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**GYAN VIHAR SCHOOL OF ENGINEERING and TECHNOLOGY**

**DEPARTMENT OF ELECTRICAL 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 Electrical Engineering
3. B.Tech EE + M.Tech Power System DD
4. M.Tech Power System

|  |  |  |
| --- | --- | --- |
| S.No | Programs | Remarks |
| 1 | B.Tech I Year (Common to all branches of Engineering) | I Sem to II Sem |
| 2 | B.Tech Electrical Engineering | III Sem to VIII Sem |
| 3 | B.Tech EE + M.Tech Power System DD | III sem. to X sem. |
| 4 | M.Tech Power System | I sem. to IV sem. |

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**GYAN VIHAR SCHOOL OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF ELECTRICAL 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 Electrical 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 Electrical Engineering fundamentals

• To build the interest in students for research

• To guide students in the development of power system

• To create the ability in students for better hardware production

• Choice based credit system

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

Electrical Engg 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 Electrical Engineering includes study of various aspects of Electrical Engineering to meet the requirements of the various industries. The course contains study of the basic Electrical 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 endeavor, ranging from space exploration to food processing and banking to communication, power system etc.

# B.Tech (Electrical Engg.), 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. Transmission and distribution ,Network theory, Power system ,Machines ,Control Theory and much more. After doing B.Tech (Electrical Engg.) from the SGVU, an individual can find a good job in the renowned Electrical Engg. company. He can work in various areas such as:-

**Career Options in B.Tech (Electrical Engineering):**

* Power Engineer
* Power Grid
* DRDO
* ISRO
* BEL
* BSNL
* NTPC
* HAL
* GAIL
* SAIL
* BHEL
* Railway
* Telecommunication
* Networking Engineer
* Software Developer
* SEB

Consumer Electrical Company, etc…………

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

Changes in the Teaching Scheme and Syllabus Edition 2015.

Following changes have been made in the Teaching Scheme and Syllabus 2014:

1. Earlier subjects were divided into two main categories- CORE and ELECTIVES, which are now classified as PROGRAM and UNIVERSITY- CORE and ELECTIVES. However the credits and teaching hours ( L, T, P) have been kept the same as before. The subjects being covered by the parent department (Electrical Engineering) are kept in either Program core or Program elective category, while those covered by other departments are covered in either University core or University elective category.
2. In certain university elective subjects (EC221-Analog Electronic Circuits and EC 253- Electronics Lab-I ; CP423-DBMS and CP457-DBMS Lab ), it is felt that the student must cover the respective laboratory part also. The credits have also been kept the same as before. Thus the students undergoing such subjects, will acquire more credits. Since we are following flexible credit system, this can be permitted.

3. codes of the following subjects have been rationalized:

|  |  |  |
| --- | --- | --- |
| S.No. | Old Name of the Subject | New Name of the Subject |
|  | EE 203 Circuit Theory I | EE 201 Circuit Theory I |
|  | EE 202 Circuit Theory II | EE 202 Circuit Theory II |
|  | EE 205 Electro-Mechanics I | EE 203 Electro-Mechanics I |
|  | EE 204 Electro-Mechanics II | EE 204 Electro-Mechanics II |
|  | EE 201 Measurements and Instrumentation | EE 205 Measurements and Instrumentation |

4. Teaching Scheme and syllabus for semester I and II (Common) have been kept the same as proposed by the concerned authority.

5. Following courses, with credit 0ne (each) and no evaluation (CE or ESE) have been added. For these courses only tutorial classes of two hours per week will be held.

(i) Employability Skills I t0 VI in semester III to smester VII respectively of all B.Tech and Dual Degree courses.

(ii)Employability Skills VII and VIII in semester II and semester III respectively of M.Tech and semester VIII and semester IX respectively of Dual Degree courses.

1. In light of introduction of employability skill courses, the humanities subjects with code series HS (Core subject), have been removed. However HS-203 (Economics and Social Sciences) in semester III of undergraduate course has been retained.
2. Three labs (one each in semester III , IV and V ) have been redesignated as industry oriented labs with more emphasis on industrial working. The credit for these labs have been increased from one each to two credits each. These are:
3. EE 251 – Industrial project oriented measurement lab.
4. EC 254 – Industrial Project oriented digital electronics lab.
5. EE 351 – Industrial project oriented power electronics lab.

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**GYAN VIHAR SCHOOL OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF ELECTRICAL 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 ELECTRICAL 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 |
|  |  | Professional Communication | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
|  |  | 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, EE Convener, BoS Engg.**

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**GYAN VIHAR SCHOOL OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF ELECTRICAL 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, EE Convener, BoS Engg.**

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**GYAN VIHAR SCHOOL OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF ELECTRICAL ENGINEERING**

**Teaching and Examination Scheme for B.Tech./Dual Degree (**Electrical 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 ELECTRICAL ENGINEERING**

**Teaching and Examination Scheme for B.Tech./Dual Degree (Electrical 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** |  |  |  |  |  |  |  |
| **1** | **EM 201** | 1.Employability Skills- II | 1 | 0 | 2 | 0 | - | - | - |
| **2** | **PC 201** | 2. Proficiency in Co-curricular Activities | 2 | 0 | 0 | 0 | - | 100 | - |
| **3** | **MA 201** | 3.Integral Transforms and Complex Analysis | 4 | 3 | 1 | 0 | 3 | 40 | 60 |
| **4** | **HS 203** | 4.Economics and Social Sciences | 3 | 3 | 0 | 0 | 3 | 40 | 60 |
| **B** |  | **Program Core** |  |  |  |  |  |  |  |
| **1** | EE 205 | Measurements and Instrumentation | 4 | 3 | 1 | - | 3 | 40 | 60 |
| **2** | EE 251 | Industrial project oriented measurement Lab | 2 | - | - | 2 | 3 | 60 | 40 |
| **3** | EE 201 | Circuit Theory I | 4 | 3 | 1 | - | 3 | 40 | 60 |
| **4** | EE 203 | Electro-Mechanics I | 4 | 3 | 1 | - | 3 | 40 | 60 |
| **5** | EE 253 | Electro-mechanics Laboratory | 1 | - | - | 2 | 3 | 60 | 40 |
| **6** |  |  |  |  |  |  |  |  |  |
| **7** | EE 255 | Electrical Engineering Drawing | 1 | - | - | 2 | 3 | 60 | 40 |
| **C** |  | **University Elective** |  |  |  |  |  |  |  |
| **1** | EC 221  EC 253 | 1(a) Analog Electronics Circuits  (b) Electronics Laboratory – I | 3  1 | 3  0 | 0  0 | 0  2 | 3  2 | 40  60 | 60  40 |
|  |  |  |  |  |  |  |  |  |  |
| **D** |  | **Program Elective** |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  | **TOTAL** | **30** | **18** | **6** | **8** |  |  |  |
|  |  | **TOTAL TEACHING LOAD** | **32** |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |

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

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**GYAN VIHAR SCHOOL OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF ELECTRICAL ENGINEERING**

**Teaching and Examination Scheme for B.Tech./Dual Degree (Electrical 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** | **CIE** | **ESE** |
| A |  | **University core** |  |  |  |  |  |  |  |
| 1 | MA 202 | 3.Numerical Analysis and Statistics | 4 | 3 | 1 | 0 | 3 | 40 | 60 |
| 2 | EM 202 | 1.Employability Skills- III | 1 | 0 | 2 | 0 |  |  |  |
| 3 | PC 202 | 2. Proficiency in Co-curricular Activities | 2 | 0 | 0 | 0 |  | 100 |  |
| 4 | CP 262 | Computer Programming Lab | 1 | - | - | 2 | 3 | 60 | 40 |
| B |  | **Program Core** |  |  |  |  |  |  |  |
| 1 | EE 202 | Circuit Theory II | 4 | 3 | 1 | - | 3 | 40 | 60 |
| 2 | EE 204 | Electro- mechanics II | 4 | 3 | 1 | - | 3 | 40 | 60 |
| 3 | EE 252 | Electro- mechanics II Laboratory | 1 | - | - | 2 | 3 | 60 | 40 |
|  |  |  |  |  |  |  |  |  |  |
| C |  | **Program elective** | 3 | 3 | 0 | - | 3 | 40 | 60 |
| 1 | EE 206 | Generation of Electric Power | 3 | 3 | 0 | - | 3 | 40 | 60 |
| 2 | EE 208 | Advanced Electrical Machine | - | - | - | - | - | - | - |
| D |  | **University/Open elective** | 2 | 3 | 0 | - | 3 | 30 | 70 |
| 1 | EC 212 | Analog integrated circuits | - | - | - | - | - | - | - |
| 2 | EC 252 | Advanced Electronics Laboratory | 1 | - | - | 2 | 3 | 60 | 40 |
| 3 | EC 204 | Digital Electronics Circuits |  |  |  |  |  |  |  |
| 4 | EC 254 | Industrial project oriented Digital Electronics Lab | 2 | - | - | 2 | 3 | 60 | 40 |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  | **Total** | **25** | **19** | **2** | **8** |  |  |  |
|  |  | **Total Teaching Load** |  | **29** |  |  |  |  |  |

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

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

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

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**GYAN VIHAR SCHOOL OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF ELECTRICAL ENGINEERING**

**Teaching and Examination Scheme for B.Tech./Dual Degree (Electrical 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** | **CIE** | **ESE** |
|  |  | **University core** |  |  |  |  |  |  |  |
| 1 | EM 301 | 1.Employability Skills- IV | 1 | 0 | 2 | 0 | - | - | - |
| 2 | PC 301 | 2. Proficiency in Co-curricular Activities | 2 | 0 | 0 | 0 | - | 100 | - |
| 3 | PT 301 | 3.Practical Training and Seminar-I | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
|  |  | **Program Core** |  |  |  |  |  |  |  |
| 1 | EE 301 | Power Electronics | 4 | 3 | 1 | - | 3 | 40 | 60 |
| 2 | EE 351 | Industrial project oriented Power Electronics Lab | 2 | - | - | 2 | 3 | 60 | 40 |
| 3 | EE 303 | Control Theory | 4 | 3 | 1 | - | 3 | 40 | 60 |
| 4 | EE 305 | Transmission and Distribution of Electrical Power. | 4 | 3 | 1 | - | 3 | 40 | 60 |
| 5 | EE 311 | Power System Instrumentation | 4 | 3 | 1 | - | 3 | 40 | 60 |
| 6 | EE 353 | MATLAB | 1 | - | - | 2 | 3 | 60 | 40 |
| 7 | EE 355 | CBPSD Lab | 1 | - | - | 2 | 3 | 60 | 40 |
|  |  | **Program elective** | 3 | 3 | 0 | - | 3 | 40 | 60 |
| 1 | MA305 | Operation Research | - | - | - | - | - | - | - |
|  |  | **University/Open elective** |  |  |  |  |  |  |  |
| 1 | EC 315  EC 355 | (i)Micro Processor and Computer Architecture  (ii) Micro Processor Lab | 2  1 | 3  - | 0  - | -  - | 3  2 | 40  60 | 60  40 |
|  |  |  |  |  |  |  |  |  |  |
| 2 | EC 317 | Principle of Communication Systems | - | - | - | - | - | - | - |
| 3 | EC 325 | Embedded Systems | - | - | - | - | - | - | - |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  | **Total** | **30** | **18** | **4** | **8** |  |  |  |
|  |  | **Total Teaching Load** |  | **30** |  |  |  |  |  |

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

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

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

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**GYAN VIHAR SCHOOL OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF ELECTRICAL ENGINEERING**

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

**EFFECTIVE FROM ACADEMIC SESSION 2015-2016**

**Year : III Semester: VI**

***Note:- Industrial training for 30 days after 6th Semester Exams is compulsory.***

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | | | **Exam Hrs.** | **Weightage (in%)** | |
| **L** | **T/S** | **P** | **CIE** | **ESE** |
|  |  | **University core** |  |  |  |  |  |  |  |
| 1 | HS 302 | Employability skills IV – technical writing | 2 | 2 | 0 | - | 0 | 0 | 0 |
| 2 | DE402 | Proficienc**y** and co-curricular activities | 2 | 2 | 0 | - | 0 | 0 | 0 |
|  |  | **Program Core** |  |  |  |  |  |  |  |
| 1 | EE 302 | Advance Control Theory | 4 | 3 | 1 |  | 3 | 30 | 70 |
| 2 | EE 352 | Advance Control Lab | 1 |  |  | 2 | 3 | 60 | 40 |
| 3 | EE 306 | Power System Protection | 4 | 3 | 1 |  | 3 | 30 | 70 |
| 4 | EE 308 | High Voltage Engineering | 3 | 3 | 0 |  | 3 | 30 | 70 |
| 5 | PE 302 | Project (Stage I) | 3 |  |  | 2 | 3 | 60 | 40 |
|  |  | **Program elective** | 3 | 3 | 0 | - | 3 | 30 | 70 |
| 1 | EE 304 | Modern Power Electronics | - | - | - | - | - | - | - |
| 2 | EE 354 | Modern Power Electronics Lab | 1 |  |  | 2 | 3 | 60 | 40 |
|  |  | **University/Open elective** | 2 | 3 | 0 | - | 3 | 30 | 70 |
| 1 | CP 320 | Data Structures in C | - | - | - | - | - | - | - |
| 2 | CP 358 | Data Structures lab | 1 |  |  | 2 | 3 | 60 | 40 |
| 3 | EC 316 | Fundamentals of Digital Communication | - | - | - | - | - | - | - |
| 4 | EC 314 | Microprocessor and Computer Architecture II | - | - | - | - | - | - | - |
| 5 | ME 318 | Strength of Materials | - | - | - | - | - | - | - |
| 6 | IT 304 | Web Technology | - | - | - | - | - | - | - |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  | **Total** | **26** | **19** | **2** | **8** |  |  |  |
|  |  | **Total Teaching Load** |  | **29** |  |  |  |  |  |

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

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

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

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**GYAN VIHAR SCHOOL OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF ELECTRICAL ENGINEERING**

**Teaching and Examination Scheme for B.Tech./Dual Degree (Electrical 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** | **CIE** | **ESE** |
|  |  | **University core** |  |  |  |  |  |  |  |
| 1 | EM 401 | 1.Employability Skills- VI | 1 | 0 | 2 | 0 |  |  |  |
| 2 | PC 401 | 2. Proficiency in Co-curricular Activities | 2 | 0 | 0 | 0 |  |  | 100 |
| 3 | PT 401 | 3.Practical and Training Seminar-II | 1 | 0 | 0 | 2 | 2 | 60 | 40 |
| 4 | IT 457 | 4. Information Technology Lab | 1 | - | - | 2 | 3 | 60 | 40 |
|  |  | **Program Core** |  |  |  |  |  |  |  |
| 1 | EE 401 | Power System Analysis | 4 | 3 | 1 |  | 3 | 30 | 70 |
| 2 | EE 403 | Electrical Machine Design | 4 | 3 | 1 |  | 3 | 30 | 70 |
| 3 | EE 405 | Utilization of Electric Power and Traction | 3 | 3 | 0 |  | 3 | 30 | 70 |
| 4 | EE 410 | Electrical Engineering Materials | 3 | 3 |  |  | 3 | 30 | 70 |
| 5 | PE 401 | Project (Stage II) | 4 |  |  | 2 | 3 | 60 | 40 |
| 6 | EE | Electric Circuit Lab | 1 | - | - | 2 | 3 | 60 | 40 |
|  |  | **Program elective** | 4 | 3 | 1 | - | 3 | 30 | 70 |
| 1 | EE 411 | Power System Reliability |  |  |  |  |  |  |  |
| 2 | EE 409 | Distribution of Electrical Power |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  | **University/Open elective** | 2 | 3 | 0 | - | 3 | 30 | 70 |
| 1 | EC 407 | Electromagnetic Field Theory | - | - | - | - | - | - | - |
| 2 | CP 425 | Artificial Intelligence and Neural Networks | - | - | - | - | - | - | - |
| 3 | CP423 | Data base management system | - | - | - | - | - | - | - |
| 4 | CP457 | Data base managemaent system lab | 1 | - | - | 2 | 3 | 60 | 40 |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  | **Total** | **31** | **22** | **4** | **8** |  |  |  |
|  |  | **Total Teaching Load** |  | **34** |  |  |  |  |  |

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

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

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

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**GYAN VIHAR SCHOOL OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF ELECTRICAL ENGINEERING**

**Teaching and Examination Scheme for B.Tech./Dual Degree (Electrical 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** | **CIE** | **ESE** |
|  |  | **University core** |  |  |  |  |  |  |  |
| 1 | PC 402 | 1. Proficiency in Co-curricular Activities | 2 | 0 | 0 | 0 |  |  | 100 |
|  |  | **Program Core** |  |  |  |  |  |  |  |
| 2 | EE 402 | Electrical Drives | 4 | 3 | 1 | - | 3 | 30 | 70 |
| 3 | EE 456 | Electrical Drives and control Lab | 2 | - | - | 2 | 3 | 60 | 40 |
| 4 | EE 404 | EHV AC/DC Transmission | 3 | 3 | 1 | - | 3 | 30 | 70 |
| 5 | EE406 | Switch Gear and Protection | 4 | 3 | 1 | - | 3 | 30 | 70 |
| 6 | SM 402 | B. Tech. Seminar | 2 | - | - | 2 | 3 | 60 | 40 |
| 7 | EE 454 | MATLAB Simulation Lab | 2 | - | - | 2 | 3 | 60 | 40 |
| 8 | EE 458 | High Voltage Engineering lab | 1 | - | - | 2 | 3 | 60 | 40 |
|  |  | **Program elective** | 3 | 3 | 0 | - | 3 | 30 | 70 |
| 1 | EE 408 | Power System Engineering |  |  |  |  |  |  |  |
|  |  | **University/Open elective** | - | - | - | - | - | - | - |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
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|  |  |  |  |  |  |  |  |  |  |
|  |  | **Total** | **23** | **12** | **3** | **8** |  |  |  |
|  |  | **Total Teaching Load** |  | **23** |  |  |  |  |  |

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**GYAN VIHAR SCHOOL OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF ELECTRICAL ENGINEERING**

**Teaching and Examination Scheme for Dual Degree (B.Tech Electrical Engineering + M.Tech Power System)**

**(5 Year Course)**

**EFFECTIVE FROM ACADEMIC SESSION 2015-2016**

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**GYAN VIHAR SCHOOL OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF ELECTRICAL ENGINEERING**

**Teaching and Examination Scheme for B.Tech. (Electrical 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



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| **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)**

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| **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** | |

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

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| --- | --- | --- | --- |
| **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)**

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| --- | --- |
| **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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|  | **MA 201 INTEGRAL TRANSFORMS AND COMPLEX ANALYSIS C(L,T,P) =4(3,1,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Engineering Maths |
| **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 |
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| **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.** | 10 |
| **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** | Continuous evaluation (Weekly test, Graded Assignments, Mid term test, End sem exam) |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **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. |
|  |  |
| **Unit -3 (7 Hours)** | **Concept of Demand and supply** :Utility Analysis, Law of Demand, Demand determinants, Demand Distinctions. Law of Supply, Elasticity |
|  |  |
| **Unit -4 (7 Hours)** | **Introduction to social Sciences**: impact of british rule on India(Economic Social and Cultural). Indian National movement, Psysography of India. |
|  |  |
| **Unit -4 (7 Hours)** | **Political Economy**: Agriculture, Socio-Economic development, Challenges to Indian Decomcracy, Polical Parties and pressure groups. |
|  |  |
| **List of Expt.** | 10 |
| **Text Book** | Microeconomics by M. L. Sethi |
| **Reference book** | Advanced Microeconomics by M.L. Shingham |
|  |  |
| **Mode of Evaluation** | Continuous evaluation (Weekly test, Graded Assignments, Mid term test, End sem exam) |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **MEASUREMENTS AND INSTRUMENTATION EE-201 C(L,T,P) = 4(3,1,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Torque equation and impedances of inductor and capacitor |
| **Objective:** | The objective of the course are: |
|  | 1. Help the learner to understand basic principle and operation of electrical measuring instruments |
|  | 1. Understand the construction and operation of wattmeter, current transformer and potential transformer. |
|  | 1. Understand the construction and operation of AC and DC potentiometer |
|  | 1. Learn about different type of resistances and their measurement methods |
|  | 1. Learn about different types of bridges |
| **Expected Outcome:** | The student will be able to |
|  | 1. Student will be able to measure the AC and DC electrical quantities(voltage, current and energy) |
|  | 1. Measurement of single and three phase ac power |
|  | 1. Calibrate the voltmeter, ammeter by the help of potentiometer |
|  | 1. Measurement of earth resistance |
|  | 1. Measure the value of capacitance and inductance by the help of different type of bridges |
| **Unit -1 (7 Hours)** | **Principles of measurement** |
|  | Moving coil, moving iron, electrodynamics and induction instruments-construction, operation, torque equation and errors. Applications of instruments for measurement of current, voltage, single-phase power and single-phase energy. Errors in wattmeter and energy meter and their compensation and adjustment. Testing and calibration of single-phase energy meter by phantom loading |
| **Unit -2 (7 Hours)** | **Polyphase Metering** |
|  | .Blondel's Theorem for n-phase, p-wire system. Measurement of power and reactive kVA in 3-phase balanced and unbalanced systems: One-wattmeter, two-wattmeter and three-wattmeter methods. 3-phase induction type energy meter. Instrument Transformers: Construction and operation of current and potential transformers. Ratio and phase angle errors and their minimization. Effect of variation of power factor, secondary burden and frequency on errors. Testing of CTs and PTs. Applications of CTs and PTs for the measurement of current, voltage, power and energy |
| **Unit -3 (7 Hours)** | **Potentiometers** |
|  | Construction, operation and standardization of DC potentiometers– slide wire and Compton potentiometers. Use of potentiometer for measurement of resistance and voltmeter and ammeter calibrations. Volt ratio boxes. Construction, operation and standardization of AC potentiometer – in-phase and quadrature potentiometers. Applications of AC potentiometers. |
| **Unit -4 (7 Hours)** | **Measurement of Resistances** |
|  | Classification of resistance. Measurement of medium resistances – ammeter and voltmeter method, substitution method, Wheatstone bridge method. Measurement of low resistances – Potentiometer method and Kelvin's double bridge method. Measurement of high resistance: Price's Guard-wire method. Measurement of earth resistance |
| **Unit -4 (7 Hours)** | **Bridge Measurements** |
|  | Generalized treatment of four-arm AC bridges. Sources and detectors. Maxwell's bridge, Hay's bridge and Anderson bridge for self-inductance measurement. Heaviside's bridge for mutual inductance measurement. De Sauty Bridge for capacitance measurement. Wien's bridge for capacitance and frequency measurements. Sources of error in bridge measurements and precautions. Screening of bridge components. Wagner earth device. |
| **List of Expt.** | \*\*\*\* |
| **Text Book** | 1.Electrical and Electronics measurements and measuring instruments. A.K.SAWAHNEY-DhanpatRai and Sons |
| **Reference book** |  |
|  | 1.Electrical measurements and measuring instruments by Rajendra Prasad-Khanna Publishers |
|  | 2 A course in Electronics and Electrical measurements and instrumentation by J.B.GUPTA-Kataria Publications |
|  | 1. Electrical measurements and measuring instruments by Rajendra Prasad-KhannaPublishe |
| **Mode of Evaluation** | Continuous evaluation (Weekly test, Graded Assignments, Mid term test, End sem exam) |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |
|  | **CIRCUIT THEORY EE-203 C(L,T,P) = 4(3,1,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Circuit analysis and basic electrical |
| **Objective:** | The objective of the course are: |
|  | 1.Help the learner to understand basic principle and working of continuous time signals & systems. |
|  | 2. Understand the application of laplace transforms. |
|  | 3.Understand the use and applicationof networktheoroms. |
|  | 4.Learn about two port networks. |
|  | 5.Learn about positive real functions. |
| **Expected Outcome:** | The student will be able to |
|  | 1.Student will be able to analyzecontinuous time signals & systems |
|  | 2.ApplyLaplace transforms techniques. |
|  | 3.Apply network theorems practically. |
|  | 4.Evaluation of two port networks |
|  | 5.Analyze positive real functions |
| **Unit -1 (7 Hours)** | **Network classification and Introduction to continuous time signals and systems** |
|  | Unit Step, ramp and impulse signals, Example of each signal, Differential Equation Formulation of linear time invariant continuous system, Responses for unit ramp, square pulse and impulse function. |
| **Unit -2 (7 Hours)** | **Review of Laplace Transform** |
|  | .Initial value and Final Value Theorem, Properties and solution of differential equation using LT, Time domain analysis of LTI network using Laplace transform, Waveform Synthesis, LT of Complex waveforms, Concept of Transform Impedance, voltage ratio, transfer function, Relation between impulse response and system function. |
| **Unit -3 (7 Hours)** | **Networks Theorems:** |
|  | Maximum power transfer Theorem, Superposition, Telligen’s, Milliman’s, Thevenin’s and Norton’s Theorem, Concept of poles and zeros, Relation between location of poles, time response and stability.. |
| **Unit -4 (7 Hours)** | **Two port networks** |
|  | Two port network parameters (z, y, T, T’, h, g), Symmetrical and Reciprocal networks, Inter-conversion of two port network parameters, Interconnection of two port networks, ,Ladder networks, T- transformation, Image and characteristic impedance. Network functions: Driving point and Transfer functions. |
| **Unit -5 (7 Hours)** | **Positive real function** |
|  | Definition and properties, Synthesis of LC, RL and RC circuits using Cauer and Foster’ s first and second form. |
| **List of Expt.** | \*\*\*\* |
| **Text Book** | 1. A Chakrabarti and S. Bhadra, ‘Networks and Systems’ DhanpatRai and Co |
| **Reference book** | 1.M.E. Van Valkenberg, ‘Network Analysis’ Prentice Hall |
|  | 2. D. Roy Choudhary, ‘Networks and Systems’ |
|  | 3. W. H. Hayt and J. E. Kemmerly, Engineering circuit Analysis, TATA MCGRAW HILL |
|  |  |
| **Mode of Evaluation** | Continuous evaluation (Weekly test, Graded Assignments, Mid term test, End sem exam) |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **EE-205 ELECTRO MECHANICS - I C(L,T,P) = 4(3,1,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Electrical Technology |
| **Objective:** | The objective of the course are: |
|  | 1. Help the learner to understand basic principle and operation of energy conversion principle. |
|  | 1. Understand the D.C machines: Construction, armature windings; emf and torque equations, starting, speed control and braking of D.C motor. |
|  | 1. Understand the generator and motor mode of operations; armature reaction, commutation; characteristics of D.C motors |
|  | 1. Understand the principle of operation of transformer. |
|  | 5. Learn about different type of connection in poly-phase transformer. |
| **Expected Outcome:** | The student will be able to |
|  | 1. Explain principles of electromechanical energy conversion |
|  | 2. Armature reaction, commutation |
|  | 1. parallel operation of generators |
|  | 1. Speed Control of DC Motor: Armature voltage and field current control methods |
|  | 1. Voltage regulation, effect of frequency, parallel operation of transformers |
| **Unit -1 (7 Hours)** | **Electromechanical Energy Conversion** |
|  | Basic principles of electromechanical energy conversion. Basic aspects and physical phenomena involved in energy conversion. Energy balance. |
| **Unit -2 (7 Hours)** | **DC generators** |
|  | Construction, Types of DC generators, emf equation, lap and wave windings, equalizing connections, armature  reaction, commutation, methods of improving commutations, demagnetizing and cross magnetizing mmf, interpoles, characteristics, parallel operation. Rosenberg generator. |
| **Unit -3 (7 Hours)** | **DC Motors** |
|  | Principle, back emf, types, production of torque, armature reaction and interpoles, characteristics of shunt, series and compound motor, DC motor starting. Speed Control of DC Motor: Armature voltage and field current control methods, Ward Leonard method. Braking, losses and efficiency, direct and indirect test, Swinburne‟s test, Hopkinsion test, field and retardation test, single-phase series motor. |
| **Unit -4 (7 Hours)** | **Transformers** |
|  | Construction, types, emf equation. No load and load conditions. Equivalent circuits, Vector diagrams, OC and SC tests, Sumpner‟s back-to-back test, efficiency. Voltage regulation, effect of frequency, parallel operation, autotransformers, switching currents in transformers, separation of losses. |
| **Unit -5 (7 Hours)** | **Polyphase Transformers** |
|  | Single unit or bank of single-phase units, polyphase connections, Open delta and V connections, Phase conversion: 3 to 6 phase and 3 to 2 phase conversions, Effect of 3-phase winding connections on harmonics, 3-phase winding transformers, tertiary winding. |
| **List of Expt.** | \*\*\*\* |
| **Text Book** | 1. P.S.Bimbhra, Electrical Machinery, 2000, Khanna publishers New Delhi. |
| **Reference book** | 1. J.Nagrath and D.P.Kothari, Electrical Machines 2000, TATA MCGRAW HILL Publication New Delhi. |
|  | 2. GopalK.Dubey, Fundamental of Electrical Drives, 2001 Narosa Publishing House, New Delhi |
|  | 3. Fitzrald,Kingsley and Umans Electrical Machines 2000, TATA MCGRAW HILL Publication New Delhi. |
|  | 4. Advance Electrical Technologies by H.Cotton |
|  | 5. Alexander S. Langsdorf, “Theory of Alternating current Machinery” Second Edition, TATA McGRAW-HILL, 1983. |
| **Mode of Evaluation** | Continuous Evaluation (Midterms, Weekly Test, Graded Assignment) End Semester Evaluation |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **MEASUREMENTS AND INSTRUMENTATION LABORATORY EE 251 C(L,T,P) = 1(0,0,1)** |
| **Version** | 1.0 |
| **Prerequisite** | Torque equation and impedances of inductor and capacitor |
| **Objective:** | The objective of the course are: |
|  | 1. Help the learner to understand basic principle and operation of electrical measuring instruments |
|  | 1. Understand the construction and operation of wattmeter, current transformer and potential transformer. |
|  | 1. Understand the construction and operation of AC and DC potentiometer |
|  | 1. Learn about different type of resistances and their measurement methods |
|  | 1. Learn about different types of bridges |
| **Expected Outcome:** | The student will be able to |
|  | 1. Student will be able to measure the AC and DC electrical quantities(voltage, current and energy) |
|  | 1. Measurement of single and three phase ac power |
|  | 1. Calibrate the voltmeter, ammeter by the help of potentiometer |
|  | 1. Measurement of earth resistance |
|  | 1. Measure the value of capacitance and inductance by the help of different type of bridges |
| **Unit-1** | Study working and applications of (i) C.R.O. (ii) Digital Storage C.R.O. and (ii) C.R.O. Probes |
| **Unit -2** | Study working and applications of Meggar, Tong-tester, P.F. Meter and Phase Shifter. |
| **Unit -3** | Measure power and power factor in 3-phase load by (i) Two-wattmeter method and (ii) One wattmeter method. |
| **Unit -4** | Calibrate an ammeter using DC slide wire potentiometer. |
| **Unit -5** | Calibrate a voltmeter using Crompton potentiometer. |
| **Unit -6** | Measure low resistance by Crompton potentiometer. |
| **Unit -7** | Measure Low resistance by Kelvin's double bridge. |
| **Unit -8** | Measure earth resistance using fall of potential method. |
| **Unit -9** | Calibrate a single-phase energy meter by phantom loading at different power factors. |
| **Unit -10** | Measure self-inductance using Anderson's bridge. |
| **List of Expt.** | 10 |
| **Text Book** |  |
| **Reference book** | 1. Electrical and Electronics measurements and measuring instruments. A.K.SAWAHNEY-DhanpatRai and Sons |
|  | Electrical measurements by E.W.Golding.  .   1. Electrical measurements and measuring instruments by Rajendra Prasad-Khanna Publishers |
|  | 1. A course in Electronics and Electrical measurements and instrumentation by J.B.GUPTA-Kataria Publications |
|  | 1. Electrical measurements and measuring instruments by Rajendra Prasad-KhannaPublisher |
| **Mode of Evaluation** | Continuous evaluation and End semester exams. |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **EE-253 ELECTRO-MECHANICS I LABORATORY C(L,T,P) = 1(0,0,1)** |
| **Version** | 1.0 |
| **Prerequisite** | Electro-Mechanics |
| **Objective:** | The objective of the course are: |
|  | 1. Help the learner to understand basic principles, operation and design of electrical drives. |
|  | 1. Understand the connection of voltmeter, ammeter and wattmeter and use of techo-generator |
|  | 1. Understand practical use of stareters and speed control methods |
|  | 1. Understand losses occurring at various stages |
| **Expected Outcome:** | The student will be able to |
|  | 1. Student will be able to measure the AC and DC electrical quantities(voltage, current and energy) |
|  | 1. Measurement of power loss in motors and find efficiency |
|  | 1. Determine the parameters of its equivalent circuit its voltage regulation and efficiency of machines |
|  | 1. Determine the load, speed and current characteristics |
|  | 1. Perform parallel operation of transformers and DC machines |
| **List of Experiments** |  |
|  | Speed control of D.C. shunt motor by (a) Field current control method and plot the curve for speed vs field current. (b) Armature voltage control method and plot the curve for speed vs armature voltage. |
|  | Speed control of a D.C. Motor by Ward Leonard method and to plot the curve for speed vs applied armature voltage. |
|  | To determine the efficiency of D.C. Shunt motor by loss summation (Swinburne‟s) method |
|  | To determine the efficiency of two identical D.C. Machine by Hopkinson‟s regenerative test.. |
|  | To perform O.C. and S.C. test on a 1-phase transformer and to determine the parameters of its equivalent circuit its voltage regulation and efficiency. |
|  | To perform back-to-back test on two identical 1-phase transformers and find their efficiency and parameters of the equivalent circuit. |
|  | To perform parallel operation of two 1-phase transformers and determine their load sharing. |
|  | To perform the load test on single phase D.C. generator. |
|  | To perform OC and SC test on a 3-phase transformer and find its efficiency and parameters of its equivalent circuit |
|  | To perform parallel operation of two 3-phase transformers and determine their load sharing |
| **Text Book** | NIL |
| **Reference book** | P.S.Bhimbhra, electrical Machines, Khanna Publishers |
| **Mode of Evaluation** | Continuous Evaluation End Semester Evaluation |
| **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. 2. 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.** | 10 |
| **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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|  | **EE 204 Electro- mechanics II C(L,T,P) = 4(3,1,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Engineering Physics and Circuit Theory |
| **Objective:** | The objective of the course are: |
|  | 1. Understand the basic principle construction, operation rotating machine |
|  | 1. Understand the basic principle construction, operation performance characteristics and steady state and transient analysis of induction machines |
|  | 1. Understand the basic principle construction, operation performance characteristics and steady state and transient analysis of synchronous machines |
|  | 1. Understand the principle, construction, operation, control and applications of special electric motors |
| **Expected Outcome:** | The student will be able to |
|  | 1. understood principle , construction, laying of armature and field windings, types, generation of emf |
|  | 1. construction, methods of starting, steady state and transient behavior of induction motor |
|  | 1. steady state and transient behavior, synchronization and parallel operation of synchronous generators |
|  | 1. understood principle, construction, methods of starting of synchronous motor, its operation with variable load operation with variable excitation, performance evaluation |
|  | 1. steady state and transient behavior and application of synchronous motor |
| **Unit -1 (7 Hours)** | **Introduction** |
|  | General equation of inducted emf, AC armature windings: concentric and distributed winding, chording, skewing, effect on induced emf. Armature and field mmf, effect of power factor and current on armature mmf, harmonics. Rotating fields |
| **Unit -2 (7 Hours)** | **Induction Motors** |
|  | Construction of squirrel cage and slip ring induction motor, basic principles, flux and mmf waves, induction motor as a transformer. Equivalent circuits, torque equation, torque-slip curves, no load and block rotor tests, circle diagram, performance calculation. Effect of rotor resistance. Cogging, Crawling. Double cage squirrel cage induction motor, induction generator, induction regulator. |
| **Unit -3 (7 Hours)** | **Starting and Speed Control of Induction Motors** |
|  | Various methods of starting and speed control of squirrel cage and slip ring motor, cascade connection, braking.**Single-Phase Induction Motor:** Revolving field theory, starting methods, equivalent circuits |
| **Unit -4 (7 Hours)** | **Synchronous Generator** |
|  | Construction, types, excitation systems, principles. Equation of induced emf, flux and emf waves, theory of cylindrical rotor and salient pole machines, tworeactance theory, phasor diagrams, power developed, voltage regulation, OC and SC tests, zero power factor characteristics, potier triangle and ASA method of finding voltage regulation, synchronization, parallel operation, hunting and its prevention |
| **Unit -5 (7 Hours)** | **Synchronous Motors** |
|  | types, construction, principle, phasor diagrams, speed torque characteristics, power factor control, V-curves, starting methods, performance calculations, applications, synchronous condenser, synchronous induction motor |
| **List of Expt.** | \*\*\*\* |
| **Text Book** | Electrical Machine, Dr.P.K.Mukherjee and S. Chakravarti,Dhanpat Rai  P.S.Bimbhra, Electrical Machinery, 2000, Khanna publishers New Delhi |
| **Reference book** | 1. J.Nagrath and D.P.Kothari, Electrical Machines 2000, TATA MCGRAW HILL Publication New Delhi. |
|  | 2. GopalK.Dubey, Fundamental of Electrical Drives, 2001 Narosa Publishing House, New Delhi |
|  | 3. Fitzrald,Kingsley and Umans Electrical Machines 2000, TATA MCGRAW HILL Publication New Delhi. |
|  | 4. Advance Electrical Technologies by H.Cotton |
|  | 5. Alexander S. Langsdorf, “Theory of Alternating current Machinery” Second Edition, TATA McGRAW-HILL, 1983. |
| **Mode of Evaluation** | Continuous Evaluation (Midterms, Weekly Test, Graded Assignment) End Semester Evaluation |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **EE-457 Electro-mechanics -II Laboratory C(L,T,P) = 1(0,0,1)** |
| **Version** | 1.0 |
| **Prerequisite** | Electro-Mechanics and Power Electronics |
| **Objective:** | The objective of the course are: |
|  | 1. To understand the starting, speed control/braking, |
|  | 1. The student will develop an ability heating and cooling characteristics of electric motors |
|  | 1. To solve numericals on starting, speed control and braking of motors and to learn the necessity of starter. |
| **Expected Outcome:** | The student will be able to |
|  | 1. Student will be able to measure the AC and DC electrical quantities(voltage, current and energy) |
|  | 1. Measurement of single and three phase ac power |
|  | 1. Calibrate the voltmeter, ammeter by the help of potentiometer |
|  | 1. Measurement of earth resistance |
|  | 1. Measure the value of capacitance and inductance by the help of different type of bridges |
| **List of Experiments** |  |
|  | Separation of transformer core losses and to determine the hysteresis and eddy current losses at rated voltage and frequency |
|  | To plot the O.C.C. and S.C.C. of an alternator and to determine its regulation by synchronous impedance method. |
|  | To synchronize an alternator across the infinite bus (RSEB) and summarize the effects of variation of excitation on load sharing |
|  | To plot the V-curve for a synchronous motor for different values of loads |
|  | To perform sumpner‟s back-to-back test on 3 phase transformers, find its efficiency and parameters for its equivalent circuits |
|  | To perform the load test on a 3-phase induction motor and determine its performance characteristics (a) Speed vs load curve (b)p.f. vs load curve (c) Efficiency vs load curve (d) Speed vs torque curve |
|  | To perform the heat run test on a delta/delta connected 3-phase transformer and determine the parameters for its equivalent circuit |
|  | Determination of losses and efficiency of an alternator |
|  | To perform no load and blocked rotor test on a 3 phase induction motor and to determine the parameters of it equivalent circuits. Draw the circle diagram and compute the following (i) Max. Torque (ii) Current (iii) slip (iv) p.f. (v) Efficiency. |
|  | To find Xd and Xq of a salient pole synchronous machine by slip test. |
| **Text Book** | NIL |
| **Reference book** | Fundamentals of Electric Dives, G.K. Dubey, Narosa Publishing House, New Delhi 1995 |
| **Mode of Evaluation** | Continuous Evaluation End Semester Evaluation |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **POWER SYSTEM INSTRUMENTS EE-311** |
| **Version** | 1.0 |
| **Prerequisite** | Circuit analysis and basic electrical |
| **Objective:** | The objective of the course are: |
|  | 1. Help the learner to understand ystematic and random errors, limits of error |
|  | 1. Understand the construction and operation of transducers, learn Measurement of temperature, pressure, 2. displacement, acceleration, noise level, |
|  | 1. Understand the construction and operation of various amplifiers for **Signal Conditioning** |
|  | 1. Learn measurement methods of power system quantities like voltage, current, phase angle, frequency, active power and reactive power |
|  | 1. Learn Capacitive voltage transformers and their transient behavior, Current Transformers for measurement and protection |
| **Expected Outcome:** | The student will be able to |
|  | 1. Student will be able to measure the AC and DC electrical quantities(voltage, current and energy). |
|  | 1. Measurement of single and three phase ac power. |
|  | 1. Calibrate the voltmeter, ammeter by the help of potentiometer. |
|  | 1. Measurement of earth resistance. |
|  | 1. Measure the value of capacitance and inductance by the help of different measuring transformers. |
| **Unit -1 (7 Hours)** | **Theory of Errors** |
|  | Accuracy and precision, systematic and random errors, limits of error, probable error and standard deviation.  Gaussian error curves, combination of errors |
| **Unit -2 (7 Hours)** | **Transducers** |
|  | Construction and Operating Characteristics of active and digital transducers, Measurement of temperature, pressure, displacement, acceleration, noise level, Instrumentation for strain, displacement, velocity, acceleration, force, torque and temperature. |
| **Unit -3 (7 Hours)** | **Signal Conditioning** |
|  | **I**nstrumentation amplifiers, isolation amplifiers, analog multipliers, analog dividers, function generators, timers,  sample and hold, optical and magnetic isolators, frequency to voltage converters, temperature to current converters. Shielding and grounding. |
| **Unit -4 (7 Hours)** | **Power System Instrumentation-I** |
|  | Measurement of voltage, current, phase angle, frequency, active power and reactive power in power plants. Energy meters and multipart tariff meters. |
| **Unit -4 (7 Hours)** | **Power System Instrumentation-II** |
|  | Capacitive voltage transformers and their transient behavior, Current Transformers for measurement and protection, composite errors and transient response. |
| **List of Expt.** | \*\*\*\* |
| **Text Book** | Electrical and Electronics measurements and measuring instruments. A.K.Sawahney-DhanpatRai and Sons |
| **Reference book** | 1. R. H. Cerni and L. E. Foster: Instrumentation for Engineering Measurements, John Wiley and Sons. |
|  | 1. Electrical measurements and measuring instruments by Rajendra Prasad-Khanna Publishers. |
|  | 1. A course in Electronics and Electrical measurements and instrumentation by J.B.GUPTA-Kataria Publications. |
|  | 1. Electrical measurements and measuring instruments by Rajendra Prasad-Khanna Publisher. |
|  | 1. A. S. Moris: Principles of Measurement & Instrumentation, Prentice Hall. |
| **Mode of Evaluation** |  |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **POWER ELECTRONICS EE-301** |
| **Version** | 1.0 |
| **Prerequisite** | Circuit analysis and basic electrical |
| **Objective:** | The objective of the course are: |
|  | 1. Help the learner to understand basic principle of different power electronics components |
|  | 1. Understand the SCR characteristic , controlling and protection |
|  | 1. Understand the single phase and 3 phase converter |
|  | 1. Understand the basic principle of chopper and dc to dc converter |
|  | 1. Understand the pulse width modulation and power factor improvement and Pulse |
| **Expected Outcome:** | The student will be able to |
|  | 1. Understand characteristics of different power electronics devices and differentiate between them |
|  | 1. Understand how to trigger and protect SCR |
|  | 1. Understand the applications of converter in industries |
|  | 1. Understand the applications of converter and pulse width modulation |
|  | 1. Understand the application of dc to dc converter in industries |
| **Unit -1 (8Hours)** | **Power Semiconductor Devices:** |
|  | |  |  | | --- | --- | | Characteristics of Power Transistor, Thyristor, GTO, Power MOSFET and IGBT. Two-Transistor | | | Model of Thyristor. |  | |
| **Unit -2 (8Hours)** | **SCR** |
|  | .   |  |  | | --- | --- | | Construction and characteristics, specification and ratings, pulse transformer, optical isolators, methods of turn on:  R, RC, | | | UJT relaxation oscillator, Rating extension by series and parallel connections, string efficiency.  Protection of SCR-Protection | | | Against over voltage, over current, dv/dt, di/dt, Gate protection. |  | |
| **Unit -3 (7Hours)** | **Converters-I:** |
|  | |  |  | | --- | --- | | Single Phase half and full wave converters with RL load, Single phase dual converters, Three phase half wave | | | Converters, Three phase full converters with RL load, Three phase dual converters. |  | |
| **Unit -4 (7 Hours)** | **DC-DC Converters: Choppers** |
|  | |  |  | | --- | --- | | Step Up/Down Copper, Chopper Configurations, analysis of type A Chopper Commutation of | | | Choppers. Switched Mode Regulators-buck, boost, buckboost and cuk regulator. | | |
| **Unit -5 (7 Hours)** | **Converters-II:** |
|  | |  |  | | --- | --- | | Single and three-phase semi converters with RL load. Power Factor Improvement-Extinction angle control, | | | symmetrical angle control, pulse width modulation control and sinusoidal pulse width modulation control. Inversion operation. | | | Effect of load and source impedances. | |
| **List of Expt.** | \*\*\*\* |
| **Text Book** | P.S BIMBRA |
| **Reference book** | 1. M.H Rashid:Power Electronics, circuits devices and applications, PRENTICE HALL OF INDIA. ,1988 |
|  | 1. Subrahmanyam Power electronics, New Age Inc.Publishers,New Delhi,1996 |
|  | 1. P.C. Sen:Power electronics Tata McGraw-Hill 1987 |
|  | 1. CW Lander:Power electronics,2nd edition, McGrawHill 1987 |
| **Mode of Evaluation** | Monday test, assignments, mid terms |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **TRANSMISSION AND DISTRIBUTION OF ELECTRICAL POWER EE 305 C(L,T,P) = 4(3,1,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Knowledge of transformer and transmission lines |
| **Objective:** | The objective of the course are: |
|  | 1. Help the learner to understand principlesof supply systems. |
|  | 2.Understand the mechanical features of overhead lines. |
|  | 3.Understand the parameters of transmission lines. |
|  | 4.Learn about ABCD parameters and corona. |
|  | 5.Learnabout different types of insulators and underground cables. |
| **Expected Outcome:** | The student will be able to |
|  | 1.Student will be able to understand the AC and DC supply systems. |
|  | 2.Understand mechanical features of overhead lines. |
|  | 3.Evaluate different parameters of transmission lines. |
|  | 4.understand ABCD line parameters and corona |
|  | 5.have knowledge of insulators and underground cables |
| **Unit -1 (7 Hours)** | **Supply systems** |
|  | Basic network of power system. Transmission and distribution voltage, effect of system voltage on size of conductor and losses. Comparison of DC 2- wire, DC 3- wire, 1- phase AC and 3- phase AC (3- wire and 4- wire) systems. **(ii) Distribution Systems**: - Primary and secondary distribution systems, feeder, distributor and service mains. Radial and ring- main distribution systems. Kelvin’s law for conductor size |
| **Unit -2 (7 Hours)** | **Mechanical features of overhead lines:** |
|  | .Conductor material and types of conductor. Conductor arrangements and spacing. Calculation of sag and tension supports at different levels, effect of wind and ice loading, stringing chart and sag template. Conductor vibrations and vibration dampers |
| **Unit -3 (7 Hours)** | **Parameters of Transmission Lines** |
|  | Resistance inductance and capacitance of overhead lines, effect of earth, line transposition. Geometric mean radius and distance. Inductance and capacitance of line with symmetrical and unsymmetrical spacing Inductance and capacitance of double circuit lines. Skin and proximity effects. Equivalent circuits and performance of short and medium transmission lines |
| **Unit -4 (7 Hours)** | **ABCD line parameters** |
|  | 1. Generalized ABCD line constants, equivalent circuit and performance of long transmission line. Ferranti effect. Interference with communication circuits. Power flow through a transmission line 2. **Corona:** Electric stress between parallel conductors. Disruptive critical voltage and visual critical voltage, Factors affecting corona. Corona power loss. Effects of corona |
| **Unit -5 (7 Hours)** | **Insulators:** |
|  | Pin, shackle, suspension, post and strain insulators. Voltage distribution across an insulator string, grading and methods of improving string efficiency  **(ii) Underground Cables:** Conductor, insulator, sheathing and armoring materials. Types of cables. Insulator resistance and capacitance calculation. Electrostatic stresses and reduction of maximum stresses. Causes of breakdown. Thermal rating of cable. Introduction to oil filled and gas filled cables. |
| **List of Expt.** | \*\*\*\* |
| **Text Book** | 1.B.R.Gupta-Power system analysis and design |
| **Reference book** | . |
|  | 1. Soni, Gupta and Bhatnagar-ACourse in Electrical Power |
|  | 2.C.L.Wadhwa-Electrical Power system |
|  | 3.Nagrath Kothari-Modern Power system Analysis. |
| **Mode of Evaluation** | Continuous evaluation (Weekly test, Graded Assignments, Mid term test, End sem exam) |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **EE-353 MATLAB PROGRAMMING LAB C(L,T,P) = 1(0,0,1)** |
| **Version** | 1.0 |
| **Prerequisite** | Fundamental of computer science |
| **Objective:** | The objective of the course are: |
|  | 1. Understand hundreds of built-in functions for technical computation, graphics, and animation of Matlab |
|  | 1. Understand tools for linear algebra computations, data analysis, signal processing, optimization |
|  | 1. Understand solution of ordinary differential equations (ODEs), quadrature, and many other types of scientific computations |
| **Expected Outcome:** | The student will be able to |
|  | 1. Get learned arithmetic operators, assign values to variables, suppress screen output, control the appearance of floating point numbers on the screen |
|  | 1. Get learned to create arrays and vectors, and how to perform 2. arithmeticand trigonometricop erations on them |
|  | 1. Get learned to make a simple 2-D plot in MATLAB and print it 2. out |
|  | 1. Get learned to create, write, execute, and save a script and function file |
|  | 1. Get learned about programming in Matlab |
| **List of Experiments** |  |
|  | Introduction to Matlab |
|  | Basic operation in Matlab using Matrix and array input type |
|  | To study plotting simple graphs |
|  | To study Programming in MATLAB :script and function files |
|  | To study Loop, branches and control flow statements. |
|  | To study curve fitting and interpolation |
|  | To study Application of simulink in Matlab |
|  | Application of matlab to Ordinary Differential Equations |
|  | Application of matlab to Nonlinear numerical methods |
|  | Application of matlab to Polynomials and data interpolation |
| **Text Book** | NIL |
| **Reference book** |  |
| **Mode of Evaluation** | Continuous Evaluation, End Semester Evaluation |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **EE-355 COMPUTER BASED POWER SYSTEM DESIGN I C(L,T,P) = 1(0,0,2)** |
| **Version** | 1.0 |
| **Prerequisite** | NIL |
| **Objective:** | The objective of the course are: |
|  | 1. To learn MATLAB software and its various applications. |
|  | 1. Learn to implement various power system and electrical engineering problems to obtain a solution through MATLAB analysis. |
|  | 1. Obtain a better understanding of the theoretical concepts through mathematical modelling. |
| **Expected Outcome:** | The student will be able to |
|  | 1. Apply the theory covered in courses to obtain working simulations of various Electrical Engineering circuits. |
|  | 1. Will be able to use MATLAB for designing of circuits/systems that have been covered in their theoretical topic thus far. |
|  | 1. Through the project development, students will be able to showcase their skills in modelling an Electrical Engineering/Power System through MATLAB. |
| **List of Experiments** |  |
|  | IntroductioN of MATLAB |
|  | Basic Electrical Circuit Analysis using MATLAB (R,RC,RLC) |
|  | Obtaining performance curves of diode and thyristor using MATLAB. |
|  | Obtaining VI characteristic curves of MOSFET (NMOS and PMOS) using MATLAB programming. |
|  | Analysis of a transformer using MATLAB software. |
|  | Modelling a DC Series and DC Shunt Motor using MATLAB |
|  | Modelling a DC Series and DC Shunt Motor using MATLAB Simulink |
|  | Design and modelling of an Induction Motor in software |
|  | Study of transient analysis using MATLAB |
|  | 1 Fault analysis (for 3 to 6 bus) of real power system and verify the results using MATLAB or any available software for LG Fault |
| **Text Book** | NIL |
| **Reference book** | Lab Manuals  MATLAB User’s Manual |
| **Mode of Evaluation** | Continuous Evaluation (Viva Voce, Performance, Record and Project)  End Semester Evaluation |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **EE 302 ADVANCED CONTROL THEORY C(L,T,P) = 4(3,1,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Representation, domain and range |
| **Objective:** | The objective of the course are: |
|  | 1. Concept of Linear vector space Linear Independence |
|  | 1. .Modern Vs conventional control theory, concept of state, state variable state vector, |
|  | 1. State space representation using canonical variables. Diagonal matrix. Jordan canonical form, Derivation of transfer function from state-model |
|  | 1. Pole placement by state feedback, Ackerman’s formula. |
|  | 1. The z-transform, Z-Transfer Function. Block diagram analysis of sampled data systems, z and s domain relationship, digital PID controller. |
| **Expected Outcome:** | The student will be able to |
|  | 1. domain and range |
|  | 1. Electrical systems, Analogous systems. |
|  | 1. . Signal flow graph representation |
|  | 1. Properties of state transition matrix. |
|  | 1. domain relationship, digital PID controller. |
| **Unit -1 (7 Hours)** | **Introduction** |
|  | Concept of Linear vector space Linear Independence, Bases and Representation, domain and range. Concept of Linearity, relaxedness, time invariance, causality. |
| **Unit -2 (7 Hours)** | **State Space Approach of Control System Analysis** |
|  | .Modern Vs conventional control theory, concept of state, state variable state vector, state space, state space equations, Writing state space equations of mechanical, Electrical systems, Analogous systems. |
| **Unit -3 (7 Hours)** | **State Space Representation using physical and phase variables:** |
|  | comparison form of system representation. Block diagram representation of state model. Signal flow graph representation. State space representation using canonical variables. Diagonal matrix. Jordan canonical form, Derivation of transfer function from state-model. |
| **Unit -4 (7 Hours)** | **Solution of State Equations** |
|  | Digitalization, Eigenvalues and eigen vectors. Matrix exponential, State transition matrix, Properties of state transition matrix. Computation of State transition matrix concepts of controllability and observability. Pole placement by state feedback, Ackerman’s formula. |
| **Unit -5 (7 Hours)** | **Digital Control Systems** |
|  | ntroduction, sampled data control systems, signal reconstruction, difference equations. The z-transform, Z-Transfer Function. Block diagram analysis of sampled data systems, z and s domain relationship, digital PID controller. |
| **List of Expt.** | \*\*\*\* |
| **Text Book** | \*\*\*\* |
| **Reference book** | 1. I J Nagrath and M Gopal : Control systems Engineering, 3rd Ed, New Age Publication. |
|  | 1. Katsuhiko Ogata:Modern control engineering. PRENTICE HALL OF INDIA. |
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| **Mode of Evaluation** | Continuous evaluation (Weekly test,Graded Assignments, Mid term test, End sem exam |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **ADVANCED POWER ELECTRONICS EE-510** |
| **Version** | 1.0 |
| **Prerequisite** | Basic Power Electronics and Laplace transform |
| **Objective:** | The objective of the course are: |
|  | 1. Help the learner to understand basic principle and operation of single phase and 3 phase converter |
|  | 1. Understand the working of chopper and its commutation circuit |
|  | 1. Understand the working of inverter and its harmonic control |
|  | 1. To understand the working of ac voltage controller and its application |
|  | 1. Learn about single phase and three phase cycloconverter |
| **Expected Outcome:** | The student will be able to |
|  | 1. Student will be able to draw the waveforms and understand the effect of source inductance on converters |
|  | 1. Understand the basic principle of chopper and its application for electrical drive control |
|  | 1. Reduce the harmonics in inverter |
|  | 1. To apply pwm controller for ac motor control |
|  | 1. Control the electrical drives by changing the frequency by the help of cycloconverter |
| **Unit -1 (6 Hours)** | **Phase Controlled Converters** |
|  | |  |  |  | | --- | --- | --- | | Performance measures of single and three-phase converters with discontinuous load current for R,   |  | | --- | | RL and RLE loads. Effect of source inductance for single and three-phase converters | | | | |  | |  | |
| **Unit -2 (6 Hours)** | **Chopper** |
|  | .   |  |  |  | | --- | --- | --- | | **-**Review of choppers configurations, Steady state analysis of type A Chopper - Minimum and Maximum Currents, Ripple   |  | | --- | | and average load current. Commutation in Chopper Circuits. | | | |  | | |
| **Unit -3 (8 Hours)** | **Inverters** |
|  | |  |  | | --- | --- | | Performance parameters, voltage control of three phase inverters-Sinusoidal PWM, Third Harmonic PWM, 60 degree | | | PWM and Space Vector Modulation. Harmonic reductions |  | |
| **Unit -4 (8 Hours)** | **AC Voltage Controllers** |
|  | Single and Three Phase AC Controllers. AC Voltage Controller with PWM Control. |
| **Unit -5 (8 Hours)** | **Cyclo-converters** |
|  | Single phase and three phase Cyclo-converters. Reduction in Output Harmonics. Matrix Converter |
| **List of Expt.** | \*\*\*\* |
| **Text Book** | P.S .BIMBRA |
| **Reference book** | 1. M.H Rashid:Power Electronics, circuits devices and applications, PRENTICE HALL OF INDIA. ,1988 |
|  | Subrahmanyam Power electronics, New Age Inc.Publishers,New Delhi,1996 |
|  | 1. P.C. Sen:Power electronics Tata McGraw-Hill 1987 |
| **Mode of Evaluation** | Monday tests , assignments, midterms |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **EE-405 UTILIZATION OF ELECTRIC POWER AND TRACTION C(L,T,P) = 4(3,1,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Circuit analysis and basic electrical. |
| **Objective:** | The objective of the course are: |
|  | 1. Help the learner to understand basic principle and operation of arc, dielectric and induction furnace and arc, resistance welding. |
|  | 1. Understand the construction and operation of wattmeter, current transformer and potential transformer. |
|  | 1. Understand principle and application of electrolysis, electro-deposition, manufactures of chemicals, anodizing, electro-polishing. |
|  | 1. DC and AC Systems, Power Supply for Electric Traction System. |
|  | 1. Estimation of power and energy requirements, Mechanics of train movement. |
| **Expected Outcome:** | The student will be able to |
|  | 1. Student will be able to calculate and design circuit for arc, dielectric and furnace. |
|  | 1. Measurement of power for illumination. |
|  | 1. Principles and applications of electrolysis. |
|  | 1. Systems of Electric Traction. |
|  | 1. estimation of power and energy requirements. |
| **Unit -1 (7 Hours)** | **Electric Heating and Welding** |
|  | **(i) Electric Heating:** Different methods of electric heating. Principle of high frequency induction and di-electric heating. Construction, operation, performance and applications of arc furnace and induction furnace. **(ii) Electric Welding:** Welding process, welding transformer, Classification of Electric Welding: arc welding, resistance welding, welding of various metals. |
| **Unit -2 (7 Hours)** | **Illuminations** |
|  | **Illuminations:** Definitions, laws of illuminations, polar curves, luminous efficiency, photometer, incandescent lamps: filament materials, halogen lamp. Electric discharge lamps: sodium vapour lamp mercury vapour lamp and fluorescent lamp. **Light Calculations:** Commercial, industrial, street and flood lighting. |
| **Unit -3 (7 Hours)** | **Electrolytic Process** |
|  | **Electrolytic Process:** Principles and applications of electrolysis, electro-deposition, manufactures of chemicals, anodizing, electro polishing electro-cleaning, electroextraction, electro refining, electro-stripping (parting) power supplies for electrolytic process. |
| **Unit -4 (7 Hours)** | **Electric Traction and Means of Supplying Power** |
|  | **Electric Traction and Means of Supplying Power:** Systems of Electric Traction: DC and AC Systems, Power Supply for Electric Traction System: Comparison and application of different systems. Sub-station equipment and layout, conductor rail and pantograph. |
| **Unit -5 (7 Hours)** | **Traction Methods** |
|  | **Traction Methods:** Types of services, speed time and speed distance curves, estimation of power and energy requirements, Mechanics of train movement. Co-efficient of adhesion, Adhesive weight, effective weight. **Traction Motor Controls:** DC and AC traction motors, Series parallel starting. Methods of electric braking of traction motors. |
| **List of Expt.** | \*\*\*\* |
| **Text Book** | Utilization of electric power by R. K. Rajput, Katson Publication. |
| **Reference book** | 1) H Pratap Art and Science of Utilization of Electric Power |
|  | 2) H. Pratap Modern Electric Traction |
|  | 3) C.L. Wadhwa Utilization of electric traction electric power. |
|  | 4) G.K. Dubey Electric Drives. Narosa Publishing House |
|  | 5) Vedam and Subrahmanyam-Concept and Application of Electric Drives |
| **Mode of Evaluation** | Continuous Evaluation (Midterms, Weekly Test, Graded Assignment) End Semester Evaluation |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **ARTIFICIAL INTELLIGENCE AND NEURAL NETWORKS CP 425** |
| **Version** |  |
| **Prerequisite** | Computer Basic |
| **Objective:** |  |
|  | 1. Explain the basic knowledge representation, problem solving, and learning methods of artificial intelligence |
|  | 1. Asses the applicability, strength, and weakness of the basic knowledge representation ,problem solving and learning methods on solving particular engineering problems |
|  | 1. Develop intelligent system by assembling solutions of concrete computational problems |
|  | 1. Understand the role of knowledge presentation, problem solving, and learning in intelligent – system engineering |
|  | 1. Develop an interest in the field sufficient to take more advanced subjects |
| **Expected Outcome:** |  |
|  | 1. Student will be able to explain AI |
|  | 1. Get knowledge about Knowledge based expert system |
|  | 1. How search techniques can be used. |
|  | 1. Get knowledge about fuzzy logic |
|  | 1. Use genetic algorithm. |
| **Unit -1 (6 Hours)** | **Artificial Intelligence:** Introduction to AI and knowledge based Expert systems: Introduction, Importance and Definition of AI, ES, ES building tools and shells. |
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| **Unit -2 (6 Hours)** | **Knowledge Representation:** Concept of knowledge, Representation of knowledge using logics rules, frames. Procedural versus. Declarative knowledge, forward versus backward chaining. **Control Strategies: -**Concept of heuristic search, search techniques depth first search, Breath first search, Generate and test hill climbing, best first search. |
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| **Unit -3 (8 Hours)** | **Artificial Neural Network:** Biological Neurons and synapses, characteristics Artificial Neural Networks, types of activation functions. **Perceptions:** Perception representation, limitations of perceptrons. Single layer and multiplayer perceptrons. Perceptron learning algorithms. |
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| **Unit -4 (8 Hours)** | **Basic Concepts in Learning ANN:** Supervised learning, Back propagation algorithm, unsupervised learning, Kohonen’s top field network and Algorithm. |
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| **Unit -4 (8 Hours)** | **Fuzzy Logic:** Fuzzy logic concepts, Fuzzy relation and membership functions, Defuzzufication, Fuzzy controllers Genetic algorithm: concepts, coding, reproduction, crossover, mutation, scaling and fitness. |
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| **List of Expt.** | \*\*\*\*\* |
| **Text Book** | Elaine Rich and Kevin Knight, Artificial Intelligence |
| **Reference book** | 1. Elaine Rich and Kevin Knight, Artificial Intelligence, TATA MCGRAW HILL Publishers. |
|  | 1. James A Anderson, An introduction to Neural Networks. |
|  | 1. Dan. W Patterson, Artificial Intelligence and Expert Systems. |
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| **Mode of Evaluation** |  |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **EE-410 ELECTRICAL ENGINEERING MATERIALS C(L,T,P) = 3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Basic Physics and Chemistry |
| **Objective:** | The objective of the course are: |
|  | 1. To obtain an overall understanding of the different materials which are used in Electrical Engineering. |
|  | 1. Understand the properties of conducting materials, dielectric materials, magnetic materials, and semiconductor materials. |
|  | 1. Obtain a detailed understanding of how these materials are affected by Electric and Magnetic Fields. |
|  | 1. Understand the application of these materials in Electrical Engineering. |
| **Expected Outcome:** | The student will be able to |
|  | 1. Understand the characteristic performance of different materials. |
|  | 1. Apply a procedure for the selection of the material based on the Electrical Engineering Application. |
|  | 1. Recognize the reason(s) for selection of a material for the construction of electrical wires, transformers and switches. |
| **Unit -1 (6 Hours)** | **Dielectric Materials** |
|  | Static dielectric constant, Polarization, atomic interpretation of the dielectric constant of mono-atomic and poly atomic gases, internal fields in the solids and liquids, static dielectric constants of solids, ferroelectric materials and spontaneous polarization, piezo- electricity. Frequency dependence of electronics, ionic and orientational polarization, complex dielectric constant and dielectric losses. |
| **Unit -2 (6 Hours)** | **Conductivity of Metals** |
|  | Ohm's Law and relaxation time of electrons, collision time and mean free path. Electron scattering, and resistivity of metals. Heat developed in current carrying conductor, thermal conductivity of metals, and superconductivity. |
| **Unit -3 (8 Hours)** | **Magnetic Materials** |
|  | Magnetisation from microscopic view point, orbital magnetic dipole movement and angular momentum materials. Diamagnetism, origin of permanent magnetic dipoles in material, and paramagnetic spin systems. |
| **Unit -4 (8 Hours)** | **Properties of Ferromagnetic Materials** |
|  | Spontaneous magnetization and the curie-Weils Law. Ferromagnetic Domains and coercive force, anti-ferromagnetic and ferromagnetic materials. Magnetic materials for electrical devices, and introduction to permanent magnets. |
| **Unit -4 (8 Hours)** | **Mechanism of Conduction in Semiconductor Materials** |
|  | Types of semiconductors, current carriers in semiconductors, Half effect, Drift and Diffusion currents, continuity equation, P-N junction diode, junction transistor, FET & IGFET, properties of semiconducting materials. |
| **List of Expt.** | NIL |
| **Text Book** | Electrical Engineering materials by J.B. Gupta |
| **Reference book** | Electrical Engineering materials by A.J. Dekker.  Electrical Engineering Materials by G.P. Chhalotra.  Electrical Engineering materials by S.P. Seth and P.V. Gupta. |
| **Mode of Evaluation** | Continuous Evaluation (Midterms, Weekly Test, Graded Assignment)  End Semester Evaluation |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **EE-411 POWER SYSTEM RELIABILITYC(L,T,P) = 4(3,1,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Basic Probability Theory |
| **Objective:** | The objective of the course are: |
|  | 1. To understand the difference between Power System Reliability and Power System Quality. |
|  | 1. Study the importance of Reliability analysis for Power System Development |
|  | 1. Learn the different methods available for evaluating reliability of systems. |
|  | 1. Understanding the methods of analysing systems through Reliability concepts of outage and generation capacity. |
|  | 1. Understanding problems of planning and maintaining the existing power systems. |
| **Expected Outcome:** | The student will be able to |
|  | 1. Perform reliability analysis on electrical systems. |
|  | 1. Evaluate possible sources of unreliability in the system and its possible causes. |
|  | 1. Perform analysis using the Reliability concept for systems under study. |
|  | 1. Plan an electrical system with proper reliability analysis. |
| **Unit -1 (6 Hours)** | **System Reliability** |
|  | Introduction, definition of reliability, failure, probability, concepts, power quality variation, reliability measurements, power supply quality survey, Reliability aids, and recent development. |
| **Unit -2 (6 Hours)** | **Reliability Concepts** |
|  | Measure of reliability rules for combining probabilities, Mathematical expectation. Distributions, reliability theory series and parallel systems, Markov processes. Static generating capacity reliability. |
| **Unit -3 (8 Hours)** | **Outage Definition** |
|  | Loss of load probability methods, loss of energy probability method. Load forecast, System Design and planning, Strategies for generation, Transmission and Distribution networks. Transmission system reliability evaluation-Average interruption rate method. The frequency and duration method. |
| **Unit -4 (8 Hours)** | **Interconnected System** |
|  | Generating capacity reliability evaluation introduction. The loss of load approach, reliability evaluation in two and more than two interconnected systems, Interconnection benefits. |
| **Unit -4 (8 Hours)** | **Load Forecasting** |
|  | Necessity short-term forecasting by preliminary analysis control, medium term forecasting by field survey method, and long-time forecasting by statistical method. Regression analysis. Analysis of time series. Factors in power system loading. |
| **List of Expt.** | NIL |
| **Text Book** | 1. Roy Billinton and Ronald N.Allan-Reliability Evaluation of power system volume-I 2. Roy Billinton and Ronald N.Allan-Reliability evaluation of power System volume-II |
| **Reference book** | J Endreny-Reliability modelling in electric power system.  A.S. Pabla-Electric power distribution. |
| **Mode of Evaluation** | Continuous Evaluation (Midterms, Weekly Test, Graded Assignment)  End Semester Evaluation |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **EE-457 ELECTRICAL CIRCUITS LAB C(L,T,P) = 1(0,0,2)** |
| **Version** | 1.0 |
| **Prerequisite** | NIL |
| **Objective:** | The objective of the course are: |
|  | 1. Learn simulation software to easily analyse the behaviour of various circuits. |
|  | 1. Understand the applications and benefits of software simulations. |
|  | 1. Perform AC-DC analysis on important power system and power electronics circuits |
| **Expected Outcome:** | The student will be able to |
|  | 1. Understand simulation software and its benefits. |
|  | 1. Design and implement power system and power electronics circuits and analyse their respective behaviours. |
|  | 1. Through project development, students will be able to design, develop and analyse and present an electrical engineering circuit through simulation. |
| **List of Experiments** |  |
|  | Introduction to the software being used (PSpice and OrCAD) |
|  | DC-analyze resistor networks to determine node voltages, components voltages, and component currents. |
|  | Analyze resistor networks that have several voltage and current sources and variable load resistors. |
|  | AC-analyze resistor networks to determine node voltages, components voltages, and component currents. |
|  | Transient –analyze RC & RL circuits to produce tables of component voltage & current levels for a given set of time instants & to produce graphs of voltages & currents versus time |
|  | AC-analyze impedance networks to determine the magnitude & phase of node voltages,  components voltages and component currents. |
|  | Determine the magnitude & phase and component voltages and currents in resonant circuits & produce voltage and current v/s frequency graphs. |
|  | **Programs For Circuit Analysis** |
|  | To determine line and load currents in a 3phase delta connected load system connected to a 3 phase balanced ac supply |
|  | To obtain a transient response in a single phase full wave rectifier with a filter capacitor. |
|  | To obtain a response in a DC-DC Boost and Buck Converter |
| **Text Book** | NIL |
| **Reference book** | Lab Manuals  PSpice User’s Manual |
| **Mode of Evaluation** | Continuous Evaluation (Viva Voce, Performance, Record and Project)  End Semester Evaluation |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **EE-408 Power System Engineering C(L,T,P) = 4(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Transmission system, generation of electrical power |
| **Objective:** | The objective of the course are: |
|  | 1. Help the learner and understand basic of optimal operation of power systems, Economic distribution of load between power stations |
|  | 1. Understand the transient conditions. Rotor dynamics and swing equation. |
|  | 1. Understand the Equal area criterion and its application |
|  | 1. Learn about different type of excitation systems of synchronous machines systems, |
|  | 1. Learn about compensation of transmission lines |
| **Expected Outcome:** | The student will be able to |
|  | 1. solve problems on unit commitment and dynamic programming |
|  | 1. Solve swing equation, |
|  | 1. Critical clearing angle and critical clearing time. factors affect stability and methods to improve stability |
|  | 1. Learn problems of interconnected power systems and excitation systems and their control |
|  | 1. Voltage stability and power security |
| **Unit -1 (6 Hours)** | **Economic Operation of Power Systems:** |
|  | Introduction, system constraints, optimal operation of power systems. Input output, heat rate and incremental rate curves of thermal generating units. Economic distribution of load between generating units within a plant. Economic distribution of load between power stations, transmission loss equation. Introduction to unit commitment and dynamic programming |
| **Unit -2 (6 Hours)** | **Power System Stability -I** |
|  | Power angle equations and power angle curves under steady state, and transient conditions. Rotor  dynamics and swing equation (solution of swing equation not included), synchronizing power coefficient. Introduction to steady state  and dynamic stabilities, steady state stability limit. |
| **Unit -3 (8 Hours)** | **Power System Stability-II** |
|  | Introduction to transient stability. Equal area criterion and its application to transient stability studies under basic disturbances, critical clearing angle and critical clearing time. Factors affect stability and methods to improve stability |
| **Unit -4 (8 Hours)** | **Interconnected System-I** |
|  | **(i) Excitation Systems:** Introduction of excitation systems of synchronous machines, types of excitation systems, Elements of various excitation systems and their control (functional block diagrams and their brief description)-DC excitation systems, AC excitation systems, brushless excitation system.  **(ii) Interconnected Power Systems:** Introduction to isolated and interconnected powers systems. Reserve capacity of power stations, spinning and maintenance reserve. Advantages and problems of interconnected power systems. Power systems inter connections in India. |
| **Unit -5 (8 Hours)** | **Interconnected Power Systems -II** |
|  | Tap Changing transformer, phase angle control and phase shifting transformer. Series compensation of transmission lines, location and protection of series capacitors, advantages and problems. (ii) Introduction to power system security. (iii) Introduction to voltage  stability. |
| **List of Expt.** | NIL |
| **Text Book** | Power System Engineering By C.M Arora, |
| **Reference book** | Power System Engineering By Nagrath Kothari, TMH  Electrical Power System By C.LWadhwa , New Age Publisher  Power System Engineering by B.R Gupta,wheeler publication |
| **Mode of Evaluation** | Continuous Evaluation (Midterms, Weekly Test, Graded Assignment) End Semester Evaluation |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **EE-454 MATLAB SIMULATION LAB C(L,T,P) = 1(0,0,1)** |
| **Version** | 1.0 |
| **Prerequisite** | Matlab |
| **Objective:** | The objective of the course are: |
|  | 1. To simulate the power system components in matlab environment |
|  | 1. To model the power system components. |
|  | 1. To model the wind energy generation system |
| **Expected Outcome:** | The student will be able to |
|  | 1. Perform modelling of machines |
|  | 1. Perform modelling of transmission lines, transformer breaker etc |
|  | 1. Perform simulation of machines transmission lines, transformer breaker |
|  | 1. Perform modelling of FACTS devices, WEGS |
|  | 1. Perform simulation of FACTS devices, WEGS |
| **List of Experiments** |  |
|  | Simulate Swing Equation in Simulink (MATLAB) |
|  | Modelling of Synchronous Machine |
|  | Modelling of Induction Machine |
|  | Simulate simple circuits using Circuit Maker |
|  | Modelling of Synchronous Machine with PSS (b) Simulation of Synchronous Machine with PSS. |
|  | Modelling of Synchronous Machine with FACTS device (b) Simulation of Synchronous Machine with FACTS devices. |
|  | FACTS Controller designs with FACT devices for SMIB system |
|  | Modelling of DFIG type wind generator |
|  | Simulation of WEGS integrated power system |
|  | Simulation of WEGS integrated power system with facts devices |
| **Text Book** | NIL |
| **Reference book** | Fundamentals of Electric Dives, G.K. Dubey, Narosa Publishing House, New Delhi 1995 |
| **Mode of Evaluation** | Continuous Evaluation End Semester Evaluation |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **EE-402 ELECTRICAL DRIVESC(L,T,P) = 4(3,1,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Electro-Mechanics and Power Electronics |
| **Objective:** | The objective of the course are: |
|  | 1. Help the learner understand the basic applications, principles and concepts governing Electric Drives and their operation. |
|  | 1. Learn about the different types of Drives. |
|  | 1. Obtain a detailed understanding of AC Drives and DC Drives, their applications and their design.   DC Drives – DC Motor s with various converters  AC Drives – Induction Motors/ Synchronous Motors with various converters |
|  | 1. Understand the Control Methodology for implementing these drives |
| **Expected Outcome:** | The student will be able to |
|  | 1. Understand and implement basic equations governing the operation of drives. |
|  | 1. Design converters based on the Electric Motor being used in the Drive. |
|  | 1. Develop a control scheme for the overall control of the Drive. |
|  | 1. Able to evaluate the performance of a designed drive and its applications. |
|  | 1. Calculate the evaluating parameters for Electric Drives. |
| **Unit -1 (7 Hours)** | **Dynamics of Electric Drives** |
|  | Fundamental torque equations, speed-torque conventions and multi-quardant operation, equivalent values of drive parameters, nature and classification of load torques, steady state stability, load equalization, close loop configurations of drives. |
| **Unit -2 (7 Hours)** | **DC Drives** |
|  | Speed torque curves, torque and power limitation in armature voltage and field control, Starting. **Braking-**Regenerative Braking, dynamic braking and plugging. **Speed Control-**Controlled Rectifier fed DC drives, Chopper Controlled DC drives. |
| **Unit -3 (8 Hours)** | **Induction motor Drives – I** |
|  | **Starting. Braking-**Regenerative braking, plugging and dynamic braking. **Speed Control-**Stator voltage control, variable frequency control from voltage source, Voltage Source Inverter (VSI) Control. |
| **Unit -4 (8 Hours)** | **Induction Motor Drives – II** |
|  | Variable frequency control from current source, Current Source Inverter (CSI) Control, Cycloconverter Control, Static rotor resistance control, Slip Power Recovery- Stator Scherbius drive, Static Kramer drive. |
| **Unit -4 (6 Hours)** | **Synchronous Motor Drive** |
|  | Control of Synchronous Motor-Separately Controlled and VSI fed Self-Controlled Synchronous Motor Drives. Dynamic and Regenerative Braking of Synchronous Motor with VSI. Control of Synchronous Motor Using Current Source Inverter (CSI). |
| **List of Expt.** | NIL |
| **Text Book** | Fundamentals of Electric Dives, G.K. Dubey, Narosa Publishing House, New Delhi 1995 |
| **Reference book** | V Subrahmanyam:Thyristor control of electric Drives,Tata McGraw Hill, New Delhi, 1988.  V Subrahmanyam:Electric Drives-Concepts and Applications,Tata McGraw Hill,New Delhi.  S K Pillai:A first course on electrical Drives,Wiley Eastern limited,India.  B K Bose:Power electronics and A. C. Drives, Prentice Hall. |
| **Mode of Evaluation** | Continuous Evaluation (Midterms, Weekly Test, Graded Assignment)  End Semester Evaluation |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **EE-456 ELECTRICAL DRIVES AND CONTROL LAB C(L,T,P) = 1(0,0,2)** |
| **Version** | 1.0 |
| **Prerequisite** | Electrical Drives (suggested to run in parallel with the course) |
| **Objective:** | The objective of the course are: |
|  | 1. Implement various Electrical Drives and analyse their performance |
|  | 1. Implement various power converters and understand the effect of various control signals on the system |
|  | 1. Observe the performance of various motors with control through different power converters. |
| **Expected Outcome:** | The student will be able to |
|  | 1. Understand the practical response of various converters and motors. |
|  | 1. Understand the practical response of various Electric Drive Systems when working together. |
|  | 1. Through project development, students will be able to design, develop and implement an Electric Drive System. |
| **List of Experiments** |  |
|  | Study and test the firing circuit of three phase half controlled bridge converter. |
|  | Study and obtain waveforms of 3 phase half controlled bridge converter with R and RL loads. |
|  | Study and test the firing circuit of 3-phase full controlled bridge converter. |
|  | Study and obtain waveforms of 3-phase full controlled bridge converter with R and RL loads. |
|  | Study and test 3-phase AC voltage regulator |
|  | Control speed of dc motor using 3-phase half controlled bridge converter. Plot armature voltage versus speed characteristic |
|  | Control speed of dc motor using 3-phase full controlled bridge converter. Plot armature voltage versus speed characteristic |
|  | Control speed of a 3-phase induction motor in variable stator voltage mode using 3-phase AC voltage regulator |
|  | Control speed of universal motor using AC voltage regulator. |
|  | Study 3-phase dual converter. |
|  | Study speed control of dc motor using 3-phase dual converter. |
|  | Study three-phase cycloconverter and speed control of synchronous motor using cyclo-converter |
|  | Control of 3-Phase Induction Motor in variable frequency V/f constant mode using 3-phase inverter. |
| **Text Book** | NIL |
| **Reference book** | Lab Manuals  Fundamentals of Electric Dives, G.K. Dubey, Narosa Publishing House, New Delhi 1995 |
| **Mode of Evaluation** | Continuous Evaluation (Viva Voce, Performance, Record and Project)  End Semester Evaluation |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **EE 502 POWER SYSTEM STABILITY C(L,T,P) = 3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Power System Analysis, AC machines |
| **Objective:** | The objective of the course are: |
|  | 1. Help the learner to model the synchronous machine and visualize flux linkage |
|  | 1. Understand the Steady state and transient stability |
|  | 1. Learn about SMIB and multi machine system. |
|  | 1. Learn about solution of various stability problems |
|  | 1. Learn various factors affecting stability |
| **Expected Outcome:** | The student will be able to |
|  | 1. Student will be able to model various synchronous machines. |
|  | 1. Solve swing equation and understand various stability |
|  | 1. Able to develop SMIB system & solve coherent non coherent system |
|  | 1. Give solution to various stability problems eg fault clearing time,critical clearing angle etc. |
|  | 1. Know the factors affecting stability and their remedy |
| **Unit -1 (7 Hours)** | **Modeling of synchronous machines** |
|  | Modeling of cylindrical rotor salient pole synchronous machines, flux linkage equations, voltage equations, Park's transformation, various inductances and time constraints of synchronous machines, vector diagrams for steady state and transient conditions, power angle curves. |
| **Unit -2 (7 Hours)** | **Stabilities** |
|  | Steady state and transient stabilities, their definitions and methods of determination. Development of Swing equation. |
| **Unit -3 (6Hours)** | **Machine Systems** |
|  | Steady state stability of single machine connected to an infinite bus by the method of small oscillations. Two machine systems. Coherent and non-coherent machines. |
| **Unit -4 (9 Hours)** | S**tudy of various stability methods** |
|  | Equal area criterion of determining transient stability, fault clearing time and critical clearing angle. Solution of Swing equation by step by step method. Euler's Method and Runga-Kutta Method, Application of Computers in the study of transient stability using these methods. Introduction to steady state and transient Stability using these methods. Introduction to steady state and transient stabilities of multi-machine system without controller. |
| **Unit -5(7 Hours)** | **Factors affecting Stabilities** |
|  | Factors affecting steady state and transient stabilities, methods of improving steady state and transient stabilities, high speed circuit breakers, auto-reclosing circuit breaker, single pole operation, excitation control, and bypass valving. |
| **List of Expt.** | Nil |
| **Text Book** | 1C L Wadhwa, Electrical power system.New Age international publishers. |
| **Reference book** | 1. B.R.Gupta: Power system Analysis and Design. |
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| **Mode of Evaluation** | Continuous evaluation (Weekly test,Graded Assignments, Mid term test, End sem exam) |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **EE-601 POWER SYSTEM PLANNING & RELIABILITY C(L,T,P) = 3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Power System Reliability Concepts |
| **Objective:** | The objective of the course are: |
|  | 1. Understand the effect of the load variation on the existing power system and how the increase/decrease in the load in the future will require efficient and reliable planning. |
|  | 1. Study the importance of Reliability analysis for Power System Development |
|  | 1. Learn the different aspects of planning of a power system in terms of the different types of generating capacity |
|  | 1. Analyse systems through Reliability concepts of outage and generation capacity. |
| **Expected Outcome:** | The student will be able to |
|  | 1. Perform reliability analysis on electrical systems. |
|  | 1. Evaluate possible sources of unreliability in the system and its possible causes. |
|  | 1. Perform analysis using the Reliability concept for systems under study. |
|  | 1. Plan an electrical system with proper reliability analysis while taking into consideration the future loads. |
| **Unit -1 (6 Hours)** | **Load Forecasting** |
|  | Classification and characteristics of loads. Approaches to load forecasting. Forecasting methodology. Energy forecasting. |
| **Unit -2 (6 Hours)** | **Basic Reliability Concepts** |
|  | General reliability function, Markov Chains and processes and their applications, simple series and parallel system models. |
| **Unit -3 (8 Hours)** | **Static Generating Capacity Reliability Evaluation** |
|  | Outage definitions, loss of load probability methods, loss of energy probability method. Frequency and duration methods, load forecasting uncertainty. |
| **Unit -4 (8 Hours)** | **Spinning Generating Capacity Reliability Evaluation** |
|  | Spinning capacity evaluation, load forecast uncertainty. |
| **Unit -4 (8 Hours)** | **Transmission System Reliability Evaluation** |
|  | Average interruption rate method. The frequency and duration method. Stormy and normal weather effects. Inter-connected Systems Generating Capacity Reliability Evaluation: Introduction, The loss of toad approach. Reliability evaluation in two and more than two interconnected systems. Interconnection benefits. |
| **List of Expt.** | NIL |
| **Text Book** | 1. Roy Billinton and Ronald N.Allan-Reliability Evaluation of power system volume-I 2. Roy Billinton and Ronald N.Allan-Reliability evaluation of power System volume-II |
| **Reference book** | J Endreny-Reliability modelling in electric power system.  A.S. Pabla-Electric power distribution. |
| **Mode of Evaluation** | Continuous Evaluation (Midterms, Weekly Test, Graded Assignment)  End Semester Evaluation |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **EE-504 HVDC TransmissionC(L,T,P) = 3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Power Electronics, Transmission & Distribution |
| **Objective:** | The objective of the course are: |
|  | 1. Help the learner to understand basic principles and operation of HVDC Systems and the main switching devices, thyristor and IGBT Valves |
|  | 1. Understand the application of Power Electronics Converters HVDC Systems |
|  | 1. Understand and implement basic design concepts for HVDC Systems |
|  | 1. Investigate the use of filters and how they may be used to remove the identified harmonics from the HVDC system. |
|  | 1. Understand how MTDC systems function and their future applications. |
| **Expected Outcome:** | The student will be able to |
|  | 1. Student will be able to measure the calculate the switching behaviour of thyristor and IGBT valves |
|  | 1. Design power electronic converters (AC-DC, DC- DC) |
|  | 1. Understand control schemes for HVDC systems and their control |
|  | 1. Measure and remove harmonics. |
|  | 1. Understand the application of MTDC systems. |
| **Unit -1 (7 Hours)** | **Thyristor and IGBT Valves** |
|  | Thyristor device, Steady state and switching characteristics, Light activated power thyristor, LED, fiber optics, valve firing, parallel and series connections of thyristors. IGBT Device |
| **Unit -2 (7 Hours)** | **Converter Circuits** |
|  | Rectification and inversion, affect of reactance, six pulse and twelve pulse converter circuits. |
| **Unit -3 (8 Hours)** | **DC Link Control** |
|  | Principles of DC link control, Converter control characteristics, System control hierarchy, Firing angle control, Extinction angle control, starting, stopping and power flow reversal of DC link, Power control, and Parallel operation of DC link with AC transmission line. Converter faults, commutation failure, valve blocking and bypassing. Protection against over currents, over voltages. DC circuit breakers. Reactive Power Control: Reactive power requirement in steady state, Sources of reactive power and reactive power control. |
| **Unit -4 (8 Hours)** | **Harmonics and Filters** |
|  | Generation of harmonics, AC and DC side harmonics, Characteristics and non-characteristics harmonics. Types of AC filters – single tuned and double tuned filters, high pass filter, DC Smoothing reactor and filters. (ii) Scheme of a HVDC converter station and components of HVDC transmission system. |
| **Unit -5 (6 Hours)** | **Multi-Terminal DC (MTDC) Systems** |
|  | Types of MTDC systems, Comparison of series and parallel MTDC systems, Control and protection of MTDC systems, Application of MTDC systems. |
| **List of Expt.** | NIL |
| **Text Book** | K.R. Padiyar-HVDC Power Transmission System |
| **Reference book** | Power System Engineering by C.M.Arora  Power Electronics, M.H.Rashid  Electrical power system. C.L. Wadhva New Age international publishers. |
| **Mode of Evaluation** | Continuous Evaluation (Midterms, Weekly Test, Graded Assignment)  End Semester Evaluation |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **EE 508 ADVANCED POWER SYSTEM C(L,T,P) = 3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Power System Analysis, Physics |
| **Objective:** | The objective of the course are: |
|  | 1. Help the learner to understand voltage stability |
|  | 2.Understand the distribution automation system |
|  | 3.Learn about various FACTS devices |
|  | 4.Learn about basics of energy audit. |
|  | 5.Learn superconductivity and applications |
| **Expected Outcome:** | The student will be able to |
|  | 1. Student will be able to analyse voltage stability |
|  | 1. Understand distribution automation and SCADA |
|  | 1. Able to apply FACTS devices |
|  | 1. Able to audit electrical utilities. |
|  | 1. Understand superconductivity and applications |
| **Unit -1 (7 Hours)** | **Voltage Stability:** |
|  | Power system voltage stability concept, comparison of angle and voltage stabilities, Power system loads, generator P-Q and Q-V characteristics. Voltage collapse. Voltage stability analysis. Methods of improving voltage stability. |
| **Unit -2 (7 Hours)** | **Distribution Automation:** |
|  | Introduction to distribution automation. Concepts of communication - power line carrier, radio communication, fibre optics, satelliteCommunication and sensors. Introduction to supervisory control and data acquisition (SCADA). Brief description of an automation system. |
| **Unit -3 (6Hours)** | **FACTS:** |
|  | Problem of AC transmission systems, basic principle of power flow control of an AC transmission line. Basic types of FACTS controllers. Brief description of FACTS controllers- STATCOM, Static Voltage and phase angle regulators, thyristor switched and thyristor controlled series capacitors, Unified Power Flow Controller. |
| **Unit -4 (9 Hours)** | **Energy Conservation:** |
|  | Introduction, conservation of natural resources, principles of energy conservation and energy audit. Brief description of energy conservation in power plants, electric utilities, electric drives, industries and electric lighting. |
| **Unit -5(7 Hours)** | **Superconductivity** |
|  | **:** Basic characteristics of superconductors. Brief description of applications of superconductivity to electric power systems - superconducting generators, motors, transformers, transmission cables and magnetic storage. |
| **List of Expt.** | \*\*\*\* |
| **Text Book** | 1.C L Wadhwa, Electrical power system.New Age international publishers. |
| **Reference book** | 1. B.R.Gupta: Power system Analysis and Design. |
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| **Mode of Evaluation** | Continuous evaluation (Weekly test,Graded Assignments, Mid term test, End sem exam) |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **EE-651 ADVANCED COMPUTER BASED POWER SYSTEM DESIGN C(L,T,P) = 2(0,0,3)** |
| **Version** | 1.0 |
| **Prerequisite** | Electro-Mechanics and Power Electronics |
| **Objective:** | The objective of the course are: |
|  | 1. To learn MATLAB software and its various applications. |
|  | 1. Learn to implement advanced power system and electrical engineering problems to obtain a solution through MATLAB/ETAP analysis. |
|  | 1. Obtain a better understanding of advanced theoretical concepts covered in M.Tech courses through mathematical modelling. |
|  | The student will be able to |
|  | 1. Apply the theory covered in courses to obtain working simulations of advanced Electrical Engineering circuits. |
| **Expected Outcome:** | 1. Will be able to use MATLAB/ETAP for designing of circuits/systems that have been covered in their theoretical topic thus far. |
|  | 1. Through the project development, students will be able to showcase their skills in modelling an Electrical Engineering/Power System through MATLAB. |
| **List of Experiments** |  |
|  | Introduction to Computer Based Power System Design and the used software. |
|  | Basic Electrical Circuit Analysis using MATLAB (R,RC,RLC) |
|  | Modelling of Power Electronic Switches in MATLAB and obtaining characteristic curves |
|  | Modelling a single phase and three phase full wave rectifier (uncontrolled) using MATLAB |
|  | Load flow analysis for a real power system (for 3 to 6 bus) using Gauss Seidal |
|  | Modelling of an Electrical Drives System – I (Selection, Design and implementation of Motor with Load) |
|  | Modelling of an Electrical Drives System – II (Selection, Design and implementation of Control of Motor with Load) |
|  | Load flow analysis for a real power system (for 3 to 6 bus) using Newton Rhaphson |
|  | 1 Fault analysis (for 3 to 6 bus) of real power system and verify the results using MATLAB or any available software for LG Fault |
|  | Introduction of ETAP software. |
| **Text Book** | NIL |
| **Reference book** | Lab Manuals  MATLAB User’s Manual |
| **Mode of Evaluation** | Continuous Evaluation (Viva Voce, Performance, Record and Project)  End Semester Evaluation |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **EE 603 OPERATION & CONTROL OF POWER SYSTEMS C(L,T,P) = 3(3,0,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Power System Analysis, Control System |
| **Objective:** | .The objective of the course are: |
|  | 1. Help the learner to understand optimal power system constraints |
|  | 2.Understand the optimal unit commitment problem and solution |
|  | 3.Learn about optimal generation scheduling |
|  | 4.Learn about load frequency control |
|  | 5.Learn power system security and AGC |
| **Expected Outcome:** | The student will be able to |
|  | 1. Student will be able to analyze various constraints of optimal power system operation |
|  | 1. Solve the unit commitment problem |
|  | 1. Solve the optimal generation scheduling |
|  | 1. Understand the speed governing system of steam turbine and analyze steady state and dynamic response. |
|  | 1. Understand power system security and AGC |
| **Unit -1 (7 Hours)** | **Optimal Power System Operation:** |
|  | System constraints. Generator operating cost. Input- Output and incremental fuel characteristics of a generating unit. Optimal operation of generators on a bus bar, algorithm and flow chart. Optimal unit commitment, constraints in unit commitment, spinning reserve, thermal and hydro constraints. |
| **Unit -2 (7 Hours)** | **Unit Commitment Solution Methods:** |
|  | Priority list method and dynamic programming method. Reliability consideration, Patton’s security function, security constrained optional unit commitment, start- up considerations |
| **Unit -3 (6Hours)** | **Optimal Generation Scheduling:** |
|  | Development of transmission loss and incremental loss equations. Optimal generation scheduling including transmission losses, algorithm and flow chart. Optimal load flow solution. Hydrothermal coordination |
| **Unit -4 (9 Hours)** | **Load Frequency Control:** |
|  | Control of real and reactive power of generator. Turbine speed governing system, Modelling of speed governing system. Methods of frequency control: flat frequency, flat tie line and tie line load bias control. Block diagram representation of load frequency control of an isolated system, steady state analysis, dynamic response. Introduction to Two – area load frequency control |
| **Unit -5(7 Hours)** | **Power System Security & Automatic Generation Control:** |
|  | Introduction to power system security, System monitoring, contingency analysis, System state classification, security controlSpeed governing characteristic of a generating unit. Load sharing between parallel operating generators. Introduction to automatic generation control of an area by computer (description of block diagram) |
| **List of Expt.** | \*\*\*\* |
| **Text Book** | 1.C L Wadhwa, Electrical power system.New Age international publishers. |
| **Reference book** | 1. B.R.Gupta: Power system Analysis and Design. |
|  | 2 P.S.Murthy Operation Control of Power System |
|  | 3 |
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| **Mode of Evaluation** | Continuous evaluation (Weekly test,Graded Assignments, Mid term test, End sem exam) |
| **Recomm. by BOS on** |  |
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|  | **EE-552POWER SYSTEM MODELLING AND SIMULATION LAB C(L,T,P) = 2(0,0,3)** |
| **Version** | 1.0 |
| **Prerequisite** | Electro-Mechanics and Power Electronics |
| **Objective:** | The objective of the course are: |
|  | 1. Help the learner to understand basic principles, operation and design of electrical drives. |
|  | 1. Understand the construction and operation of wattmeter, current transformer and potential transformer. |
|  | 1. Understand the construction and operation of AC and DC potentiometer |
|  | 1. Learn about different type of resistances and their measurement methods |
|  | 1. Learn about different types of bridges |
| **Expected Outcome:** | The student will be able to |
|  | 1. Student will be able to measure the AC and DC electrical quantities(voltage, current and energy) |
|  | 1. Measurement of single and three phase ac power |
|  | 1. Calibrate the voltmeter, ammeter by the help of potentiometer |
|  | 1. Measurement of earth resistance |
|  | 1. Measure the value of capacitance and inductance by the help of different type of bridges |
| **List of Experiments** |  |
|  | Simulate Swing Equation in Simulink (MATLAB) |
|  | Modelling of DC Series Motor and DC Shunt Motor. |
|  | Simulate DC Series Motor and DC Shunt Motor (Simulink). |
|  | Modelling of Induction Machine. |
|  | Simulation of Induction Machine. (Simulink) |
|  | Modelling of Synchronous Machine with PSS |
|  | Simulation of Synchronous Machine with PSS (Simulink) |
|  | Modelling of Synchronous Machine with FACTS device |
|  | Simulation of Synchronous Machine with FACTS devices (Simulink) |
|  | FACTS Controller designs with FACT devices for SMIB system. |
| **Text Book** | NIL |
| **Reference book** | Lab Manuals  MATLAB User’s Manual |
| **Mode of Evaluation** | Continuous Evaluation (Viva Voce, Performance, Record and Project)  End Semester Evaluation |
| **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** |  |
| **Approved by AC 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 |
| **Text Book** |  |
| **Reference book** |  |
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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 202 ANALOG ELECTRONICS C (L,T,P) =4(3,1,0)** |
| **Version** | 1.0 |
| **Prerequisite** | Nil |
| **Objective:** | The objective of the course are: |
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|  | 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.** | 10 |
| **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 208 (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 |
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| **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. | |
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| **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. |
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| **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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|  | **OBJECT ORIENTED PROGRAMMING (CP 216) 3-0-2-4** |
| **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. |
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| **Text Book** |  |
| **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. |
| **Text Book** |  |
| **Reference book** |  |
|  |  |
| **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 |
| **Text Book** |  |
| **Reference book** |  |
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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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|  | **OBJECT ORIENTED PROGRAMMING (CP 216) 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 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. |
| **List of Expt.** | **Total** |
| **Text Book** | \*\*\*\* |
| **Reference book** | Dietel and Associates, “Java How to Program”, 7th Ed., Prentice-Hall. |
|  | 1. David Flanagan, “Java in a Nutshell”, 5th Ed., O’Reilly Media, Inc. |
|  | 1. 3. Bruce Eckel, “Thinking in Java”, Prentice-Hall. |
| **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 |
|  | Calculate the convolution of two signals or systems. |
|  | Design a project based on communication. |
|  | Easily understand the properties of signals. |
|  | Design a communication system. |
|  |  |
| **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. |
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| **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. |
|  |  |
| **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 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. |
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| **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. |
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| **Unit -3 (7 Hours)** | **8085 MICROPROCESSOR INSTRUCTIONS**: Classification, format and timing. Instruction set.Programming and debugging, 8 bit and 16 bit instructions. |
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| **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). |
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| **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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|  | **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 |
| **Text Book** |  |
| **Reference book** |  |
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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. |
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| **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 |
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| **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** |  |

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|  | **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. |
|  |  |
| **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** |  |
| **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. |
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| **List of Expt.** | 10 |
| **Text Book** | Power Electronics Principles & Applications, Joseph Vithayathil, TMH , (2010). |
| **Reference book** | 1. Industrial Electronics And Control, Ttti, TMH 2001 |
|  | 1. 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** |  |
| **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. |
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| **Unit -3 (7 Hours)** | **ANALOG INTERFACING:** A/D and D/A converter interfacing, keyboard and display interfacing, RS 232 and IEEE 488 communication standards**.** |
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| **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** | 1. A. Ray & K. Bhurchandi. “Advanced Microprocessors and Peripherals. Tata Mc Graw Hill, 2012 |
|  | 1. 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** |  |
| **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. |
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| **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 |
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| **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** |  |
| **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: |
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| **Expected Outcome:** | The student will be able to |
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| **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. |
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| **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 |
|  |  |
| **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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| **UNIT** | **Contents of the Subject** | **Total Contact Hrs** |
| 1 | **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. | 7 |
| II | **Wireless Networking System**  Cellular Networks – 2G , 3G. CDMA and GSM. Satellite System – Broadcast System – Cordless System – Wireless Local Loop – MPLS. | 7 |
| III | **Wlan Standards**  Wireless LAN Technology – Architecture and Standards – Hyper LAN – Blue Tooth Architecture – Wideband Wireless Local Access – Wireless ATM, PAN | 7 |
| IV | **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. | 7 |
| V | **Application Issues**  Concepts for working with wireless applications. WAP – WML. Mobile Database – Content Management. Wireless Network Simulators – Case Study. | 7 |
|  | **Total** | 35 |

**Reference Books:**

1. Anna Hac, Mobile Telecommunication Protocols for Data Networks, 2003, John Wiley and Son, Ltd

2. Jochen Schille, Mobile Communications, 2003, Pearson Education Asia

3. William Stalling, Wireless Communication and Networking, 2002, Pearson Education Asia

4. Mark Beaulieu, Wireless Internetworking Applications and Architecture, 2002, Addison Wesley, Newyork

5. John R. Vacca, Wireless Broadband Networks Handbook, 2001,Tata McGraw Hill Publication Co. Ltd, New Delhi

6. Kaveh Pahlavan and Krishnamoorthy, P., Principles of Wireless Networks, 2002., Pearson Education

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

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| **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)**

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| **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)**

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| **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 |

**OPTIMIZATION TECHNIQUES C(L,T,P)=3(3,0,0)**

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| --- | --- | --- |
| **Unit** | **Course Contents** | **Total Contact Hrs.** |
| 1 | Introduction: Historical development, application to engineering problems, statement of optimization, classification of optimization, examples of optimization problems. | 7 |
| 2 | Linear Programming: Graphical method, simplex method, revised simplex method, Big-M method, 2- phase method, alternate optimal solutions, unbounded LPs | 7 |
| 3 | Degeneracy and convergence, duality in linear programming, sensitivity analysis, dual simplex method, Transportation, assignment and other applications. | 7 |
| 4 | 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. | 7 |
| 5 | Dynamic Programming: Multistage decision process, principles of optimality, computational procedures in dynamic programming | 7 |
|  | Total | 35 |

• Hiller and Lieberman, Introduction to Operation Research (Seventh Edition) Tata McGrawHill Publishing Company Ltd

• Ravindren Philips and Solberg, Operation Research Principles and Practice (Second Edition) John Wiley & Sons.

**RESEARCH METHODOLOGY**

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

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| **Unit** | **Course Contents** | **Total Contact Hrs.** |
| 1 | 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 | 7 |
| 2 | Defining the Research Problem : What is Research Problem?, Selecting the Problem, Necessity of and Techniques in defining the problem | 7 |
| 3 | ) 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 | 7 |
| 4 | 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 | 7 |
| 5 | 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 | 7 |
|  | Total | 35 |

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|  | **CP 320 DATA STRUCTURES IN C** |
| **Version** |  |
| **Prerequisite** | Computer basic and c Language |
| **Objective:** |  |
|  | 1. To introduce about the data structure and algorithm, linear data structure and non linear data structure |
|  | 1. To introduce about array representation and application of Stack and Queue and Sparse matrix and practice on them |
|  | 1. To introduce the link list architecture of data structure and the application of it and practice on that |
|  | 1. To introduce the tree architecture of data structure and the application of it and practice on that |
|  | 1. To introduce the graph architecture of data structure and the application of it and practice on that |
| **Expected Outcome:** |  |
|  | 1. Get knowledge about the data structure, how to design an algorithm and importance of data structure |
|  | 1. How we represent an array in memory and all application of array |
|  | 1. How we implement the link list and its application |
|  | 1. How we implement the tree data structure and its application |
|  | 1. How we implement the graph data structure and its application |
| **Unit -1 (6 Hours)** | **Performance Measurement:** Space complexity and Time complexity, big oh, omega and theta notations and their significance. Linear Lists **- Array** and linked representation, singly and doubly linked lists. Concept of circular linked lists. |
|  |  |
| **Unit -2 (6 Hours)** | **Array and Matrices:** Row and Column Major mapping and representation, irregular 2D array, Matrix operations, Special matrices: diagonal, tri-diagonal, triangular and symmetric. Sparse matrices representation and its transpose. |
|  |  |
| **Unit -3 (8 Hours)** | **Stacks:** Representation in array and linked lists, basic operation, Applications of stacks in parenthesis matching, towers of Hanoi etc. Queues **-** Representation in array and linked lists, applications, circular queues. |
|  |  |
| **Unit -4 (8 Hours)** | **Trees:** Binary Tree, representation in array and linked lists, basic operation on binary trees, binary tree traversal (preorder, post order, in order). Search Trees **-** Binary search tree, indexed-binary search tree, basic operation, AVL tree, B-tree and Heap Tree. |
|  |  |
| **Unit -4 (8 Hours)** | **Graphs:** Representation of unweighted graphs, BFS, DFS, and Minimum cost spanning trees, Single source shortest path. Sorting **-** Bubble sort, insertion sort, merge sort, selection sort, quick sort, heap sort. |
|  |  |
| **List of Expt.** |  |
| **Text Book** | Data Structures in C by VikasThada, CBC Publishers |
| **Reference book** | 1. Tannenbaum:Data structures in C (PRENTICE HALL OF INDIA) |
|  | 1. Data Structures in C by Lipsutcz in Schaum Series. |
|  | 1. Havowitz and Sawhni:Data structures in C and C++ (BPB Publication). |
| **Mode of Evaluation** | Continuous Evaluation (Midterms, Weekly Test, Graded Assignment), End Semester Evaluation |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **WEB TEHNOLOGY IT 304** |
| **Version** |  |
| **Prerequisite** | Basic Computer |
| **Objective:** |  |
|  | 1. Understand the various steps in designing a creative and dynamic website. |
| 1. They will have clear understanding of hierarchy of objects in HTML and XML. |
| 1. Finally they can create good, effective and customized websites. |
| 1. Know regarding internet related technologies. Systematic way of developing a website. |
| 1. They will able to write html, JavaScript, CSS and applet codes. |
| **Expected Outcome:** |  |
|  | 1. Understand web basics. |
| 1. understand hierarchy of objects in HTML and XML |
| 1. can create good, effective and customized websites |
| 1. Know regarding internet related technologies |
| 1. Can develop an applet application |
|  |  |
| **Unit -1 (6 Hours)** | INTRODUCTION: What is Internet? Introducing web browsers with specific reference to net scape and internet explorer, http, ftp, file type URLs, Image, audio or video formats like jpeg, gif, png, avi, mpeg, mp3.Markup concept and its use in markup languages. |
|  |  |
| **Unit -2 (6 Hours)** | BASIC HTML 4.0 ELEMENTS : Basic structure of an HTML document, doctype, Meta data, Link, displaying images, various fonts, colors, sizes and alignments of texts. Lists and Tags. |
|  |  |
| **Unit -3 (8 Hours)** | STYLE SHEET, TABLES : CSSI standard, including style sheets. Applying styles to specific groups of elements, creating overall look for the web page. Basic Table elements, combining the tables and CSSI style sheet. |
|  |  |
| **Unit -4 (8 Hours)** | CREATING FORMS;FRAMES and FRAMESETS : What are forms? Buttons, Text field,selection list, Radio button and check boxes on a web page submitting and resetting forms with submit and reset button. Creating and working with frames. |
|  |  |
| **Unit -4 (8 Hours)** | EVENT DRIVEN PROGRAMMING IN JAVA APPLET : Applet Architecture and its start, stop, in it, paint, update and repaint methods, drawing string, lines, polygons Ellipses and circles using abstract windows tool kit package and its classes. Working with colors and fonts. Running Applets from HTML with/without PARAM Tag. Using button, check box group, choice, List point, Text field, Text area classes, Border Layout, card layout and Grid layout. Layout managers. |
|  |  |
| **List of Expt.** |  |
| **Text Book** | Dynamic web publishing 2nd Edition by shelly powers |
| **Reference book** | 1. Dynamic web publishing 2nd Edition by shelly powers, Techmedia publishers |
|  | 1. Java 2-The complete reference 4th Edition by Herbert Schildt, Tata McGraw Hill |
|  | 1. Learn HTML IN 24 Hrs by Techmedia publishers |
|  |  |
| **Mode of Evaluation** | Continuous Evaluation (Midterms, Weekly Test, Graded Assignment), End Semester Evaluation |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **Information Technology Lab IT 457** |
| **Version** |  |
| **Prerequisite** | Computer basic |
| **TObjective:** | The objective of the course are: |
| 1. Understand the various steps in designing a creative and dynamic website. |
| 1. Can create good, effective and customized web sites. |
| 1. Know the advantages and use of different types of CSS. |
| 1. To create a fully functional web site. |
| 1. Understand the fundamentals of web. |
| **Expected Outcome:** | The student will be able to |
| 1. Understand web basics. |
| 1. understand hierarchy of objects in HTM |
| 1. can create tables and frames. |
| 1. can create CSS |
| 1. can create good, effective and customized websites |
| **List of Experiments** |  |
|  | Create a web page of meaningful story or description using various tags i.e. <u>, <i>, <b>, <big>, <small>, <large>, <tt>, <s>, <p>, <marquee> etc. |
|  | Create a web page of learning various lists e.g. ordered lists, unordered lists, definition lists and hence inscribe meaning list of various fields for e.g. academics, sports, politics etc. |
|  | Create a web page of learning usage of tables |
|  | Create a Curriculum vita of your self. |
|  | Create a web page of learning usage of frames. |
|  | Create a web page of learning usage of target and hyperlinks (same page and different page linking). |
|  | Insert an Image and create a link such that clicking on image takes user to other page. |
|  | Create a web page of learning usage of forms, using various buttons and fields |
|  | Create a program of CSS. |
|  | Create a web page of your own description using all the information learned above |
| **Text Book** | NIL |
| **Reference book** | Lab manual |
| **Mode of Evaluation** | Continuous Evaluation  End Semester Evaluation |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **DATA STRUCTURES LAB CP 358** |
| **Version** |  |
| **Prerequisite** | C language |
| **Objective:** | The objective of the course are: |
| 1. Demonstrate familiarity with major algorithms and data structures. |
| 1. Analyze performance of algorithms. |
| 1. Choose the appropriate data structure and algorithm design method for a specified application |
| 1. Determine which algorithm and data structure to use in different scenarios. |
| 1. Be familiar with writing recursive methods. |
| **Expected Outcome:** | The student will be able to |
| 1. Represent an array in memory and all application of array |
| 1. Analyze performance of algorithms |
| 1. implement the link list and its application |
| 1. implement the tree data structure and its application |
| 1. implement link list. |
| **List of Experiments** |  |
|  | Simple array and sorting algorithm implementations. |
|  | Addition, multiplication and transpose of sparse matrices represented in array form. |
|  | Polynomial addition, multiplication (8th degree polynomials), using array and linked lists. |
|  | Implementation of stack and queue using array and linked lists |
|  | Implementation of circular queue using array. |
|  | Infix to postfix/prefix conversion. |
|  | Binary search tree creation and traversing |
|  | Generation of spanning trees for a given graph using BFS and DFS algorithms. |
|  | AVL tree implementation (creation, insertion, deletion). |
|  | Symbol table organization (Hash Table). |
|  | Simple array and sorting algorithm implementations. |
|  | Basic operation over linked list (add node, delete node). |
| **Text Book** | NIL |
| **Reference book** | Lab manual |
| **Mode of Evaluation** | Continuous Evaluation  End Semester Evaluation |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |

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|  | **Computer Programming Lab CP 262** |
| **Version** |  |
| **Prerequisite** | C Programming |
| **Objective:** | The objective of the course are: |
| 1. Understanding concept of basic commands used in the UNIX operating system |
| 1. Implementation of shell how we make a program in shell, pipeline and I/O redirection |
| 1. Implementation of array using shell |
| 1. Implementation of commands and formation of result using shell |
| 1. Implementation of file system and the directories of UNIX system |
| **Expected Outcome:** | The student will be able to |
| 1. Get knowledge of importance of the shell in UNIX platform |
| 1. How we configure the LINUX platform |
| 1. How we implement shell script in vi-editor |
| 1. Get knowledge of shell commands. |
| **List of Experiments** |  |
|  | UNIX Use of advanced vi commands. |
|  | Sorting of files containing records using sort command |
|  | Searching patterns in files. |
|  | Use of bc, expr, factor commands. |
|  | Use of head, tail, compress commands |
|  | Memory management commands, dfspace, du, ulimitetc |
|  | JAVA |
|  | Programs based on matrix: addition, multiplication, transpose, check if matrix is symmetric / upper triangular / lower triangular / unit matrix. |
|  | Representation of complex numbers and their operation: add, multiply; divide, subtraction, magnitude (mod) etc. |
|  | Complex matrix representation and operation: add, subtract, multiply. |
|  | Defining packages for sorting algorithms. |
|  | File handling operations: input from file, output to file, file copy, file concatenation. |
|  | Mouse and keyboard event handling programs. |
|  | Programs based on string operations. |
|  | Drawing in applet and use of buttons check boxes, text fields and labels in applets. |
| **Text Book** | NIL |
| **Reference book** | Lab manual |
| **Mode of Evaluation** | Continuous Evaluation  End Semester Evaluation |
| **Recomm. by BOS on** |  |
| **Approved by AC on** |  |