Rhombic antennas, Folded dipole, Yagi-Uda antenna, Frequency independent antennas, Log-periodic antennas,UHF and Microwave antennas- Antenna with parabolic reflectors, Horn and Lens antennas, Helical antennas, Square and Circular loop antennas, Fundamentals of Slot and Microstrip antennas.. |
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| **Unit -3 (7 Hours)** | **ANTENNA ARRAYS -** Two element array, N-element linear arrays, Broadside, End fire,collinear and combination arrays, Multiplication of patterns, Binomial arrays. Effect of ground on antennas, Antenna loading. **Antenna Measurements** - Antenna impedance, radiation pattern, gain, directivity, polarization and phase measurements |
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| **Unit -4 (7 Hours)** | **RADIO WAVE PROPAGATION** - Mechanism of radio wave propagation, Reflection, Refraction interference and diffraction of radio waves. Theory of ground wave, space wave and sky wave propagation. Plane earth reflection, Reflection factors for horizontal and vertical polarizations. Duct propagation and tropospheric scattering. |
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| **Unit -5 (7 Hours)** | Various Ionospheric layers. Characteristics of ionosphere and its effects on wave propagation. Critical frequency, Virtual height, skipzone and maximum usable frequency. Multiple hop transmission. Oblique and vertical incidence transmission. Effect of earth's magnetic field, solar activity and meteorological conditions on wave propagation. |
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| **List of Expt.** | 10 |
| **Text Book** | 1. Sisir. Das and A. Das, Antenna and wave propagation, Tata McGrawHill  Education Pvt. Ltd, (2013) . 2. A.R. Harish and M. Sachidananda, Antennas  and Wave Propagation, Oxford Univ. Press, Edition (2011 |
| **Reference book** | 1. J.D. Kraus, Antennas, Tata McGrawHill,  2nd Edition.(1999) |
|  | 2. E.C. Jordan and K.G. Balmain, Electromagnetic Waves and Radiating Systems, PrenticeHall  of India, 2nd Edition.(1986) |
| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **EC 403 WIRELESS COMMUNICATION C(L,T,P) =4(3,1,0** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The objective of the course are: |
|  | To familiarize students with the fundamental concepts and terminology about wireless communication |
|  | To make students aware about the propagation phenomena of wireless signals. |
|  | To make students aware about the line of sight Microwave communicatio |
|  | To make students aware about the mobile and wireless networks. Likes – GSM, WLL, Mobile IP, Wireless access protocol. Wireless LAN’s:  Technology, IEEE 802.11 standards and Blue tooth. Broadband Wireless 802.16. |
|  | To make students learning and study about the satellite communication. |
| **Expected Outcome:** | The student will be able to |
|  | An ability to understand the fundamental concept of wireless communication. |
|  | An ability to know the concepts about propagation phenomena of wireless signals. |
|  | An ability to understand the design concepts about line of sight Microwave communication. |
|  | An ability to design and function of cellular wireless networks. Likes – GSM, WLL, Mobile IP, Wireless access protocol. Wireless LAN’s:Technology, IEEE 802.11 standards and Blue tooth. Broadband Wireless 802.16. |
|  | An ability to understand and know the working of the concepts of satellite communication. |
| **Unit -1 (7 Hours)** | **PROPAGATION PHENOMENA -** Fundamentals of fading, Multipath channels, Spread Spectrum signals: Direct-sequence spread spectrum signals, p-n sequences, Frequency-hopped spread spectrum signals, Code-division multiplexing. |
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| **Unit -2 (7 Hours)** | **LINE OF SIGHT MICOWAVE COMMUNICATION**- Link Engineering, Frequency planning, Free space loss, Fresnel zone clearance bending of radio beam, Effective earth radius, Building blocks of Transmitter and Receiver. |
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| **Unit -3 (7 Hours)** | **MULTIPLE ACCESS TECHNIQUES -** FDMA, TDMA and CDMA with reference to mobile radio and satellite systems. TDMA based networks. CDMA based networks, |
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| **Unit -4 (7 Hours)** | **CELLULAR WIRELESS NETWORKS-**, GSM: Introduction, overview of the GSM systems, GSM codec, channel coding and interleaving, radio like control. Cordless systems and WLL, Mobile IP, Wireless access protocol. Wireless LAN’s: Technology, IEEE 702.11 standards and Blue tooth., Broadband Wireless 702.16 |
|  |  |
| **Unit -5 (7 Hours)** | **SATELLITE COMMUNICATION -** Elements of satellite communication: Frequency bands, Transmission and multiplexing. Modulation, Multiple access. Satellite orbit and description- orbital period and velocity, effects of orbital inclination, Azimuth and elevation, Coverage angle and slant range, Geostationary orbit, Satellite description. Earth Station antenna, high-power amplifier, low-noise amplifier, up converter, down converter, monitoring and control, reliability. Satellite Link: basic link analysis, |
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| **List of Expt.** | 10 |
| **Text Book** | William Stallings, Wireless Communication and Networks, Pearson Education (2010). |
| **Reference book** | Singal, T.L, Wireless Communication, Tata McGraw Hill. |
|  | W.C.Y. Lee , Mobile Cellular Telecommunications , Tata McGraw Hill. |
| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **EC 405 MICROCONTROLLER AND EMBEDDED SYSTEMS C(L,T,P) =4(3,1,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | Introduces the use, characterization, analysis, troubleshooting methods and programming of microcontrollers and embedded systems with a focus on application. |
| **Expected Outcome:** | The student will be able to |
|  | 1. Program, build and test a microcontroller system. |
|  | 2. Interface a microcontroller system to user controls and other electronic systems. |
|  | 3. Describe the internal architecture of microcontroller systems, including counters, timers, ports, and memory. |
| **Unit -1 (7 Hours)** | **THE 8051 MICROCONTROLLER:** Introduction, The 8051 microcontroller hardware. I/O pins, Port, External memory. Counters and Timers, Serial data. Interputs. |
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| **Unit -2 (7 Hours)** | **8051 ASSEMBLY LANGUAGE PROGRAMMING:** Addressing modes, External data moves, push and pop opcides, Logical operations, Byte level and bit level logival operations. Arithmetic operations, Jump and call instructions, Interrupts and returns. |
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| **Unit -3 (7 Hours)** | **REAL TIME CONTROL:** Interrupts, Multiple sources of interrupts, Non maskable sources of interrupts, Interrupt structure in 8051,Timers,Free running counter & Real Time control .. |
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| **Unit -4 (7 Hours)** | **SYSTEM DESIGN AND INTRODUCTION TO REAL TIME OPERATING SYSTEMS:** Serial I/O interface, Parallel I/O ports interface, Digital and Analog interfacing methods, LED array, keyboard, Printer, Flash memory interfacing. Round robin with interrupts, RTOS Architecture, Task and task states, Semphores and shared data. |
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| **Unit -5 (7 Hours)** | **INTRODUCTION TO EMBEDED SYSTEM**: Application of Microcontrollers in interfacing, Robotics, MCU based measuring instruments. Real Time Operating System for System Design, Multitasking System, Task Definition in a Multitasking System, Round Robin Scheduling, Full Pre-emptive Scheduling, Basic study and Features of Commercial RTOS : WINCE and Embedded Linux. |
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| **List of Expt.** | nil |
| **Text Book** | K.N. Ayala-The 8051 Microcontroller. Penram International. |
| **Reference book** | M.A. Mazidi and J.G. Mazidi-The 8051 Microcontroller and Embedded Systems, Pearson Education Asia.  David simon-An Embedded software Primer. Pearson Education Asia.  J.W. Valvano Brooks/Cole-Embedded Microcomputer Systems Thomson LearningTM |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **EC 409 DIGITAL SIGNAL PROCESSING C(L,T,P) =4(3,1,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The objective of the course are: |
|  | 1. To know about. Sampling is usually carried out in two stages, discretization and quantization.. |
|  | 2. To know about the Convolution of discretetime  signals simply becomes multiplication of their ztransforms.  Systematic method for finding  the impulse response of LTI systems |
|  | 1. To design IIR filter design using approximation of derivative method and impulse invariant method. |
|  | 1. To design a digital FIR filter using Window method and To design digital filters on paper and implement the design by using MATLAB.   filtering is to improve the quality of signal or to extract information from signal |
|  | 1. To know about the discrete Fourier transform (DFT) and FFT and how to converts a finite list of equally spaced samples of a function into   the list of coefficients of a finite combination of complex sinusoids. |
| **Expected Outcome:** | The student will be able to |
|  | 1. Able to understand Discrete time processing of Continuoustime   signals, Continuous time Processing of discrete signals, changing the  sampling rate using discretetime  Processing |
|  | 1. Understand circular convolution, its relationship to linear convolution, and how circular convolution can be achieved via the discrete Fourier transform. |
|  | 1. Able to implement digital filters in a variety of forms:Direct   form I &II, Parallel, Cascade and lattice structure |
|  | 1. Able to design a digital FIR filter using Window method. |
|  | 1. Able to analyze signals using the discrete Fourier transform (DFT).Able to understand the decimation in time and frequency FFT algorithms for efficient computation of the DFT. |
| **Unit -1 (7 Hours)** | **SAMPLING -** Discrete time processing of Continuous-time signals, continuous-time processing of discrete-time signals, changing the sampling rate using discrete-time processing. |
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| **Unit -2 (7 Hours)** | **TRANSFORM ANALYSIS OF LTI SYSTEMS -** Introduction, The frequency response of LTI systems, System functions for systems characterized by LCCD (Linear Constant Coefficient Difference) equations, All-pass system, Minimum-Phase systems, Linear systems with linear phase. |
|  |  |
| **Unit -3 (7 Hours)** | **STRUCTURES FOR DISCRETE-TIME SYSTEMS-** Block diagram and signal flow graph representation of LCCD (LCCD – Linear Constant Coefficient Difference) equations, Basic structures for IIR and FIR systems, Transposed forms. |
|  |  |
| **Unit -4 (7 Hours)** | **FILTER DESIGN TECHNIQUES -** Introduction, Analog filter Design: Butterworth and Chebyshev.IIR filter design by impulse invariance and bilinear transformation. Design of FIR filters by Windowing: Rectangular, Hanning, Hamming and Kaiser. |
|  |  |
| **Unit -5 (7 Hours)** | The Discrete Fourier transforms (DFT), Properties of the DFT, Linear Convolution using DFT. Efficient computation of the DFT: Decimation–in-Time and Decimation-in frequency FFT Algorithms. Processing of speech signals: Vocoders, linear predictive coders. |
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| **List of Expt.** | 10 |
| **Text Book** | 1. Proakis, Manolakis, “Digital Signal Processing: Principals, Algorithms And Applications”, 4th ed.,  Pearson Education. (2006)  2. Oppenheim, Schafer, “Discrete Time Signal Processing”, 3rd ed. , PHI (2010) |
| **Reference book** | Schafer, Buck-Discrete Time signal Processing, Pearson Education Asia.  Prokis and Monolakis-Digital Signal Processing: Principles, Algorithms and Application, Prentice hall of India.  S.K. Mitra-Digital Signal Processing. Tata Mc-Graw Hill.  Rabiner and Gold-Theory and Applications of Digital Signal Processing, Prentice Hall of India.  Lathi-Signal Processing and Linear System, Oxford Univ Pren. |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **EC 451 SIGNAL PROCESSING LAB-II C(L,T,P) =1(0,0,2)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The objective of the course are: |
|  | 1. To enable the students to understand various Digital Signal Processing Concepts. |
|  | 2. To enable design digital filters and implement the design using MATLAB. |
|  | 3. To enable the students to understand various system modeling using Simulink. |
|  | 4. To enable the students to understand various real time DSP applications using TMS320C67xx DSP Kits. |
| **Expected Outcome:** | The student will be able to |
|  | 1. Be able to apply the MATLAB programming to solve practical DSP problems. |
|  | 2. Be able to design a digital FIR and IIR filters using MATLAB. |
|  | 3. Be able to design a digital FIR filters using TMS320C67xx DSP Kits. |
|  | 4. Be able to apply the Filter design toolbox to solve practical problems. |
| S. No. | List of Experiments |
|  | **Modeling and simulation using MAT LAB** |
| 1. | To carry out convolution in both continuous time and discrete time systems. |
| 2. | Realising a given block diagram having multiplier, adder/subtractor and system (Discrete/Continuous)  with given Impulse response. Calculating output for given input. |
| 3. | Perform various keying Techniques: PSK, ASK, FSK & MSK. |
| 4. | To simulate the transmitter and receiver for BPSK |
| 5. | To design and simulate FIR digital filter (LP/HP). |
| 6. | To design and simulate IIR digital filter (LP/HP). |
|  | **DSP Lab using TMS320C6XXX DSP Kits** |
| 7. | To study the architecture of TMS320C6XXX DSP kits using Bloom with DSP. |
| 8. | To generate wave form (SINE, COSINE, SQUARE & TRIANGULAR). |
| 9. | Verification of Sampling Theorem. |
| 10 | Verification of linear/circular convolution. |
| **List of Expt.** | 10 |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **EC 453 MICROCONTROLLER LAB C(L,T,P) =1(0,0,2**) |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The objective of the course are: |
|  | To introduce to students the basics of microprocessor and microcontroller  Programming and their applications. |
| **Expected Outcome:** | The student will be able to |
|  | The students will be equipped with the basic knowledge of microprocessor and  microcontroller interfacing and their applications. |
| S. No. | List of Experiments |
| 1. | Write a program to add two 2-byte numbers with a 3-byte sum. |
| 2. | Write a program to add an array of 8 numbers using loop. |
| 3. | Write a program to convert temperature from Fahrenheit to Centigrade. |
| 4. | Implement a sequencer traffic light controller. |
| 5-6. | Implement real time interrupt. |
| 7-8. | Interface microcontroller with stepper motor and move motor by given steps. |
| 9-10. | Interface, test and control LED display with Microcontroller. |
| 11-12. | Implement a watchdog timer and test the same to check infinite loop. |
| **List of Expt.** | 12 |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **DATABASE MANAGEMENT SYSTEMS C(L,T,P) =2(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | 1. To educate students with fundamental concepts of Data Base Design |
|  | 2.To analyze Data Base design methodology |
| **Expected Outcome:** | The student will be able to |
|  | 1. Brief knowledge about SQL Fundamentals. |
|  | 1. Unary & Binary table operations. |
|  | 1. Able to handle with different Data Base languages. |
|  | 1. Table View, Log & Triggers. |
|  | 1. Introduction to different Database packages(Oracle/ MySql/ DB2/ etc) |
|  | 1. Commit & Rollback. |
|  | 1. Handling online Transactions. |
|  | 1. Database connectivity with front-end. |
|  | 1. Embedded and Nested Queries. |
|  | 1. Mini Database project. |
| **Unit -1 (7 Hours)** | Introduction to Databases and Transactions- What is database system, purpose of database system, view of data, relational databases, database architecture, transaction management, The importance of data models, Basic building blocks, Business rules, The evolution of data models, Degrees of data abstraction. |
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| **Unit -2 (7 Hours)** | Database design and ER Model:overview, ER-Model, Constraints, ER-Diagrams, ERD Issues, weak entity sets, Codd’s rules, Relational Schemas, Introduction to UML Relational database model: Logical view of data, keys, integrity rules. Relational Database design: features of good relational database design, atomic domain and Normalization (1NF, 2NF, 3NF, BCNF). |
|  |  |
| **Unit -3 (7 Hours)** | Relational algebra: introduction, Selection and projection, set operations, renaming, Joins, Division, syntax, semantics. Operators, grouping and ungrouping, relational comparison. Calculus: Tuple relational calculus, Domain relational Calculus, calculus vs algebra, computational capabilities. |
|  |  |
| **Unit -4 (7 Hours)** | What is constraints, types of constrains, Integrity constraints, Views: Introduction to views, data independence, security, updates on views, comparison between tables and views SQL: data definition, aggregate function, Null Values, nested sub queries, Joined relations. Triggers. |
|  |  |
| **Unit -5 (7 Hours)** | Transaction management: ACID properties, serializability and concurrency control, Lock based concurrency control (2PL, Deadlocks),Time stamping methods, optimistic methods, database recovery management. |
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| **List of Expt.** | nil |
| **Text Book** | **A Silberschatz, H Korth, S Sudarshan, “Database System and Concepts”, fifth Edition McGraw-Hill ,** |
| **Reference book** | **Rob, Coronel, “Database Systems”, Seventh Edition, Cengage Learning.** |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **EC 407 VLSI DESIGN C(L,T,P) =3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The objective of the course are: |
|  | To introduce the principles of VLSI Design which are used in practical world for Integrated Circuit manufacturing . |
|  | To familiarize students with the fundamental concepts and terminology of fabrication of NMOS and CMOS Devices |
|  | To understand the advantage of CMOS Technology and to understand how the VHDL language works in IC Technology |
|  | To provide a thorough understanding and working knowledge of design, implementation, analysis and comparison of IC designing and  implementation of it in real world |
|  |  |
| **Expected Outcome:** | The student will be able to |
|  | Understand the general introduction to VLSI design and fabrication process of NMOS and CMOS circuits. |
|  | How the MOSFET works by studying electrical properties of MOS circuits and CMOS logic circuits. |
|  | To understand how to design the different logic gates using CMOS technology and designing of Memory latches and Registers. |
|  | Understanding of the back end tool of VLSI and layout designing |
|  |  |
| **Unit -1 (7 Hours)** | **INTRODUCTION TO MOS TECHNOLOGY-** Basic MOS transistors, Enhancement Mode transistor action, Depletion Mode transistor action, NMOS and CMOS fabrication |
|  |  |
| **Unit -2 (7 Hours)** | **BASIC ELECTRICAL PROPERTIES OF MOS CIRCUITS-** Ids versus Vds relationship, Aspects of threshold voltage, Transistor Transconductance gm. The nMOS inverter, Pull up to Pull-down ratio for a NMOS Inverter and CMOS Inverter (Bn/Bp), MOS transistor circuit Model, Noise Margin. |
|  |  |
| **Unit -3 (7 Hours)** | **CMOS LOGIC CIRCUITS-** The inverter, Combinational Logic, Nand Gate NOR gate, Compound Gates, 2 input CMOS Multiplexer, Memory latches and registers, Transmission Gate, Gate delays, CMOS-Gate Transistor sizing, Power dissipation. |
|  |  |
| **Unit -4 (7 Hours)** | Basic physical design of simple Gates and Layout issues. Layout issues for inverter, Layout for Nand and NOR Gates, Complex Logic gates Layout, Layout optimization for performance. |
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| **Unit -5 (7 Hours)** | Introduction to VHDL, Prolog and other design tools. VHDL Code for simple Logic gates, flip-flops, shift registers. |
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| **List of Expt.** | 10 |
| **Text Book** | Principles of CMOS Vlsi Design, Neil H.E.Weste, Pearson |
| **Reference book** | Stephen Brown and Zvonlo Veranesic-Fundamentals of Digital Logic with VHDL Design, Tata Mc-Graw Hill.  Schafer, Buck-Discrete Time signal Processing, Pearson Education Asia.  Prokis and Monolakis-Digital Signal Processing: Principles, Algorithms and Application, Prentice hall of India.  S.K. Mitra-Digital Signal Processing. Tata Mc-Graw Hill.  Rabiner and Gold-Theory and Applications of Digital Signal Processing, Prentice Hall of India.  Lathi-Signal Processing and Linear System, Oxford Univ Pren. |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **EC 411 IC TECHNOLOGY C(L,T,P) =3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The objective of the course are: |
|  | 1. To provide an overview of the different processes involved in wafer preparation along with the methods which makes wafer suitable for fabrication purpose. |
|  | 2. To provide the understanding of kinetics involved in oxidation of SiO2 and diffusion of various dopants needed in fabrication. |
|  | 3. To provide knowledge of the deposition of dielectric and polysilicon thick layer using chemical vapour deposition. Further, the epitaxial |
|  | 4. To provide the knowledge of photo/optical lithography and dry & wet etching, |
|  | 5. To provide the knowledge of VLSI process integration using contact and interconnect metallization. Further, different IC Technology isintroduced along with their comparison. |
| **Expected Outcome:** | The student will be able to |
|  | 1. The students will be familiar with wafer prepration mehods. They can understand the requirement of different processing steps used to improve wafer properties prior to fabrication. |
|  | 1. They will be able to understand the advantages of depositing oxide layer over the wafer surface along with kinetics of oxidation and diffusion. |
|  | 1. They will be able to understand the process involved in thick and thin films along with the advantages/disadvantages of these layers. |
|  | 1. They will understand the steps involved in designing of particular circuit over wafer surface using lithography, masking and etching. |
|  | 1. They will understand different IC technologies and their comparison. Further, they will understand why the CMOS technology is best suited for fabrication. |
| **Unit -1 (7 Hours)** | **INTRODUCTION TO TECHNOLOGIES-** Semiconductor Substrate-Crystal defects, Electronic Grade Silicon, Czochralski Growth, Float Zone Growth, Characterization and evaluation of Crystals; Wafer Preparation- Silicon Shaping, Etching and Polishing, Chemical cleaning. |
|  |  |
| **Unit -2 (7 Hours)** | **DIFFUSION and ION IMPLANTATION-** Ficks diffusion Equation in One Dimension, Atomic model, Analytic Solution of Ficks Law, correction to simple theory , Diffusion in SiO2. Ion Implantation and Ion Implantation Systems Oxidation. Growth mechanism and Deal-Grove Model of oxidation, Linear and Parabolic Rate co-efficient, Structure of SiO2, Oxidation techniques and system, Oxide properties. |
|  |  |
| **Unit -3 (7 Hours)** | **CHEMICAL VAPOUR DEPOSITION and LAYER GROWTH-** CVD for deposition of dielectric and polysilicon – a simple CVD system, Chemical equilibrium and the law of mass action, Introduction to atmospheric CVD of dielectric, low pressure CVD of dielectric and semiconductor. Epitaxy-Vapour Phase Expitaxy, Defects in Epitaxial growth, Metal Organic Chemical Vapor Deposition, Molecular beam epitaxy. |
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| **Unit -4 (7 Hours)** | **PATTERN TRANSFER-** Introduction to photo/optical lithography, Contact/ proximity printers, Projection printers, Mask generation, photoresists. Wet etching, Plasma etching, Reaction ion etching. |
|  |  |
| **Unit -5 (7 Hours)** | **VLSI PROCESS INTEGRATION-** Junction and Oxide Isolation, LOCOS methods, Trench Isolation, SOI; Metallization, Planarization. Fundamental consideration for IC Processing, NMOS IC Technology, CMOS IC Technology, Bipolar IC Technology. |
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| **List of Expt.** | 10 |
| **Text Book** | 1.Vlsi Technology, Sze, TMH  2. Semiconductor Devices: Modelling And Technology, Nandita Dasgupta, Amitava Dasgupta, PHI  3. Fundamentals Of Semiconductor Fabrication, Gary S. May, S.M.Sze, John Wiley & Sons  4. Semiconductor Devices: Physics And Technology, Simon M. Sze, John Wiley & Sons  5. Introduction To System Design Using Integrated Circuits, Sonde, B.S., New Age International |
| **Reference book** | S.M. Sze-VLSI Technology, Tata Mc-Graw Hill.  D. Nagchoudhary-principles of Microelectronic Technology, Wheeler Publishing.  Stephen A Campbell-The Science and Engineering of Microelectronic Fabrication, Oxford University Press.  Hong Xiao-Introduction to Semiconductor Manufacturing, Prentice Hall India.  Kang- CMOS circuit design, Tata Mc-Graw Hill.  Razoni-Design of CMOS Analog Integrated Circuit. |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **EC 402 OPTICAL COMMUNICATION C(L,T,P) =3(3,1,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The objective of the course are: |
|  | 1.To provide a general introduction of basic optical communication and lay the foundation to understand the various fabrication processes in optical fibers and the basic materials information used for optical fibers |
|  | 2. To study about optical sources like LED and LASER Diodes |
|  | 3 To learn the methods for optical detectors like PIN and Avalanche photo diodes.. |
|  | 4. To give knowledge of link design for optical fiber communication systems and introduce methods for optical couplings, joints, connectors,  multiplexers and their applications. |
|  | 5. To learn the laboratory measurement methods of various optical parameters and as well as field method using OTDR equipment |
| **Expected Outcome:** | The student will be able to |
|  | 1.An ability to understand the principle of optical wave propagation, characteristics of different types of optical fibers and its manufacturing techniques with use of different types of materials |
|  | 2. An ability to know the use of appropriate optical source for particular industrial applications with optimum efficiency |
|  | 3. An ability to understand the different techniques of optical detection and receivers use in optical fiber engineering |
|  | 4. An ability to know the process of optical joints, splicing, connectors, coupling and multiplexing to design the optical link for particular  applications. |
|  | 5. An ability to understand the laboratory and field measurement techniques of different optical parameters for link design. |
| **Unit -1 (7 Hours)** | **OPTICAL FIBERS** - Basic optical laws and definitions, Principles of light propagation in fibers, Ray theory, Optical fiber modes and configurations, Step index and graded index fibers, Monomode and multimode fibers, Fiber materials, fiber fabrication, Fiber optic cables. Attenuation, signal distortion in optical fibers, Dispersion-intra modal and inter modal, Dispersion shifted and flattened fiber. |
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| **Unit -2 (7 Hours)** | **OPTICAL SOURCES** - LED’s- Structure, Materials, Characteristics, Modulation, Power and efficiency, Laser Diodes - Basic concept, Hetro Structure, properties and modulation. |
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| **Unit -3 (7 Hours)** | **OPTICAL DETECTORS** - PIN and Avalanche photo diodes, photo detector noise, detector response time, Avalanche multiplication noise. Photo diode materials. Fundamental of Optical Receiver Operation. |
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| **Unit -4 (7 Hours)** | **OPTICAL FIBER COMMUNICATION SYSTEMS**- Source to fiber coupling, fiber to fiber joints, fiber splicing, fiber connectors. Principal components. Link design calculation, Applications, Wavelength division multiplexing. |
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| **Unit -5 (7 Hours)** | **OPTICAL FIBER MEASUREMENTS**: Measurements of Fiber attenuation, Dispersion, refractive index profile, Numerical aperture and diameter. |
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| **List of Expt.** | nil |
| **Text Book** | J.M. Senior, Optical Fiber Communication: Principles and Practice, Pearson Education. (2011). |
| **Reference book** | 1. R.P. Khare, Fiber Optics & Optoelectronics, Oxford Publications. (2010) .  2. Gerd keiser, “Optical communications Essentials”, ISBN: 00714120402,  McGrawHill  publication, 2nd edition (2003).  3. Joseph C Palais, Fiber Optics Communication, PHI.  4. A.Ghatak & K.Thygarajan, Introduction to Fiber Optics, Cambridge University Press. |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **EC 404 RADAR AND TV ENGINEERING C(L,T,P) =4(3,1,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The objective of the course are: |
|  | 1. To get the knowledge of working of principle Radar and its components, frequency range, application |
|  | 2. To get the knowledge of working of principles of different types of Radar and relative comparison. Use of radar in navigational add and air  traffic control. |
|  | 3. To get the knowledge of working principles of black and white Television engineering, Composite video signal and its generation and  processing for broadcasting |
|  | 4. To get the knowledge of different circuits used in TV transmitter and receiver. |
|  | 5. To get the working principle of color TV, color signal generation and processing for transmission. |
| **Expected Outcome:** | The student will be able to |
|  | 1 Understand the working of Radar. The terminology used in Radar engineering |
|  | 2 Understand the working of Black & white as well as color TV. The terminology used in TV engineering. |
|  | 3 Able to design different TV circuits.. |
|  | 4. Able to diagnose different Faults in TV receiver. |
|  |  |
| **Unit -1 (7 Hours)** | **RADAR -** Radar Block diagram, frequencies and applications. Radar range equation. Continuous wave (CW) and FM radar; Moving target indicator (MTI): Delay line cancellers, blind velocity Pulse Doppler Radar. Tracking radar sequential lobbing, Conical scan and monopulse radar, Types of display, Radar receivers, Noise figure. |
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| **Unit -2 (7 Hours)** | **NAVIGATIONAL AIDS** - Principle of operation of Radar direction finder and range system.LORAN system, DME, TACAN, Aircraft landing systems. |
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| **Unit -3 (7 Hours)** | **TV ENGINEERING-** Theory of scanning standards, Principles of Monochrome and colour T.V. system (PAL, SECAM, NTSC). Composite video signal analysis. T.V Cameras: Image orthicon, plumbicon, vidicon. CCD camera tubes. Types of Monochrome and colour picture tubes, set-up adjustments. LCD and Plasma displays |
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| **Unit -4 (7 Hours)** | . **TV ENGINEERING-** Theory of scanning standards, Principles of Monochrome and colour T.V. system (PAL, SECAM, NTSC). Composite video signal analysis. T.V Cameras: Image orthicon, plumbicon, vidicon. CCD camera tubes. Types of Monochrome and colour picture tubes, set-up adjustments. LCD and Plasma displays |
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| **Unit -5 (7 Hours)** | . **TV RECEIVER:** Functional block diagram of T.V. receiver, R.F. Tuner, I.F. amplifier, Video detector, video amplifier, AGC, Synch. Separation, Sync. Processing and AFC. Deflection oscillators, vertical and horizontal deflection and sound system circuits. EHT generation. Common faults and their diagnosis. Basic idea of HDTV, DBS-TV and 3D-TV. |
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| **List of Expt.** | 10 |
| **Text Book** | Radar Principles, By Peyton Z. Peebles, Oxford  • Radar HandBOOK, By Merrill I. Skolnik, Oxford  • Television Engineering And Video System, By Rg Gupta, TMH  • Television & Video Engineering, By Dhake, TMH  • Modern Television Practice – Principle, R.R. Gulati, New Age  • Monochrome And Colour Tv, By R.R. Gulati, New Age  • Components, And Circuits HandBOOK (Hardcover), By Ferril Losee, New Age |
| **Reference book** | M.I.Skolink - 'Introduction to Radar System', Mc-Graw Hill.  N.S. Nagaraja - 'Elements of Electronic navigation', Tata Mc-Graw hill.  R.R. Gulati - Monochromic and Colour Television, Wiley Eastem.  Dhake - television Engineering. Tata Mc-Graw Hill |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |
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|  | **EC 454 WIRELESS COMMUNICATION LAB C(L,T,P) =1(0,0,2)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The objective of the course are: |
|  | 1. To conduct the experiment on antenna kit to find out characteristics of different types of antennas. |
|  | 2. To study and design antenna using software. |
|  | 3. To study the working and calculate parameters on radar and CDMADSSS trainer kit. |
|  | 4. To make the satellite link and transmit & receive audio and video signal. |
|  | 5. To study the GPS receiver working. |
| **Expected Outcome:** | The student will be able to |
|  | 1. An ability to find out the characteristics parameters of different types of antennas.. |
|  | 2. An ability to understand the antenna software and simulate the program to find out results. |
|  | 3. An ability to understand the concept and find out parameter results of radar and CDMA techniques.. |
|  | 4. An ability to setup a satellite link and broadcasting audio & video signals. |
|  | 5. An ability to understand principle of GPS system and its application in various systems. |
| S. No. | List of Experiments |
|  | **PART I:Measurement of antenna characteristics:**  Radiation Pattern on polar plots, Beam width and Gain of main lobe for the following types of antennas.  Half wave and quarter wave dipole  Folded dipole  Yagi UDA multiple element folded dipole  Hertz Antenna  End fire array and broad side array |
|  | **PART-II: Measurement of antenna characteristics:**  Helix antenna  Paraboloid reflector antenna  Loop antenna  Ground plane antenna  Log periodic antenna  Rhombus antenna  Slot antenna |
|  | Demonstration of modeling of wire antenna using appropriate design software. |
|  | Simulation of antenna arrays using appropriate software. |
|  | Design and testing of microstrip rectangular patch antenna using appropriate software. |
|  | Investigate the transmission characteristics of the link and measure the gain of the microstrip patch antennas. Draw the antenna radiation diagram. |
|  | Radar Trainer: Working of Doppler radar, velocity of moving object, time and frequency measurement and other applications. |
|  | Study of LED TV Trainer |
|  | To perform Modulation, Demodulation and BER measurement using CDMA – DSSS Trainer. |
|  | To establish analog/digital communication link and transmit and receive three signals (audio, video, tone) simultaneously using Satellite Communication Trainer. |
|  | To study GPS Receiver, establishing link between GPS satellite and GPS trainer and measure of latitude and longitude |
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| **List of Expt.** | 11 |
| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **EC 452 VLSI AND OPTICAL FIBER LAB C(L,T,P) =1(0,0,2)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The objective of the course are: |
|  | 1. To develop the understanding that, how to design schematic level circuit of a digital integrated circuit basic building blocks using EDA tools. |
|  | 2. To familiarize the students with the designing of layouts for digital circuits. |
|  | 3. To develop the understanding of the static and dynamic characterization and power dissipation performance evaluation of logic circuits. |
|  | 4. To provide detailed understanding of VHDL modeling, simulation, and synthesis and FPGA implementation of digital integrated circuit micro and macro building blocks. |
|  | 5. To develop ability of establishing optical fibre analog and digital links. |
|  | 6. To develop the understanding of performance evaluation of components of analog and digital optical fibre links |
| **Expected Outcome:** | The student will be able to |
|  | 1.Knowing schematic level design, implementation, performance characterization and component level parameter optimization of digital IC basic building blocks. |
|  | 3. Layout designing and parasitic extraction and performance evaluation of layouts of digital logic circuits. |
|  | 4. VHDL modeling and FPGA implementation of digital IC building blocks. |
|  | 5. Understanding of frontend and backend EDA design tools |
|  | 6.Establishing analog and digital link and performance evaluation of these links. |
| S. No. | List of Experiments |
|  | To set up Fiber Optic Analog link. |
|  | To set up fiber Optic Digital link. |
|  | Measurement of Propagation loss and numerical aperture. |
|  | Characterization of laser diode and light emitting diode. |
|  | Xilinx Simulation of VHDL Programming of Adders and Subtractors. |
|  | Xilinx Simulation of VHDL Programming of Encoder and Decoder |
|  | Xilinx Simulation of VHDL Programming of MUX and DEMUX |
|  | Xilinx Simulation of VHDL Programming of Code Converter |
|  | Xilinx Simulation of VHDL Programming of Flip Flops |
|  | Xilinx Simulation of VHDL Programming of Shift Registers |
|  | Xilinx Simulation of VHDL Programming of Counters |
|  | Xilinx Simulation of VHDL Programming of Finite State Machines. |
| **List of Expt.** | 12 |
| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **CP 419 ARTIFICIAL INTELLIGENCE C(L,T,P) =2(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | Use various symbolic knowledge representation to specify domains and reasoning tasks of a situated  software agent. |
|  | o Use different logical systems for inference over formal domain representations, and trace how a  particular inference algorithm works on a given problem specification. |
|  | o Understand the conceptual and computational trade-offs between the expressiveness of different  formal representations. |
|  | Transferable skills: Upon completion, students will be able to:  o Use key logic-based techniques in a variety of research settings;  o communicate scientific knowledge at different levels of abstraction. |
| **Expected Outcome:** | The student will be able to |
|  | Use and apply current technical concepts and practices in core computing and information technologies. |
|  | Analyze a problem, and identify and define the computing requirements appropriate to its solution. |
|  | Design, implement, and evaluate computer based systems, processes, components, and programs both in teams and individually to meet desired outcomes. |
| **Unit -1 (7 Hours)** | **INTRODUCTION TO AI KNOWLEDGE-** Importance of AI, Knowledge Base System Knowledge organization and manipulation, Conceptual Introduction to LISP and other AI programming Languages. |
|  |  |
| **Unit -2 (7 Hours)** | **KNOWLEDGE REPRESENTATION-** Syntax Semantics, Inference Rules, Non-deductive Inference methods, and representations using rules, forward chaining and backward chaining. Fuzzy Logic and Natural languages computations. Probabilistic Reasoning. Object Oriented Representations. |
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| **Unit -3 (7 Hours)** | **KNOWLEDGE ORGANIZATION and MANIPULATION-** Search and control strategies, matching techniques, knowledge organization and management, Genetic Algorithms based search techniques. |
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| **Unit -4 (7 Hours)** | **KNOWLEDGE SYSTEMS ARCHITECTURE-** Rule based, non-production, uncertainty knowledge system building tools. |
|  |  |
| **Unit -5 (7 Hours)** | **KNOWLEDGE ACQUISITION-** General Concepts, learning by induction. |
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| **List of Expt.** | nil |
| **Text Book** | AI and ES- Dan W.Patterson, Prentice Hall of India. |
| **Reference book** | Luger- Artificial Intelligence, Pearson Education.  Jockson- Introduction Expert Systems, Pearson Education  Rich and Knigh- Artifical Intelligence, Tata Mc-Graw Hill. |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **REMOTE SENSING C(L,T,P) =3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | 1. To provide exposure to students in gaining knowledge on concepts and applications leading to modeling of earth resources management using Remote Sensing |
|  | 2. To acquire skills in storing, managing digital data for planning and development. |
|  | 3. To acquire skills in advance techniques such as hyper spectral, thermal and LiDAR scanning for mapping, modeling and monitoring. |
| **Expected Outcome:** | The student will be able to |
|  | 1. Fully equipped with concepts, methodologies and applications of Remote Sensing Technology. |
|  | 2. Prepare the candidates for National and Global Employability |
|  | 3. Acquire skills in handling instruments, tools, techniques and modeling while using Remote Sensing Technology |
|  | 4. It empowers the candidate with confidence and leadership qualities. |
| **Unit -1 (7 Hours)** | Overview of Remote Sensing Technology - An Introduction History, Concepts, Conventional methods of survey, Advantages of Remote Sensing. Physics of Remote Sensing - Electromagnetic energy, EMR interaction-atmospheric, atmospheric scattering, skylight & Haze, Solar and Terrestrial Radiation. Spectral Response Patterns ó reflectance of Earth surface features in different wavelength regions of the EMR |
|  |  |
| **Unit -2 (7 Hours)** | History of Space Imagery - Sensors, Types of Satellites, MeteorologicaL Satellites, Remote Sensing in India, Future Missions, Overview of imageries from various satellites- LANDSAT, IRS series, SPOT, MODIS, TERRA, IKONOS, ERS Etc. |
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| **Unit -3 (7 Hours)** | Data Acquisition systems - IFOV, Scanners and Scanning mechanisms, Data formats, Satellite Orbits. Optical Remote Sensing - Types of Resolution, Types of sensors and Platforms |
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| **Unit -4 (7 Hours)** | Thermal Remote Sensing: Basics concepts, Thermal Inertia: Temperature From Radiance Values - Thermal Sensors, Scanners, Optomechanical CCD Arrays. Microwave Remote Sensing : Basic Concepts, Micro Wave Sensors – Micro Wave Radiometers - Geometric Characteristics, Spectral, Spatial resolution, SLAR, SAR Satellite Altimeters - Scatterometer and Airborne Sensors. |
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| **Unit -5 (7 Hours)** | Principles of Image Interpretation: Decoding of Different Imagery – Elements of Image Interpretation - Techniques of Visual Interpretation. |
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| **List of Expt.** | nil |
| **Text Book** | Alexay Bunkin & Konstantin Volia.K, - Laser Remote Sensing of the Ocean Methods & Publications. John & Wiley & Sons, N.Y. |
| **Reference book** | American Society Of Photogrammetry, 1983: Manual Of Remote Sensing (2nd Edition), ASP Falls  Church, Virginia |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **EC 406 DIGITAL SYSTEM DESIGN USING VHDL C(L,T,P) =3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | 1.To introduce fundamentals of hardware description language |
|  | 2. To understand the different circuit building blocks of combinational circuits with coding. |
|  | 3. To understand the different circuit building blocks of sequencial circuits with coding. |
|  | 4. To understand the design of different sequencial circuits with specific machine i.e. Moore and Mealy etc. |
|  | 5. To introduce the use and organization of memory in VHDL |
| **Expected Outcome:** | The student will be able to |
|  | 1. Enable students to model a digital System |
|  | 2. Ability of the student to write VHDL model independently |
|  | 3. The course will able to deliver information and design concept of Moore and Meelay Finite state machines and their practical application in Vending Machine |
| **Unit -1 (7 Hours)** | **INTRODUCTION –**Fundamental and history of various hardware description language, Design flow of ASICs and and standard logic circuits using software. |
|  |  |
| **Unit -2 (7 Hours)** | **COMBINATIONAL CIRCUIT BUILDING BLOCKS-**Multiplexer, Decoders, encoders, Code Converters, VHDL Code for Combinational Circuits. |
|  |  |
| **Unit -3 (7 Hours)** | **SEQUENCIAL CIRCUITS:**VHDL code for Flip-Flops, shift registers, Counters. |
|  |  |
| **Unit -4 (7 Hours)** | **SYNCHRONOUS/ ASYNCHRONOUS SEQUENCIAL CIRCUITS:**Mealy and Moore type FSMs, VHDL Code for Mealy and Moore Machines, VHDL Codes for Serial Adder, Vending Machine. |
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| **Unit -5 (7 Hours)** | **DIGITAL SYSTEM DESIGN-**Building Block circuits, Memory organization, SRAM, Design examples of divider, Multiplier, Shifting and Sorting Operations, Clock Synchronization, CPU organization and design concepts. |
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| **List of Expt.** | nil |
| **Text Book** | Stephen Brown and Zvonki Vranesic-Fundamentals of Digital Logic circuit VHDL Design, Tata Mc-Graw Hill. |
| **Reference book** | Z.Navabi-Analysis and Modeling of Digital Systems, Tata Mc-Graw Hill.  D.L.Perry-VHDL 3rd cd., Tata Mc-Graw Hill.  Morris Mano-Digital Logic and Computer Design, Prentice Hall of India. |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **NANOELECTRONICS C(L,T,P) =3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | To learn and understand basic and advance concepts of nanoelectronics. |
| **Expected Outcome:** | The student will be able to |
|  | The students should be able to understand basic and advanced concepts of nanoelectronic devices, sensors and transducers and their applications in nanotechnology. |
| **Unit -1 (7 Hours)** | QUANTUM DEVICES Charge and spin in single quantum dots- Coulomb blockade– Electrons in mesoscopic structures - single electron transfer devices (SETs) – Electron spin transistor – resonant tunnel diodes, tunnel FETs - quantum interference transistors (QUITs) - quantum dot cellular automata (QCAs) - quantum bits (qubits). |
|  |  |
| **Unit -2 (7 Hours)** | NANOELECTRONIC DEVICES Electronic transport in 1,2 and 3 dimensions- Quantum confinement - energy subbands - Effective mass - Drude conduction - mean free path in 3D - ballistic conduction - phase coherence length - quantized conductance - Buttiker-Landauer formula- electron transport in pn junctions - short channel NanoTransistor –MOSFETs - Advanced MOSFETs - Trigate FETs, FinFETs - CMOS. |
|  |  |
| **Unit -3 (7 Hours)** | MOLECULAR NANOELECTRONICS Electronic and optoelectronic properties of molecular materials - Electrodes & contacts – functions – molecular electronic devices - elementary circuits using organic molecules- Organic materials based rectifying diode switches – TFTs- OLEDs- OTFTs – logic switches. |
|  |  |
| **Unit -4 (7 Hours)** | SPINTRONICS Spin tunneling devices - Magnetic tunnel junctions- Tunneling spin polarization - Giant tunneling using MgO tunnel barriers - Tunnel-based spin injectors - Spin injection and spin transport in hybrid nanostructures - spin filters -spin diodes - Magnetic tunnel transistor - Memory devices and sensors - ferroelectric random access memory- MRAMS -Field Sensors - Multiferro electric sensors- Spintronic Biosensors. |
|  |  |
| **Unit -5 (7 Hours)** | NANOELECTRONIC ARCHITECTURES AND COMPUTATIONS Architecture Principles: Mono and Multi processor systems – Parallel data processing – Power Dissipation and Parallelism – Classic systolic arrays - Molecular devices-properties - Self-organization – Size dependent - limitations. Computation: Monte Carlo Simulations- Computational methods and Simulations from ab initio to multiscale Modeling- Modeling of Nanodevices. |
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| **List of Expt.** | nil |
| **Text Book** | **1.** Introduction to Nanoelectronics: Science, Nanotechnology, Engineering, and Applications by Vladimir V. Mitin, Viatcheslav |
| **Reference book** | 2. Nanotechnology and Nanoelectronics - Materials, Devices, Measurement Techniques by Wolfgang Fahrner |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **CP 430 COMPUTER NETWORKS C(L,T,P) =3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The objective of the course are: |
|  | 1 To familiarize students with the fundamental concepts and terminology about Computer Networking and about the Queuing Model systems |
|  | 2. To make students aware about the Data link layer. |
|  | 3. To make students aware about the Medium layer. |
|  | 4.. To make students aware about the Network layer. |
|  | 5. To make students aware about the ATM Networks. |
| **Expected Outcome:** | The student will be able to |
|  | 1 Understand the Fundamental concept of Computer Networking and |
|  | 2. Understand the concepts about Data link layer. |
|  | 3 Understand the concepts of Medium layer. |
|  | 4. Understand the concepts of Network layer. |
|  | 5. Understand the concepts of ATM Networks. |
| **Unit -1 (7 Hours)** | QUEUING THEORY- Network, Network Protocols, Edge, Access Networks and Physical Media  Protocol Layers and their services models, Internet Backbones, NAP's and ISPs |
|  |  |
| **Unit -2 (7 Hours)** | DATA LINK LAYER- Application Layer: Protocol and Service provided by application layer, transport protocols. The World Wide Web.  HTTP, Message formats, User Server Interaction and Web caches.  FTP commands and replies.  Electronic Mail, SMTP, Mail Message Formats and MIME and Mail Access Protocols  DNS The internet's directory service DNS records and Message. |
|  |  |
| **Unit -3 (7 Hours)** | MEDIUM LAYER- Transport Layer: Transport Layer Service and Principles, Multiplexing and Demultiplexing applications,  Connectionless Transport. UDP Segment structure and UDP Checksum. Principles of Reliable Data Transfer-Go back to N and Selective Repeat.  Connection Oriented Transport TCP Connection and Segment Structure, Sequence Numbers and acknowledgement numbers, Telnet, Round trip time and timeout. TCP connection management |
|  |  |
| **Unit -4 (7 Hours)** | NETWORK LAYER- Network Layer and Routing: Network service model, Routing principles. Link State routing Algorithm, A distant Vector routing and OSPF algorithm.  Router Components; Input Prot, Switching fabric and output port. IPV6 Packet format. Point To Point Protocol (PPP), transition States, PPP Layers-Physical Layer and Data Link Layer, Link Control Protocols. LCP Packets and options.  Authentication PAP and CHAP, Network Control Protocol (NCP). |
|  |  |
| **Unit -5 (7 Hours)** | ATM NETWORKS- Sonet/SDH: Synchronous Transport Signals. Physical configuration-SONET Devices, Sections, Lines and Paths.  SONET Layers-Photonic Layer, section layer, line layer, path layer and device layer relationship.  Sonet Frame format. Section overhead, Line overhead and path overhead. Virtual Tributaries and types of VTs. |
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| **List of Expt.** | 10 |
| **Text Book** | 1. Computer Network, Leon And Garcia, TMH  2.Data Communication And Networking(Sie), Forouzan, TMH  3.Computer Network, Tanenbaum, Pearson  4. Computer Networking, Kurose, Pearson  5. Computer Networking And Inernet, Halsell, Pearson  6. Digital Telephony, 3rd Ed, James Irvine & David Harle, Wiley  7. Line Communication System: Telecommunication Switching Approach, Das, Apurba,  New Age  8. Telecommunication Switching And Networks, Gnanasivam, New Age |
| **Reference book** | 1. Computer Network, Leon And Garcia, TMH  2.Data Communication And Networking(Sie), Forouzan, TMH  3.Computer Network, Tanenbaum, Pearson |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **CP 457 Computer Networks LAB C(L,T,P) =1(0,0,2)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The objective of the course are: |
|  | 1.To study fundamental of protocol architecture. |
|  | 2. To design and develop the algorithms for various network. |
|  | 3. To simulate the network protocols to find the desire result. |
|  | 4. To study the LAN training kit to find the throughput of protocols. |
|  | 5. To study fundamental of protocol architecture. |
| **Expected Outcome:** | The student will be able to |
|  | 1 An ability to understand the various types of protocols and their uses. |
|  | 2. An ability to various algorithms of different tasks. |
|  | 3. An ability to make program to simulate the protocol architecture to find throughputs. |
|  | 4. An ability to install different sever for different uses. |
| **S.No.** | List of Experiments |
|  | 1. The lab is to be conducted in Perl programming language, Perl works on all platforms (including windows) |
|  | 2. Write few basic programs of Perl. |
|  | a. A Hello World Program |
|  | b. Write a program to add to 10 numbers. |
|  | c. Write a program of reading input from the keyboard and displaying them on monitor. |
|  | d. Write a program to take two strings as input and compare them |
|  | 3. To understand advance constructs of Perl |
|  | e. Write a program to create a list of your course (all theory courses in current semester) using array and print them. |
|  | f. Write a program to accept ten number, store it into a hash table (Perl have itself) and when asked by user tell him that number exists or not. (do not store duplicate numbers) |
|  | g. Write a program to compute the number of lines in a file. |
|  | 4. Find the IP address of a host or turn an IP address into a name. |
|  | 5. Connect to an FTP server and get or put files. Automate the one-time transfer of many files to download the file everyday, which have changed since yesterday. (use Net: FTP) |
|  | 6. Write a program to send mail. The programs should monitor system resources like disk space and notify admin by mail when disk space becomes dangerously low. (use Net: mail) |
|  | 7. Fetch mail from a POP3 server (use Net: pop 3) |
|  | 8. Find out who owns a domain (use Net: whois, Whois is a service provided by domain name registration authorities to identify owners of domain names) |
|  | 9. Test whether a machine is alive. machine can be specified using IP address or domain name of machine. |
|  | 10. You have a URL that fetch its content from a Perl script, convert it to ASCII text (by stripping html tags) and display it. |
|  | 11. Writing a TCP Client, Writing a TCP Server and communicate some data over TCP |
| **List of Expt.** | 10 |
| **Text Book** | 1. Computer Network, Leon And Garcia, TMH  2.Data Communication And Networking(Sie), Forouzan, TMH  3.Computer Network, Tanenbaum, Pearson  4. Computer Networking, Kurose, Pearson  5. Computer Networking And Inernet, Halsell, Pearson  6. Digital Telephony, 3rd Ed, James Irvine & David Harle, Wiley  7. Line Communication System: Telecommunication Switching Approach, Das, Apurba,  New Age  8. Telecommunication Switching And Networks, Gnanasivam, New Age |
| **Reference book** | 1. Computer Network, Leon And Garcia, TMH  2.Data Communication And Networking(Sie), Forouzan, TMH  3.Computer Network, Tanenbaum, Pearson |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **EC 501 MOS VLSI C(L,T,P) =3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | 1. To bring both Circuits and System views on design together. |
|  | 2. It offers a profound understanding of the design of complex digital VLSI circuits, computer aided simulation and synthesis tool for hardware design. |
|  |  |
| **Expected Outcome:** | The student will be able to |
|  | 1. To be aware about the trends in semiconductor technology, and how it impacts scaling and performance. |
|  | 2. Able to learn Layout, Stick diagrams, Fabrication steps, Static and Switching characteristics of inverters |
|  | 3. Synthesis of digital VLSI systems from register-transfer or higher level descriptions in hardware design languages. |
|  | 4. To understand MOS transistor as a switch and its capacitance. 5. Student will be able to design digital systems using MOS circuits. |
|  |  |
| **Unit -1 (7 Hours)** | **PROCESS FLOW and MASKING STEPS FOR MOS and CMOS TECHNOLOGIES**, Lambda based design rules. (1) Electrical behavior of MOS transistors, (2) Latch up in CMOS technology |
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| **Unit -2 (7 Hours)** | Layer properties of various conducting layers in MOS technology (diffusion, poly-silicon and metal): Sheet resistance, relative capacitance. |
|  |  |
| **Unit -3 (7 Hours)** | Fundamental time constant (τ) for a technology. Design and analysis of NMOS (enhancement and depletion) and CMOS inverters; rationing of transistor size, logic threshold, logic low voltage level, rise and fall of delays. |
|  |  |
| **Unit -4 (7 Hours)** | **DESIGN OF BASIC GATES IN NMOS TECHNOLOGY.** CMOS logic design styles: static CMOS logic(and, NOR gates), complex gates, domino logic, pseudo NMOS logic ,clocked CMOS(C2 MOS) logic. |
|  |  |
| **Unit -5 (7 Hours)** | **STRUCTURED LOGIC DESIGN:** Programmable arrays. Design of latches and flip-flops, static memory cell and dynamic memory cell. MOS scaling theory and scaling of interconnection. |
|  |  |
| **List of Expt.** | nil |
| **Text Book** | Sung-Mo Kang and Yusuf Leblebici, CMOS Digital Integrated Circuits Analysis and Design, McGraw-Hill, 1998. |
| **Reference book** | 1. Neil H.E.Weste and Kamran Eshraghian, Principles of CMOS VLSI Design, Addison Wesley, 1998. 2. Rabaey et al., Digital Integrated Circuits, Pearson India, 2002. 3. K. Martin, Digital Integrated circuit design, Oxford University press, 2001. 4. A.Mukherji, Introduction to nMOS and CMOS VLSI system design, Prentice Hall Inc., 5. C.Mead and L.Conway, Introduction to VLSI systems, Addison Wesley, 1986. 6. Glasser and Dobberpuhl, Design and analysis of VLSI circuits, Addison Wesley, 1985 |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **EC 502 COMPUTER-AIDED VLSI DESIGN C(L,T,P) =3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | 1. Introductory course about cad vlsi |
|  | 1. Different stages in VLSI Design flow |
|  | 1. Front-end VLSI Design |
|  | 1. FPGA Design flow |
|  | 1. CAD for VLSI Design -2 |
|  | 1. Transistor level design issues |
|  | 1. Logic Synthesis and Static Timing Analysis |
|  | 1. High-speed circuits and processor architectures |
| **Expected Outcome:** | The student will be able to |
|  | 1. Establish comprehensive understanding of the various phases of CAD for digital electronic systems, from digital logic simulation to physical design, including test and verification. |
|  | 1. Demonstrate knowledge and understanding of fundamental concepts in CAD. |
|  | 1. Demonstrate knowledge of computational and optimization algorithms and tools applicable to solving CAD related problems. |
|  | 1. Establish capability for CAD tool development and enhancement. |
|  |  |
| **Unit -1 (7 Hours)** | **INTRODUCTION :** Why design ICs? Technology and economics for IC manufacturing. COMOS technology-circuit techniques,Power consumption,Design and testability. IC Design Techniques-Hierarchical design,Data abstraction and computer aided design |
|  |  |
| **Unit -2 (7 Hours)** | **TRANSISTORS and LAYOUT :** Design Rules-Fabrication Errors,Scalable design rules, SCMOS design rules and typical process parameters. Layout Design and Tools-Layout for Circuits,Stick Diagrams,Hierarchical Stick Diagrams,Layout Design and Analysis Tools and Automated Layout. |
|  |  |
| **Unit -3 (7 Hours)** | **SEQUENTIAL MACHINES:** Latches and FlipFlops-Categories of memory elements,Latches and Flip-Flops. Sequential Systems and clocking disciplines-One phase systems for Flip-Flops, Two-phase systems for Latches,Advanced clocking analysis and clock generation.Sequential system Design-structural specification,State Transition Graph,Tables and State assignment.Power optimization. Design validation and sequential testing. |
|  |  |
| **Unit -4 (7 Hours)** | **SUBSYSTEM DESIGN :**Subsystem Design Principles-Pipelining and Data paths. Combinational shifter,Adders ALUs and Multipliers.High Density Memory-ROM,Static RAM, Three-Transistor DRAM and one transistor DRAM. |
|  |  |
| **Unit -5 (7 Hours)** | **CHIP DESIGN :**Design Methodologies.Kitchen Timer chip-Timer specification and Architecture,Architecture Design.Logic design,layout design and Design Validation. |
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| **List of Expt.** | nil |
| **Text Book** | Wayne Wolf: CMOS VLSI Design, PHI, 2008 |
| **Reference book** | J Bhaskar: VHDL Design,  Nawabi: VHDL Design, |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **EC 503 VLSI TECHNOLOGY C(L,T,P) =3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | 1. To learn in detail about the fabrication of BJT and MOSFET transistors.. |
|  | 1. All the unit process steps involved in planar process starting from silicon crystal growth to packaging of circuits has to be deal in depth. |
| **Expected Outcome:** | The student will be able to |
|  | 1. To gain enough knowledge about the basic process of fabrication. |
|  | 1. Students are expected to design VLSI circuits by keeping technological process constraints in mind. |
|  |  |
| **Unit -1 (7 Hours)** | Crystal growth & wafer preparation. Processing considerations: Chemical cleaning, getting the thermal Stress factors etc.  **Epitaxy :** Vapors phase Epitaxy Basic Transport processes & reaction kinetics, doping & auto doping, equipments, & safety considerations, buried layers, epitaxial defects, molecular beam epitaxy, equipment used, film characteristics, SOI structure. |
|  |  |
| **Unit -2 (7 Hours)** | **Oxidation :** Growth mechanism & kinetics, Silicon oxidation model, interface considerations, orientation dependence of oxidation rates thin oxides. Oxides. Oxidation technique & systems dry & wet oxidation. Masking properties of SiO2. |
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| **Unit -3 (7 Hours)** | **Diffusion :** Diffusion from a chemical source in vapor form at high temperature, diffusion from doped oxide source, diffusion from an ion implanted layer. |
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| **Unit -4 (7 Hours)** | **Lithography :** Optical Lithography: optical resists, contact & proximity printing, projection printing, electron lithography: resists, mask generation. Electron optics: roster scans & vector scans, variable beam shape. X-ray lithography: resists  & printing, X ray sources & masks. Ion lithography |
|  |  |
| **Unit -5 (7 Hours)** | **Etching :** Reactive plasma etching, AC & DC plasma excitation, plasma properties, chemistry & surface interactions, feature size control & apostrophic etching, ion enhanced & induced etching, properties of etch processing. Reactive Ion Beam etching, Specific etches processes: poly/polycide. Trench etching, |
|  |  |
| **List of Expt.** | nil |
| **Text Book** | “    Sze, ” Modern Semiconductor Device Physics”, John Wiley & Sons, 2000. |
| **Reference book** | 1.         B.G. Streetman, “Solid State Electronics Devices”, Prentice Hall, 2002.  2.         Chen, “VLSI Technology” Wiley, March 2003.  3. SK Gandhi, VLSI fabrication principles, John Wiley 1983 |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **EC 505 System Level Design and Modeling of Digital System C(L,T,P) =3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | 1. disciplines for robust digital logic and signaling (e.g., restoration, clocking, handshaking) |
|  | 1. where delay, energy, area, and noise arises in gates, memory, and interconnect |
|  | 1. how to model these physical effects both for back-of-the-envelope design (e.g. RC and Elmore delay) and detailed simulation (e.g., SPICE) |
|  | 1. the nature of tradeoffs in optimization |
|  | 1. how to design and optimize logic, memory, and interconnect structures at the gate, transistor, and wire level |
|  | 1. how technology scales and its impact on digital circuits and computer systems |
|  |  |
| **Expected Outcome:** | The student will be able to |
|  | 1. Be able to use VLSI design methodologies to understand and design complex digital systems. |
|  | 2. Be able to create circuits that realize specified digital functions. |
|  | 3. Be able to identify logic and technology-specific parameters to control the functionality, timing, power, and parasitic effects.Be able to complete a significant VLSI design project having a set of objective criteria & design constraints. |
|  |  |
| **Unit -1 (7 Hours)** | Sequential Logic Design- Introduction, Basic Bistable Memory Devices,additional bistable devices, reduced characteristics and excitation table for bistable devices. |
|  |  |
| **Unit -2 (7 Hours)** | Synchronous Sequential Logic Circuit Design: Introduction, Moore, Mealy and Mixed type Synchronous State Machines. Synchronous sequential design of Moore, Melay Machines, Synchronous Counter Design. |
|  |  |
| **Unit -3 (7 Hours)** | Data path and Control design. Algorithmic State Machine: An Algorithm with inputs, digital solution, Implementation of traffic light controller, ASM charts, Design Procedure for ASMs. |
|  |  |
| **Unit -4 (7 Hours)** | Introduction to programmable logic devices: PALs, PLDs, CPLDs and FPGAs. |
|  |  |
| **Unit -5 (7 Hours)** | Introduction to VHDL: Data types, Concurrent statements, sequential statements, behavioral modelling. |
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| **List of Expt.** | nil |
| **Text Book** | Zvi Kohavi, Switching and Finite Automata Theory, Tata McGraw-Hill. |
| **Reference book** | 1. Digital System Design, Ercegovic, Wiley. 2. Richard S. Sandige, Modern Digital Design, McGraw-Hill, 1990. 3. Navabi. Analysis and modeling of digital systems. McGraw Hill, 1998. 4. Perry. Modeling with VHDL. McGraw Hill, 1994. |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **EC 507 ADVANCED COMPUTER COMMUNICATION C(L,T,P) =3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | 1. Build an understanding of the fundamental concepts of computer networking. |
|  | 1. Familiarize the student with the basic taxonomy and terminology of the computer networking area. |
|  | 1. Allow the student to gain expertise in some specific areas of networking such as the design and maintenance of individual networks. |
|  | 1. Introduce the student to advanced networking concepts, preparing the student for entry Advanced courses in computer networking. |
|  |  |
| **Expected Outcome:** | The student will be able to |
|  | 1. Independently understand basic computer network technology. |
|  | 2. Understand and explain Data Communications System and its components. |
|  | 3. Identify the different types of network topologies and protocols. |
|  | 4. Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer. |
|  | 5. Identify the different types of network devices and their functions within a network. |
|  | 6. Understand and building the skills of subnetting and routing mechanisms. |
| **Unit -1 (7 Hours)** | **Introduction to Reference Models:** Introduction to data communication. Concept of analog and digital signals. Bandwidth. Network architecture. Basics of OSI and TCP/IP reference models. Example architecture of other reference models. |
|  |  |
| **Unit -2 (7 Hours)** | **Transmission media**: Wired and wireless connectivity. FDM, TDM and CDMA. Circuit and packet switching. Frame relay and ATM switching. ISDN.  Local area network protocols. IEEE standards for LAN. Fibre optic networks. Satellite networks. Data link layer design issues: its functions and protocols. |
|  |  |
| **Unit -3 (7 Hours)** | Protocol and Packet format:  Internet protocol. Routing algorithms. Congestion control algorithms. IP addressing schemes. Internetworking and sub-netting. Transport and application layer design issues. Connection management. Transport protocol on top of X.25. File transfer and access management. |
|  |  |
| **Unit -4 (7 Hours)** | Quality of Services:  In ATM, IETF integrated services model, Differentiated services Model. Flow identification, Packet Classifiers and Filters, Scheduling. Factors affecting QOS parameters and service categories. QOS classes. |
|  |  |
| **Unit -5 (7 Hours)** | Network Management:  Network Management protocol; SNMP, CMIP, Issues in the management of large networks. Multicast: IGMP, PIM, DVMRP.Concept of Traffic and service. Traffic and service characteristics of voice and video data. ATM Traffic descriptors and QOS parameters. Elements of ATM Traffic management-Traffic contracting, policing and shaping. Ion Beam etching, Specific etches processes: poly/polycide. Trench etching, |
|  |  |
| **List of Expt.** | nil |
| **Text Book** | Stallings: Data communication and Networking |
| **Reference book** | 1. Charle Kaufman, Radia Perlman, Mike Specines, Uyless Black "Computer Networks: Protocols Standards and Interfaces " PHI. 2. K.C. Mansfield,J.L. Antonakos " An introduction to computer networking" PHI. 3. Network Systems Design using Network Processor, Douglas Comer, Pearson Education, ISBN 81-7808-994-7 4. IXP 1200 programming, Erik J. Johnson and Aaron Kunze, Intel Press. |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **EC 504 ANALOG ICS C(L,T,P) =3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | 1. The operation of the MOS transistor |
|  | 2. Understand the behaviour of the MOS transistor in circuits |
|  | 3. Understand how MOS transistors are modelled for CAD tools |
|  | 4. The analysis of the Single stage amplifiers |
|  |  |
| **Expected Outcome:** | The student will be able to |
|  | 1. To analyze quantitatively the behaviour of MOS transistor in various regions of operation |
|  | 1. Use the time domain and frequency domain concepts in analysing the circuits |
|  | 1. To design a CMOS based system, component, or process within realistic constraints. |
|  |  |
| **Unit -1 (7 Hours)** | **REVIEW OF MOS TRANSISTOR** operation models and equivalent circuits. Single-Stage Amplifiers, Differential Amplifiers. Passive and Active Current Mirrors: Cascode Current mirror, Wilson Current mirror. |
|  |  |
| **Unit -2 (7 Hours)** | **THEORY and DESIGN OF MOS OPERATIONAL AMPLIFIER**, Complete CMOS operational amplifier including frequency compensation. Comparators and Voltage Reference Sources. |
|  |  |
| **Unit -3 (7 Hours)** | **SWITCHED CAPACITOR CIRCUITS:** Principles of operation of Switched Capacitor Circuits, Switched Capacitor Filters. |
|  |  |
| **Unit -4 (7 Hours)** | D/A and A/D CONVERTERS. |
|  |  |
| **Unit -5 (7 Hours)** | **NONLINEAR ANALOG CIRCUITS:** Timers, Function generators, Multipliers and PLL |
|  |  |
| **List of Expt.** | nil |
| **Text Book** | P. R. Gray and R. G. Meyer. Analysis and Design of Analog Integrated Circuits. McGraw Hill, NY, 1994. |
| **Reference book** | 1. 2. A. B. Grebene, Bipolar and MOS analog integrated circuits design. John Wiley, 1984. |
|  | 1. 3. S. Soclof. Analog Integrated Circuits. Prentice Hall Inc. , 1985. |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **EC506 ADVANCED DIGITAL SIGNAL PROCESSING C(L,T,P) =3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | 1. Sampling, aliasing and the relationship between discrete and continuous signals |
|  | 1. Review of Fourier transforms, the Z-transform, FIR and IIR filters, and oscillators |
|  | 1. Filter implementation techniques, structures and numerical round-off effects |
|  | 1. Filter design techniques |
|  | 1. Auto-correlation, cross-correlation, and power spectrum estimation techniques |
|  | 1. Linear prediction |
|  | 1. Wiener filters, LMS adaptive filters, and applications. |
|  | 1. Multi-rate signal processing and subband transforms. |
|  | 1. Time-frequency analysis, the short time Fourier transform, and wavelet transforms. |
|  |  |
| **Expected Outcome:** | The student will be able to |
|  | 1. Understanding of the relationship between time and frequency domain interpretations and implementations of signal processing algorithms |
|  | 1. Understand and be able to implement adaptive signal processing algorithms based on second order statistics |
|  | 1. Be familiar with some of the most important advanced signal processing techniques, including multi-rate processing and time-frequency analysis techniques. |
|  |  |
| **Unit -1 (7 Hours)** | **Signals and signal Processing**: characterization & classification of signals, typical Signal Processing operations, example of typical Signals, typical Signals Processing applications.  Time Domain Representation of Signals & Systems: Discrete Time Signals, Operations on Sequences, the sampling process, Discrete-Time systems, Time-Domain characterization of LTI  Discrete-Time systems, state-space representation of LTI Discrete-Time systems, random signals. |
|  |  |
| **Unit -2 (7 Hours)** | **Transform-Domain Representation of Signals:** the Discrete-Time Fourier Transform, Discrete Fourier Transform, DFT properties, computation of the DFT of real sequences, Linear Convolution using the DFT. Z-transforms, Inverse z-transform, properties of z-transform, transform domain representations of random signals |
|  |  |
| **Unit -3 (7 Hours)** | **FIR FILTERS DESIGN:** Symmetric and antisymmetric linear phase. FIR filter by rectangular, triangular and Blackman window functions. |
|  |  |
| **Unit -4 (7 Hours)** | FINITE WORD LENGTH EFFECTS IN FIR and IIR DIGITAL FILTERS: Quantization, round off errors and overflow errors. |
|  |  |
| **Unit -5 (7 Hours)** | **MULTI RATE DIGITAL SIGNAL PROCESSING:** Concepts, design of practical sampling rate converters, Decimators, interpolators. Polyphase decompositions. |
|  |  |
| **List of Expt.** | nil |
| **Text Book** | Prokis and Monolakis-Digital Signal Processing: Principles, Algorithms and Application, Prentice hall of India. |
| **Reference book** | 1. 1. Schafer, Buck-Discrete Time signal Processing, Pearson Education Asia. |
|  | 1. 3. S.K. Mitra-Digital Signal Processing. Tata Mc-Graw Hill. |
|  | 1. 4. Rabiner and Gold-Theory and Applications of Digital Signal Processing, Prentice Hall of India. |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **EC508 SYNTHESIS OF DIGITAL SYSTEM C(L,T,P) =3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | 1. To learn about state-of-the-art techniques and algorithms for synthesis and verification of digital systems. |
|  | 1. Topics in synthesis cover high-level and architectural synthesis, decision and word-level diagrams, combinational logic optimization, and sequential optimization. |
|  | 1. Topics in verification include: formal and simulation based verification techniques; combinational and sequential equivalence checking; model and property checking; satisfiability (SAT); and functional test generation. |
|  |  |
| **Expected Outcome:** | The student will be able to |
|  | 1. An ability to describe, design, simulate, and synthesize computer hardware using the Verilog hardware description language. |
|  | 1. An ability to rapidly design combinational and sequential logic that works. |
|  | 1. An ability to rapidly design complex state machines (present in all practical computers) that work. |
|  | 1. An ability to synthesize logic and state machines using an Automatic Logic Synthesis program. |
|  | 1. An ability to implement state machines using Field-Programmable Gate Arrays. |
|  | 1. An ability to design high-speed computer arithmetic circuits |
|  | 1. An ability to design a computer so that it can test itself with built-in circuitry. |
|  |  |
| **Unit -1 (7 Hours)** | **ROLE OF CAD IN DIGITAL SYSTEM DESIGN,** levels of design and description such as behavioral, structural and physical; |
|  |  |
| **Unit -2 (7 Hours)** | **TECHNOLOGICAL ALTERNATIVES;** languages for design description and modeling at various levels; |
|  |  |
| **Unit -3 (7 Hours)** | **SRAM and DRAM CELL DESIGN:** Basic Cell Structures, modeling and design Equations. |
|  |  |
| **Unit -4 (7 Hours)** | **CAD TOOLS FOR SYNTHESIS,OPTIMIZATION,** simulation and verification of design at various levels as well as for PLAs, gate arrays etc. |
|  |  |
| **Unit -5 (7 Hours)** | SPECIAL REALIZATIONS and STRUCTURES such as microprogrammes |
|  |  |
| **List of Expt.** | nil |
| **Text Book** | G. D. Micheli. Synthesis and optimization of digital systems. |
| **Reference book** | 1. 2. Dutt, N. D. and Gajski, D. D. High level synthesis, Kluwer, 2000. |
|  | 1. 3. T. H. Cormen, C. E. Leiserson and R. L. Rivest, “Introduction to Algorithms,” McGraw-Hill, 1990. |
|  | 1. 4. N. Deo, Graph Theory, PH India. |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |
|  | **EC 601 EMBEDDED SYSTEM DESIGN C(L,T,P) =3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | 1. Describe what makes a system a real |
|  | 1. Explain the presence of and describe the characteristics of latency in real |
|  | 1. Summarize special concerns that real-time systems present and how these concerns are addressed |
|  |  |
| **Expected Outcome:** | The student will be able to |
|  | 1. Understand and design embedded systems and real-time systems for real-time systems: |
|  | 1. Identify the unique characteristics of real-time systems |
|  | 1. Explain the general structure of a real-time system |
|  | 1. Define the unique design problems and challenges of real-time systems |
|  | 1. Apply real-time systems design techniques to various software programs. |
|  |  |
| **Unit -1 (7 Hours)** | **EMBEDDED COMPUTING-** Microprocessors, embedded design process, system description formalisms. Instruction sets- CISC and RISC; CPU fundamentals- programming I/Os, co-processors, supervisor mode, exceptions, memory management units and address translation, pipelining, super scalar execution, caching, CPU power consumption. |
|  |  |
| **Unit -2 (7 Hours)** | **EMBEDDED COMPUTING PLATFORM-** CPU bus, memory devices, I/O devices, interfacing, designing with microprocessors, debugging techniques., Program design and analysis- models of program, assembly and linking, compilation techniques, analysis and optimization of execution time, energy, power and size. |
|  |  |
| **Unit -3 (7 Hours)** | **PROCESSES and OPERATING SYSTEMS-** multiple tasks and multiple processes, context switching, scheduling policies, inter-process communication mechanisms.s. |
|  |  |
| **Unit -4 (7 Hours)** | **HARDWARE ACCELERATORS-** CPUs and accelerators, accelerator system design., Networks- distributed embedded architectures, networks for embedded systems, network-based design, Internet-enabled systems. |
|  |  |
| **Unit -5 (7 Hours)** | **SYSTEM DESIGN TECHNIQUES-** design methodologies, requirements analysis, system analysis and architecture design, quality assurance. |
|  |  |
| **List of Expt.** | nil |
| **Text Book** | 1. Wolf, W. Computers as components- Principles of embedded computing system design. Academic Press (Indian edition available from Harcourt India Pvt. Ltd., 27M Block market, Greater Kailash II, New Delhi-110 048. |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **EC 605 MICRO-ELECTRONICS C(L,T,P) =3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | 1. This subject covers the basics of digital logic circuits and design. |
|  | 1. Through the basic understanding of Boolean Algebra and Number systems , it introduces the student to the fundamentals of combination logic design and then to sequential circuits(both synchronous and asynchronous). Memory systems are also covered. |
|  | 1. There is an introduction to VHDL |
|  | 1. Students will be provided with an opportunity to implement the PLD based designs(using both schematic capture and VHDL) in actual chips. |
|  |  |
| **Expected Outcome:** | The student will be able to |
|  | The students will be able to design, simulate , built and debug complex combinational and sequential circuits based on an abstract functional specification. |
|  |  |
| **Unit -1 (7 Hours)** | **INTRODUCTION TO VLSI,** circuits Asics and Moore's Law. Microelectronic Design, Styles, four phases in creating Microelectronics chips computer Aided Synthesis and Optimization. |
|  |  |
| **Unit -2 (7 Hours)** | Graph Theory : Algorithms Review of Graph Definitions and Notations Decision and Optimization Problems, Shortest and Longest Path Problems, Vertex Cover, Graph, Coloring, Clique covering and partitioning Algorithms Boolean Algebra and Representation of Boolean Functions, binary Decision diagrams. Satisfiability and cover problems. |
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| **Unit -3 (7 Hours)** | **HARDWARE MODELING**: Introduction to Hardware Modeling Language, State Diagrams. Data flow and Sequencing Graphs. Compilation and Behavioral Optimization Techniques. Circuits Specifications for Architectural Synthesis Resources and constraints. Fundamental Architectural Synthesis Problems Temporal Domain Scheduling Spatial Domain Binding Hierarchical Models and Synchronization Problem. Area and performance estimation-Resource Dominated circuits and General Circuits. |
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| **Unit -4 (7 Hours)** | **SCHEDULING ALGORITHMS:** Model for Scheduling Problems, Scheduling without Resource, Constraints-Unconstrained Scheduling ASAP Scheduling Algorithms Latency. Constrained Scheduling. ALAP scheduling. Under Timing Constraints and Relative Scheduling with Resource Constraints Integer Linear Programming Model, Multiprocessor Scheduling, Heuristic Scheduling Algorithms (List Scheduling). Force Directed Scheduling. |
|  |  |
| **Unit -5 (7 Hours)** | **TWO LEVEL COMBINATION LOGIC OPTIMIZATION**: Logic Optimization Principles-Definitions, Exact Logic Minimization, Heuristic, Logic Minimization, and Testability Properties Operations on Two level logic Cover-positional Cube Notation, Functions with Multivolume inputs and list oriented manipulation. Algorithms for logic minimization. |
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| **List of Expt.** | nil |
| **Text Book** | G. D. Micheli. Synthesis and Optimization of Digital Systems. |
| **Reference book** | 1. Dutt, N. D. and Gajski, D. D. High level synthesis, Kluwer, 2000. |
|  | 1. T. H. Cormen, C. E. Leiserson and R. L. Rivest, “Introduction to Algorithms,” McGraw-Hill, 1990. |
|  | 1. 4. J Bhaskar: VHDL Design |
|  | 1. 5. Nawabi: VHDL Design |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |
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|  | **EC 615 MICRO-ELECTRO-MECHANICAL-SYSTEMS (MEMS) C(L,T,P) =3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | 1. To gain a fundamental understanding of standard microfabrication techniques and the issues surrounding them. |
|  | 1. To know the major classes, components, and applications of MEMS devices/systems and to demonstrate an understanding of the fundamental principles behind the operation of these devices/systems |
|  | 1. apply knowledge of microfabrication techniques and applications to the design and manufacturing of an MEMS device or a microsystem |
|  |  |
| **Expected Outcome:** | The student will be able to |
|  | 1. Students will be able to understand working principles of currently available microsensors, actuators, and motors, valves, pumps, and fluidics used in microsystems. |
|  | 1. Students will be able to apply scaling laws that are used extensively in the conceptual design of microdevices and systems. Students will be able to differentiate between the positive and negative consequences of scaling down certain physical quantities that are pertinent to microsystems. |
|  | 1. Students will be able to use materials for common microcomponents and devices. |
|  | 1. Students will be able to choose a micromachining technique, such as bulk micromachining and surface micromachining for a specific MEMS fabrication process. |
|  | 1. Students will be able to understand the basic principles and applications of micro-fabrication processes, such as photolithograpy, ion implantation, diffusion, oxidation, CVD, PVD, and etching. |
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| **Unit -1 (7 Hours)** | system-level design methodology, Equivalent Circuit representation of MEMS, signal-conditioning circuits, and sensor noise calculation. |
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| **Unit -2 (7 Hours)** | MEMS & Microsystems, Typical MEMS and Micro system products — features of MEMS, The  multidisciplinary nature of Microsystems design and manufacture, Applications of Microsystems in automotive industry, health care industry,  aerospace industry, industrial products, consumer products and telecommunications. |
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| **Unit -3 (7 Hours)** | Introduction, Photolithography, Ion-implantation, diffusion, oxidation, CVD, PVD, etching and materials  used for MEMS, Some MEMS fabrication processes: surface micro-machining, bulk micromachining, LIGA process, LASER micro machining, MUMPS, FAB-less fabrication. |
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| **Unit -4 (7 Hours)** | MEMS devices: The cantilever beam. Microwave MEMS applications:Scheduling, Heuristic Scheduling Algorithms (List Scheduling). Force Directed Scheduling. |
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| **Unit -5 (7 Hours)** | MEM switch design considerations. The micro-machined transmission line. MEMS-based microwave circuit and system. |
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| **List of Expt.** | nil |
| **Text Book** | Microelectromechanical (MEM) Microwave Systems by Hector J.De Los Santos, Artechhouse |
| **Reference book** | 1. An Introduction to Microelectromechanical System by Nadim Maluf, Artechhouse |
|  | 1. Tai — Ran Hsu, “MEMS and Micro Systems : Design and Manufacture”, Tata McGraw Hill, 2002 |
|  | 1. Boca Raton, “MEMS and NEMS: Systems, Devices and Structures”, CRC Press, 2002 |
|  | 1. J. W. Gardner and V. K. Vardan, “Micro Sensors MEMS and SMART Devices”, John Wiley, 2002 |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **EC 603RECONFIGURABLE COMPUTING C(L,T,P) =3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | 1. This course introduces some fundamental and advanced computer and reconfigurable computing architectures including CISC, RISC and VLIW. FPGA technology is used as the basis for describing different forms of reconfigurable computing architectures that are becoming increasingly important in many consumer and industrial applications. |
|  | 1. Specific emphasis will be given to the understanding of computer arithmetic architectures and methods which are used in the design of embedded systems the fundamental principles behind the operation of these devices/systems |
|  | 1. The module uses practical design examples using both C and VHDL to illustrate the material. |
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| **Expected Outcome:** | The student will be able to |
|  | 1. An understanding of basic computer architecture including CISC, RISC and VLIW processors. |
|  | 1. An understanding of pipelining and cache techniques for improving performance. |
|  | 1. An understanding of other common processing architectures such as SIMD and MIMD. |
|  | 1. An understanding of computer arithmetic standards, methods and algorithms. |
|  | 1. An understanding of reconfigurable architectures including CPLD, FPGA and coarse-grained devices and how to programme them using VHDL. |
|  | 1. An understanding of heterogeneous architectures. |
|  | 1. An overview of custom, ASIC, Platform ASIC and SoC technologies |
|  |  |
| **Unit -1 (7 Hours)** | Evolution of programmable devices: Introduction to and-OR structured Programmable Logic Devices PROM, PLA, PAL and MPGAs; Combinational and sequential circuit realization using PROM based Programmable Logic Element (PLE); Architecture of FPAD, FPLA, FPLS and FPID devices. |
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| **Unit -2 (7 Hours)** | FPGA Technology: FPGA resources - Logic Blocks and Interconnection Resources; Economics and applications of FPGAs; Implementation Process for FPGAs Programming Technologies – Static RAM Programming, Anti Fuse Programming, EPROM and EEPROM Programming Technology; Commercially available FPGAs - Xilinx FPGAs, Altera FPGAs; FPGA Design Flow Example – Initial Design Entry, Translation to XNF Format, Partitioning, Place and Route, Performance Calculation and Design Verification. |
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| **Unit -3 (7 Hours)** | Technology Mapping for FPGAs: Logic Synthesis - Logic Optimization and Technology Mapping; Lookup Table Technology Mapping - Chortle-crf Technology Mapper, Chortle-d Technology Mapper, Lookup Table Technology Mapping in mis-pga, Lookup Table Technology Mapping in Asyl and Hydra Technology Mapper; Multiplexer Technology Mapping - Multiplexer Technology Mapping in mis-pga. |
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| **Unit -4 (7 Hours)** | Logic Block Architecture: Logic Block Functionality versus Area-Efficiency - Logic Block Selection, Experimental Procedure, Logic Block Area and Routing Model and Results. |
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| **Unit -5 (7 Hours)** | Routing for FPGAs: Routing Terminology; Strategy for routing in FPGAs; Routing for Row-Based FPGAs - Segmented channel routing, 1-channel routing algorithm, K – channel routing algorithm and results. |
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| **List of Expt.** | nil |
| **Text Book** | FPGA Based System Design by Wayne Wolf published by Pearson Education |
| **Reference book** | 1. Digital System Design Using Programmable Logic Devices by Parag K Lala published by BS publications |
|  | 1. 3. Field-Programmable Gate Arrays by Stephen Brown published by Kluwer Academic |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **EC 514 ANTENNA THEORY AND TECHNIQUES C(L,T,P) =3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | 1. The course provides the fundamentals in the theory and practice of antenna design and the antenna deployment in the modern wireless telecommunication systems. |
|  | 1. The theory of electromagnetic radiation is introduced and the fundamental antenna parameters are explained. |
|  | 1. The principles of analysis and design of antenna arrays are discussed. Special attention is paid to antennas popular in mobile (cellular, satellite) telecommunications. |
|  | 1. The fundamental limitations of electrically small antennas as well as the principles of smart antennas are briefly introduced through seminar sessions. |
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| **Expected Outcome:** | The student will be able to |
|  | 1. An ability to design a system, component, or process to meet desired needs. |
|  | 1. An ability to function on multi-disciplinary teams. |
|  | 1. An ability to identify, formulate, and solve engineering problems. |
|  | 1. An understanding of professional and ethical responsibility. |
|  | 1. An ability to communicate effectively. |
|  | 1. The broad education necessary to understand the impact of engineering solutions in a global and societal context. |
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| **Unit -1 (7 Hours)** | Review of the theory of electromagnetic radiation. Introduction to various antenna types wire, loop and helical antennas, analysis using assumed current distribution. |
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| **Unit -2 (7 Hours)** | **Aperture antennas:** slot, wave guide, horn, and reflector antennas. Analysis using field equivalence principle and Fourier transform methods. Linear arrays. Traveling wave and broadband antennas. Antenna measurements. |
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| **Unit -3 (7 Hours)** | **Printed antennas:** Feeding methods, transmission line and cavity models, analysis and design of rectangular and circular microstrip antenna. Arrays: pattern synthesis, planar arrays, phased arrays, Phased Array Antenna Design , Active antennas and arrays, Paraboloidal reflector antenna, different feed configurations, shaped beam antennas, lens antenna. |
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| **Unit -4 (7 Hours)** | **Microstrip Lines:**  Introduction; Overview of strip transmission lines; methods of microstrip analysis; dispersion on microstrip line; planar waveguide model; microstrip discontinuities, junctions and associated circuit elements; microstrip loss; technology. |
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| **Unit -5 (7 Hours)** | Antennas for biomedical, mobile and infrared detectors. |
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| **List of Expt.** | nil |
| **Text Book** | Practical Microstrip Design and Applications: Gunter Kompa; Artech House. |
| **Reference book** | Antenna Theory, by Balanis |
| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **EC513 WIRELESS DIGITAL COMMUNICATION SYSTEM C(L,T,P) =3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | 1. To study those aspects of digital communication systems that are unique to these systems. |
|  | 1. The theory of modulation and demodulation technique. |
|  | 1. Basics of CDMA and characterization of signals. |
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| **Expected Outcome:** | The student will be able to |
|  | 1. An ability to design a system, component, or process to meet desired needs. |
|  | 1. An ability to function on multi-disciplinary teams. |
|  | 1. An ability to identify, formulate, and solve engineering problems. |
|  | 1. An understanding of professional and ethical responsibility. |
|  | 1. An ability to communicate effectively. |
|  | 1. The broad education necessary to understand the impact of engineering solutions in a global and societal context. |
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| **Unit -1 (7 Hours)** | Principles of data transmission: Characterization of communication signals, signal space representation, equalization, |
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| **Unit -2 (7 Hours)** | Binary communication systems (ASK. PSK, FSK, QPSK, QAM and M-ary modulation techniques and their representation. |
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| **Unit -3 (7 Hours)** | Coherent and non coherent detection, carrier and symbol synchronization, bits vs symbol error probability, bandwidth efficiency.) , SNR error rates, comparison of various system, carrier and clock synchronization, Based pulsed Transmission, Nyquist criterion, Partial response signaling, Channel characterization, Effect of Inter symbol Interference, Equalization, Linear Equalization and decision feedback equalization. |
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| **Unit -4 (7 Hours)** | Spread Spectrum signals, synchronization of spread spectrum signals, Spread spectrum modulation: Pseudo noise sequences, Generaton of PN sequence Frequency hopped spread spectrum signals, DS and FH spread spectrum, Direct sequence spread spectrum signsls and their applications, |
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| **Unit -5 (7 Hours)** | Basics of CDMA, Applications of CDMA to cellular communication systems, Second and third generation CDMA systems/ standards. Multicarrier CDMA, Synchronization and demodulation .Diversity techniques and rake receiver. |
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| **List of Expt.** | nil |
| **Text Book** | B.P. Lathi-"Communication Systems:, John Wiley. |
| **Reference book** | 1. Louch-Digital and analog Communication, Pearson Education. |
|  | 1. Tomasi-Electronic Communication. Pearson Education |
|  | 1. Proakis-"Digital Communication" Tata Mc-Graw Hill. |
|  | 1. Sklar-"Digital Communication" Pearson Education. |
|  | 1. P. Chakarbarti-"Principles of Digital Communication" Danpatrai and Sons. |
| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **EC 515 MOBILE AND CELLULAR COMMUNICATION C(L,T,P) =3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | 1. To enable the student to synthesis and analyze wireless and mobile cellular communication systems over a stochastic fading channel. |
|  | 1. To provide the student with an understanding of advanced multiple access techniques. |
|  | 1. To provide the student with an understanding of diversity reception techniques |
|  | 1. To give the student an understanding digital cellular systems (GSM, cdmaOne, GPRS, EDGE, cdma2000, W-CDMA, and LTE) |
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| **Expected Outcome:** | The student will be able to |
|  | 1. By the end of the course, the student will be able to analyze and design wireless and mobile cellular systems. |
|  | 1. By the end of the course, the student will have the ability to work in advanced research wireless and mobile cellular programs |
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| **Unit -1 (7 Hours)** | Introduction: Components of Mobile Communication systems, Operation of cellular system, Trunking Efficiency, Concept of Frequency reuse, Multipath propagation, Short term and Long term fading, Frequency selective fading, Signal Propagation Models. |
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| **Unit -2 (7 Hours)** | Co-Channel Interference, Techniques for reducing Co-Channel Interference, Diversity Techniques, Other Interferences-Adjacent Channel Interference, Near End Far End Interference, Cross talk, Interference between systems, Hand off Techniques, Antennas for Base Station and Mobile Units |
|  |  |
| **Unit -3 (7 Hours)** | Analog cellular Mobile System: Channel structures, RF power level, Modulation, Spectrum and channel Designation, Network control activity, System operation , Principal functions, Mobile scanning, registration, Call origination, Call receipt, Handoff, call termination, security and Identification, Supervisory Audio Tone (SAT) Signalling Tone (ST), Signalling Format. |
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| **Unit -4 (7 Hours)** | Digital Cellular Mobile Systems: Digital v/s Analog cellular systems, Modulation, ARQ Technique, Digital Speech coding, Digital Mobile Telephony, channel Equalization, Multiple Access Schemes- FDMA, TDMA, CDMA. |
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| **Unit -5 (7 Hours)** | Introduction to Analog and Digial MARR, WLL system, 3-G Systems, Mobile Computing. Example systems: AMPS, MATS-D, CD-900, GSM |
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| **List of Expt.** | nil |
| **Text Book** | Wireless Communications by T. S Rappaport, IEEE Press |
| **Reference book** | 1. Mobile and Cellular Telecommunication by W.C.Y Lee. McGrawhill |
|  | 1. Wireless and Mobile Communication Systems by D.P Agarwal and Qing Anzen, Thomson Press |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **EC516 INFORMATION THEORY, CODING AND COMMUNICATION THEORY**  **C(L,T,P) =3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | 1. It offers an introduction to the quantitative theory of information and its applications to reliable, efficient communication systems. |
|  | 1. Topics include mathematical definition and properties of information, source coding theorem, lossless compression of data, |
|  | 1. Topics include optimal lossless coding, noisy communication channels, channel coding theorem, the source channel separation theorem, multiple access channels, broadcast channels, Gaussian noise, and time-varying channels. |
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| **Expected Outcome:** | The student will be able to |
|  | The course provides a general introduction to the topic of Information Theory with a focus on the application of Information Theory to communications in general and on channel coding and capacity in particular. |
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| **Unit -1 (7 Hours)** | Concept of Information and Entropy, Shanon’s theorms, Channel capacity Self information, Shannon’s fundamental coding theorems, Differential entropy and mutual information for discrete and continuous ensembles, Discrete and Continuous entropy, Mutual and joint information, Redundancy, source coding, Source encoding andchannel encoding, Error detection and Correction, Various codes for channel coding, Rate distortion theory, Rate Distortion functions.. Error Control coding for wireless fading channels, Channel Estimation and Adaptive channel coding, Joint Source and Channel coding. |
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| **Unit -2 (7 Hours)** | Introduction to Algebra: Groups, fields, Binary field arithmetic, Basic properties of Galois field GF (2m) and vector spaces. |
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| **Unit -3 (7 Hours)** | Channel coding and decoding: Run length limited codes, Linear block codes LBC, systematic linear codes and optimum coding for Binary symmetric channel, cyclic code, BCH code, MDS codes, BCH codes , generalized BCH codes,.. |
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| **Unit -4 (7 Hours)** | Convolution code: Coding and Decoding, Distance bounds, Performance bounds, Trellis coded modulation, TCM Decoders, TCM for AWGN and Fading Wireless Channels, Performance comparison, Reed-Solomon code. The Generator and parity check matrices, Syndrome decoding and Symmetric channels, Hamming codes, Weight enumerator, Perfect codes, Idempotent andMattson Solomon polynomials, justeen codes, Viterbi decoding algorithm. Performance of linear block |
|  |  |
| **Unit -5 (7 Hours)** | Non binary Linear Block Codes, Hard and soft decision decoding, Coding and Decoding of BCH, Reed Solomon Codes, Turbo codes: Coding, Decoding Algorithms, Performance comparison , Interleaver design |
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| **List of Expt.** | nil |
| **Text Book** | Manolakis.G.Proakis; Digital Communication |
| **Reference book** | 1. Ranjan Bose; Information Theory Coding and Cryptography |
|  | 1. Stephen G. Wilson; Digital Modulation and Coding |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **EC 509 TESTING AND FAULT TOLERANCE C(L,T,P) =3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | To provide students with an understanding of fault tolerant computers, including both the theory of how to design and evaluate them and the practical knowledge of real fault tolerant systems. |
| **Expected Outcome:** | The student will be able to |
|  | The students will be able to design, simulate , built and debug complex combinational and sequential circuits based on an abstract functional specification. |
| **Unit -1 (7 Hours)** | **PHYSICAL FAULTS and THEIR MODELING;** Stuck at Faults, Bridging Faults; Fault collapsing; Fault Simulation: Deductive, Parallel, and Concurrent Fault Simulation. Critical Path Tracing; |
|  |  |
| **Unit -2 (7 Hours)** | **ATPG FOR COMBINATIONAL CIRCUITS:** D-Algorithm, Boolean Differences, PODEM Random, Deterministic and Weighted Random Test Pattern Generation; Aliasing and its effect on Fault Coverage. PLA Testing, Cross Point Fault Model and Test Generation. |
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| **Unit -3 (7 Hours)** | **MEMORY TESTING** Permanent Intermittent and Pattern Sensitive Faults, Marching Tests; Delay Faults. ATPG for Sequential Circuits: Time Frame Expansion ; Controllability and Observability Scan Design, BILBO , Boundary Scan for Board Level Testing ; |
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| **Unit -4 (7 Hours)** | **BIST and TOTALLY SELF CHECKING CIRCUITS.**System Level Diagnosis: Introduction; Concept of Redundancy, Spatial Redundancy, Time Redundancy, Error Correction Codes. |
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| **Unit -5 (7 Hours)** | **RECONFIGURATION TECHNIQUES;** Yield Modeling, Reliability and effective area utilization. |
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| **List of Expt.** | nil |
| **Text Book** | Abramovici, M., Breuer, M. A. and Friedman, A. D. Digital systems testing and testable design. IEEE press (Indian edition available through Jayco Publishing house), 2001. |
| **Reference book** | Bushnell and Agarwal, V. D. VLSI Testing. Kluwer. |
|  | Agarwal, V. D. and Seth, S. C. Test generation for VLSI chips. IEEE computer society press. |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **EC510 ISSUES IN DEEP SUB-MICRON CMOS IC DESIGN C(L,T,P) =3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | To introduce students to deep-submicron and nanotechnology aspects in CMOS VLSI Design |
| **Expected Outcome:** | The student will be able to |
|  | a student is expected to be able to design and analyze digital circuits, understand transistor operations, circuit families, area-power-performance analysis, layout design techniques, signal integrity analysis, memory design and clocking issues. Students are also expected to understand various design methodologies such as custom, semi-custom, standard cell, arrayed logic, sea-of-gates. |
| **Unit -1 (7 Hours)** | Introduction to concept of design, design methodologies, semi-custom and custom design approaches. |
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| **Unit -2 (7 Hours)** | Data path and control design. |
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| **Unit -3 (7 Hours)** | Elements of device and circuit simulation, logic simulation, Stick diagram and representation |
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| **Unit -4 (7 Hours)** | layout of ICs, lambda based design rules, Deep submicron interconnects modeling and synthesis. |
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| **Unit -5 (7 Hours)** | Topics in design-yield and redundancy, low power design techniques. |
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| **List of Expt.** | nil |
| **Text Book** | Raguram, R. Modeling and Simulation of Electronic circuits. PHIndia, 1996. |
| **Reference book** | Weste and Eshraghian. Principles of CMOS VLSI design. Addison Wesley |
|  | A.Mukherji. Introduction to NMOS and CMOS VLSI system design. Prentice Hall Inc., 1986 |
|  |  |
| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **EC 511 MEMORY DESIGN AND TESTING C(L,T,P) =3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | Different memory devices like, RAM, ROM, PROM, EPROM, EEPROM, etc. Different terms like: read, write, access time, nibble, byte, bus, word, word length, address, volatile, non-volatile etc. How to implement combinational and sequential circuits using ROM |
| **Expected Outcome:** | The student will be able to |
|  | Describe the technology used in the construction of digital memory, and assess the quality of various memory types. Draw the schematic of a static and dynamic memory cell and explain in details the process of reading and writing a bit of information in it. Draw the schematic of a typical sense amplifier and explain how it works. Draw a schematic of a simple (2-3 bit) NOR/NAND NMOS address decoder and explain how it decodes a given address. |
| **Unit -1 (7 Hours)** | Review of MOS Structure, Scaled Down MOSFET and CMOS Processing. |
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| **Unit -2 (7 Hours)** | Processing for Memories: Multipoly Floating Gate and Control Gate, Trench Capacitors and thin Oxide. Inverter Design: Choice of W/L and Noise Margin Calculation, Cascode and Differential Inverters. |
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| **Unit -3 (7 Hours)** | SRAM and DRAM Cell Design: Basic Cell Structures, modeling and design Equations. |
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| **Unit -4 (7 Hours)** | Sense Amplifiers: Necessity for Sense Amplifiers, Voltage and Current Sense Amplifiers, Reference Voltage Generation, Influence of Sense Amplifier on cell Architecture. |
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| **Unit -5 (7 Hours)** | Peripheral Circuits. Memory Testing: Modeling, Introduction to Functional Testing and Built in Self-Test. |
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| **List of Expt.** | nil |
| **Text Book** | Sung-Mo Kang and Yusuf Leblebici, CMOS Digital Integrated Circuits Analysis and Design, McGraw-Hill, 1998. |
| **Reference book** | A.Mukherji, Introduction to nMOS and CMOS VLSI system design, Prentice Hall Inc |
|  | Glasser and Dobberpuhl, Design and analysis of VLSI circuits, Addison Wesley, 1985. |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **EC 512 ADVANCED IC TECHNOLOGY C(L,T,P) = 3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | As part of this course, students will understand the physical, electrical, and optical properties of semiconductor materials and their use in microelectronic circuits. Relate the atomic and physical properties of semiconductor materials to device and circuit performance issues. Develop an understanding of the connection between device-level and circuit-level performance of microelectronic systems. |
| **Expected Outcome:** | The student will be able to |
|  | Compute carrier concentrations for semiconductor materials under a variety of conditions. |
|  | Compute conductivity and resistivity of semiconductor materials under a variety of conditions. |
|  | Compute terminal voltage and current characteristics for pn junction diodes under a variety of conditions. |
|  | Compute terminal voltage and current characteristics for bipolar transistors under a variety of conditions. |
|  | Compute terminal voltage and current characteristics for MOS transistors under a variety of conditions. |
| **Unit -1 (7 Hours)** | **INTRODUCTION:** Tools for technological processing in microelectronics. Survey of methods for analysis of microelectronic materials and devices. |
|  |  |
| **Unit -2 (7 Hours)** | **CLASSIFICATION OF DIFFERENT TOOLS** for bulk, surface and thin film characterization. |
|  |  |
| **Unit -3 (7 Hours)** | **FABRICATION OF NANOSCALE and SUBMICRON STRUCTURES**: Physical and chemical techniques for nanomaterial synthesis, Assembling and self organization of nanostructures, |
|  |  |
| **Unit -4 (7 Hours)** | **Nanoscale manipulation**, Nanotube and wire formation, Importance of size distribution control, size measurement and size selection. |
|  |  |
| **Unit -5 (7 Hours)** | Fabrication of hetrostructure in submicron and quantum level for microelectronic and optical applications |
|  |  |
| **List of Expt.** | nil |
| **Text Book** | S. M. Sze, VLSI Technology, McGRAW-HILL, 1988. |
| **Reference book** | 1. AB Glaser, GE Subak-Sharpe, Integrated circuit engineering, Reading MA, Addison Wesley 1977 |
|  | 1. D. Nagchoudhuri, Principles of Microelectronic Technology, Wheeler Publishing, 1998. |
|  | 1. Stephen A. Campbell, The Science and Engineering of Microelectronic Fabrication, Oxford University Press, 1996. |
|  | 1. SK Gandhi, VLSI fabrication principles, John Wiley 1983. |
|  |  |
| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **EC517 MOBILE COMPUTING C(L,T,P) =3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | 1. Basics of mobile communications and how the signals encoded and decoded |
|  | 1. To enable the student to synthesis and analyze wireless and mobile cellular communication systems over a stochastic fading channel. |
|  | 1. To give the student an understanding digital cellular systems (GSM, cdmaOne, GPRS, EDGE, cdma2000, W-CDMA, and LTE) |
|  |
| **Expected Outcome:** | The student will be able to |
|  | 1. By the end of the course, the student will be able to analyze and design wireless and mobile cellular systems. |
|  | 1. By the end of the course, the student will have the ability to work in advanced research wireless and mobile cellular programs |
|  | 1. To gain the knowledge about bluetooth technology which are used in wireless technology. |
|  |  |
| **Unit -1 (7 Hours)** | **Introduction**  Computing Paradigms – Mobile Computing – Pervasive Computing – Distributed Computing – Centralized Computing – Network Computing – Types of Wireless Networks – Wireless Communication Technology – Signal Encoding – Spread Spectrum Technology – LOS Tower Design. |
|  |  |
| **Unit -2 (7 Hours)** | **Wireless Networking System**  Cellular Networks – 2G , 3G. CDMA and GSM. Satellite System – Broadcast System – Cordless System – Wireless Local Loop – MPLS. |
|  |  |
| **Unit -3 (7 Hours)** | **Wlan Standards**  Wireless LAN Technology – Architecture and Standards – Hyper LAN – Blue Tooth Architecture – Wideband Wireless Local Access – Wireless ATM, PAN |
|  |  |
| **Unit -4 (7 Hours)** | **Network Issues**  Adhoc Network – Characteristics – Performance Issues – Routing Protocols in Mobile and Wireless Networks – Table Driven Routing, On-Demand Routing Protocols – Mobile IP – DHCP – Mobile TCP |
|  |  |
| **Unit -5 (7 Hours)** | **Application Issues**  Concepts for working with wireless applications. WAP – WML. Mobile Database – Content Management. Wireless Network Simulators – Case Study. |
|  |  |
| **List of Expt.** | Nil |
| **Text Book** | Kaveh Pahlavan and Krishnamoorthy, P., Principles of Wireless Networks, 2002., Pearson Education |
| **Reference book** | 1. Anna Hac, Mobile Telecommunication Protocols for Data Networks, 2003, John Wiley and Son, Ltd |
|  | 1. Jochen Schille, Mobile Communications, 2003, Pearson Education Asia |
|  | 1. William Stalling, Wireless Communication and Networking, 2002, Pearson Education Asia |
|  | 1. Mark Beaulieu, Wireless Internetworking Applications and Architecture, 2002, Addison Wesley, Newyork |
|  |  |
| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **EC 518 TELECOMMUNICATION SWITCHING and NETWORK MANAGEMENT C(L,T,P) =3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | 1. To introduce to students the latest development of Telecommunication systems |
|  | 1. To provide an introduction to, and an understanding of the architecture and major design issues relating to switching systems. |
|  |  |
| **Expected Outcome:** | The student will be able to |
|  | 1. Understand the need for switching systems and their evolution from analogue to digital. |
|  | 1. Understand the Public Switched Telephone Network |
|  | 1. Understand private networks |
|  | 1. Understand integrated networks. |
| **Unit -1 (7 Hours)** | Principles of circuit switching & signaling schemes, space time & space time division switching, single  stage & multi stage switching network. Traffic engineering and teletraffic theory. |
|  |  |
| **Unit -2 (7 Hours)** | Markov processes representing traffic, calculation of blocking probability.. |
|  |  |
| **Unit -3 (7 Hours)** | Modeling and analysis of important media access control protocols: ALOHA, slotted  ALOHA,CSMA,CSMA/CD. |
|  |  |
| **Unit -4 (7 Hours)** | LAN: Ethernet, token ring, FDDI. |
|  |  |
| **Unit -5 (7 Hours)** | B-ISDN architecture, B-ISDN protocols, ATM traffic & congestion control, signaling, routing and addressing, Internetworking: switches, bridges, routers, gateways. ATM switching. |
|  |  |
| **List of Expt.** | Nil |
| **Text Book** | W. Stalling, Data and Computer Communications, 6e, Pearson Education |
| **Reference book** | W. Stalling, Wireless Communications and Network, 2e, Pearson/PHI Education |
|  |  |
| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **EC 522 MICROSTRIP ANTENNAS FOR WIRELESS SYSTEMS C(L,T,P) =3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | 1. The basic idea about the microwave components. |
|  | 1. The complete knowledge about the micristrip patch antenna. |
|  | 1. The complete knowledge about design and analysis of microstrip antenna |
|  |
| **Expected Outcome:** | The student will be able to |
|  | 1. To design the microstrip patch antenna with using the antenna parameter. |
|  | 1. Complete knowledge about the full wave analysis and active smart microstrip antennas |
|  | 1. Can design the analytical model for microstrip antenna. |
|  |  |
| **Unit -1 (7 Hours)** | Microstrip radiators, printed dipole, slot, traveling wave, aperture coupled microstrip antennas, various microstrip antenna configurations |
|  |  |
| **Unit -2 (7 Hours)** | Rectangular, Circular disk, ring, Triangular patch antennas and their design. Feed networks for microstrip antennas and arrays. |
|  |  |
| **Unit -3 (7 Hours)** | Analytical models for microstrip antennas. Transmission line model, Cavity Model, Multiport Network Model, Model for Coaxial probe in microstrip antenna. Full wave analysis of microstrip antennas |
|  |  |
| **Unit -4 (7 Hours)** | Active and smart microstrip antennas,. |
|  |  |
| **Unit -5 (7 Hours)** | Design and analysis of microstrip antenna arrays |
|  |  |
| **List of Expt.** | Nil |
| **Text Book** | W. Stalling, Data and Computer Communications, 6e, Pearson Education |
| **Reference book** | W. Stalling, Wireless Communications and Network, 2e, Pearson/PHI Education |
|  |  |
| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **EC 551 DIGITAL SYSTEM DESIGN LAB C(L,T,P) =1(0,0,2)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | Explain the elements of digital system abstractions such as digital representations of information, digital logic, Boolan algebra, state elements and finite state machine (FSMs). |
|  | Design simple digital systems based on these digital abstractions, using the "digital paradigm" including discrete sampled information. |
|  | Use the "tools of the trade": basic instruments, devices and design tools. |
|  | Work in a design team that can propose, design, successfully implement and report on a digital systems project. |
|  | Communicate the purpose and results of a design project in written and oral presentations. |
| **Expected Outcome:** | The student will be able to |
|  | Describe how analog signals are used to represent digital values in different logic families, including characterization of the noise margins. |
|  | Create the appropriate truth table from a description of a combinational logic function. |
|  | Discuss how to interface digital circuits with analog components (ADC, DAC, sensors, etc.). |
|  | Learn how to write test-benches and perform verification of the relatively complex digital system. |
| S. No. | List of Experiments |
|  | PART-I: |
| 1-6 | Design, implement and experiment with digital system, this will include ASIC design, FPGA based design. design of relevant hardware and software for microcontroller ,processor and DSP based embedded system. |
|  | PART-II: |
| 7-12. | Custom design and simulation of different higher level analog and digital circuits using advance EDA tools like Tanner Spice S-edit and L- edit |
| **List of Expt.** | 12 |
|  |  |
| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **EC 552 MODELING AND SIMULATION LAB C(L,T,P) =1(0,0,2)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | The purpose of this course is to provide in-depth treatment on methods and techniques in discrete-time signal transforms, digital filter design, optimal filtering, power spectrum estimation, multi-rate digital signal processing, DSP architectures, which are of importance in the areas of signal processing, control and communications. |
| **Expected Outcome:** | The student will be able to |
|  | The topics covered in this course provide comprehensive foundation for other more specialized areas in signal processing, control, and communications. At the end of the course, students would be able to apply fundamental principles, methodologies and techniques of the course to analyze and design various problems encountered. |
|  | **EXPERIMENTS USING TMS320C6XXX DSP KITS** |
| 1. | FIR Digital Filter Design |
| 2. | IIR Digital Filter Design |
| 3. | FFT of a given signal |
| 4. | Plot PSD/Power Spectrum of a signal |
| 5. | Discrete Cosine Transform |
| 6. | Adaptive Filter Design using Standard LMS Algorithm |
| 7. | Speech analysis using L.P.C. |
| **List of Expt.** | 7 |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **EC 553 COMMUNICATION SYSTEM LAB C(L,T,P) =1(0,0,2)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | To verify the function of digital modulation and multiplexing techniques using Simulink for different channel characteristics. |
| **Expected Outcome:** | The student will be able to |
|  | After the completion of the course, student will have hands-on  experience that enable the design of digital communication links  from transmitter to the receiver in single or multi-channel  configurations. |
| **PART** | **Contents of the Subject** |
|  | **PCM and LINK ANALYSIS** Link establishment, Noise on PCM link, Error detection, BER calculation, Error correction, TDM. |
|  | To study ASK Digital Modulation and Demodulation |
|  | To study FSK Digital Modulation and Demodulation |
|  | To study PSK Digital Modulation and Demodulation |
|  | To study QPSK Digital Modulation and Demodulation |
|  | To study MSK Digital Modulation and Demodulation |
|  | **CDMA** Modulation, Demodulation |
|  | **DSSS** Modulation, Demodulation |
|  | SIMULATION IN MATLAB ENVIRONMENT for BPSK |
|  | SIMULATION IN MATLAB ENVIRONMENT for QPSK |
|  | SIMULATION IN MATLAB ENVIRONMENT for FSK |
|  | To study and perform GSM system |
| **List of Expt.** | 7 |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **EC 607 COMBINATORIAL OPTIMIZATION C(L,T,P) =3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | 1. Building a weighted sum of the objectives and solving the single objective problem |
|  | 1. To give a well-defined sense to the “min” in the mathematical formulation, a context should be posed =Several definitions of optimality |
|  | 1. Algorithm to find the optimal path |
|  |  |
| **Expected Outcome:** | The student will be able to |
|  | 1. emphasis on theoretical results and algorithms with provably good performance, in contrast to heuristics. |
|  | 1. Find the optimum or shortest path using algorithm |
|  |  |
| **Unit -1 (7 Hours)** | Optimization problem- Convex sets and functions. The SIMPLEX algorithm- forms of linear programming problem, geometry of LP, Organization of Tableau. |
|  |  |
| **Unit -2 (7 Hours)** | Computational considerations for simplex algorithm Duality- dual of LP, Dual simplex problem. Primal-dual algorithm. |
|  |  |
| **Unit -3 (7 Hours)** | Algorithms and complexity- shortest path, max-flow, Dijkshtra’s algorithm, min-cost flow,algorithm for graph search and matching; Spanning trees and matroids;. |
|  |  |
| **Unit -4 (7 Hours)** | Integer Linear programming, Greedy algorithm, |
|  |  |
| **Unit -5 (7 Hours)** | approximation algorithms; branch-and-bound; dynamic programming |
|  |  |
| **List of Expt.** | nil |
| **Text Book** | Papadimitriou and Steiglitz, Combinatorial optimization, PH India, 2001. |
| **Reference book** | Nemhauser and Wolsey, Integer and Combinatorial optimization, Wiley International |
|  |  |
| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **EC 609 SATELLITE COMMUNICATION C(L,T,P) =3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | 1. The first of the primary course objectives is to understand how mission dictates orbit.This will require the student to understand the basics of orbital mechanics, the types of satellite orbits, the location of ground stations, and the look angles from ground stations to the satellite. User footprints will also be covered. |
|  | 1. The second primary objective is to use and understanding of link budget equations to provide sufficient margin for performance.This includes examining the various types of modulation, error correcting codes, and encryption. |
|  | 1. The third primary objective is to examine concepts of satellite networking.This includes mobile satellite systems for voice and internet communication, data networks, and scientific data. |
|  |
| **Expected Outcome:** | The student will be able to |
|  | 1. The student should be good at fundamentals of satellite communications link design and provides an overview of practical considerations. |
|  | 1. Existing systems are described and analyzed, including direct broadcast satellites, VSAT links, and Earth-orbiting and deep space spacecraft. |
|  | 1. Topics include satellite orbits, link analysis, antenna and payload design, interference and propagation effects, modulation techniques, coding, multiple access, and Earth station design |
|  |  |
| **Unit -1 (7 Hours)** | Introduction:, Orbital mechanics and launching, satellite Channel |
|  |  |
| **Unit -2 (7 Hours)** | Earth station and satellite sub systems, Transponder and utilization, |
|  |  |
| **Unit -3 (7 Hours)** | Satellite link: design and analysis, multiplexing techniques, Earth station design and relay links, |
|  |  |
| **Unit -4 (7 Hours)** | Multiple accesses for satellite links: FDMA, TDMA CDMA and DAMA, propagation effects, DBS-TV, GPS. |
|  |  |
| **Unit -5 (7 Hours)** | VSAT: Network architecture access control protocol and link analysis, Lower Earth Orbit satellites |
|  |  |
| **List of Expt.** | Nil |
| **Text Book** | Satellite communication by prett |
| **Reference book** | 1. Satellite communication by D.C. Agrawal |
|  | 1. Satellite communication by Robert M. Gagliardi |
|  |  |
| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **EC 611 WIRELESS SENSOR NETWORK C(L,T,P) =3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | 1. Sensors are typically capable of wireless communication and are significantly constrained in the amount of available resources such as energy, storage and computation. |
|  | 1. This course provides a broad coverage of challenges and latest research results related to the design and management of wireless sensor networks. |
|  | 1. Covered topics include network architectures, node discovery and localization, deployment strategies, node coverage, routing protocols, medium access arbitration, fault-tolerance, and network security. |
|  |  |
| **Expected Outcome:** | The student will be able to |
|  | 1. Architect sensor networks for various application setups. |
|  | 1. Explore the design space and conduct trade-off analysis between performance and resources. |
|  | 1. Assess coverage and conduct node deployment planning. |
|  | 1. Device appropriate data dissemination protocols and model links cost. |
|  | 1. Determine suitable medium access protocols and radio hardware. |
|  | 1. Prototype sensor networks using commercial components. |
|  |  |
| **Unit -1 (7 Hours)** | **WIRELESS SENSOR NETWORKS**: Introduction, Smart environments, the physical layer in WSN, WSN medium access control and link layer protocols |
|  |  |
| **Unit -2 (7 Hours)** | **COMMUNICATION NETWORKS:** Network architecture, Network Topology, Communication Protocols and Routing, Power Management, Network Structure and Hierarchical Networks, Historical Development and Standards |
|  |  |
| **Unit -3 (7 Hours)** | **SMART SENSORS:** IEEE 1451 and Smart Sensors, Transducers and Physical Transduction Principles, Sensors for Smart Environments,Commercially Available Wireless Sensor Systems |
|  |  |
| **Unit -4 (7 Hours)** | **WSN SERVICES:**Self-Organization and Localization, topology control and routing, data-centric and content-based routing, Quality of Service and transport protocols, in-network aggregation and WSN security. |
|  |  |
| **Unit -5 (7 Hours)** | **SIGNAL PROCESSING and DECISION-MAKING:** signal processing and decision-making, Signal Conditioning, Digital Signal Processing, Decision-Making and User Interface Building and Home Automation |
|  |  |
| **List of Expt.** | Nil |
| **Text Book** | William Stallings, “Wireless Communications and Networks”, ISBN: 0131918354, Prentice Hall; 2nd edition, November 12, 2004. |
| **Reference book** | 1. R. Frank, Understanding Smart Sensors, 2nd Ed., Artech House, Norwood, MA, 2000. |
|  | 2. Ivan Stojmenovic Wireless Sensor Networks: Challenges and Opportunities |
|  | 3. C.W. de Silva, Control Sensors and Actuators, Prentice-Hall, New Jersey, 1989. |
|  | 4. F.L. Lewis, Optimal Estimation, Wiley, New York, 1986. |
|  | 5. F.L. Lewis, Applied Optimal Control and Estimation, Prentice-Hell, New Jersey, 1992. |
|  | 6. F.L. Lewis, C.T. Abdallah, and D.M Dawson, Control of Robot Manipulators, Macmillan, New York, Mar. 1993. |
|  | 7. Murthy and Manoj, "Ad Hoc Wireless Networks: Architectures and Protocols," ISBN 0-13-147023-X, Pearson 2004 |
|  |  |
| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **EC 613 ADVANCED OPTICAL COMMUNICATION SYSTEMS C(L,T,P) =3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | 1. Basics of the optical fibres and optical communication. |
|  | 1. Basic introduction of the optoelectronic source. |
|  | 1. Optical sensors application and vital role in the communication |
|  |  |
| **Expected Outcome:** | The student will be able to |
|  | 1. To gain the knowledge about the optical fibres used in communication. |
|  | 1. Ability to design the the optical fibres used according to the application. |
|  | 1. Students can easily understand the WDM concept in the optical fibres. |
|  |  |
| **Unit -1 (7 Hours)** | **Optoelectronic Sources:** Introduction, Fundamental Aspects of Semiconductor physics, The p-n junction, Current Densities and Injection Efficiency, Injection Luminescence and the Light Emitting Diode, The Hetero-junction,  **Optoelectronic Detectors:** Introduction, Principle of Optoelctronic Detection, Types of Photodiodes, Photoconducting Detectors, Noise Considerations |
|  |  |
| **Unit -2 (7 Hours)** | **Optoelectronic Modulators:** Introduction, Electro-optic Modulators, Acousto Optic Modulators, Application areas of Optoelectronic Modulators, |
|  |  |
| **Unit -3 (7 Hours)** | **Optical Amplifiers:** Introduction, Semiconductor Optical Amplifiers, Erbium Doped Fiber Amplifiers, Application areas of Optical Amplifiers |
|  |  |
| **Unit -4 (7 Hours)** | **WDM**: Introduction, Concepts of WDM and DWDM, Passive Components and Active Components |
|  |  |
| **Unit -5 (7 Hours)** | **FIBER OPTIC SENSORS:** Introduction**,** Classification of Fiber Optic Sensors: Intensity modulated, phase modulated and spectrally modulated sensors, Distributed Fiber Optic Sensors, Fiber Optic Smart Structures, Industrial Applications of Fiber Optic Sensors |
|  |  |
| **List of Expt.** | Nil |
| **Text Book** | Fiber Optics and Optoelectronics by RP Khare, Oxford Univ, Press, 2004 |
| **Reference book** | Fundamentals of Fiber Optics in Teleecommication and Sensor Systems by Bishnu P. Pal, New Age International, 1992 |
|  |  |
| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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| EC 508 | **EC 521 Real Time Systems and Software C(L,T,P) =3 (3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | to bring students into the position to analyze and (partially) design real-time systems, and conduct research in the area of real-time systems. |
| **Expected Outcome:** | The student will be able to |
|  | 1. explain and apply the fundamental concepts and terminology of real |
|  | 1. explain and address the fundamental problems of real |
|  | 1. analyze real |
|  | 1. design a real |
|  | 1. identify and assess the relevant literature and research trends of real |
| **Unit -1 (7 Hours)** | Introduction, Real-time Versus Conventional Software, Computer Hardware for Monitoring and Control, Software Engineering Issues. Process and State-based Systems model, Periodic and Sporadic Process, Cyclic Executives, CE definitions and Properties, Foreground-Background Organiazations, Standard OS and Concurrency – Architectures, Systems Objects and Object-Oriented Structures, Abstract Data Types, General Object Classes. |
|  |  |
| **Unit -2 (7 Hours)** | Requirements and Design Specifications: Classification of Notations, Data Flow Diagrams, Tabular Languages, State Machine, Communicating Real Time State Machine- Basic features, Timeing and clocks, Sementics Tools and Extensions, Statecharts-Concepts and Graphical Syntax, Semantics and Tools.  Declarative Specifications: Regular Expressions and Extensions, Traditional Logics-Propositional Logic, Predicates, Temporal logic, Real time Logic |
|  |  |
| **Unit -3 (7 Hours)** | Deterministic Scheduling : Assumptions and Candidate Algorithms, Basic RM and EDF Results, Process Interactions-Prority Inversiotn and Inheritance.   Execution Time Prediction: Measurement of Software by software, Program Analysis with Timing Schema, Schema Concepts, Basic Blocks, Statements and Control, Schema Practice, Prediction by optimisation, System Interference and Architectural Complexities |
|  |  |
| **Unit -4 (7 Hours)** | Timer Application, Properities of Real and ideal clocks, Clock Servers – Lamport’s Logical clocks, Monotonic Clock service, A software Clock server, Clock Synchronization- Centralized Synchronization, Distributed Synchronization |
|  |  |
| **Unit -5 (7 Hours)** | Programming Languages: Real Time Language Features, Ada-Core Language, Annex Mechanism for Real Time Programming, Ada and Software Fault Tolerance, Java and Real-time Externsions, CSP and Occam.  Operating Systems: Real Time Functions and Sevices, OS Architectures-Real Time UNIX and POSIX, Issues in Task management- Processes and Threads, Scheduling, Synchronization and communication. |
|  |  |
| **List of Expt.** | Nil |
| **Text Book** | Real – Time Systems and software by Alan C. Shaw ; John Wiley & Sons Inc |
|  |  |
| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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| EC 523 | **EC 523 Digital Image Processing C(L,T,P) =3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | 1. The basic fundamental of Digital Image Processing and the basics of sampling and quantization. |
|  | 1. The basics of image transforms algorithm |
|  | 1. The complete procees of image processing, how the image enhanced restorted,image compression and image segmentation. |
|  |
| **Expected Outcome:** | The student will be able to |
|  | 1. To gain the complete knowledge about the fundamentals of digital image processing. |
|  | 1. To know the complete knowledge about the how an image produce. |
|  | 1. To gain the knowledge about the colour image processing |
|  |  |
| **Unit -1 (7 Hours)** | **Introduction And Digital Image Fundamentals :** Digital Image Representation, Fundamental Steps in Image Processing, Elements of Digital image processing systems, Sampling and quantization, some basic relationships like neighbours, connectivity, Distance measure between pixels, Imaging Geometry. |
|  |  |
| **Unit -2 (7 Hours)** | **Image Transforms :** Discrete Fourier Transform, Some properties of the two-dimensional fourier transform, Fast fourier transform, Inverse FFT.. |
|  |  |
| **Unit -3 (7 Hours)** | **Image Enhancement :** Spatial domain methods, Frequency domain methods, Enhancement by point processing, Spatial filtering, Lowpass filtering, Highpass filtering, Homomorphic filtering, Colour Image Processing. |
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| **Unit -4 (7 Hours)** | **Image Restoration :** Degradation model, Diagnolization of Circulant and Block-Circulant Matrices, Algebraic Approach to Restoration, Inverse filtering, Wiener filter, Constrained Least Square Restoration, Interactive Restoration, Restoration in Spatial Domain |
|  |  |
| **Unit -5 (7 Hours)** | **Image Compression :** Coding, Interpixel and Psychovisual Redundancy, Image Compression models, 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. |
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| **List of Expt.** | Nil |
| **Text Book** | A.K. Jain, “Fundamental of Digital Image Processing”, PHI. |
| **Reference book** | 1. Rosefield Kak, “Digital Picture Processing”, |
|  | 1. W.K. Pratt, “Digital Image Processing”, |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **EC 653 VLSI DESIGN LAB C(L,T,P) =1(0,0,2)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | The course objective is to introduce the fundamental principles of VLSI circuit design and to examine the basic building blocks of large-scale digital integrated circuits. |
| **Expected Outcome:** | The student will be able to |
|  | The students will be able to design logic circuit layouts for both static CMOS and dynamic clocked CMOS circuits, to extract the analog parasitic elements from the layout and analyze the circuit timing using a logic simulator and an analog simulator, to insert elementary testing hardware into the VLSI chip, to analyze VLSI circuit timing using Logical Effort analysis and to estimate and compute the power consumption of a VLSI chip. |
| **PART** | **Contents of the Subject** |
|  | PART-I: |
| 1-6 | Draw the Layout; do circuit partitioning, placement and routing, circuit compaction, check DRC, Circuit co-ction and finally post layout simulation for different combinational and sequential circuits. |
|  | PART-II: |
| 7-12. | Use the feature of automation test program generation, multilevel logic synthesis for design smaller application chips like multi bit parallel adder priority encoder, general purpose register, ALU, microcontroller/ dsp processor/ traffic light controller /sequential adder etc. |
| **List of Expt.** | 12 |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **EC 655 CAD of RF and Microwave Circits C (L,T,P) =2(0,0,3)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | To educate students with the knowledge of MOS transistor with their design, operation, characterization and design of combinational logic circuits, sequential logic circuits and dynamic logic circuits practically by which they can be able to design circuits like ALU. |
| **Expected Outcome:** | The student will be able to |
|  | 1. Design Entry & simulation of Multiplexer circuit with test bench & functional verification. 2. Design Entry & simulation of D flip-flop circuit with test bench & functional verification. 3. Synthesis, P&R and Post P&R simulation for Full adder, Concepts of FPGA floor plan, critical path, design gate count, I/O configuration and pin assignment to be discussed. 4. Generation of configuration/fuse files for 4:1 multiplexer & D flip-flop & implementation of the hardware using FPGA. 5. Design a schematic and simple layout for CMOS Inverter, parasitic extraction and simulation. 6. Design a schematic and simple layout for CMOS NOR gate, parasitic extraction and simulation. 7. Design a schematic and simple layout for CMOS NAND gate, parasitic extraction and simulation. 8. Design an ALU with limited instructions. 9. Design a schematic and simple layout for Full Adder, & simulation. |
| **PART** | **Contents of the Subject** |
|  | **PART-I:** |
| **1** | Introduction to Simulation Software |
|  | **PART-II:** |
| 2-5 | CAD of Circular, Rectangular, Triangular Patch Antenna Square and Other RF circuits. |
| **List of Expt.** | 5 |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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| EC 525 | **EC 525 ADVANCE SIGNAL THEORY C(L,T,P) =3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | 1. The complete knowledge about the representation of signals. |
|  | 1. Construction of orthogonal signals and basic representation of random process. |
|  | 1. The topics includes the basics of noise present in the signals during transmission |
|  |
| **Expected Outcome:** | The student will be able to |
|  | 1. To gain the complete knowledge about the signals representation |
|  | 1. Complete knowledge about the filtering process. |
|  | 1. To know how the signals theory are important in the wireless technology. |
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| **Unit -1 (7 Hours)** | Representation of deterministic signals: Orthogonal representation of signals. Dimensionality of signal spaces. Construction of orthogonal basis functions. |
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| **Unit -2 (7 Hours)** | Random Processes: Definition and classification, stochastic integrals, Fourier transforms of random processes, stationary and non-stationary processes, correlation functions. Ergodicity, power spectral density, transformations of random processes by linear systems. |
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| **Unit -3 (7 Hours)** | Representation of random processes (via sampling, K-L expansion and narrow band representations). |
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| **Unit -4 (7 Hours)** | special random processes :white Gaussian noise, Wiener-Levy process, Poisson process, shot-noise process, Markov process. |
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| **Unit -5 (7 Hours)** | Optimum Filtering: Matched filters for deterministic signals in white and colored Gaussian noise. Wiener filters for random signals in white and colored Gaussian noise |
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| **List of Expt.** | Nil |
| **Text Book** | Fundamentals Of Signals And Systems,M.J. Roberts ,Wiley |
| **Reference book** | Signals And Systems,P Rao,Tmh • Signals And Systems: A Simplified Approach,Ganesh Rao ,Pearson |
|  | 1. Signals And Systems: Continuous And Discrete,Roger E Ziemer, Phi |
|  | 1. Signals And Systems |
|  | 1. Signals And Systems,Ravi Kumar, ,Phi |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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|  | **EC 529 OPTIMIZATION TECHNIQUES C(L,T,P) = 3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | 1. To understand the theory of optimization methods and algorithms developed for solving various types of optimization problems |
|  | 2. To develop and promote research interest in applying optimization techniques in problems of Engineering and Technology |
|  | 3. To apply the mathematical results and numerical techniques of optimization  theory to concrete Engineering problems. |
| **Expected Outcome:** | The student will be able to |
|  | (1) basic theoretical principles in optimization;  (2) formulation of optimization models;  (3) solution methods in optimization;  (4) methods of sensitivity analysis and post processing of results  (5) applications to a wide range of engineering problems |
| **Unit -1 (7 Hours)** | Introduction: Historical development, application to engineering problems, statement of optimization, classification of optimization, examples of optimization problems. |
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| **Unit -2 (7 Hours)** | Linear Programming: Graphical method, simplex method, revised simplex method, Big-M method, 2- phase method, alternate optimal solutions, unbounded LPs |
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| **Unit -3 (7 Hours)** | Degeneracy and convergence, duality in linear programming, sensitivity analysis, dual simplex method, Transportation, assignment and other applications. |
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| **Unit -4 (7 Hours)** | Non-Linear Programming: Unconstrained optimization techniques, direct search methods (Fibonacci method, golden section, quadrature and cubic interpolation) descent methods, constrained optimization, direct and indirect methods, optimization with calculm, kuhn-tucker conditions. |
|  |  |
| **Unit -5 (7 Hours)** | Dynamic Programming: Multistage decision process, principles of optimality, computational procedures in dynamic programming |
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| **List of Expt.** | nil |
| **Text Book** | Hiller and Lieberman, Introduction to Operation Research (Seventh Edition) Tata McGrawHill Publishing Company Ltd |
| **Reference book** | Ravindren Philips and Solberg, Operation Research Principles and Practice (Second Edition) John Wiley & Sons. |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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| EC 619 | **EC 619 ESTIMATION THEORY C(L,T,P) = 3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
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| **Expected Outcome:** | The student will be able to |
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| **Unit -1 (7 Hours)** | Hypothesis testing: bayes, minimax and Neyman-Pearson criteria. Types of estimates and error bounds. |
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| **Unit -2 (7 Hours)** | Parameter Estimation: Least square, generalized and recursive least square, estimator properties including error bounds and convergence. |
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| **Unit -3 (7 Hours)** | MES, ML and MAP estimators. General Gaussian problem. |
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| **Unit -4 (7 Hours)** | Detection and estimation in colored noise. Elements of sequential and non-parametric detection. |
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| **Unit -5 (7 Hours)** | Applications to communication, radar and sonar systems. |
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| **List of Expt.** | nil |
| **Text Book** | S.M. Kay, Fundamentals of Statistical Signal Processing: Estimation Theory. Englewood Cliffs, NJ: |
| **Reference book** | • H.V. Poor, An Introduction to Signal Detection and Estimation, 2nd ed. New York: Springer-Verlag.  • Gelman, J.B. Carlin, H.S. Stern, and D.B. Rubin, Bayesian Data Analysis, 2nd ed. New York: Chapman & Hall.  • L. Wasserman, All of Statistics. New York: Wiley. |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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| EC 623 | **COGNITIVE RADIO NETWORK C(L,T,P)=3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | Cognitive radio has emerged as a promising technology for maximizing the utilization of the limited radio bandwidth while accommodating the increasing amount of services and applications in wireless communication networks. The objective of this course is to present the principles and applications of cognitive radio technology and the related protocol engineering issues for the next generation wireless communication networks. As a graduate-level course, it will combine extensive reading and in-class discussion of the research literature with in-depth research projects done by the students. |
| **Expected Outcome:** | The student will be able to know that |
|  | The rapid proliferation of wireless technologies is expected to increase the demand for radio spectrum by orders of magnitude over the next decade. This problem must be addressed via technology and regulatory innovations for significant improvements in spectrum efficiency and increased robustness and performance of wireless devices. |
| **Unit -1 (7 Hours)** | **INTRODUCTION TO SOFTWARE DEFINED RADIO**  Definitions and potential benefits, software radio architecture evolution, technology tradeoffs and architecture implications |
|  |  |
| **Unit -2 (7 Hours)** | **SDR ARCHITECTURE**  Essential functions of the software radio, basic SDR, hardware architecture, Computational processing resources, software architecture, top level component interfaces, interface topologies among plug and play modules,. |
|  |  |
| **Unit -3 (7 Hours)** | **INTRODUCTION TO COGNITIVE RADIOS**  Marking radio self-aware, cognitive techniques – position awareness, environment awareness in cognitive radios, optimization of radio resources, Artificial Intelligence Techniques. |
|  |  |
| **Unit -4 (7 Hours)** | **COGNITIVE RADIO ARCHITECTURE**  Cognitive Radio – functions, components and design rules, Cognition cycle – orient, plan, decide and act phases, Inference Hierarchy, Architecture maps, Building the Cognitive Radio Architecture on Software defined Radio Architechture. |
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| **Unit -5 (7 Hours)** | **NEXT GENERATION WIRELESS NETWORKS**  The XG Network architecture, spectrum sensing, spectrum management, spectrum mobility, spectrum sharing, upper layer issues, cross – layer design. |
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| **List of Expt.** | nil |
| **Text Book** | * 1. Joseph Mitola III,”Software Radio Architecture: Object-Oriented Approaches to Wireless System Engineering”, John Wiley & Sons Ltd. 2000. * 2. Thomas W.Rondeau, Charles W. Bostain, “Artificial Intelligence in Wireless communication”, ARTECH HOUSE .2009. * 3. Bruce A. Fette, “Cognitive Radio Technology”, Elsevier, 2009. * 4. Ian F. Akyildiz, Won – Yeol Lee, Mehmet C. Vuran, Shantidev Mohanty, “Next generation / dynamic spectrum access / cognitive radio wireless networks: A Survey” Elsevier Computer Networks, May 2006. |
| **Reference book** | * 1. Simon Haykin, “Cognitive Radio: Brain –Empowered Wireless Communications”, IEEE Journal on selected areas in communications, Feb 2005. * 2. Hasari Celebi, Huseyin Arslan, “Enabling Location and Environment Awareness in Cognitive Radios”, Elsevier Computer Communications , Jan 2008. * 3. Markus Dillinger, Kambiz Madani, Nancy Alonistioti, “Software Defined Radio”, John Wiley, 2003. * 4. Huseyin Arslan, “Cognitive Radio, SDR and Adaptive System”, Springer, 2007. * 5. Alexander M. Wyglinski, Maziarnekovee, Y. Thomas Hu, “Cognitive Radio Communication and Networks”, Elsevier, 2010. |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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| EC 531 | **EC 531 STATISTICAL MODELING C(L,T,P)=3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | learn techniques of statistical modeling |
|  | acquire solid data analysis skills |
|  | learn to communicate their results effectively to others, including non-experts |
|  | understand the analysis process |
|  | have the technical knowledge required to understand the meaning of publications containing statistical results |
|  | have hands-on experience with analyzing diverse data types, using modern statistical computer tools |
|  | Know how to design and implement a database, and use managements systems effectively, understand major model of databases. |
| **Expected Outcome:** | The student will be able to |
|  | Presented with data, students will choose the appropriate modeling technique, build the model, check validity of the model and revise if necessary, and employ the model for estimation and prediction. |
|  | Students will summarize and present data in meaningful ways, test for relationships within data, test hypotheses, and carry out modeling techniques as described above |
|  | Students will propose and carry out projects, presenting results in written and/or oral form. |
|  | Given the intent of a study, students will identify data needed,  the appropriate instruments needed to collect the data, and the means of analysis necessary to carry out the study |
|  | Students will use the modern statistical computing environments  SAS and R to carry out the analysis of data. |
| **Unit -1 (7 Hours)** | Introduction to multivariate statistical modeling |
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| **Unit -2 (7 Hours)** | Basic univariate statistics: Sampling distribution, Estimation, Hypothesis testing |
|  |  |
| **Unit -3 (7 Hours)** | Basic multivariate statistics:Multivariate descriptive statistics, Multivariate normal distribution, Multivariate Inferential statistics |
|  |  |
| **Unit -4 (7 Hours)** | Multivariate models: Analysis of variance (ANOVA), Multivariate analysis of variance (MANOVA), Tutorial: ANOVA, Case study: MANOVA |
|  |  |
| **Unit -5 (7 Hours)** | Multiple linear regression (MLR): Introduction, MLR: Sampling distribution of regression coefficients, MLR: Model adequacy tests, MLR: Test of assumptions, MLR: Model diagnostics, Multivariate linear regression (MvLR): Introduction, MvLR: Estimation. |
|  |  |
| **List of Expt.** | nil |
| **Text Book** | Applied multivariate statistical analysis by R A Johnson and D W Wichern, Sixth Edition, PHI, 2012 |
| **Reference book** | Multivariate data analysis by [Joseph F. Hair Jr,](http://www.amazon.com/s/ref%3Dntt_athr_dp_sr_1?_encoding=UTF8&field-author=Joseph%20F.%20Hair%20Jr&search-alias=books&sort=relevancerank)[Rolph E. Anderson,](http://www.amazon.com/s/ref%3Dntt_athr_dp_sr_4?_encoding=UTF8&field-author=Rolph%20E.%20Anderson&search-alias=books&sort=relevancerank) Ronald L Tatham, and [William C. Black,](http://www.amazon.com/s/ref%3Dntt_athr_dp_sr_2?_encoding=UTF8&field-author=William%20C.%20Black&search-alias=books&sort=relevancerank)Fifth Edition, Pearson Education, 1998. |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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| EC 617 | **EC 617 RESEARCH METHODOLOGY C(L,T,P) = 3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | 1. To develop understanding of the basic framework of research process. 2. To develop an understanding of various research designs and techniques. 3. To identify various sources of information for literature review and data collection. 4. To develop an understanding of the ethical dimensions of conducting applied   research.   1. Appreciate the components of scholarly writing and evaluate its quality. |
| **Expected Outcome:** | The student will be able to |
|  | 1. To define research and describe the research process and research methods |
|  | 1. To know how to apply the basic aspects of the research process in order to plan and execute a research project |
|  | 1. To effectively use the library and its resources in gathering information related to the learners' research project |
|  | 1. To understand qualitative research and methods used to execute and validate qualitative research |
|  | 1. To be able to present, review and publish scientific articles |
| **Unit -1 (7 Hours)** | Introduction to Research Methodology : Meaning of Research, Objectives of Research, Motivations in Research, Types of Research, Research Approaches, Significance of Research, Research Methods v/s Methodology, Research and Scientific Methods, Research Process, Criteria of Good Research |
|  |  |
| **Unit -2 (7 Hours)** | Defining the Research Problem : What is Research Problem?, Selecting the Problem, Necessity of and Techniques in defining the problem |
|  |  |
| **Unit -3 (7 Hours)** | Sample Design: Implication, Steps. Criteria for selecting a sample procedure, Characteristics of Good sampling Procedure, Types of Sample Design, Selecting Random Samples, Complex random sampling Design |
|  |  |
| **Unit -4 (7 Hours)** | Methods of Data Collection: Collection of Primary Data, Observation Method, Interview method, Collection of Data through questionnaire and Schedules, Other methods. Collection of Secondary Data, Selection of appropriate method for data collection, Case Study Method, Guidelines for developing questionnaire, successful interviewing. Survey v/s experiment |
|  |  |
| **Unit -5 (7 Hours)** | Processing and Analysis of Data: Measures of Central Tendency, Dispersion,. correlation and Regression, Chi- square test : Applications, Steps, characteristics, limitations, Analysis of Variance and Co-variance |
|  |  |
| **List of Expt.** | nil |
| **Text Book** | S.M. Kay, Fundamentals of Statistical Signal Processing: Estimation Theory. Englewood Cliffs, NJ: |
| **Reference book** | • H.V. Poor, An Introduction to Signal Detection and Estimation, 2nd ed. New York: Springer-Verlag.  • Gelman, J.B. Carlin, H.S. Stern, and D.B. Rubin, Bayesian Data Analysis, 2nd ed. New York: Chapman & Hall.  • L. Wasserman, All of Statistics. New York: Wiley. |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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| **EC 527** | **EC 527 ADVANCE MICROWAVE ENGINEERING C(L,T,P) =3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | 1. how to apply Maxwell’s equations to various canonical situations for free space, waveguides and cavity resonators. |
|  | 1. how to characterize microwave systems and components in terms of network theory (Scattering matrix, ABCD matrix, impedance matrix, etc.) |
|  | 1. how to make fundamental measurements related to microwave engineering (VSWR, S parameters,etc.) |
|  |  |
| **Expected Outcome:** | The student will be able to |
|  | 1. Able to apply electromagnetic theory to calculations regarding waveguides and transmission lines. |
|  | 1. Able to describe, analyze and design simple microwave circuits and devices e g matching circuits, couplers, antennas and amplifiers. |
|  | 1. Able to describe and coarsely design common systems such as radar and microwave transmission links. |
|  | 1. Able to describe common devices such as microwave vacuum tubes, high-speed transistors and ferrite devices. |
|  | 1. Able to handle microwave equipment and make measurements. |
|  |  |
| **Unit -1 (7 Hours)** | **MICROWAVE TRANSMISSION LINES**: Introduction of Microwaves and their applications. Rectangular Waveguides: TE and TM wave solutions, Field patterns, Wave impedance and Power flow. |
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| **Unit -2 (7 Hours)** | **PLANAR TRANSMISSION LINES:** Stripline and microstrip lines – Field patterns, Characteristic impedance, Basic design formulas and characteristics. Parallel coupled striplines , Slot lines and Coplanar lines. Advantages over waveguides. Integrated finline, image guide and its variants, non-radiative guide, H-guide and groove guide.. Transitions, bends and discontinuities. |
|  |  |
| **Unit -3 (7 Hours)** | **MICROWAVE O –TYPE** High Frequency limitations in conventional tubes, UHF miniature tubes. Classification of Microwave tubes, O-type and M-type Tubes,. Transit time O-type Microwave Tubes: reflex klystrons, Klystrodes, multi-cavity klystrons, traveling wave tube amplifiers, Microwave M-Type Tubes Magnetrons: device operation, Device operation, gain and efficiency calculations, operational characteristics, design criteria, and future trends |
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| **Unit -4 (7 Hours)** | **MICROWAVE PASSIVE COMPONENTS**: Waveguide Components: Eplane and H- plane Tees, Magic Tee, Directional couplers, and Attenuator. |
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| **Unit -5 (7 Hours)** | **MICROWAVE ACTIVE DEVICE**: Construction and Opertation of PIN Diode, GUNN Diode,BJT,FET,MESFET |
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| **List of Expt.** | Nil |
| **Text Book** | Radio Frequency and Microwave Electronics - Matthew M. Radmanesh Pearson Education Asia publication |
| **Reference book** | Microwave Circuit Design - George D. Vendelin, Anthony M. Pavio & Ulrich L. Rehde John Wiley & Sons publication |
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| **Mode of Evaluation** | Assignment/Quiz/Viva-voce/Lab examination/student seminar/written examination |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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| **PT 301** | **Practical Training and Seminar-I C (L, T, P) = 1 (0,0,2)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | 1. To interact the students with industry to study advanced engineering developments |
|  | 2. To learn operating of different type of machines this is recently used in industries. |
|  | 3. To prepare and present technical reports. |
| **Expected Outcome:** | The student will be able to |
|  | 1. Ability to work in the industry with the latest machinery. |
|  | 2. Ability to review, prepare and present technological developments |
|  | 3. Ability to face the environment of industry |
| **Mode of Evaluation** | During the practical training seminar session each student is expected to prepare and present a topic on work and industry in which they take the training. In the summer vacation students will take the practical training in any industry related to electronics area.. In a session of two periods per week, 15 students are  expected to present the seminar. Each student is expected to present at least twice during the semester and the student is evaluated based on that. At the end of the semester, he / she can submit a report on his / her topic of seminar and marks are given based on the report. A Faculty guide is to be allotted and he / she  will guide and monitor the progress of the student and maintain attendance also. Evaluation is 60% internal and 40% external. |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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| **PE 302** | **B. Tech Project (Stage – 1) C (L, T, P) = 3 (0,0,5)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same. To train the students in a group of 3 to 4 works on a topic approved by the respective faculty guides of the department and prepare a minor project report after studying the literature work related to area of their topic. |
| **Expected Outcome:** | On Completion of the minor project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology. |
| **Mode of Evaluation** | The review committee may be constituted by the Head of the Department. A project report is required at the end of the semester. The project work is evaluated based on oral presentation and the project report jointly by external and internal examiners constituted by the Head of the Department.Evaluation is 60% internal and 40% external. |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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| **PE- 401** | **B. Tech Project (Stage – 2) C (L, T, P) = 5 (0,0,7)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same. To train the students in a group of 3 to 4 works on a topic approved by the respective faculty guides of the department and prepare a minor project report after studying the literature work related to area of their topic. |
| **Expected Outcome:** | On Completion of the minor project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology. |
| **Mode of Evaluation** | The review committee may be constituted by the Head of the Department. A project report is required at the end of the semester. The project work is evaluated based on oral presentation and the project report jointly by external and internal examiners constituted by the Head of the Department.Evaluation is 60% internal and 40% external. |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

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| **SM 402** | **B.Tech. Seminar C (L, T, P) = 1 (0,0,2)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The student will have the following objectives of the course to be fulfilled: |
|  | To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same. To train the students in a group of 3 to 4 works on a topic approved by the respective faculty guides of the department and prepare a minor project report after studying the literature work related to area of their topic. |
| **Expected Outcome:** | On Completion of the minor project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology. |
| **Mode of Evaluation** | The review committee may be constituted by the Head of the Department. A project report is required at the end of the semester. The project work is evaluated based on oral presentation and the project report jointly by external and internal examiners constituted by the Head of the Department.Evaluation is 60% internal and 40% external. |
| **Recomm. by BOS on** | 14/5/2015 |
| **Approved by AC on** |  |

**HS 501 SOFT SKILLS TRAININIG I C (L, T, P) = 3 (3,0,0)**

|  |  |  |
| --- | --- | --- |
| **Unit** | **Course Contents** | **Hours** |
| I | Spoken English – PICTURE (p=pronunciation, I=inflection, C=Clarity & courtesy, T=Tone, U=Understanding and feedback, R=Rate of speech and Repeatition, E=Emphasis), Body Language Training, Active Listening | 8 |
| **II** | Introduction to business terms, Economic Times Reading, Communication skills | 8 |
| **III** | Johari Window Training, Firo-B Training, Relationship Management | 10 |
| **IV** | Role Plays, Conflict Management | 7 |
| **V** | I’m OK U’r OK Training, Time Management Training | 6 |
|  | **Total** | 39 |

**HS 502 SOFT SKILLS TRAININIG I I C (L, T, P) = 3 (3,0,0)**

|  |  |  |
| --- | --- | --- |
| **Unit** | **Course Contents** | **Hours** |
| I | Making impact making business presentations | 6 |
| **II** | Team Management and Collaborative Work Culture | 8 |
| **III** | Training in Anchoring and Public Speaking | 6 |
| **IV** | Emotional Intelligence Training | 7 |
| **V** | Business Games, Business Etiquettes | 10 |
|  | **Total** | 37 |

**HS601** **SOFT SKILLS TRAININIG III C (L, T, P) = 3 (3,0,0)**

|  |  |  |
| --- | --- | --- |
| **Unit** | **Course Contents** | **Hours** |
| I | Group Discussion Training | 6 |
| **II** | Interview Training | 8 |
| **III** | Public Relations Management, Press Relations Management | 10 |
| **IV** | Conference and Seminar Management, Event management | 7 |
| **V** | Persuasion and Negotiation Skills | 6 |
|  | **Total** | 37 |

|  |  |
| --- | --- |
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**GYAN VIHAR SCHOOL OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF ELECTRONICS AND COMMMUNICATION ENGINEERING**

**Teaching & Examination scheme for Diploma (Electronics and Communication Engineering)**

**(3 Year Course)**

**EFFECTIVE FROM ACADEMIC SESSION 2015-2016**

**DETAILED SYLLABUS**

**EN 131 English and Communication Skills-I C (L, T, P) = 2 (2, 0, 0)**

|  |  |  |
| --- | --- | --- |
| **UNIT** | **CONTENTS OF THE COURSE** | **HOURS** |
| I | Basic Sentence Patterns –I  Basic Sentence Patterns. (Nine basic 5 sentence patterns) | 4 |
| II | Basic Sentence Patterns -II  Transformation of Sentences, Determines, Preposition | 4 |
| III | **Tenses** :  Tenses, Question Tags | 4 |
| IV | Common Errors (Noun, Pronoun, Articles, Adverb, Punctuation, Preposition etc.) | 4 |
| V | Narration - Direct - indirect,  Voice - Active - Passive | 4 |

**REFERECE BOOKS :**

1. Intermediate English Grammar Raymond Murphy, Foundation Books, New Delhi.
2. Eng. Grammar, usage & Composition Tickoo & Subramanian S.Chand and Co.
3. Living Eng. Structure Stannard Alien, Longman.

**EN 132 English and Communication Skills –II C (L, T, P) = 2 (2, 0, 0)**

|  |  |  |
| --- | --- | --- |
| UNIT | CONTENTS OF THE COURSE | HOURS |
| I | **BASIC SENTENCE PATTERNS**-I  Narration, Voice, Basic Sentence Patterns. (Nine basic sentence patterns) | 9 |
| II | **BASIC SENTENCE PATTERNS-**II  Transformation of Sentences, Determiners, Preposition. | 7 |
| III | **TENSES** :  Tenses, Common errors (Noun, Pronoun, Articles, Adverb, Punctuation, Preposition etc.) | 9 |
| IV | **Modals in Conversational** Usage Prefix, Suffix, Idioms & Phrasal verbs : Can, Could, Should ,Will, Would, May, Might, Must, Need not, Dare not, Ought to, Used to.Phrases :At all; In stead of; In Spite of; As well as; Set up; Up set; Look up; Call off; Call out; Come across; Set right; Look other. Idioms Work up (excite); Break down; Stand up for; Turn down; Pass away; Pass on; Back up; Back out; Carry out; Done for (ruined); Bring about; Go through; Ran over; Look up (improve); Pick out | 7 |
| V | **Composition -**  Precis Writing ,Letter writing,paragraph writing ,report writing, Essay writing ,Unseen passage | 7 |

**REFERECE BOOKS :**

1. Intermediate English Grammar Raymond Murphy, Pub: Foundation Books, New Delhi

2. Eng. Grammar, usage & Composition Tickoo & Subramanian Pub: S.Chand and Co.

3. Living Eng. Structure Stannard Alien. Pub: Longman

4. A Practical Eng. Grammar Thomson and Martinet. (and its Exercise Books) Pub : ELBS

5. High School English Grammar Wren & Martin. and Composition.

**EN 171 Communication Skills-I Lab C (L, T, P) = 1 (0, 0, 2)**

|  |  |  |
| --- | --- | --- |
| UNIT | CONTENTS OF THE COURSE | Practical  Hours |
| I | Listening Skill development :For improving listening skills the following steps are recommended,  Listen to Prerecorded Tapes /Work on language proficiency software , Reproduce Vocally what has been heard  Reproduce in Written form Summarise the text heard , Suggest Substitution of Words and Sentences  Answer Questions related to the taped text ,Summarise in Writing | 4 |
| II | Speaking Skills : Introducing English consonant-sounds and vowel-sounds. Remedial exercises where necessary ,Knowing Word stress ,Shifting word stress in poly-syllabic words .Work with language software | 4 |
| III | Vocabulary: Synonyms. Homonyms. Antonyms and Homophones Words often confused, as for example,  [I-me; your-yours; its-it's; comprehensible-comprehensive; complement-compliment]  Context-based meanings of the words, for example, man[N] man[vb]; step[|N| ,step[vb]  conflict \_\_\_\_\_\_\_\_\_Israel Palestinian conflict ,Emotional conflict, Ideas conflict | 4 |
| IV | Personality Development  Delivering Short Discourses: About oneself , Describing a Place, Person, Object ,Describing a Picture, Photo. | 4 |
| V | Group Discussion : Presentation and Interview skills | 4 |

**REFERECE BOOKS:**

1. A Practical Eng. Grammar Thomson and Martinet. (and its Exercise Books),ELBS.
2. High School English Grammar and Composition Wren & Martin.

**EM 201** Employability Skills – II **LTPC:** 0201**Total Contact Hours**: 25

|  |  |  |  |
| --- | --- | --- | --- |
| **S.No.** | **Topic** | **Details** | **Contact Hours** |
| 1 | Communication | Role Play, Reading, Formal writing skills Listening, Interaction Process, Interpersonal Relationship | 15 |
| 2 | Attitude& Manners | Motivation, Team Building, Winning Strategy, CAN DO, | 5 |
| 3 | Preparation, presentation | Presentation skills, Preparation Skills, | 4 |
| 4 | Industry | Concept & Importance of SIP, Industrial Mentoring & Networking | 1 |

**PY 131 Physics-I C (L, T, P) = 3 (3, 0, 0)**

|  |  |  |
| --- | --- | --- |
| **Unit No** | **Description of Unit** | **No. hours** |
| **I** | 1. **Units and Dimensions**:  1.1 Idea of various systems of units SI units - Basic, Supplementary and Derived Units, Prefixes & Symbols  1.2 Dimensions and Dimensional Formulae  1.3 Principle of Homogeneity of Dimensions  1.4 Dimensional Analysis  1.5 Applications and Limitations | **6** |
| **II** | **2. Elasticity**:  2.1 Elasticity  2.2 Stress and Strain  2.3 Elastic Limit & Hooke's law  2.4 Young’s Modulus, Bulk Modules & Modulus of Rigidity,Poisson's Ratio | **4** |
| **III** | 3**. Properties of Liquids**:  3.1 Surface Tension & Surface Energy  3.2 Cohesive & Adhesive Force  3.3 Angle of Contact  3.4 Capillarity & Expression for Surface Tension  3.5 Streamline & Turbulent Flow  3.6 Reynolds Number.  3.7 Viscosity & Coefficient of Viscosity  3.8 Stoke's law & Terminal Velocity | **7** |
| **IV** | **4. Gravitation & Satellites**:  4.1 Newton's law of Gravitation  4.2 Acceleration due to Gravity  4.3 Kepler's laws of Planetary Motion (statement only)  4.4 Artificial Satellite (simple idea), Geo-Stationary Satellites  4.5 Escape Velocity  4.6 Velocity & Time Period of an Artificial Satellite. | **6** |
| **V** | **5. Transfer of Heat:** 5.1 Modes of Transmission of Heat - Idea of Conduction,Convection & Radiation  5.2 Thermal Conductivity & Coefficient of Thermal Conductivity  5.3 Black Body  5.4 Kirchoff's Laws & Stefan Boltzmann Law (statement only)  5.5 Newton's Law of Cooling & its Derivation from Stefan's Law | **7** |

**REFERENCE BOOKS:**

1. Engineering Physics Gaur & Gupta

2. Applied Physics Vol.-I Hari Harlal, NITTTR

3. Applied Physics Vol.-II Hari Harlal, NITTTR

4. A Text Book of Applied Physics N.S. Kumar

5. Principles of Physics Brijlal, Subhramanyam

**PY 132 Physics-II C (L, T, P) = 3 (3, 0, 0)**

|  |  |  |
| --- | --- | --- |
| **Unit No** | **Description of Unit** | **No. hours** |
| I | 1. Electrostatics and D.C. Circuits:  1.1 Coulomb’s Law  1.2 Intensity of Electric Field, Intensity due to a Point Charge  1.3 Electric Lines of Forces & Electric Flux  1.4 Electric Potential, Electric Potential due to a Point Charge  1.5 Resistivity, Effect of Temperature on Resistance  1.6 Ohm’s Law  1.7 Resistance in Series and Parallel and their Combination  1.8 Kirchoff’s Law  1.9 Wheatstone Bridge  1.10 Meter Bridge | 08 |
| II | 2. A.C. Circuits and Modern Physics:  2.1 Faraday's Laws of Electro Magnetic Induction, Lenz's Law  2.2 Self and Mutual Inductance  2.3 Alternating Current, Phase & Phase Difference  2.4 Instantaneous, Average and rms value of AC  2.5 Behaviour of Resistance, Capacitance and Inductance in an AC Circuit  2.6 AC Circuits Containing, R-L, R-C and LCR in Series  2.7 Power in AC Circuit and Power Factor  2.8 Photo Electric Effect  2.9 Einstein's Equation | 08 |
| III | 3. Semi Conductor Physics: 3.1 Energy Bands in Conductor, Semi Conductor & Insulator  3.2 Chemical Bonds in Semiconductor  3.3 Intrinsic and Extrinsic Semiconductors  3.4 PN-Junction Diode, Working, Biasing and Characteristics Curves  3.5 Zener Diode and Voltage Regulation using it  3.6 Half Wave & Full Wave Rectifiers (only working, no derivations) | 06 |
| IV | 4. Nuclear Physics, Pollution and its control:  4.1 Mass - Defect and Binding Energy  4.2 Nuclear Reactions  4.3 Natural and Artificial Radioactivity  4.4 Law of Radioactive Disintegration  4.5 Half Life & Mean Life.  4.6 Idea of Nuclear Fission and Fusion  4.7 Chain Reaction. | 05 |
| V | 5. Transfer of Heat:  5.1 Modes of Transmission of Heat - Idea of Conduction,  Convection & Radiation  5.2 Thermal Conductivity & Coefficient of Thermal Conductivity  5.3 Black Body  5.4 Kirchoff's Laws & Stefan Boltzmann Law (statement only)  5.5 Newton's Law of Cooling & its Derivation from Stefan's Law | 07 |

REFERENCE BOOKS:

1. Engineering Physics Gaur & Gupta

2. Applied Physics Vol.-I Hari Harlal, NITTTR

3. Applied Physics Vol.-II Hari Harlal, NITTTR

4. A Text Book of Applied Physics N.S. Kumar

5. Principles of Physics Brijlal, Subhramanyam

**PY 171 Physics-I Lab C (L, T, P) = 1 (0, 0, 2)**

**List of Practicals:**

1. To Measure Internal Diameter, External Diameter and Depth of a Calorimeter using Vernier Calliper’s.

2. To Measure Density of a Wire using Screw gauge.

3. To Measure Radius of Curvature of a Lens, Mirror using Spherometer.

4. To Determine Refractive Index of Glass using Prism.

5. To Determine the Refractive Index of Glass using Travelling Microscope.

6. To Determine Focal Length of a Convex Lens by Displacement Method.

7. To Determine the Velocity of Sound at 00C using Resonance Tube.

8. To Determine Young’s Modulus of Elasticity using Searle’s Apparatus.

**REFERECE BOOKS :**

**1. Engineering Physics Gaur & Gupta**

**2. Applied Physics Vol.-I Hari Harlal, NITTTR**

**3. Applied Physics Vol.-II Hari Harlal, NITTTR**

**4. A Text Book of Applied Physics N.S. Kumar**

**5. Principles of Physics Brijlal, Subhramanyam**

**PY 172 Physics-II Lab C (L, T, P) = 1 (0, 0, 2)**

1. To Determine Acceleration due to Gravity using Simple Pendulum.
2. To Verify Newton’s Law of Cooling.
3. To Verify Law of Resistances.
4. To Determine Specific Resistance of Material using Meter Bridge.
5. To Determine Internal Resistance of a Primary Cell using Potentiometer.
6. To Compare emf of two Primary Cells using a Potentiometer.
7. To Draw Characteristic Curves of PN Diode and Determine its Static and Dynamic Resistance.
8. To Draw Characteristic Curves of a PNP/NPN Transistor in CB/CE Configuration..
9. To Measure Resistance of a Galvanometer by Half-Deflection Method.

**REFERECE BOOKS :**

**1.** Engineering Physics Gaur & Gupta

2. Applied Physics Vol.-I Hari Harlal, NITTTR

3. Applied Physics Vol.-II Hari Harlal, NITTTR

4. A Text Book of Applied Physics N.S. Kumar

5. Principles of Physics Brijlal, Subhramanyam

**CY 131 Chemistry-I C (L, T, P) = 3 (3, 0, 0)**

|  |  |  |
| --- | --- | --- |
| UNIT | CONTENTS OF THE COURSE | HOURS |
| I | **Atomic Structure and Chemical Bonding :**Atomic Structure : Bohr model of atom [ Radius and Energy of H – atom is excluded ] , De Broglie modification, Quantum numbers, Orbits and Orbitals, Aufbau principal, Pauli’s Exclusion principle, Hunds rule of maximum multiplicity, Electronic configuration of elements upto atomic number 36. Definition of Atomic number, Mass number, Isotopes, Isotones and Isobars with suitable examples. Concept of hybridization sp3, sp2,sp and shape of molecules (simple example H2O, NH3, BCl3 , BeCl2)Chemical Bonding: Electrovalent, Covalent and coordinate bonds, H-bond in HF, water and ice. Classification of solids – crystalline and amorphous. Relationship between structure and properties of the following crystalline solids- (i) Ionic solid i,e. Sodium chloride (ii) Covalent solid i,e. diamond and graphite | 9 |
| II | **Avogadro Concept , Acids , Bases & Salts** Avogadro number, Mole concept, Simple numerical problems involving Weight and volume. Acids, Bases and Salts (Arrhenius and Lewis concept) Basicity of acids and Acidity of bases, Neutralization reaction, Hydrolysis of Salts,. Equivalent Weight of acids, bases, & salts of Strength of Solution ---- normality, molarity, molality, formality and percentage strength, standard solution primary and secondary standards, concept of pH, and pH scale, Indicators and choice of indicator, principles of acidimetry and alkalimetry (simple numerical problems) Buffer solution (excluding numerical problems) Solubility product principle (excluding numerical problems), common ion effect with relation to group analysis. | 7 |
| III | **Oxidation, Reduction, Electrochemistry** Oxidation and Reduction by electronic concept, balancing chemical equations by Ion-electron method, Redox Titration, Electrolysis, Arrhenius theory, Faraday’s Laws, Electrolysis of CuSO4 solution using Pt-electrode and Cu-electrode, simple numerical problems on electrolysis, Application of electrolysis such as Electroplating, Electrorefinings and Electrotyping, Electrochemical Cells, Primary Cell- Dry Cell, Secondary Cell --- Lead storage cell, Electrochemical series.Reversible and irreversible reactions, Exothermic and Endothermic reactions, concept of chemical equilibrium, Lechatelier’s principle, Industrial preparation of Ammonia by Haber’s Process, | 9 |
| IV | **Minerals, Ores, Gangue, Flux, Slag, General method of extraction of metals with reference to Iron,** Metallurgy copper and Aluminium (detailed method of extraction is excluded) Definition of Alloy, purposes of making Alloy, Composition and uses of alloys (Brass, Bronze German Silver, Deuralumin, Nichrome, Bell metal, Gun metal, Monel metal, Alnico, Dutch metal, Babbit metal, stainless steel), Amalgams, properties and uses of cast iron, wrought iron, steel and sponge iron , Manufacture of steel by L-D process, composition and uses of different alloy steels. | 7 |
| V | **Organic compounds,** their differences from inorganic compounds, Classification, Homologous series, Functional groups, Isomerism, Nomenclature up to C5 , properties and preparation of Methane, Ethylene and Acetylene, | 7 |
| Total |  | 39 |

**Text Books:**

1.S. S. Dara Environmental chem. & pollution control S. Chand Publication

2.Dr. Aloka Debi A Text Book of Env. Engg. Dhanpat Rai Publishing Co.

3.Jain & Jain Engg. Chem. Dhanpat Rai Publishing Co.

Jain & Jain Engg. Chem. Dhanpat Rai Publishing Co.

Dr. Aloka Debi A Text Book of Env. Engg. Dhanpat Rai Publishing Co.

Shrieve Atkins Industrial Chemstry

Bahl & Bahl A Text Book of Organic Chemistry S. Chand Publication

M. M. Uppal Engg. Chemistry

S. N. Poddar & S. Ghosh General & Inorganic. Chemistry Book Syndicate Pvt. Ltd.

Harish Kr. Chopra Anupama Parkar Engg. Chemistry

**CY 132 Chemistry-II C (L, T, P) = 3 (3, 0, 0)**

|  |  |  |
| --- | --- | --- |
| UNIT | CONTENTS OF THE COURSE | HOURS |
| I | **Water technology** Introduction –soft and hard water – causes of hardness – types of hardness disadvantages of hard water – degree of hardness (ppm) – softening methods – permutit process – ion exchange process – numerical problems related to degree of hardness –drinking water – municipal treatment of water for drinking purpose – Osmosis, Reverse Osmosis - advantages of Reverse osmosis | 9 |
| II | **Lubricant** Definition, purpose and types of lubrication, names of common lubricants and uses, Flash point, Fire point, Pour point, Cloud point, selection of lubricant. | 7 |
| III | **Cement** : Portland cement: Raw materials, Composition and Manufacture, Setting and Hardening of cement, function of gypsum, Cement Mortar, Cement concrete, Lime mortar, plaster of paris. **:** | 9 |
| IV | **Corrosion** : Definition, Causes of Corrosion and methods of prevention, Refractories --- properties and use of Boron Carbide and Carborandirm , Asbestors, Glass, Ceramics, Cork (preliminary idea only). Paints : Composition , types (Snowchem, distemper) Varnishes : Definition , types , difference from paint, uses, characteristics. Metallic coating : Galvanisation, Electroplating, Tin plating. Lacquers. | 7 |
| V | **Polymers** : Definition & classification of Synthetic polymers Synthetic plastic : Thermoplastic plastic and Thermosetting plastic --- their differences with examples, preparation and uses of Polythene, PVC,Polypropylene, Polystyrene, Teflon, Bakelite, Orlon, Saran. Synthetic rubber : Buna –S, Buna –N, Neoprene, Butyl, rubber, silicone, Vulcanization of rubber.Synthetic Fibres : Nylon , Terylene , Rayon**.** | 7 |
|  | Total | 39 |

**Text Books**:

1.S. S. Dara Environmental chem. & pollution control S. Chand Publication

2.Dr. Aloka Debi A Text Book of Env. Engg. Dhanpat Rai Publishing Co.

3.Jain & Jain Engg. Chem. Dhanpat Rai Publishing Co.

**Reference Books:**

Jain & Jain Engg. Chem. Dhanpat Rai Publishing Co.

Dr. Aloka Debi A Text Book of Env. Engg. Dhanpat Rai Publishing Co.

Shrieve Atkins Industrial Chemstry

Bahl & Bahl A Text Book of Organic Chemistry S. Chand Publication

M. M. Uppal Engg. Chemistry

S. N. Poddar & S. Ghosh General & Inorganic. Chemistry Book Syndicate Pvt. Ltd.

Harish Kr. Chopra Anupama Parkar Engg. Chemistry

**CY 171 Chemistry-I Lab C (L, T, P) = 1 (0, 0, 2)**

**Laboratory Experiments :**

1. To identify the following Basic Radicals by dry and wet tests – Pb +2 , Cu +2, Al+3, Fe+3, Zn+2, Ni+2 Ca+2 Mg+2, Na+, K+, NH4+2

2. To identify the following Acid Radicals by dry and wet tests – Cl- , CO3-2 , SO4-2, S-2 , NO3-3 To identify an unknown water soluble salt containing one basic and one acid radical as mentioned above.

3. To perform titration of (N/10) approximate solution of an alkali with an unknown solution of an acid supplied.

4. To determine Iron content in Mohr’s salt by standard K2Cr2O7 solution.

5.Preparation of Potash Alum

Books Reference:

1. Engineering Chemistry II (Hindi) Mathur and Agarwa.l
2. Chemistry of Engineering Materials C.V. Agarwal.
3. Engineering Chemistry P.C. Jain and Monika.
4. Engineering Chemistry M.M. Uppal.
5. Engineering Chemistry V.P.Mehta Jain Bros. Jodhpur.
6. Practical Chemistry for Engineers Virendra Singh.
7. Hand book of Technical Analysis Bannerji Jain Bros.Jodhpur.
8. Engineering Chemistry-I(Hindi) Mathur & Agrawal.
9. Inorganic Chemistry Shivhare & Lavania.
10. Organic Chemistry Kumar & Mehnot.
11. Practical Engineering Chemistry Dr Renu Gupta & Dr Sapana Dubey.
12. A Text book of Engineering Chemistry S. K. Jain & K. D. Gupta.
13. Engineering Chemistry Dr. K.L. Menaria & Dr Praveen Goyal

**CY 172 Chemistry-II Lab C (L, T, P) = 1 ( 0, 0, 2)**

**List of Experiments**

1. Introduction to volumetric analysis

2. Preparation of Standard Na2CO3 solution

3. Estimation of HCl solution using Std. Na2CO3 solution

4. Estimation of NaOH using Std. HCl solution

5. Estimation of Mohr‘s Salt using Std. KMnO4 solution

6. Determination of acidity of water sample

7. Determination of alkalinity of water sample

8. Determination of total hardness of water using Std. EDTA solu

9. Estimation of Chlorides present in water sample

DEMONSTRATION EXPERIMENTS

1. Estimation of total solids present in water sample
2. Determination of pH using pH meter.
3. High volume air sampler.
4. Explain Lewis theory of acids and bases and its limitations.

14. Applications of buffer solutions

15. Composition and uses of following Alloys: Brass, German silver, Nichrome

16. Define conductor Insulator, Electrolyte and Non – electrolyte

17. Explain the mechanism of rusting of iron

Books Reference:

1. Engineering Chemistry II (Hindi) Mathur and Agarwa.l
2. Chemistry of Engineering Materials C.V. Agarwal.
3. Engineering Chemistry P.C. Jain and Monika.
4. Engineering Chemistry M.M. Uppal.
5. Engineering Chemistry V.P.Mehta Jain Bros. Jodhpur.
6. Practical Chemistry for Engineers Virendra Singh.
7. Hand book of Technical Analysis Bannerji Jain Bros.Jodhpur.
8. Engineering Chemistry-I(Hindi) Mathur & Agrawal.
9. Inorganic Chemistry Shivhare & Lavania.
10. Organic Chemistry Kumar & Mehnot.
11. Practical Engineering Chemistry Dr Renu Gupta & Dr Sapana Dubey.
12. A Text book of Engineering Chemistry S. K. Jain & K. D. Gupta.
13. Engineering Chemistry Dr. K.L. Menaria & Dr Praveen Goyal

**MA 131 MATHEMATICS I C (L, T, P) = 4(3, 1, 0)**

|  |  |  |
| --- | --- | --- |
| **Units** | **CONTENTS OF THE COURSE** | **Hours** |
| I | **Algebra** : Complex Numbers, Algebra of complex numbers. Conjugate of a complex number. Modulus and Amplitude of a complex number. Triangular inequalities. Square root of a complex number. | 6 |
| II | **Trigonometry**: Trigonometrical ratios of allied angles [ Sum and Difference formulae and their applications. Product formulae. T-Ratios of multiple and sub-multiple angles (2A, 3A, A/2). Solution of Trigonometrical equations. | 6 |
| III | **Matrices and Determinants** : Definition and properties of Determinants. Definition and types of Matrices, Transpose of a matrix, Minors and Cofactors, Adjoint of a matrix , Inverse of matrix Cramer`s rule, Solution of simultaneous linear equations by Inverse matrix method. Characteristic matrix Characteristic equation, Eigen values and Eigen vectors, Cayley Hamilton theorem( Verification only). | 7 |
| IV | **Coordinate Geometry**: Distance formula, Ratio formula. Coordinates of Centroid, In-centre, Ortho-centre and Ex-centre of a triangle, Area of a triangle. Equation of a straight line in General form, Slope form, Intercept form, Perpendicular form. Equation of a line passing through one point and passing through two points, Angle between two lines. Perpendicular distance of a line from a point. | 8 |
| V | **Conic Section : Circle** : Definition and equation of a circle in General and standard forms, Equation of a circle in diametral form, Equation of Tangent and Normal at a point.(Simple problems)  **Parabola** : Definition and equation of a parabola in standard form, Equation of Tangent and Normal at a point.(Simple problems)  **Ellipse and Hyperbola** : Definition and equation in standard forms, Equation of Tangent and Normal at a point.(Simple problems) | 8 |
|  | **Total** | 35 |

**Books Recommended :**

1. Mathematics XI & XII by NCERT, New Delhi
2. Mathematics XI & XII by Rajasthan Board , Ajmer
3. Coordinate Geometry by Bhargava, Agrawal
4. Algebra XII by Bhargava, Agrawal
5. Plane Trigonometry by Bhargava, Agrawal
6. Elements of Matrices and Determinants by Sharma, Gokhroo, Saini
7. Conic Section by Gokhroo, Bhargava
8. Coordinates Geometry by RBD Publication

**MA 132 MATHEMATICS II C (L, T, P) = 4(3, 1, 0)**

|  |  |  |
| --- | --- | --- |
| **Units** | **CONTENTS OF THE COURSE** | **Hours** |
| I | **Function** : Definition, Domain, Codomain and Range of a function. Algebra of functions. Different kinds of functions. Concept of Limit, Left hand limit and Right hand limit, Limit of standard functions(Simple problems), Continuity and Differentiability at a point(Simple problems). | 7 |
| II | **Differential Calculus** : Derivative of Sum, Difference, Multiplication and Division of two functions, Differentiation of function of a function, Logarithmic differentiation, Differentiation of Implicit functions, Differentiation of Parametric functions, Differentiation by trigonometrical transformations, Differentiation of a function with respect to other function. Second order derivative. | 7 |
| III | **Differential Calculus** : Geometrical meaning of . Tangents and Normals. Angle of intersection between two curves. Derivative as a Rate measurer , Errors and Approximations. Maxima and Minima of function with one variable. | 6 |
| IV | **Integral Calculus** : Integral as anti-derative. Integration of Sum and Difference of functions. Integration by substitution, Integration by partial fractions, Integration by parts. Integration of Rational and irrational functions . Definite Intgral and its properties. | 7 |
| V | **Differential Equations** : Differential equations of first order and first degree : variable separable, homogeneous form , linear form, reducible to linear form, exact form , reducible to exact form. Linear differential equations of higher order with constant coefficients. | 8 |
|  | **Total** | **35** |

**Books Recommended:**

1. Mathematics XI & XII by NCERT, New Delhi
2. Mathematics XI & XII by Rajasthan Board , Ajmer
3. Differential Calculus by Bansal, Bhargava, Agrawal
4. Integral Calculus by Bansal, Bhargava, Agrawal
5. Elements of Differential Equations by Gokhroo, Saini, Agrawal
6. Differential Equations Vol. I by Bansal, Dhami
7. Differential Equations Vol. I by RBD Publication
8. Differential Calculus by RBD Publication

**ME 134 APPLIED MECHANICS C (L, T, P) = 3 (3, 0, 0)**

|  |  |  |
| --- | --- | --- |
| **Units** | **CONTENTS OF THE COURSE** | **Hours** |
| I | **Force:** Definition, Unitsand Different Types of Forces. **Coplanar Forces:** Resolution of Forces,Law of Parallelogram of Forces,Resultant of two or more Forces,Basic Conditions of Equilibrium, Lami's Theorem (No Proof),Jib Crane and Law of Polygon of Forces (Only Statement). | 7 |
| II | **Moment:** Definition, Units & Sign Convention, Principle of Moments, Application of Equilibrium Conditions for non-concurrent Forces. **Application of Principles of Forces & Moments:** Levers & their Types, Reactions of Simply Supported Beams (Graphical & Analytical Method),Steel Yard, Lever Safety Valve and Foundry Crane. | 9 |
| III | **Centre of Gravity:** Concept, Centroid, Calculation of C.G. of Regular Bodies and Calculation of C.G. of Plain Geometrical Figures. **Friction:** Types of Friction, Laws of Friction, Angle of Friction, Angle of Repose, Friction on Horizontal and Inclined Plains, Application of Laws of Friction Related to Wedge, Ladder and Screw Jack. | 8 |
| IV | **Simple Machines:** Basic Concepts,Loss in Friction,Inclined Plane,Simple & Differential Wheel and Axle (Neglecting Rope thickness),Screw Jack,Lifting Crabs**,** Systems of Pulleys**,** Worm and Worm Wheel. **Rectilinear Motion:**  Concept, Motion under Constant Velocity**,** Motion under Constant Acceleration**,** Velocity-time graph and its uses. | 8 |
| V | **Motion under Gravity:** Concept,Vertical Motion,Smooth Inclined Plane. **Projectiles:** Concept,Range, Maximum Height and Time of Flight**,** Equation of Trajectory**,** Calculation of Velocity of Projectile at Certain Height And at Certain instant. | 7 |

**Books Recommended**

1. Engineering Mechanics by Domkundwar & Domkundwar
2. Engineering Mechanics by D S Kumar
3. Engineering Mechanics by R K Rajput
4. Engineering Mechanics by R. Doughlas Gregory
5. Engineering Mechanics by Bhattacharya

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| **ME 151/152** | | **AUTO-CAD LAB** | **C (L, T, P) = 1 (0, 0, 2)** | |
|  |  |  |  |  |
| **Units** |  | **Contents of the Course** |  | **Hours** |
| I | **LINE:** Lettering and Dimensioning. |  |  | 6 |
|  | **SCALES:** Representative factor, Plain scales, Diagonal scales, Scales of Chords. | |  |  |
|  | **CONIC SECTIONS:** Construction of ellipse, Parabola and hyperbola by different methods, normal | | |  |
|  | and tangents. |  |  |  |
| II | **PROJECTIONS:** Types of Projection, Orthographic Projection, First angle and Third angle | | | 6 |
|  | Projection. |  |  |  |
| III | **SECTIONS OF SOLIDS:-** Section of right solids by normal and inclined planes. | |  | 7 |
| IV | **2 D Drafting:-** Introduction to CAD, using coordinate systems, 2-Dimensional drafting, making 2 D | | | 6 |
|  | vices, working with Draw tools, Working with Grips, Dynamic & Parametric Modification, | | |  |
|  | understanding References ( X-Line, Ray), Concept of Hatching, Different Hatching styles & patterns, | | |  |
|  | Importance of Layer, Working with Layers, Dimensioning ( Create, Edit & Styling). | |  |  |
| V | **3D Modeling:-** Intro to 3-D Modeling, Concept & Typing of 3-D Model, 3-D coordinate system, | | | 7 |
|  | overview of 3-D objects, Create wire frame model, viewing 3-D Model, Create surfaces, Solid | | |  |
|  | Modeling, Sectioning of 3-D Model. |  |  |  |
|  |  |  | **Total** | **32** |

**Recommended Books:**

1. Engineering Drawing by N.D.Bhatt & V.M.Panchal.
2. Practical Geometry by P.S.Gill.
3. Engineering Drawing by Laxmi Narayan Mathur.
4. Advanced Techniques in Auto CAD by Tickoo Sham T.M.H.
5. Understanding Auto CAD by Tickoo Sham T.M.H.



**ME 171 Engineering Drawing-I Lab C(L, T, P) = 2 (0, 0, 3)**

1. Introduction of Drawing Instruments.
2. Lines, Lettering and Dimensioning:
3. Types of Line.
4. Lettering – Single Stroke, Italics.
5. Various Systems of Placing the Dimensions.
6. Geometrical Construction and Engineering Curves:
7. 3.1 Regular Polygons of Given Side.
8. 3.2 Conic sections – Construction of Ellipse, Parabola, Hyperbola.
9. 3.3 Construction of Cycloid, Epicycloid and Hypocycloid.
10. 3.4 Construction of Involute, Archimedian Spiral and Cylindrical Helix.
11. Scales:
12. 4.1 Type of Scales (Reducing and Enlarging ).
13. 4.2 Representative Fraction.
14. 4.3 Plain and Diagonal Scales.
15. Theory of Orthographic Projections :
16. Introduction of Projections, Reference Planes and Projectors .
17. Angle of Projections (First Angle and Third Angle Projections).
18. System of Rotations.
19. Projection of Points in Different Quadrants.
20. Projection of Lines :
21. Parallel to Both the Planes.
22. Parallel to One and Perpendicular to Other Planes.
23. Parallel to One and Inclined to Other Planes.
24. Inclined to Both the Planes.
25. True Length of a Line and its Apparent and True Inclinations.
26. Projection of Planes :
27. Projection of Triangular, Square, Rectangular, Pentagonal, Hexagonal and Circular Planes.
28. Plane Parallel to One & Perpendicular to Other.
29. Plane Perpendicular to Both the Planes.
30. Plane Perpendicular to One and Inclined to Other Plane.
31. Projection of Solids :
32. Projection of Cube, Prism, Pyramid, Cylinder and Cone.
33. Projection of Solid whose Axis is Perpendicular to One and Parallel to Other plane.
34. Projection of Solid Whose Axis is Parallel to One and Inclined to Other Plane.
35. Projection of Solid Whose Axis is Parallel to both the Planes (excluding inclined to both the planes).
36. Conversion of Pictorial Views into Orthographic Views :

* Orthographic Projections of Simple Solid Object from Pictorial / Isometric view.

1. Section of Solids and Development of Surfaces :
2. Introduction of Sectional Planes.
3. Sectional Plane Perpendicular to one Reference Plane and Parallel to other.
4. Sectional Plane Perpendicular to one and Inclined to other.
5. Section of all types of Geometrical Solids. viz, Prism, Pyramid, Cone and Cylinder.
6. Apparent Section and True Section.
7. Development of Surfaces of Regular Solids viz, Prism, Pyramid, Cone and Cylinder.
8. Sectional Plan, Sectional Elevation and Sectional Side View and Development of Surface of Solid after Section.

**Practicals:**

1. Preparation of following on Imperial Size Drawing Sheet :-

Practical

1. Lines, Letters and Scales. 8
2. Geometrical Constructions and Engineering Curves. 8
3. Projection of Lines. 10
4. Projection of Planes 6
5. Projection of Solids 10
6. Orthographic Projections of Simple objects 12
7. Section and Development of Surfaces of Solids 8

Cone, Cylinder, Sphere etc.

1. Preparation of following Drawings in Sketch Book (Home Assignment) :
2. Lettering (On Graph Sheet).
3. 2.2 Projection of Points In Different Quadrants.
4. 2.3 Isometric Projection of Various Planes.

**REFERECE BOOKS:**

1. Engineering Drawing N D Bhatt
2. Machine Drawing N D Bhatt
3. Engineering Graphics V. Laxmi Narayan
4. Machine Drawing V. Laxmi Narayan
5. Engineering Drawing P S Gill
6. Machine Drawing M L Mathur
7. Engineering Drawing (Hindi) B K Goyal
8. Mechanical Engineering Drawing (Hindi) Gupta & Kumar
9. Engineering Drawing A C Parkinson

**ME 172 Engineering Drawing-II Lab C(L, T, P) = 2 (0, 0, 3)**

1. Isometric Projection :
2. Isometric Axes, Isometric Scale, Isometric Lines and Isometric Planes.
3. Isometric View and Isometric Projection of Plane (Square, Rectangular, Pentagonal Hexagonal, Circular).
4. Isometric View and Isometric Projection of Prism, Pyramid, Cone, Cylinder, Sphere, their Frustum and Combination of these Solids.
5. Sections and Conventions :
6. Conventional Method of Representing Full, Half, Removed, Revolved, Partial and Offset Section.
7. Section Lines for Different Material as per ISI Recommendations.
8. Rivets and Riveted Joints:
9. Different Types of Rivets -Snap Head, Pan Head with Tapered Neck, Rounded Counter Sunk Head, Flat Counter Sunk Head.
10. Lap Joint - Single Riveted, Double Riveted (Chain Riveting and Zigzag Riveting).
11. Butt Joint - Single Riveted, Double Riveted Chain Riveting and Zigzag Riveting (using Single and Double Cover Plates).
12. Screw Threads and Fasteners:
13. Classification of Threads.
14. Profiles and uses of - Metric, BSW, Square, ACME, Knuckle, Sellers Threads.
15. Machine Screw – Fillister, Flat Counter Sunk, Rounded Counter Sunk, Cup and Socket.
16. Set Screws – Oval, Conical, Flat and Cup Pointed.
17. Hexagonal Bolt and Nut, Stud and Collar Stud.
18. Foundation Bolt and Locking Devices:
19. Drawing and uses of Rag, Lewis and Eye Bolt.
20. Locking by Simple Lock Nut, Split Pin and Spring Washer, Castle Nut, Locking by Plate.
21. Keys and Pulleys:
22. Drawing and uses of Various Types of Keys - Saddle Key - Hollow and Flat, Sunk - Rectangular, Square, Key with Gib Head, Woodruff Key.
23. Pulley - Straight Arms flat Belt Pulley, V-Belt Pulley.
24. Shaft Couplings:
25. Muff Coupling.
26. Protected Type Flange Coupling.
27. Bearings:

* Simple Bush Bearing.

1. Building Drawing:
2. Introduction of Orientation and Sun Chart Diagram of Residential Building.
3. Section of a Wall Including Foundation.
4. Sectional Plan of One Room and Toilet from Given Sketch.

**Practicals:**

Practical

1. Section and Development of Surfaces of Prism and 8
2. Pyramids
3. Isometric Projections 10
4. Riveted Joints. 6
5. Screw Threads and Fasteners 8
6. Pulleys 6
7. Couplings 6
8. Bearing 6
9. Building Drawing 8
10. Preparation of following Drawings in Sketch Book (Home Assignment) :
11. Various Types of Rivet Heads
12. Section and Conventions
13. Set Screws
14. Machine Screws
15. Foundation Bolts, Key.

**REFERECE BOOKS:**

1. Engineering Drawing N D Bhatt
2. Machine Drawing N D Bhatt
3. Engineering Graphics V. Laxmi Narayan
4. Machine Drawing V. Laxmi Narayan
5. Engineering Drawing P S Gill
6. Machine Drawing M L Mathur
7. Engineering Drawing (Hindi) B K Goyal
8. Mechanical Engineering Drawing (Hindi) Gupta & Kumar
9. Engineering Drawing A C Parkinson

**ME 174 WORKSHOP PRACTICE C (L, T, P) = 1 (0, 0, 2)**

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| **CARPENTRY SHOP**  Timber, definition, engineering applications, seasoning and preservation Plywood and ply boards. Measuring and Marking Tools, cutting tools used in carpentry & safety Measures.  **List of jobs to be made in the Carpentry shop**   1. T – Lap joint 2. Bridle joint   **FOUNDRY SHOP**  Moulding tools and Moulding Boxes and other requirementst like furnace etc Moulding Sands, constituents and characteristics,  Pattern definition, materials types, core prints,Role of gate, runner, riser, core and chaplets, Causes and remedies of some common casting defects like blow holes, cavities, inclusions  **List of jobs to be made in the Foundryshop**   1. Mould of any pattern 2. Casting of any simple pattern   **WELDING SHOP**  Definition of welding, brazing and soldering processes and their applications  Oxyacetylene gas welding process, equipment and techniques, types of flames and their  Applications. Manual metal arc welding technique and equipment, AC and DC welding  Electrodes: Constituents and functions of electrode coating, welding positions  Types of welded joints, common welding defects such as cracks, undercutting, slag  inclusion and boring  **List of jobs to be made in the Weldingshop**   1. Gas welding practice by students on mild steel flat 2. Lap joint by gas welding 3. MMA welding practice by students 4. Square butt joint by MMA welding 5. Lap joint by MMA welding 6. Demonstration of brazing   **SHEET METAL SHOP**  Name ,Functions & Specification of common Sheet Metal Tools like Slakes, Hammes, Hard Sstrips, Purchase, Groovers, and Rivet Sets.  List of jobs to be made in the Sheet Metal.  Joints:   1. Single & Double Hem Joints 2. Wire Edge 3. Lap Joint 4. Utility Jobs     **FITTING AND SMITHY SHOP**  Files, materials and classification. Specification files use of Marking & Measuring Tools.  Forging, forging principle, materials, Operations like drawing, upsetting, bending and forge welding, Use of forged parts. List of tools used in Marking & Measuring for Smithy Shop.  **List of jobs to be made in the Fitting And Smithy Shop**   1. Finishing of two sides of a square piece by filing 2. Tin smithy for making mechanical joint and soldering of joint 3. To cut a square notch using hacksaw and to drill three holes on PCD and tapping 4. Job Preparation in forging shop involving basic operations.   **PLUMBING SHOP**  Classification of pipes according to Material and use of I.S.I. specification of pipes. Introduction to cement & PVC Pipes: and their uses.  List of Tools & Equipment used in Plumbing Shop   1. Cutting & Trending on G.I. Pipe 2. Exercises on PVC Pipe Fitting 3. Repair of Taps & Cocks |

**List of Recommended Books:-**

1. Workshop Technology and Practice By Hazara Chowdhary Vol I & Vol II
2. Workshop Technology and Practice By B.S. Raghuvanshi
3. Workshop Technology By : Chapman Vol I ,II & III
4. Workshop Technology (Hindi) Tahil
5. Workshop Technology (Hindi) Machnani
6. Domestic Devises & Application by KB Bhala

**ELECTRONIC COMPONENTS AND SHOP PRACTICE** **C(L,T,P) =3(3,0,0)**

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| --- | --- | --- |
| **Unit** | **Course Contents** | **Total Contact Hrs.** |
| 1 | Resistors, capacitors, Inductors and Coil- Classification, colour coding, tolerance, constructional details, specifications, applications . Failures in Resistors and capacitors, Losses in Inductors and Coils. | 7 |
| II | Soldering and De-soldering Techniques- Soldering - connection, flux alloy, different soldering materials and problems, Different soldering methods - hand, wave, dip and ultrasonic, De-soldering technique | 7 |
| III | Printed Circuit Board Fabrication- Introduction, Types and Specifications of PCB, Basic Steps of Fabrication, Advantage and limitation of PCB, Safety recommendation, Block diagram of PCB plant, Preparation of PCB art work for (simple electronics circuit) | 7 |
| IV | Transformer- Principle of transformer, Voltage, current and turn ratio relationship, Construction details of Core, Shell and Auto Transformer, Design procedure of iron core small transformers and numerical problems, Constructional details of transformers winding machine, | 7 |
| V | Surface Mounted Devices- Assembly Techniques, Packages- 2,3,5,6 terminal packages, Integrated Circuits. | 7 |
|  |  | 35 |

**Reference Books:**

1. Electronics Component & Shop Practice by K.R. Nahar

2. Hand Book of Philips Component

3. Maintenance of Electronic Equipments by K.S. Jamwal

4. Electronic Shop Practice. by Madhavia Joshi.

5. Electrical & Electronic Materials by M.L. Gupta

6. Coil Winding & Fabrication Practice by K.R. Nahar

7. Transformer & Coil BPB Publication

8. PCB - Design & Technology by W.C. Bosshort

9. Electrical &Electric Workshop by A.K. Sanaydhya & A.K. Khatri

10. Electonics Workshop by A.K. Sanaydhya

**CIRCUIT ANALYSIS** **C(L,T,P) =3(3,0,0)**

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| --- | --- | --- |
| **Unit** | **Course Contents** | **Total Contact Hrs.** |
| 1 | Network Elements (Definition and examples), Initial conditions in elements, Mutual inductance (coupling coefficient and dot rule), Voltage and current sources (ideal and practical), Dependent and independent sources, Accompanied and unaccompanied sources, Classification of networks (Definition and examples), Network configuration (No formula derivation) | 7 |
| II | **Mesh and Nodal Analysis :**Definition of branch, node, mesh, loop and tree.**,** Kirchhoff's laws, Voltage and current equations for simple meshes and nodes, Cramer's Rule, Simple problems upto three variable using Cramer's rules (for DC circuits only), **Network Theorems :** Statement, proof, application and numerical problems (DC circuit only) related to Superposition theorem, Reciprocity theorem, Thevenin's theorem, Norton's theorem, Millman's theorem, Maximum power transfer theorem, Tellegen's theorem (Only statements), Star Delta conversion | 7 |
| III | Introduction to Laplace transformation, Solution of first order and second order differential equations (no initial condition), Laplace transform of - Unit step function, Ramp function, Exponential function, Impulse function, Sinusoidal functions, Parabolic function, Derivative of function, Integral of function, Laplace transforms theorems, Shifting theorem, Initial and final value theorem, Inverse Laplace transformation for simple, multiple and conjugate complex roots. Application of Laplace transformation for simple RL, RC and RLC series circuits, D.C. transients in RL, RC and RLC circuits, Determination of initial condition, Determination of final condition, Simple numerical problems | 7 |
| IV | **Two Port Networks:** Introduction, Open circuit impedance parameters, Short circuit admittance parameters, Hybrid (h) parameters, Transmission parameters, Inter-relationship between Z and Y parameters, Equivalent models of Z and Y parameters, Reciprocity and symmetry of two port networks, Equivalent T and π (Pie) section representation, Determination of Z and Y parameters for some special networks (T, π, lattice, bridge T), Idea of image impedance, characteristics impedance for two port networks | 7 |
| V | **Resonance :** Series resonance in uncoupled circuits, Definition, reactance curves, resonance condition, selectivity and bandwidth, Parallel resonance in uncoupled circuits, Q factor, Q factor on energy basis, **Line Filters:** Constant K type & m- derived filter, Composite filter | 7 |
|  |  | 35 |

**Reference Books:**

1. Network Analysis by Arumugan & Prem Kumar

2. Network Analysis by Dhar & Gupta

3. Network Analysis by Ven Valenburg

4. A Course in Circuit Analysis by Soni & Gupta

5. A Course in Circuit Analysis by Umesh & Sinha

6. Circuit Theory by Iyer

7. Electric Circuits by Josheep Edminster

8. Network Analysis by Suba Rao & Prasad

9. Circuit Analysis by Hayt

10. Network Analysis by A.K. Sanaydhya & A.K. Khatri

**ELECTRONIC MEASUREMENT AND INSTRUMENTATION** **C(L,T,P) =3(3,0,0)**

|  |  |  |
| --- | --- | --- |
| **Unit** | **Course Contents** | **Total Contact Hrs.** |
| 1 | **Basic Concept of Measurement :**  1.1. Introduction.  1.2. Generalized configuration of measuring system.  1.3. Characteristics of measuring devices  1.3.1. Accuracy.  1.3.2. Resolution.  1.3.3. Precision.  1.3.4. Expected Value.  1.3.5. Error (Gross, Systematic and Random error).  1.3.6. Sensitivity.  1.3.7. Linearity.  1.3.8. Hysterisis.  1.3.9. Repeatability.  1.3.10. Threshold  1.4. Calibration of measuring devices. | 7 |
| II | **Transducers :**  2.1 Concept of Primary and Secondary transducers.  2.2 Difference between active and passive transducer.  2.3 Difference between analog and digital transducer.  2.4 Construction and working of the following transducers and measurement of quantities such as  Displacement (Linear and angular), Strain, Stress, Temperature, Pressure, Flow level, pH value.  2.4.1 Potentiometers  2.4.2 Strain gauge (resistance and semiconductor type)  2.4.3 Resistance Temperature detectors (RTD)  2.4.4 Thermo couples, thermistor.  2.4.5 Linear variable differential transformer (LVDT).  2.4.6 Capacitive transducer  2.4.7 Load Cell  2.4.8 Piezo Electric Transducer  2.4.9 Photo Cells  2.4.10 Photo Voltaic Cell  2.4.11 Techogenerator  2.4.12 Ultrasonic method for level measurement  2.4.13 Electro magnetic flow meter.  2.4.14 pH electrodes | 7 |
| III | **Measuring Instruments :**  3.1 Classification of measuring instruments  3.2 General consideration of torques employed in indicating type instrument (deflection torque, control  torque, damping torque)  3.3 Construction and working of voltmeter and ammeter  3.3.1 Moving iron type  3.3.2 Moving coil type  3.3.3 Rectifier type  3.3.4 Dynamometer type  3.4 Ohmmeter  3.6.1 Series type  3.6.2 Shunt type | 7 |
| IV | **Range Extension and Calibration :**  4.1 Significance of range extension  4.2 Use of series and shunt multipliers  4.3 Multirange ammeter and voltmeter  4.4 Simple problems | 7 |
| V | **Signal Conditioning :**  5.1 Introduction.  5.2 DC Signal Conditioning.  5.3 AC Signal Conditioning.  5.4 Brief idea of data acquisition system | 7 |
|  |  | 35 |

**Reference Books:**

1. A Course in Electrical & Electronics Measurement & Instrumentation by A.K. Shawney.

2. Instrumentation Measurement and Feed Back Barry E Jones.

3. Instrumentation Devices and System C.S. Ranga, Sharma, Mani.

4. Instrumentation. R.K. Jain.

5. Measurement Systems Application & Design. E.O. Deoblin.

6. Electronic Instruments Helpric Cooper

**ELECTRONIC DEVICES AND CIRCUITS** **C(L,T,P) =3(3,0,0)**

|  |  |  |
| --- | --- | --- |
| **Unit** | **Course Contents** | **Total Contact Hrs.** |
| 1 | **Semiconductor and P\_ Junction :**  1.1 Metal, non metals and semiconductors and their Energy Band Diagram.  1.2 Intrinsic and Extrinsic Semiconductors.  1.3 Effect of temperature on extrinsic semiconductor  1.4 Energy band diagram of extrinsic semiconductor  1.5 Fermi Level and fermi dirac distribution  1.6 Drift and diffusion current  1.7 Hall effect  1.8 P-N Junction Diode  1.9 Working, characteristics and application of  1.9.1 Tunnel diode  1.9.2 Zener diode  1.9.3 Varactor diode  1.9.4 Photo diode  1.9.5 Light emitting diode (LED)  1.10 Photo conductors  1.11 Cds photo conductive cells and photo voltaic cell.  **Clipper and Clamping Circuit :**  Various clipping circuits using ideal diode  Transfer characteristics  Transistor clippers  Clamping circuit and its application as a staircase wave form generator | 7 |
| II | **Bipolar Junction Transistor (BJT) :**  2.1 Working of PNP & NPN transistor  2.2 Configuration of transistor (CB, CE and CC)  2.3 Behavior of BJT in Active, Cut off and Saturation regions  2.4 Low frequency and small signal hybrid model of BJT. | 7 |
| III | **Transistor Biasing and Bias Stability :**  3.1 D.C. and A.C. Load line.  3.2 Operating point and its stability  3.3 Factors affecting bias stability  3.4 Stability factors  3.5 Bias stabilization  3.6 Calculation of operating point and stability factor for  3.6.1 Fixed Bias Circuit.  3.6.2 Collector to base biasing.  3.6.3 Voltage Divider biasing (Self bias)  3.7 Bias Compensation techniques using  3.7.1 Diode.  3.7.2 Thermistor and Sensistor.  3.8 Thermal stability and Thermal runaway | 7 |
| IV | **Field Effect Transistor :**  4.1 Construction, operation and characteristics of JFET , E and D MOSFET  4.2 Biasing of FET  4.3 Small signal model of JFET  4.4 Terminology used with JFET  4.5 Precaution for handling of MOSFETs | 7 |
| V | **Rectifiers and Power Supplies :**  5.1 Working of rectifiers  5.1.1 Half wave rectifier  5.1.2 Centre tape full wave rectifier  5.1.3 Bridge rectifier  5.2 Analysis of rectifiers (for all type)  5.2.1 Calculations for average and RMS values  5.2.2 PIV of diodes  5.2.3 Ripple factor  5.2.4 Regulation and efficiency  5.3 Calculation of ripplefactor and working of following filters:  5.3.1 Capacitance filter  5.3.2 Inductance filter  5.3.3 L-C and π (Pie) filters  5.4 Voltage Multipliers  5.5 Regulated power supply using zener diode  5.5.1 Simple problems on zener regulator. | 7 |
|  |  | 35 |

**Reference Books:**

1. Electronic Devices & Circuits Millman & Halkias

2. Electronic Devices & Circuits G.K. Mittal

3. Electronic Devices & Circuits A.Mottershed

4. Functional Electronics K.V. Ramanan

5. Electronic Devices & Circuits Mathur, Kulshrestha & Chadda

6. Electronic Devices & Circuits Sanjeev Gupta

7. Pulse & Wave Shaping Circuits. Millman & Taub.

8. Pulse Circuits Rajul Singhal

9. Pulse & Digital Circuits K.K. Agarwal

10. Electronic Devices & Circuits G.K. Mithal

11. Wave Shaping & Digital Circuits Agarwal & Rai

12. Pulse & Wave Shaping Circuits G.L. Verma

**ELECTRONIC WORKSHOP LAB** **C(L,T,P) =1(0,0,2)**

1. Study of different tools used in electronics workshop.

2. Study of analog and digital multimeters and their uses for measuring voltage, current and resistance.

3. To study and read data manual for different components (diodes & transistors) and their equivalents.

4. Use of CRO for voltage, frequency and phase measurements.

5. Use of function generator for different waveform generation.

6. Soldering and de-soldering of different components on PCB by soldering iron

7. Soldering and de-soldering of different SMD on PCB.

8. Cable preparation for RJ - 11, RJ-45, flat ribbon and 9-pin D-type connectors and their testing.

9. Identification of different type of connectors

10. Study of coil winding machine

11. Familiarization with different type of stampings and bobin

12. To design winding and test small transformer of single and tapped secondary

13. To design winding and test the transformer of multiple secondary

14 Study of PCB plant equipment

15. To prepare art work PCB using software ( circuit maker / Easy PC/ multi sim).

16. Design and fabrication of PCB using silk screen / photography methods.

**ELECTRONIC DEVICES AND CIRCUIT LAB** **C(L,T,P) =1(0,0,2)**

1. To plot the V-I characteristics of P-N diode and LED.

2. To plot the V-I characteristics of zener diode and study of zener diode regulator circuit

3. To plot the V-I characteristics of PNP transistor in CB, CE and CC configuration

4. To plot the V-I characteristics of NPN transistor in CB, CE and CC configuration and calculate h-parameter for CE

configuration.

5. Study of the different biasing circuits and observe the effect of component variation on operating point

6. Study of half wave and full wave rectifiers.

7. Study of bridge rectifier.

8. To study the filter circuits and measure the ripple factor.

9. To plot the V-I characteristics of JFET.

10. To plot the V-I characteristics of MOSFET.

11. To study the voltage multipliers.

12. To Study Emitter follower circuits and measure its input and output impedances

13. To study the behavior of Cds photo conductive, photo voltaic cell and photo conductors

14. Design a RC high pass filter for a given frequency

14.1 Plot its frequency response

14.2 Observe it as a differentiator (for different time constant)

15. Design a RC low pass filter for a given frequency

15.1 Plot its frequency response

15.2 Observe it as an integrator (for the different time constant)

16. Observe the wave forms of various clipping circuit

17. Observe the wave forms of various clamping circuits

**ELECTRONIC MEASUREMENT AND INSTRUMENTATION LAB C(L,T,P) =1(0,0,2)**

1. To measure the linear and displacement by LVDT.

2. To measure the linear and displacement by Potentiometer.

3. To measure the angular displacement by RVDT Capacitive transducer.

4. Measurement of speed of the shaft by contact and non contact methods photo electric transducer.

5. Measurement of speed of the shaft by contact and non contact methods Magnetic transducer

6. Measurement of speed of the shaft by contact and non contact methods Techogenerator

7. Measurement of force by strain gauge bridge

8. Measurement of pH value using pH meter

9. Error detection by synchro pair

10. Measurement of temperature and draw the characteristics of following Thermocouple.

11. Measurement of temperature and draw the characteristics of following RTD

12. Measurement of temperature and draw the characteristics of following Thermister

13. To draw the torque and speed curve for servo motor.

14. Measurement of level by capacitive transducer.

15. To observe the output wave form of synchro transmitter on CRO and find the electrical zero.

16. Use of series multiplier for voltage range extension.

17. Use of shunt multiplier for current range extension.

**C PROGRAMMING** **C(L,T,P) =3(3,0,0)**

|  |  |  |
| --- | --- | --- |
| **Unit** | **Course Contents** | **Total Contact Hrs.** |
| 1 | **Introduction :**  1.1 Scope of ‘C’ Language  1.2 Distinction and similarities with other HLLs  1.3 Special features and Application areas | 7 |
| II | **Elements of ‘C’ :**  2.1 Character set  2.2 Key words  2.3 Data types  2.4 Constants and Variables  2.5 Operators: unary, binary, ternary  2.6 Operator precedence | 7 |
| III | **Console Input-Output :**  3.1 Types of I-O  3.2 Console I-O  3.3 Unformatted console I-O: getchar(),putchar(), gets(), puts(),  getch(),getche()  3.4 Formatted I-O: scanf(), printf()  **Control Flow :**  3.1 Statements and blocks  3.2 if  3.3 switch  3.3 Loops: for, while, do-while  3.4 goto and labels  3.5 break, continue, exit  3.6 Nesting control statements | 7 |
| IV | **Arrays :**  4.1 Basic concepts  4.2 Memory representation  4.3 One dimensional array  4.4 Two dimensional array  **Functions :**  Basic concepts  Declaration and prototypes  Calling  Arguments  Scope rules  Recursion  Storage classes types  Library of functions: math, string, system | 7 |
| V | **Pointers :**  Basic concepts  &, \* operator  Pointer expression: assignment, arithmetic, comparison  Dynamic memory allocation  Pointer v/s Arrays | 7 |
|  |  | 35 |

**Reference Books:**

1. 'C' Programming Stephen Kochan

2. Programming with 'C' Schaum's Series

3. 'C' Programming V.Balguru Swami

4. 'C' Programming Kernighan & Ritchie

5. Let us 'C' Yashwant Kanetkar

**C PROGRAMMING LAB** **C(L,T,P) =1(0,0,2)**

1. Problems based on arithmetic expression, fixed mode arithmetic.

2. Problems based on conditional statements and control structures.

3. Problems based on arrays (1-D, 2-D), functions and pointers.

4. Problems based on engineering applications.

**ECONOMICS & SOCIAL SCIENCES C(L,T,P) = 3(3,0,0)**

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| **Unit** | Contents of the Course | **Total Contact Hrs.** |
| I | **Introduction: Definition meaning, nature and scope of economics.** | 6 |
| II | **Micro Economics**: Definition, meaning and scope of Micro Economics. Importance and limitations. | 6 |
| III | **Concept of Demand and supply** :Utility Analysis, Law of Demand, Demand determinants, Demand Distinctions. Law of Supply, Elasticity | 7 |
| IV | **Introduction to social Sciences**: impact of british rule on India(Economic Social and Cultural). Indian National movement, Psysography of India. | 10 |
| V | **Political Economy**: Agriculture, Socio-Economic development, Challenges to Indian Decomcracy, Polical Parties and pressure groups. | 8 |
|  | **Total** | 37 |

**AUDIO AND VIDEO SYSTEMS** **C(L,T,P) =3(3,0,0)**

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| **Unit** | **Course Contents** | **Total Contact Hrs.** |
| 1 | **Basic Components of Audio and Video :**  1.1 Construction & Working of Microphone  1.1.1 Carbon type  1.1.2 Electrodynamics type  1.1.3 Condenser type  1.1.4 Crystal type  1.2 Construction & Working of Loud Speaker  1.2.1 Tweeter  1.2.2 Wooffer  1.2.3 Mid range  1.3 CCD Camera | 7 |
| II | 2.1 Meaning of Hi-Fi  2.2 Basic components  2.3 Fundamental of sound harmonics  2.4 Loudness  2.5 Pitch  2.6 Timbre  2.7 Sensitivity  2.8 Stereophony recording  2.9 Broadcasting of stereophony and its reproduction  2.10 Active and passive audio circuits  2.10.1 Volume control  2.10.2 Tone control  2.10.3 Bass and treble control  2.10.4 Graphic equaliser  2.11 Basic idea about audio pre amplifier and power amplifiers | 7 |
| III | **Scanning and Composite Video Signal :**  3.1 Scanning Process.  3.2 Flicker & Inter lace scanning  3.3 Contrast Ratio & Aspect ratio and viewing distance  3.4 Composite Video signal dimensions.  3.5 Horizontal and vertical sync details.  3.6 Scanning sequence and Function of sync pulse train.  3.7 TV standards for 625 line system | 7 |
| IV | **T.V. Signal Transmission :**  4.1 Modulation technique for picture and sound with reason of preferences  4.2 Concept of Vestigial Side Band (VSB)  4.3 VSB band width and transmission efficiency  4.4 TV channel B.W.  4.5 Positive and Negative modulation  4.6 Block diagram of TV transmitter  4.7 Interference suffered by carrier  4.8 TV transmitting antenna  **T.V. Receiver :**  Principle of TV Receiver.  VSB reception  Block diagram of B/W T.V. Receiver and function of each stage  Balun and its construction | 7 |
| V | **Colour T.V.** :  Colour T.V. Essentials.  Compatibility.  Colour perception and three colour theory  Luminance, hue, saturation, chroma  Colour difference signal  Colour picture tube  Delta gun  Precision in line (PIC)  Trinitron  Colour Signal Transmission (frequency inter leaving technique)  Band width for Colour Signal Transmission.  Modulation of Colour Signals  Weighting factor  Elementary idea for NTSC, PAL, SECAM systems, their merits and demerits.  **Basic Concept of \_ew Trends :**  Audio CD player  Audio conferencing  Digital versatile disk (DVD)  Home theatre system  LCD & LED TV  Plasma TV  Blue ray disc  Simple audio and video compression techniques | 7 |
|  |  | 35 |

**Reference Books:**

1. Audio & Video Systems A.K. Saxena & K.K. Saxena

2. Hand Book of Magnetic Recording D. Jorgen

3. A Course in Electrical & Electronic Measurement & Instruments A.K. Sawhney

4. Basic TV & Video System Bernard Grob

5. Monochrome & Colour TV System R.R. Gulati.

6. Colour TV Principle & Practice R.R. Gulati.

7. T.V. Engineering A.M. Dhake

8. T.V. Engg. Theory & Service Kiver Kaufman

9. Basic TV Principles Bernard Grob

10. Audio & Video System A.K. Sanadhya

11. T.V. Engineering A.K. Khatri

**ELECTRONIC INSTRUMENTS** **C(L,T,P) =3(3,0,0)**

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| **Unit** | **Course Contents** | **Total Contact Hrs.** |
| 1 | **Multimeter :**  1.1 Principle of measurement of  1.1.1 D.C. Voltage and current  1.1.2 A.C. Voltage and current  1.1.3 Resistance  1.2 Calculation of shunt and multiplier for range extension  1.3 AC and D.C. sensitivity  1.4 Loading effect  1.5 Specifications and limitations of multimeter. | 7 |
| II | **Electronic Voltmeter :**  2.1 Characteristics of different analog electronic voltmeter  2.2 Circuits for D.C. voltmeter using BJTs and FETs (single device and balanced bridge type)  2.3 Theory and operation of circuits for average, peak, peak to peak and RMS responding  A.C. electronic voltmeters  2.4 Comparison of amplifier rectifier type and rectifier amplifier type electronic voltmeter | 7 |
| III | **Cathode Ray Oscilloscope (C.R.O) :**  3.1 Construction of CRT and deflection sensitivity  3.2 Block diagram of CRO  3.3 Various controls of CRO  3.4 Detail of X-Y section and delay line  3.5 Horizontal sweep section  3.6 Synchronization of sweep and triggered sweep  3.7 Measurement of voltage, current, frequency and phase angle using CRO  3.8 CRO probes  3.9 Construction and working of dual trace and dual beam CROs  3.10 Frequency & phase measurement by lissaju figure. | 7 |
| IV | **Working Principle and Application of :**  4.1 Q-meter  4.2 AF/RF signal generators  4.3 Harmonic distortion analyzers.  4.4 Transistor Tester  4.5 Curve Tracer  4.6 LCR bridge  4.7 Output power meter (AF)  4.8 Spectrum analyzer  4.9 Cable fault locator  4.10 Magger | 7 |
| V | **Digital Displays :**  5.1 Construction and Working Principle of different type of displays. Such as Diode Matrix, 7-segment using  LED and LCD, Dot matrix using LED  5.2 Comparison of different type of displays  **Guarding Techniques:**  Safety guard and signal ground.  Ground loops and ground currents.  Common mode and series mode voltage.  Avoiding parasitic voltage. | 7 |
|  |  | 35 |

**Reference Books:**

1. A Course in Electrical and Electronics Measurement & Instrumental A.K. Sawhney

2. Modern Electronic Instrumentation and Measurement Techniques Cooper

3. Electronic Instrumentation Fundamentals Malvino

4. Electronic Measurement Terman Pettit

5. Electronic Instruments David Bell

**ANALOG COMMUNICATION** **C(L,T,P) =3(3,0,0)**

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| **Unit** | **Course Contents** | **Total Contact Hrs.** |
| 1 | **Introduction :**  1.1 Basic component of communication  1.2 Definition of modulation  1.3 Need of modulation in communication  1.4 Definition of AM, FM, PM, PAM, PPM, PWM and PCM | 7 |
| II | **Noise and Cross Talk :**  Classification of noise  Atmospheric noise  Shot noise  Thermal noise  Transit time noise  Miscellaneous noise  Noise figure  Concept of cross talk  Cross-talk elimination techniques | 7 |
| III | **Amplitude Modulation :**  Derivation of AM wave equation  Modulation index for sinusoidal AM  Frequency spectrum for sinusoidal AM  Total power in AM wave.  Effective voltage and current for sinusoidal AM  BJT collector amplitude modulator  General idea of carrier and sideband suppression  Balance modulator circuits  Using diode  Using FET  SSB generation by filter and phase shift methods  Block diagram of AM transmitter | 7 |
| IV | **Frequency Modulation :**  Derivation of FM wave equation  Modulation index and frequency deviation for FM  Frequency spectrum for sinusoidal FM  FET reactance and varactor diode FM modulator circuits  Block diagram of FM transmitter using direct and indirect method (Armstrong method)  Comparison of AM and FM system | 7 |
| V | **Radio Receivers :**  Various types of receivers  Receiver characteristics and their measurements  Electronic tuning system  AM demodulator - envelope detection, product demodulator (SSB detection circuit)  FM demodulator - balance slope, Foster Seely and ratio detector circuit  Block diagram of Super heterodyne AM receiver  Block diagram of FM receiver | 7 |
|  |  | 35 |

**Reference Books:**

1. Communication System. George Kannedy.

2. Radio Engg. G.K. Mithal.

3. Electronic Communications. Roddy & Coolen.

4. Carrier Communication N. N. Biswas

5. Electronic Communication System Kennedy

**MICROPROCESSOR** **C(L,T,P) =3(3,0,0)**

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| **Unit** | **Course Contents** | **Total Contact Hrs.** |
| 1 | **Introduction of Microprocessor :**  Microprocessor concept  Historical review of microprocessor development  Organization of a micro computer | 7 |
| II | **3. The 8085 Architecture :**  Internal block diagram  8085 signals and their functions  Demultiplexing of buses  Pin configuration and logical diagram. | 7 |
| III | **8085 Instructions and Programming :**  Instruction format  Mnemonics  Opcode and operand  Instruction length  Classification of instruction  Data transfer  Arithmetic  Logical  Branching  Machine control  Different interrupts of 8085 Microprocessor  Addressing modes  Stack operation and related instructions  Subroutine and related instructions  Machine and assembly language  Assembly language programming  Debugging of programs | 7 |
| IV | **Memory and I/O System :**  Memory types  Memory organization  Basic concept of memory interfacing and I/O interfacing  Difference between peripheral I/O and memory mapped I/O | 7 |
| V | **Instruction Execution and Timings :**  Instruction cycle - machine cycle, T-states  Fetch cycle  Memory read and write cycle  I/O read and write cycle  Interrupt acknowledge cycle  Bus idle cycle  DMA cycle  Machine cycle with wait states.  Programs using delays and counters | 7 |
|  |  | 35 |

**Reference Books:**

1. Microprocessor Architecture, Programming & Application Gaonkar

2. Fundamentals of Microprocessors & MicroComputers B.Ram

3. Assembly Language Programming A.Leventhal, Osborn

4. Theory & Problems of Microprocessor Fundamentals Tokhein

5. Microprocessor & Peripheral Hand book INTEL

6. Computer Architecture & org. J.P Hayes

7. Digital Computer Fundamentals T.C.Bartee

8. An Introduction to Microprocessors A.P.Mathur

**DIGITAL ELECTRONICS** **C(L,T,P) =3(3,0,0)**

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| **Unit** | **Course Contents** | **Total Contact Hrs.** |
| 1 | **Number System :**1.1 Decimal, binary, octal and hexa-decimal number system  1.2 Conversion of a number from one system to another system  1.3 Binary addition, subtraction and multiplication  1.4 Representation of positive and negative numbers  1.5 1's complement and 2's complement  1.6 Subtraction using 2's complement  1.7 Parity bit  1.8 Binary codes (Gray, Excess -3, Hamming codes), ASCII code  1.9 Floating point number  **Boolean Algebra :**  Historical review - logical statements, logical constants and variables, truth table  Boolean operators  Postulates of Boolean algebra  Laws of Boolean algebra  Duality theorem  De' Morgan's theorem  Simplification of Boolean expressions  Verification of Boolean expressions using truth table | 7 |
| II | **Logic Gates :**  Introduction  Symbol and truth table of NOT, AND, OR, NAND, NOR, EX-OR and EX-NOR gates  Universal gates  Positve, negative and tristate logic  Classification & Characteristics of digital ICs  Brief idea of RTL, DTL, TTL, CMOS logic families & there comparison | 7 |
| III | **Minimization Techniques ( K-Mapping) :**  Representation of Boolean expression - min. and max. term SOP, POS  Conversion of truth tables in POS and SOP form  Karnaugh map upto 4 variables - implication of logic function with and without don't care conditions  Realization of logic diagrams using NAND/NAND, NOR/NOR gate | 7 |
| IV | **Combinational Logic Design :**  Binary half and full adder  Binary half and full subtractor  Binary serial, parallel and BCD adder  Parity bit generator and checker  Binary comparator  Multiplexer  4 to 1 multiplexer  8 to 1 multiplexer  16 to 1 multiplexer  Demultiplexer  1 to 4 Demultiplexer  1 to 8 Demultiplexer  1 to 16 Demultiplexer  Encoder  Decimal to BCD  Gray to BCD  Decoder  BCD to Decimal  BCD to seven segment  BCD to gray | 7 |
| V | **Sequential Systems :**  Introduction  Symbol, logic circuit, truth table of R-S, J-K, M/S J-K,D,T flip-flops  Edge and level triggering  Shift registers  Left, right and bi-direction  Series and parallel  Universal shift register  Asynchronous and synchronous counters - up, down and up-down  Mod counters - Mod 5, Mod 9, decade counter  Ring counters, Johnson counter  Use of shift register for simple binary multiplication and division.  Programmable logic device (PLD)  Programmable logic array (PLA)  Programmable Array logic (PAL) | 7 |
|  |  | 35 |

**Reference Books:**

1. Digital Principles & Applications Malvino Leach.

2. Integrated Electronics Millman & Halkias

3. Digital Electronics T.C. Bartee

4. Digital Electronics Practice Using IC’s R.P. Jain.

5. Modern Digital Electronics R.P. Jain

6. Digital Electronics L. Solanki

7. Digital Intregrated Circuit K.R. Botker

8. Digital Design Flloyd

9. Digital Logic Design Morris Mano.

**ANALOG ELECTRONICS** **C(L,T,P) =3(3,0,0)**

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| **Unit** | **Course Contents** | **Total Contact Hrs.** |
| 1 | **FEEDBACK AMPLIFIERS:** Concept of feedback; Topologies: Voltage-voltage, current voltage, voltage-current, current-current; Stability and compensation. Transfer gain with feedback, General characteristics of negative feedback amplifiers. | 7 |
| II | **OSCILLATORS:** Classification. Barkhausen criterion, damped oscillations in LC circuits, audio and rf oscillators. Tuned collector, Hartley, Colpitts, RC Phase shift, Wien bridge and crystal oscillators, Blocking oscillators. | 7 |
| III | **HIGH FREQUENCY AMPLIFIERS:** High frequency models of BJT and FET, hybrid-π model, Gummel Poon model, generalized high frequency response of CE amplifier, gain-bandwidth product. Emitter follower at high frequencies. | 7 |
| IV | **TUNED AMPLIFIER -** Band Pass Amplifier, Parallel resonant Circuits, Band Width of Parallel resonant circuit. Analysis of Single Tuned Amplifier, Primary and Secondary Tuned Amplifier with BJT and FET. Double Tuned Transformer Coupled Amplifier. Stagger Tuned Amplifier. Pulse Response of such Amplifier. Shunt Peaked Circuits for Increased Bandwidth. | 7 |
| V | **POWER AMPLIFIERS:** Power amplifier circuits, Class A output stage, class B output stage and class AB output stages, class C amplifiers, pushpull amplifiers with and without transformers. Complementary symmetry and quasi complimentary symmetry amplifiers | 7 |
|  |  | 35 |

**Reference Books:**

|  |
| --- |
| J.Millman and C.C. Halkias-Integrated Electronics; Tata Mc-Graw Hill |
| Robert Boylestad and L. Nashelsky - Electronic Devices and Circuit Theory; Pearson education |
| Sedra Smith - Microelectronic Circuits, Oxford Press, India. |
| Floyd-Electronic Devices, Pearson Education. |

**MICROPROCESSOR LAB C(L,T,P)=1(0,0,2)**

1. Study of 8085 microprocessor kit

2. Addition of two 8 bit numbers with and without carry

3. Subtraction of two 8 bit numbers with and without borrow

4. Multiplication of two 8 bit number using successive addition and resistor shifting method

5. Program to find ones compliment of 1 byte number

6. Program to find ones compliment of 2 byte number

7. Program to find MASK OFF for LSB and MSB compliment of 1 byte number

8. Program to find out square of a number.

9. Programs to find sum of first ten natural number involving data arrays

10. Programs to Generating odd numbers.

11. Programs to Data transfer schemes

12. Programs to Sorting of odd/even numbers.

13. Programs to Finding largest and smallest numbers.

14. Programs to Arrange data array in ascending / descending order

15. Programs using stack

16. Programs using subroutine.

17. Debugging of programs using single stepping on kit

**ANALOG ELECTRONICS LAB C(L,T,P)=1(0,0,2)**

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|  | Plot gain-frequency characteristics of BJT amplifier with and without negative feedback in the emitter circuit and determine bandwidths, gain bandwidth products and gains at 1kHz with and without negative feedback. |
|  | Study of series and shunt voltage regulators and measurement of line and load regulation and ripple factor. |
|  | Plot and study the characteristics of small signal amplifier using FET. |
|  | Study of push pull amplifier. Measure variation of output power and distortion with load. |
|  | Study Wein bridge oscillator and observe the effect of variation in R and C on oscillator frequency |
|  | Study transistor phase shift oscillator and observe the effect of variation in R and C on oscillator frequency and compare with theoretical value. |
|  | Study the following oscillators and observe the effect of variation of C on oscillator frequency: (a) Hartley (b) Colpitts |
|  | Study of a Digital Storage CRO and store a transient on it. |
|  | To plot the characteristics of UJT and UJT as relaxation. |
|  | To plot the characteristics of MOSFET and CMOS. |

**DIGITAL ELECTRONICS LAB C(L,T,P)=1(0,0,2)**

1. Verify the truth tables of NOT, AND, OR

2. Verify the truth tables NAND, NOR, EX-OR, EX-NOR gates

3. Design a NOT, AND, OR

4. Design a EX-OR, EX-NOR gates using universal gates

5. Design a binary half and full adder

6. Design a binary half and full subtractor

7. Study of BCD to 7 segment decoder

8. Verify the truth table of RS, D

9. Verify the truth table J-K, M/S J-K,D,T flip-flops.

10. Study of asynchronous binary ripple up, down and up-down and different mod counters

11. Study of synchronous counters

12. Study of decade counter

13. Study of programmable counter

14. Study of a shift register using flip flops

15. Study of ring counter using flip flops

16. Study of twisted ring counter.

17. Study of PLD.

**COMMUNICATION LAB C(L,T,P)=1(0,0,2)**

1. Generation of AM and measurement of the modulation index.

2. Perform the AM demodulation (Envelope detector)

3. Generation of F.M.

4. Operation of standard R.F. signal generator.

5. Measurement of selectivity, sensitivity, fidelity of radio receiver

6. Study of F.M. demodulation.

7. Alignment and tuning of a transistor radio receiver.

8. Study of AM receiver

9. Study of FM receiver

10. Fault finding exercise in a radio receiver

**OBJECT ORIENTED PROGRAMMING** **C(L,T,P) =3(3,0,0)**

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| **Unit** | **Course Contents** | **Total Contact Hrs.** |
| 1 | **Introduction to Java-** Programming Environment, Java compiler and virtual machine: Structure of a Java program, standalone programs and applets; concepts of portability. Basic Programming Elements in Java: Data types, variables and array operators, assignment and selection statements iterative structures, nested loops.. | 7 |
| II | **Classes in Java:** General form of a class, creating objects, access control in classes; Constructors, methods, finalization, parameters, method overloading, recursive methods, returning objects, static members, final qualifier, nested and inner classes, string handling in Java, I/O mechanism, command line arguments. | 7 |
| III | **Inheritance:** Basics super classes and subclasses, the keyword extends, multilevel hierarchy, method overriding; run time polymorphism, abstract classes, final in inheritance, the object class. Packages and Interfaces: Defining package, access protection, importing classes and packages, defining and implementing interfaces, nested interfaces, use of interfaces, variables in interfaces. | 7 |
| IV | **Exception Handling** Fundamentals, types of exceptions catching exceptions, multiple catching, nested try statements, uncaught exceptions, throw and throws, finally mechanism, built-in exceptions, creating exception subclasses, using exceptions. | 7 |
| V | **Applets:** Applet fundamentals, native methods, static import, the applet class, applet display method, requesting repainting, a banner applet, passing parameters to applets, uses of applets. | 7 |
|  | **TOTAL** | 35 |

**Reference Books:**

|  |
| --- |
| Dietel and Associates, “Java How to Program”, 7th Ed., Prentice-Hall. |
| David Flanagan, “Java in a Nutshell”, 5th Ed., O’Reilly Media, Inc. |
| Bruce Eckel, “Thinking in Java”, Prentice-Hall. |

**OBJECT ORIENTED PROGRAMMING LAB C(L,T,P) =1(0,0,2)**

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| S. No. | List of Experiments |
|  | PART I: Programs in C++ |
|  | Write a program to perform the complex arithmetic. |
|  | Write a program to perform the rational number arithmetic. |
|  | Write a program to perform the matrix operations. (Transpose, addition, subtraction, multiplication, test if a matrix is symmetric/ lower triangular/ upper triangular) |
|  | Implement Morse code to text conversion and vice-versa. |
|  | To calculate Greatest Common Divisor of given numbers. |
|  | To implement tower of Hanoi problem. |
|  | PART II: Program in Java |
|  | To implement spell checker using dictionary. |
|  | To implement a color selector from a given set of colors. |
|  | To implement a shape selector from a given set of shapes. |

**TELECOMMUNICATION FUNDAMENTALS** **C(L,T,P) =3(3,0,0)**

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| **Unit** | **Course Contents** | **Total Contact Hrs.** |
| 1 | **INTRODUCTION** :- Electromagnetic Spectrum, Frequency Spectrum-Bandwidth-Allocation, Time domain and Frequency domain analysis  **TRANSMISSION MEDIA**:- Twisted pair, UTP cables, Coaxial and optical fiber cables, wireless, microwave and satellite transmission  **DATA TRANSMISSION: -** Transmission impairments. Serial and parallel transmission, Simplex, half duplex or full duplex transmission mode. | 7 |
| II | **DATA ENCODING** :- Modulation (ASK, FSK and PSK, PCM, PAM, Delta Modulations), Line coding (NRZ-L, NRZ–I , Bipolar AMI, Manchester and differential Manchester),  **MULTIPLEXING**:- FDM, Synchronous and Statistical TDM | 7 |
| III | **DATA LINK LAYER**: Channel allocation problem, pure and slotted ALOHA Protocols, Persisted And Non-Persisted CSMA  Collision Free Protocols, Digital Cellular Radio and CDMA  Logical Link Sub Layer, MAC Sub layer.  Brief Introduction: Frame Relay, PPP  **PROTOCOL** :- OSI & TCP/IP Protocol Architecture | 7 |
| IV | **SWITCHING NETWORKS**: Circuit switching Networks, Space and Time division switching, Routing circuit switched networks, control signaling packet switching principles, fixed, flooding and adaptive routing strategies: X.25 & X.28 protocols Brief introduction: ISDN,ADSL | 7 |
| V | **NETWORK DEVICES**: Gateway, Router, Bridge, Switch, Hub, Repeater, Multilayer Switch, Protocol Converter, Router, Proxy, Firewall, Multiplexer, Network Card, Modem.  **NETWORK TECHNOLOGY**: DSL, GSM, Bluetooth, Infrared. | 7 |
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**Reference Books:**

1. William Stallings: Data and Computer Communications (PHI, 5th Ed.)
2. James Martin: Telecommunication and the Computer (PHI, 3rd Ed.)

**TRANSMISSION LINE AND NETWORKS C(L,T,P) =3(3,0,0)**

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| **Unit** | **Course Contents** | **Total Contact Hrs.** |
| 1 | **TRANSMISSION LINE:** Types of transmission lines, general transmission line equation, line constant, equivalent circuits, infinite line, and reflection on a line, SWR of line with different type of terminations. Distortion less and dissipation less lines, Coaxial cables, Transmission lines at audio and radio frequencies, Losses in transmission line,. Characteristics of quarter wave, half wave and lines of other lengths, | 7 |
| II | **TRANSMISSION LINE APPLICATIONS:** Smith chart and its application. Transmission line applications, Impedance matching Network. Single and double Stub matching. Measurement of parameters of transmission line, measurement of attenuation, insertion loss, reflection coefficient and standing wave ratio. | 7 |
| III | **ATTENUATORS and FILTERS:** Elements of telephone transmission networks, symmetrical and Asymmetrical two port networks. Different Attenuators, ð-section and T-section attenuators, stub matching, Transmission equalizers Filters, constant K-section, Ladder type, ð-section, T-section filter, m-derived filter sections, Lattics filter section. | 7 |
| IV | **TELEPHONE TRANSMISSION:** Telephone set, Touch tone dial types, two wire/ four wire transmission, Echo suppressors and cancellors, cross talk. Multi-channel systems: Frequency division and time division multiplexing. | 7 |
| V | **AUTOMATIC TELEPHONY and TELEGRAPHY:** Trunking concepts, Grade of service, Traffic definitions, Introduction to switching networks, classification of switching systems. Principle of Electronic Exchange, EPABX and SPC Digital telephone Exchange,Numberig Plan, Fascimile services. | 7 |
|  | Total | 35 |

Suggested Books:

W. Fraser-Telecommunications (BPB Publication)

I. Vishvanathan- Telecommunication switching systems & Networks. Prentice Hall of India.

Cole- Introduction to Telecommunication. Pearson Education

**DIGITAL COMMUNICATION** **C(L,T,P) =3(3,0,0)**

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| **Unit** | **Course Contents** | **Total Contact Hrs.** |
| 1 | **SAMPLING**- Mathematical theory of sampling. Sampling theorem. Ideal and Real sampling. Interpolation technique for the reconstruction of a signal from its samples. Aliasing. Sampling in freq. domain. Sampling of discrete time signals. | 7 |
| II | **PCM and DELTA MODULATION SYSTEMS:** Uniform and Non-uniform quantization. PCM and delta modulation, Signal to quantization noise ratio in PCM and delta modulation. DPCM, ADM, T1 Carrier System, Matched filter detection. Error probability in PCM system. | 7 |
| III | **BASE BAND TRANSMISSION:** Line coding (RZ, NRZ): Polar,Bipolar,. Inter symbol interference, Pulse shaping, Nyquist criterion, Raised cosine spectrum. | 7 |
| IV | **DIGITAL MODULATION TECHNIQUES:** Geometric interpretation of signals, Orthogonalization. ASK, BPSK, BFSK, QPSK, MSK modulation techniques and Coherent detection of these techniques. Calculation of error probabilities. | 7 |
| V | **INFORMATION THEORY:** Amount of Information, Average Information, Entropy, Information rate, Increase in Average information per bit by coding, Shannon's Theorem and Shannon's bound, Capacity of a Gaussian Channel, BW-S/N trade off, | 7 |
|  |  | 35 |

**Reference Books:**

H.Taub and D.L. schilling-"Principles of communication System", Tata Mc-Graw Hill.

Simon Haykin-"Communication Systems", John Wiley and Sons.

B.P. Lathi-"Communication Systems", Tata Mc-Graw Hill.

Proakis-"Digital Communication" Tata Mc-Graw Hill.

Sklar-"Digital Communication" Pearson Education.

P. Chakarbarti-"Principles of Digital Communication" Danpatrai and Sons.