****

**REGULATION**

**FOR**

**B.TECH. COURSE**

 **RANCHI UNIVERSITY**

**REGULATION**

**FOR
B.TECH. COURSE OF RANCHI UNIVERSITY**

**Leading to Bachelor of Technology Degree**

1. **Introduction :**
	1. The Ranchi University, Ranchi, constituted the Board of studies, vides Notification, No. RU/R/8086/12 dated 12.03.2012 , to formulate the Curricula of B. Tech.Courses as well as regulations of the university. Several meetings of the committee were held chairmanship of the Dean, Faculty of Engineering of Ranchi University, Ranchi. The Board of studies considered the guidelines provided by AICTE, while formulating the regulation and syllabus of B.Tech Courses.
	2. All B.Tech Courses of 4-year duration shall consist of eight semesters. However, a student may be allowed to complete the course in maximum of six years.
	3. The regulation and curriculum of B.Tech Courses will come into force from the Academic Year 2012 for the students admitted in the session 2012-13 and onwards.
	4. The provision of this regulation shall also be applicable to any discipline that is introduced from time to time in the Engineering Colleges affiliated to Ranchi University.
	5. The University Senate on the recommendation of the Academic Council may change any or all parts of this Regulation at any time considered appropriate.
2. **Academic Calendar**

 2.1 The Academic Session shall be divided into two semesters each of approximately 17 weeks duration (90 working days including examination period).The odd semesters shall start from July and end in December, whereas even semesters will begin in January and end in May every academic year.

 2.2 A Co-ordination Committee shall be constituted consisting of Dean, Faculty of Engineering (Chairman), Controller of Examination of R.U (Member-Secretary) and Principals of all affiliated engineering colleges under Ranchi University (members).

The committee shall prepare the Examination Calendar at the beginning of each Academic Year for both odd as well as even semesters.

**3. Admission**

 3.1 Admission to all B. Tech. Courses will be made in the first semester of each academic year, at the first year level through the JECECE, AIEEE, and others as per the guidelines of AICTE/Government of Jharkhand. Lateral entry in IIIrd Semester will be permitted as per the guidelines of AICTE/ Government of Jharkhand.

 3.2 All students admitted to any of the B.Tech. courses shall deposit the requisite fees as prescribed by the institutes at the time of joining in each academic year.

 **4. Residence**

 4.1 The Residential requirement shall be as per rules of AICTE. There should be
 accommodation facility at least 25% for Boys & 50% for Girls Students.

 **5. Attendance**

 5.1 Minimum 70 % attendance is essential for any student to appear in the end semester examination. The balance 30% shall include absence for all other reasons including medical.

**6. Conduct & Discipline**

Following rules shall be in force to govern the conduct and discipline of students:

 6.1 Students shall show due respect to the teachers of the Institute, the wardens of Hostels, the sports officers and the officers of the National Cadet Corps; proper courtesy and consideration should also be extended to the employees of the institute and hostel. They shall also pay due attention and courtesy to visitors.

6.2 Students are required to develop a friendly relationship with fellow students. In particular, they are expected to show kindness and consideration to the new students admitted to the institute every year. Law bans ragging in any form to anybody. Any act of physical or mental pressurization of junior students, individually or in a group, will be considered as an act of ragging. Ragging also includes forcing junior students to meet seniors outside institute premises, or in places where student has no valid reason to be present, asking irrelevant questions or using abusive language. Ragging will be considered as gross indiscipline and will be severely dealt with, which may include expulsion from institute.

If junior student yields to any form of ragging by senior students and does not inform the institute or hostel authorities, or willfully withholds the information in an enquiry of ragging incident, the matter will be treated as indiscipline on part of junior student and will invite punishment comparable to those against whom ragging charge are framed. Willful withholding of complain by a junior student does not automatically exempt a senior from punishment.

 6.3 The following acts of omission and /or commission shall constitute gross violation of the code of conduct and are liable to invoke disciplinary measures:

* Furnishing a false statement of any kind in the form of application for admission or for award of scholarship or prizes etc.
* Furnishing false statement to the Disciplinary Committee, or willfully withholding information relevant to an enquiry.
* Organising or participating in an activity that has potential for hurting fellow students along lines of religion, caste, home state, and batch of admission, hostel or any other unhealthy criterion.
* Physical or mental harassment of freshers through physical contact or oral abuse.
* Getting involved in a brawl or fight with persons outside the Institute, either alone or in a group, irrespective of who has initiated the conflict.
* Willfully damaging or stealthily removing any property that belonging to the institute, hostel or fellow students.
* Adoption of unfair means in the examinations.
* Possession, consumption or distribution of alcoholic drinks or any kind of hallucinogenic drugs.
* Organising or participating in any group activity except purely academic and scientific programms in the company with others in or outside the campus without prior permission of Dean of Student’s affairs /Principal of Institute.
* Mutilation or unauthorized possession of library books.
* Displaying lack of courtesy and decorum by resorting to indecent behavior anywhere within or outside campus.
* Resorting to noisy and unseemly behavior, disturbing studies of fellow students.
* Not intimating his/her absence to the warden before leaving the campus.

6.4 Commensurate with the gravity of offence, the punishment may be

1. Reprimand.
2. Additional work in the institute.
3. Debarment from student activities and elections and captaincy of sport teams.
4. Debarment from medals and prizes.
5. Partial ( 1 month or one semester ) or complete debarment from campus placement.
6. Reduction in grade in one or more subjects.
7. Expulsion from hostel.
8. Rustication for a specified period.
9. Outright expulsion from the Institute.

 Punishment under items v-ix will constitute major punishment and will debar a student from all academic medals & prizes as well important non academic awards.

* 1. For all such major acts of indiscipline, which may have serious repercussion on students in general and/or which may warrant a uniform and more formalized nature of investigation, the Institute will form Disciplinary Committee to examine available evidences and award punishment through Principal of the college.
	2. Cases of unfair means in the sessional examination may be dealt with Examination Disciplinary committee of the Institute
	3. In case any student is found using unfair means in any subject/paper for the End Semester for which the examination are in progress, the concerned student will be expelled from the course for which he was admitted. However, this would not preclude from his being readmitted to the next course in the series and such student may be readmitted to the next course from the beginning of concerned semester during which he was expelled from the course. As an example, if a student was found using unfair means during examination for second semester of the course, he may be readmitted from the beginning of second semester of next course in the series.

**7. Change of Branch**

7.1 Only those Students will be eligible for a change of Branch after the Second Semester, who has
 (a) Completed all the Credits prescribed in the First Two Semesters of their Studies in their

 first attempt.

 (b) Obtained a CGPA, at the end of the Second Semester, not lower than 8.25.

7.2 Students may *enlist their* *choice* of Branch, in order of preference, to which they wish to change over. It will not be permissible to alter the *choice* after the application has been submitted.

* 1. Change of Branch shall be made strictly on the basis of Merit of the applicants. For this purpose, the CGPA obtained at the end of second semester shall be considered.
	2. *All Change of Branch made in accordance with the above Rules will be effective from the 3rd
	 Semester of the applicants concerned.*
	3. *No changes of Branch shall be permitted here after.*
	4. Maximum branch change will be limited to 10% of branch intake, subject to condition that (a) strength of branch will not go below 90 % of sanctioned strength and (b) there is vacancy in the branch.
	5. The Institute will forward *the* recommendation for branch change to Dean, Faculty of Engineering, followed by approval *of* Vice-Chancellor *and the decision is* to be communicated to Controller of Examination, Ranchi University and the Institute concerned.

**8. Course Structure**

 8.1 Total credit point for B.Tech course should be between 200-212.

 8.2 The Curricula for the different Degree Programs as proposed by the respective
Departments *and* recommended by the Academic Committee of the Institute shall be approved by the Academic Council of the University and subsequently ratified by Ranchi University Senate.

 **9. Registration**

 9.1 Every Student of the B. Tech. Course is required to register, in person, at the
 commencement of each semester, on the day fixed for and notified in the Academic
 Calendar.

 9.2 Registration of students for all semesters will be centrally organized by the Academic
 section of the Institute.

 9.3 A student who failed to register on the day announced for the purpose may be
 permitted for late registration within next three working days on payment of additional late fee as prescribed by the Institute. Normally no Late Registration shall be permitted after the Third Working Day from the scheduled date of registration.

 9.4 Only those students will be permitted to register who have:

 (a) Cleared all dues of the previous semesters.

 (b) Paid all prescribed fee for the current semester.

 (c) Not been debarred from registering for a specified period on disciplinary or any
 other ground.

 **10. Performance Evaluation**

 10.1 Students’ performance will be measured on a 10 point Scale Grading System using Letter Grades.

 10.2 Grading System: A grade will be awarded to student in a subject based on his performance in end semester examination, practical examination and internal assessment through class tests, home assignments. Grades will be assigned and associated point values will be as follows:

|  |  |  |
| --- | --- | --- |
| Range of Marks(percentage) | Grade | Point of Value |
| 90-100 | Ex | 10 |
| 80-89 | A | 9 |
| 70-79 | B | 8 |
| 60-69 | C | 7 |
| 50-59 | D | 6 |
| 35-49 | P for theory courses  | 5 |
| 40-49 | P for Laboratory Courses(Practical) | 5 |
| Less than 35 | F for theory courses  | 0 |
| Less than 40 | F for Laboratory Courses(Practical)  | 0 |

The student must secure 35% marks in end semester examination (ESE) **and** 35% marks in sessional separately.

The Examination Section of Ranchi University will centrally conduct the End Semester Examinations in respect of the Theory component of the subjects. Each subject/paper will carry 100 marks. The sessional and practical will be assessed on 50 marks each.

The distribution of sessional marks will be as follows:

 Attendance: 10

 Class Test/Home assignment: 30

 Performance/Behavior: 10

 The distribution of practical marks will be as follows:

 Attendance: 10

 Timely submission of lab report: 05

 Lab oratory report: 15

 Viva-voce: 20

 10.3 Students who have failed in maximum of three theory subjects, but pass in all practical and sessional examination, will be promoted to next higher semester & they will be permitted to appear in those subjects, when semester examination of this subject takes place. The marks obtained by the students in practical/sessional examination in the relevant semester will be counted for publication of result.

 10.4 For registration in III rd Semester a student must have

 (a) Completed at least 35 Credits out of 57 Credits with minimum P grades in each Practical Examination.

 (b) Obtain a Cumulative Grade Point Average(35) (CGPA(35)) of not lower than 4.5 calculated on the basis of the best Grades obtained by him/her to attain in 35 Credits.

 10.5 Students who have failed in more than three subjects in a semester must register for all subjects including sessional /practical courses offered in the corresponding semester of the next year.

 10.6 No supplementary examination will be conducted for B. Tech I, II, III, IV and V semesters.

 10.7 There will a supplementary examination for promoted candidates only each for VI and VII semesters to enable candidates to clear backlog papers of these semester, if any. However, if the candidate fails to clear any of the subject/paper in supplementary examination, he/she will not be promoted to the next semester. Such candidate will have to repeat that particular semester again.

 10.8 However, if the student is successful in obtaining at least pass marks or more in the subjects, he/she has appeared then, only pass grade will be entered for publication of result.

 10.9 Only those candidates, who have cleared all the subjects of all previous semesters including those in VIIth semester, will be promoted to VIII semester.

 10.10 Only one supplementary examination will be conducted for VIII semester for those candidates only, who could not clear or could not appear ( due to compelling reasons like serious illness of himself/herself), subject to following conditions:

 a. If the candidate appears in all the papers and obtains at least pass marks or more in all the subjects he/ she has appeared, then marks obtained in all the papers along with the sessional and practical marks already secured, will be considered afresh for publication of result.

 b. If the candidate appears in failed papers & obtains at least pass marks or more, only pass grade will be entered for publication of result.

 10.11 Semester Grade Point average (SGPA) will be computed for each semester. The SGP will be calculated as follows:

$$SGPA=\frac{\sum\_{i=1}^{n}c\_{i} g\_{i} }{\sum\_{i=1}^{n}c\_{i} } $$

 Where ‘n’ is the number of subjects registered for the semester, ‘ci’ is the number of Credit allotted to particular subject, & ‘gi’ is the grade point carried by the Letter Grade corresponding to the subject. SGPA will be rounded off to the second place of decimal
 and recorded as such. The SGPA would indicate the performance of the student in the
 semester to which it refers.

 10.12 Starting from second Semester at the end of each semester , a cumulative Grade Point Average (CGPA) will be computed for every student as follows:$CGPA=\frac{\sum\_{i=1}^{m}c\_{i} g\_{i} }{\sum\_{i=1}^{m}c\_{i} } $

 Where ‘m’ is the total number of subjects the student has registered from the First Semester onwards up to & including the semester, ‘ci’ is the Number of Credits
allotted to a particular subject and ‘gi’ is the Grade –Point carried by the Letter Grade corresponding to the Grade awarded to the student for the subject . CGPA will be rounded off to the second place of Decimal & recorded as such.

The CGPA would indicate the cumulative Performance of the student from the First semester up to the end of the semester to which it refers.

 The CGPA, SGPA & the Grades obtained in all the subjects in a semester will be communicated to every student at the end of every semester.

 For determining the Inter se Merit Ranking of a group of students, only the rounded off values of the CGPAs will be used.

10.13 When a student gets the grade ‘F’ in any subject during a semester, the SGPA and the CGPA from that semester onwards will be tentatively calculated, taking only ‘Zero Point’ for each such ‘F’ Grade. After the ‘F’ Grade(s) has/have been substituted by Letter Grade during a subsequent/examination, the SGPA and the CGPA of all the semester, starting from the earliest Semester in which ‘F’ Grade has been updated, will be recomputed and recorded to take this Change of Grade into account.

 10.14 The six week Industrial training undergone by the students in summer vacation will be assessed within five weeks after commencement of the seventh semester. The students are required to submit a written report on training received & give a seminar. This will be evaluated along with project work of VII semester.

 10.15 Assessment of Project Work: Performance in the various activities involved in the Project would be assessed individually at the end of each semester in which it is being carried out as per the curriculum.

 10.16 The Chairman, Academic Affairs/Head of the Department of Institute will constitute
a committee for conducting the comprehensive Vive-Voce Examination, evaluation of project etc. as per the requirement of the Curriculum.

 10.17 A Student will be issued an Admit Card for appearing in the End Semester Examination, only if he/she has

 (a) requisite attendance.

 (b) paid all Institute & Hostel dues for the semester.

 (c) no disciplinary action is pending against him.

 (d) paid the requisite examination fee

**11. Graduation Requirement**

 11.1. In order to qualify for a B.Tech. Degree of Ranchi University covered under this regulation a student must:

 (a) Complete all the Credit requirements for the degree as laid down in the prescribed
 Curriculum of the Course with a minimum of Grade ‘P’ scored in every subject.

 (b) Obtain a minimum CGPA of 4.50 at the end of the semester in which he/she completes all the requirements for the degree.

 (c) In the final degree certificate CGPA obtained by the candidate will be mentioned.

***16.05.2012 (DRAFT)***

**B. TECH COURSE STRUCTURE**

**ELECTRONICS & COMMUNICATION**

**ENGINEERING**

**RANCHI UNIVERSITY, RANCHI**

 **COMMON TO ALL B.TECH BRANCHES YEAR : I SEMESTER : I**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sl No.** | **Course No.** | **Subject** | **Periods** |  |
| **THEORY** | **L** | **T** | **P** | **Credit****Point** |
|
| 1. | HS 1101 | ENGLISH FOR PROFESSIONAL COMMUNICATION | 2 | - | - | 2 |
| 2. | CH 1101 | ENGINEERING CHEMISTRY | 2 | - | - | 2 |
| 3. | PH 1101 | ENGINEERING PHYSICS I | 3 | - | - | 3 |
| 4. | MH 1101 | MATHEMATICS I | 3 | 1 | - | 4 |
| 5. | ME 1101 | ENGINEERING MECHANICS | 3 | 1 | - | 4 |
| 6. | EE 1101 | BASIC ELECTRICAL ENGINEERING | 3 | 1 | - | 4 |
| **PRACTICAL/DRAWING/DESIGN** |
| 7. | CH1102-PPH1102-P | CHEMISTRY/ PHYSICS LAB(TO BE TAKEN IN ALTERNATE WEEKS) | - | - | 3 | 2 |
| 8. | ME1102-PEE 1102-P | ENGINEERING MECHANICS / ELECTRICAL LABORATORY(TO BE TAKEN IN ALTERNATE WEEKS) | - | - | 3 | 2 |
| 9. | ED1101-P | ENGINEERING GRAPHICS I | - | - | 3 | 2 |
| 10. | WP1101-P | WORKSHOP PRACTICE I | - | - | 3 | 2 |
| 11. | HS1102-P | GENERAL PROFICIENCY I | - | - | - | 2 |
| **TOTAL** | **16** | **3** | **12** | **29** |

**COMMON TO ALL B. TECH BRANCHES YEAR : I SEMESTER : II**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sl No.** | **Course No.** | **Subject** | **Periods** |  |
| **THEORY** | **L** | **T** | **P** | **Credit****Point** |
|
| 1. | CS 1201 | INTRODUCTION TO COMPUTING | 2 | - | - | 2 |
| 2. | CH 1201 | ENVIRONMENT & ECOLOGY | 2 | - | - | 2 |
| 3. | PH 1201 | ENGINEERING PHYSICS II | 3 | - | - | 3 |
| 4. | MH 1201 | MATHEMATICS II | 3 | 1 | - | 4 |
| 5. | ME 1201 | ENGINEERING THERMODYNAMICS | 3 | 1 | - | 4 |
| 6. | EC 1201 | BASIC ELECTRONICS | 3 | - | - | 3 |
| **PRACTICAL/DRAWING/DESIGN** |
| 7. | EC1202-P | BASIC ELECTRONICS LAB | - | - | 3 | 2 |
| 8. | CS1202-P | COMPUTER PROGRAMMING LAB | - | - | 3 | 2 |
| 9. | ED1202-P | ENGINEERING GRAPHICS II (M/C DRAWING) | - | - | 3 | 2 |
| 10. | WP1202-P | WORKSHOP PRACTICE II | - | - | 3 | 2 |
| 11. | HS1202-P | GENERAL PROFICIENCY II | - | - | - | 2 |
| **TOTAL** | **16** | **2** | **12** | **28** |

**ELECTRONICS & COMMUNICATION ENGINEERING**: **YEAR: II SEMESTER: III**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sl. No** | **Course No.** | **Subject** | **Periods** | **Credit** |
| **THEORY** | **L** | **T** | **P** |
| 1 | CS1301 | Numerical Analysis & Computer Programming (C) | 2 | - | - | 2 |
| 2 | ME1312 | Material Science | 2 | - | - | 2 |
| 3 | MH1302 | Mathematics III | 3 | 1 | - | 4 |
| 4 | ME 1303 | Strength of Materials | 3 | 1 | - | 4 |
| 5 | EC1301 | Switching & Pulse Theory | 3 | - | - | 3 |
| 6 | EC1302 | Electronics Measurements | 3 | - | - | 3 |
| **PRACTICAL/DRAWING/DESIGN** |
| 7 | CS 1302 - P | Numerical Analysis & Computer Programming (C) lab | - | - | 3 | 2 |
| 8 | ME 1307 – P | Material Science lab | - | - | 2 | 1 |
| 9 | ME 1308 – P | Strength of Materials lab | - | - | 2 | 1 |
| 10 | EC 1302 – P | Switching & Pulse theory lab | - | - | 3 | 2 |
| 11 | EC 1303 – P | Electronics Measurement lab | - | - | 3 | 2 |
| 12 | HS 1303-P | General Proficiency III | - | - | - | 2 |
| **Total** | **16** | **2** | **13** | **28** |

**ELECTRONICS & COMMUNICATION ENGINEERING**: **YEAR: II SEMESTER: IV**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sl. No** | **Course No.** | **Subject** | **Periods** | **Credit** |
| **THEORY** | **L** | **T** | **P** |
| 1 | EC1401 | Electromagnetics | 2 | - | - | 2 |
| 2 | EC1402 | LinearIc’s & Applications | 2 | - | - | 2 |
| 3 | EC1403 | Electronic Circuits | 3 | 1 | - | 4 |
| 4 | EC1404 | Solid State Devices | 3 | - | - | 3 |
| 5 | EC1405 | Network Theory | 3 | - | - | 3 |
| 6 | CS 1513 | Computer Programming (C++) | 3 | - | - | 3 |
| **PRACTICAL/DRAWING/DESIGN** |
| 7 | EC 1403 – P | LinearIc’s & Applications lab | - | - | 3 | 2 |
| 8 | EC 1404 – P | Electronic Circuits lab | - | - | 3 | 2 |
| 9 | EC 1405 – P | Solid State Devices lab | - | - | 3 | 2 |
| 10 | EC 1406 - P | Network Theory lab | - | - | 2 | 1 |
| 11 | CS 1514 – P | Computer Programming (C++) lab | - | - | 2 | 1 |
| 12 | HS1404 - P | General Proficiency IV | - | - | - | 2 |
| **Total** | **16** | **1** | **13** | **27** |

**ELECTRONICS & COMMUNICATION ENGINEERING**: **YEAR: III SEMESTER: V**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sl. No** | **Course No.** | **Subject** | **Periods** | **Credit** |
| **THEORY** | **L** | **T** | **P** |
| 1 | HS1501 | Management Science | 2 | - | - | 2 |
| 2 | EC1501 | Electronics Instrumentation | 2 | - | - | 2 |
| 3 | CS 1512 | Computer Organization | 3 | - | - | 3 |
| 4 | EC1502 | Communication System - I | 3 | - | - | 3 |
| 5 | EC1503 | Microprocessor Theory | 3 | - | - | 3 |
| 6 | EC1504 | Automatic Control Systems | 3 | - | - | 3 |
| **PRACTICAL/DRAWING/DESIGN** |
| 7 | EC 1502 - P | Electronics Instrumentation lab | - | - | 3 | 2 |
| 8 | EC 1503 - P | Communication System – I lab | - | - | 3 | 2 |
| 9 | EC 1504 – P | Microprocessor Theory lab | - | - | 3 | 2 |
| 10 | EC 1505 – P | Automatic Control Systems lab | - | - | 3 | 2 |
| 11 | HS1505 - P | General Proficiency V | - | - | - | 2 |
| **Total** | **16** | **-** | **12** | **26** |

**ELECTRONICS & COMMUNICATION ENGINEERING**: **YEAR: III SEMESTER: VI**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sl. No** | **Course No.** | **Subject** | **Periods** | **Credit** |
| **THEORY** | **L** | **T** | **P** |
| 1 | EC1601 | Industrial Electronics | 2 | - | - | 2 |
| 2 | EC1602 | RADAR & TV Engineering | 2 | - | - | 2 |
| 3 | EC 1603 | Data Communication & Networking | 3 | - | - | 3 |
| 4 | EC 1604 | Communication Hardware Design | 3 | - | - | 3 |
| 5 | EC 1605 | Microwave Engineering | 3 | - | - | 3 |
| 6 | EC 1606 | Communication System - II | 3 | - | - | 3 |
| **PRACTICAL/DRAWING/DESIGN** |
| 7 | EC 1604 – P | Data Communication & Networking lab | - | - | 3 | 2 |
| 8 | EC 1605 – P | Communication Hardware Design lab | - | - | 3 | 2 |
| 9 | EC 1606 – P | Microwave Engineering lab | - | - | 3 | 2 |
| 10 | EC 1607 – P | Communication System - II lab | - | - | 3 | 2 |
| 11 | HS1606 - P | General Proficiency VI | - | - | - | 2 |
| **Total** | **16** | **-** | **12** | **26** |

**ELECTRONICS & COMMUNICATION ENGINEERING**: **YEAR: IV SEMESTER: VII**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sl. No** | **Course No.** | **Subject** | **Periods** | **Credit** |
| **THEORY** | **L** | **T** | **P** |
| 1 | EC1701 | Optical Communication | 3 | - | - | 3 |
| 2 | EC1702 | Digital Signal Processing | 3 | - | - | 3 |
| 3 | EC1703 | Microelectronics Devices & VLSI Technology | 3 | - | - | 3 |
| 4 |  | Open Elective- I | 3 | - | - | 3 |
| 5 |  | Professional Elective- I | 3 | - | - | 3 |
| **PRACTICAL/DRAWING/DESIGN** |
| 6 | EC 1702 - P | Optical Communication lab | - | - | 3 | 2 |
| 7 | EC 1703 - P | Digital Signal Processing lab | - | - | 3 | 2 |
| 8 | EC 1706 - P | Microelectronics Devices & VLSI Technology lab | - | - | 3 | 2 |
| 9 | EC 1707 -P | Project- I | - | - | 3 | 2 |
| 10 | HS 1707 -P | General Proficiency VII | - | - | - | 2 |
| **Total** | **15** | **-** | **12** | **25** |

|  |  |  |  |
| --- | --- | --- | --- |
| **Electives** | **Sl.No.** | **Code** | **Paper** |
| Open Elective - I | 01 | HS 2711 | Enterprise Resource Management |
| 02 | CS 2711 | E – Commerce Strategic IT |
| 03 | HS 2712 | Technology Management |
| 04 | HS 2713 | Decision Support & Executive Information System |
| 05 | CS 2712 | Software Technology |
| Professional Elective - I | 01 | EC 2711 | Active Filters |
| 02 | EC 2712 | Speech Signal Processing |
| 03 | CS 2713 | Digital Image Processing |
| 04 | EC 2714 | Optical Network |
| 05 | EC 2715 | Mobile Communication |

**ELECTRONICS & COMMUNICATION ENGINEERING**: **YEAR: IV SEMESTER: VIII**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sl. No** | **Course No.** | **Subject** | **Periods** | **Credit** |
| **THEORY** | **L** | **T** | **P** |
| 1 |  | Open Elective II | 3 | - | - | 3 |
| 2 |  | Professional Elective- II | 3 | - | - | 3 |
| 3 |  | Professional Elective - III | 3 | - | - | 3 |
| 4 | EC 1801 | Digital Hardware Design | 3 | - | - | 3 |
| 5 | EC 1802 | Satellite Communication | 3 | - | - | 3 |
| **PRACTICAL/DRAWING/DESIGN** |
| 6 | EC 1803-P | Project- II | - | - | 9 | 6 |
| 7 | HS 1808 -P | General Proficiency VIII | - | - | - | 2 |
| **Total** | **15** | **-** | **9** | **23** |

|  |  |  |  |
| --- | --- | --- | --- |
| **Electives** | **Sl. No.** | **Code** | **Paper** |
| Open Elective - II | 01 | CS 2811 | IT in Marketing Management |
| 02 | CS 2812 | IT in HR Management |
| 03 | HS 2811 | IT in Finance Management |
| 04 | CS 2813 | Project Management and Software Tools |
| 05 | HS 2812 | Human Values |
| Professional Elective - II | 01 | EC 2811 | Data Communication & Design |
| 02 | EC 2812 | Microprocessor Based System Design |
| 03 | EC 2813 | Advanced Topics in Microprocessors & Microelectronics |
| 04 | CS 2814 | Personnel Computer Systems |
| 05 | EC 2814 | Biomedical Instrumentation |
| 06 | EC 2815 | Power Electronics |
| Professional Elective - III | 01 | CS 2815 | System Software |
| 02 | CS 2816 | Computer Graphics |
| 03 | EC 2816 | Modeling and Simulation |
| 04 | EC 2714 C | Mobile Computing |
| 05 | EC 2818 | VLSI Design |
| 06 | EE 2811 | Natural Network and Fuzzy System |

**B. TECH COURSE STRUCTURE**

**COMMON TO ENGINEERING**

**BRANCHES**

**1ST SEMESTER**

**RANCHI UNIVERSITY, RANCHI**

**HS 1101 ENGLISH FOR PROFESSIONAL COMMUNICATION**

 **UNITS NO. OF LECTURES**

**COMMUNICATION (5 LECTS)**

Role & Objectives Of Communication, Process of Communication, Element & Essentials of Communication, Flow of Communication, Barriers /Factors Inhibiting Communication, Verbal/Non-Verbal Communication, Kinesics/Body Languages, Style In Technical Communication, Communication Skills-Reading, Writing, Speaking, Listening& Talking.

**PROFESSIONAL WRITING (3 LECTS)**

Business Letters/Official Letters, Letter Writing Skills, Letter Writing Process, Letter Formats, Essentials of Letter Writing, Types Of Professional Letters, D.O Letter, Job Application and resume.

**GRAPHICS (1 LECT)**

Introduction, Planning of Graphics, Placing of Graphics, Construction of Graphics, Types of Graphics.

**PHONETICS & PHONOLOGY (8 LECTS)**

Organs of Speech/ Speech Mechanism, Phonetic Symbols, Consonant/Vowels/ Diphthongs-Classification, Stress Pattern/Intonation, Pronunciation Guidelines, Syllable/Syllable Division, Tones.

**REPORT WRITING (5 LECTS)**

Introduction & Important Features of Report, Types of Report, Structure &Layout Format, Language Style, Project Report, Laboratory Report, Industry Report, Socio Culture Report, Technical Report, Proposals –Nature,Significance Types,Structures.

**DISCUSSION SKILLS (3LECTS)**

Introduction, importance of group discussion, Process of group discussion Group discussion strategies, Interaction strategies, Individual, Contribution, Leadership skills, Team management, Creating a friendly co operative atmosphere.

**PRESENTATION SKILLS**

Nature And Importance of Presentation, Introduction And Meaning of Presentation, Planning Presentation, Objective With Central Idea, Main Ideas, Role of Supporting, Material –Steps, Handling Stages Fright

 **STUDY SKILLS (2LECTS)**

Note making, Mechanics of note making, Note writing techniques, Reduction device, Organizing techniques, Methods of sequencing, Summarizing & paragraph, Mechanics of summarizing, Summarizing techniques, Outlining & paraphrasing

**REFERENCING (2LECTS)**

Referencing Skills, Method of Referencing, Using Footnotes, Scanning Skills, Skimming Skills, Locating Books in the Library, Required Information/Meaning/Pronunciation.

 **SENTENCES (2LECTS)**

Requisites of Good Sentence Writing, Effective Sentence Structure, Sentence Building, Sentence Coherence, Use of Connectives, Sentence Emphasis/Sentence Theme, Development of Paragraph

 **PARAGRAPH WRITING (2LECTS)**

Paragraph Structure, Principles of Paragraph Writing, Paragraph length/ Coherence/ Division, Use of Modals/Connectives/Modifies, Punctuations & Spelling, Concord

**TELEPHONIC CONVERSATION** (**2LECTS)**

Introduction, Listening/speaking, Telephonic skills required Problems of telephonic conversations, Intensive listening

**LISTENING COMPHREHSION (2LECTS)**

To comprehend spoken materials in standard Indian, English/British English & American English, Current situation in India regarding English American English/British English

**INTERVIEW** (**2LECTS)**

The Interview process, Pre interview preparation techniques, projecting a positive image, Answering strategies.

**GENERAL PROFICIENCY**

G.P. classes are conducted for personality development of students. It includes Group Discussion, Presentation, Seminar, Quiz, C V Writing, Technical Report Writing and also inculcates Human Values and Professional Ethics. There will be assignments and class tests also.

**SYLLABUS OF ENGINEERING CHEMISTRY CH1101**

Adv. Atomic structure / Atoms

1. Basic ideas about de-Broglie’s ware equation, Heisenberg uncertainty principle, schrodinger wave equation (Derivation). Particle in a box illustrating energy quantization radial and angular part of H-atom. Wave functions/orbitals, probability and charge distribution.  **(4 period)**
2. Chemical bonding/chemical valency/ molecules.

Ionic bond, covalent bond, co-ordinate bond, vanderwalls forces & hydrogen bonding shape and geometry of species (Helfrich rule, VSEPERT & Hybridisation) and nature of species (VBT & MOT) of diatomic molecular.  **(4 period)**

1. Chemical kinetics / Reaction dynamics

Rate laws, molecularity & order of reaction, kinetic derivation of first and 2nd order of reaction with their half life period. Arrhenius equation for single and double temperature. Collision and transition state theory. **(3 period)**

1. Laser in chemistry

Explain laser in chemistry with their types **(2 period)**

1. Electrochemistry:

Nernst equation for electrode potential (Derivation), Application of electrode potentials to predicet redox reactions in solution with special reference in lattimer and frost diagrams. **(3 Period)**

1. Transition metal chemistry/Co-ordination chemistry

Nomenclature and isomerism of complex compounds. Theories of bonding in co-ordination compounds, Viz crystal field theory, Valence bond theory. Chelation. Application in organic synthesis. **(4 Period)**

1. Organometallic chemistry:

Introduction, structure and bonding in organometallic complexes. The eighteen and sixteen electron rules. **(3 period)**

1. Catalysis:

Introduction, types and characteristics of catalysis (Homogeneous, Heterogeneous, acid-base, auto and enzyme catalysis). The role of metals in catalysis cycles turning some chemical reaction (e. g. Hydrofirngalation, Hydrogenetion ) **(3Period)**

1. Role of metals in biology:

Oxygen carrier, electron transfer biologigical role of iron and copper.

**(2 Period)**

1. Structure and reactivity of organic molecules/organic chemistry:

Electron displacement effects (Inductive effect, Mesomeric effect or resonance hyper conjugation, electromeric effect, inductomeric effect)

Intermediate organic species based on carbon (free radicals, carbocations, carbanions, carbenes)

Types of organic reactions addition reaction, elimination reaction (E1 & E2) substitution reactions ( SN1 SN2, SNi)

Stereochemistry (introduction, Chirality, isomerism conformational analysis E-Z & R-S nomenclature) **(6 Period)**

1. Polymerisation;

Basic concepts, classification and industrial application **(2 Period)**

1. Photochemistry:

Introduction, fluorescence, phosphorescence, norrish type –I and II reaction, application of photosynthesis, photosynthem ( Z- diopram) chemistry of vision. Laws of phtochemistry. **(4 Period)**

**Reference Books:-**

1. Advance physical chemistry, Gurdeep Raj, Goel publishing house Meerut
2. Essentials of Physical Chemistry B. S. Bahal, S. chand and Company
3. Organic Chemistry Morrison Boyd
4. Advanced Inorganic Chemistry Gurdeep Raj
5. Engg. Chemistry Shashi Chawla, Dhanpat Rai and Com.
6. Engg. Chemistry Jain & Jain, Dhanpat Rai and Com.
7. Industrial Chemistry, B. K. Sharma, Goel publishing house Meerut

**PH 1101 ENGINEERING PHYSICS-I (3-1-0)**

**Module 1. Theory of Relativity**

Inertial frame of reference, Noninertial frames and fictitious forces, Outline of relativity, Michelson-Morley experiment, Lorentz transformation of space and time, Length contraction, variation of mass with velocity, Equivalence of mass and energy. **[6]**

**Module 2. Cardinal Points of Optical System**

Combination of thin lenses, Cardinal points of coaxial system of thin lenses, Thick lenses, Location and properties of cardinal points, Graphical construction of images. **[4]**

**Module 3. Interference of Light**

Analytical treatment of interference, Intensity distribution of fringes system, Coherent and Non-coherent sources, Fundamental conditions of interference, Fresnel’s biprism, Displacement of fringes, Wedge shaped films, Newton’s rings. **[5]**

**Module 4. Diffraction of Light**

Single slit and double slit diffraction, Diffraction grating, Limit of resolution, Resolving power of grating and image forming systems. **[4]**

**Module 5. Polarization of Light**

Brewster’s law, Double refraction, Geometry of calcite crystal, Optic axis, nicol prism, Circularly and elliptically polarized light, Retardation plates, Production and analysis of plane, circularly and elliptically polarized light, Polarimeter. **[5]**

**Module 6. Thermal Physics**

Kinetic theory of gases, Maxwellian distribution, Mean free path , Transport phenomena in gases, Imperfect gases and Vander waal’s equation of state. **[4]**

**Module 7. Accoustics**

Production and applications of Ultrasonics, Accousitcs of buildings. **[2]**

**Module 8. Dynamics of fluids**

Continuity equation, Bernoulli’s theorem and its applications, Torcelli’s theorem, Viscosity-flow of Liquid through a capillary tube , Capillaries in series and parallel, Stoke’s formula, Rotation viscometer. **[5]**

**Books Recommended**:

1. Optics, Ajoy Ghatak, Tata Mc: Graw- HILL Publising Company Co. , New Delhi.
2. Relativistic Mechanics, Satya Prakash , Pragati Prakasan , Meerut.
3. Heat and thermodynamics, P. K. Chakrawarty, Hindustan Publishing Concern.

 **Mathematics-I**

**Unit-1**

Differentiation of functions of one variable:- Successive differentiation, Leibnitz Theorem( without proof), Rolle’s Theorem ,Lagrange’s Mean Value Theorem, Taylor’s Theorem and Expansions of functions into Taylor’s and Maclaurin’s Series. **(05 Classes)**

**Unit-2**

Calculus of function of several variables:-Partial Derivatives, Chain Rule, Differentiation of implicit function, Total Differentials, Euler’s Theorem. **(05 Classes)**

**Unit-3**

Maxima and Minima:-Maxima and Minima of function of two Variables, Method of Lagrange’s Multiplier’s. **(02 Classes)**

**Unit-4**

Integral Calculus:-Elementary Reduction formula for Integral, Integration as a Limit of Sum, Problems on Length, Area, Volume and surface area of revolutions. **(08 Classes)**

**Unit-5**

Multiple Integral:-Double and Triple Integral, Change of Order of Integration, Jacobian, Applications to Areas and Volume. **(05 Classes)**

**Unit-6**

Differentiation of Vector:- Scalar and Vector point Function, Gradient Divergence and Curl. **(03 Classes)**

**Unit-7**

Integration of Vectors:-Line Integral and surface Integral, Greens Theorem, Gauss Divergence Theorem and Stoke’s Theorem (without proof) and their simple applications. **(05 Classes)**

**Unit-8:**

Infinite Series:- Convergence and Divergence of Series, Comparison Test, Ratio Test, Cauchy’s root test, Leibnitz Rule, Absolute and Conditionally convergence. **(06 Classes)**

**Reference Books**:-

 1. Advanced Mathematics for Engineers, by “Erwin Kreyszig”(Wiley Eastern Publication)

 2. Higher Engineering Mathematics, by “B.S.Grewal” ( Khanna Publication)

 3. Engineering Mathematics, by “ S.S.Shastri” (PHI Publication)

 4.Advance Mathematics for Engineer,by’Gorakh Prasad”(Torrent Publication).

**1st Semester**

**ME 1101 ENGINEERING MECHANICS (3-1-0)**

**Fundamentals of Mechanics – Basic concepts (5 Lectures)**

**Force Systems and Equilibrium**Force,Moment and couple, Principle of Transmissibility, Varignon’s theorem, Resultant of force system- Concurrent and non- concurrent coplanar forces, Free body diagram, Equilibrium equations and their uses in solving elementary engineering problems. **(5 Lectures)**

**Plane Trusses (5 Lectures)**The structural model, simple trusses, analysis of simple trusses: method of joints, method of sections, graphical method.

**Friction (5 Lectures)**Introduction, laws of coulomb friction, simple contact friction problems, belt friction, the square screw thread, rolling resistance.

**Properties of Surfaces (5 Lectures)**First moment of an area and centroid, Second moment and product of area of a plane area, transfer theorems, relation between second moment and product of area, polar moment of inertia, principal axes, mass moment of inertia.

**Virtual work (5 Lectures)**Work of a force, Principle of Virtual work and its application.

**Kinematic of Rigid bodies (5 Lectures)**Plane motion, Absolute motion, Relative motion, Translating axes and rotating axes.

**Kinetics of Rigid bodies (5 Lectures)**Plane motion, Work energy, Impulse and momentum.

**Suggested Text Books & References:-**

* Mechanics for Engineering ,Beer F.P. and Johnson F.R. , Mc Graw Hill
* Engineering Mechanics, Timoshenko ,Young & Rao , TMH
* “Engineering Mechanics,Dr. R.K. Bansal ,Laxmi Publications
* “Engineering mechanics, R.S. Khurmi ,
* “Engineering Mechanics,Dr. V.M. Domkundwar , Dhanpat Rai Publications
* Engineering mechanics”, I.H Shames & Rao , Prentice Hall of India
* Engineering mechanics, Dr. D. S. Kumar , Kataria & sons

**Semester I**

**EE 1101 - BASIC ELECTRICAL ENGINEERING (3-1-0)**

**DC Networks**

Kirchoff’s laws, node voltage and mesh current methods; Delta-star and star-delta conversion; Classification of Network Elements, Superposition principle, Thevenin’s and Norton’s theorems. **4Hrs**

**Single Phase AC Circuits**

Single phase EMF generation, average and effective values of sinusoids; Solution of R,L,C series circuits, the j operator, complex representation of impedances; Phasor diagram, power factor, power in complex notation; Solution of series, parallel and series- parallel circuits. **6Hrs**

**Three Phase AC Circuits**

Three phase EMF generation, delta and Y- connection, line and phase quantities; Solution of three phase circuits balanced supply voltage and balanced load; Phasor diagram, measurement of power in three phase circuits; three phase four wire circuits.

 **6Hrs**

**Magnetic Circuits**

Ampere’s circuital law, B-H curve, solution of magnetic circuits, Hysteresis and eddy current losses. **4Hrs** **Transformers**

Construction, EMF equation, ratings; Phasor diagram on no load and full load; Equivalent circuit, regulation and efficiency calculations; Open and short circuit test,

 Three phase transformers. **4Hrs**

**Induction Motors**

The revolving magnetic field, principle of operation, ratings; Equivalent circuit

; Torque-speed characteristics; **4Hrs**

**DC Machines**

Construction, EMF and Torque equations; Characteristics of DC generators and motors; Speed control of DC motors and DC motor stators; Armature reaction and communication. **4Hrs**

**Electrical Measuring Instruments**

DC PMMC instruments, shunts and multipliers, multi-meters, Moving iron ammeters and voltmeters, Extension of instrument ranges. **4Hrs**

**Power Supply Systems (Introductory)**

General structure of electrical power systems; power transmission and distribution via overhead lines and underground cables, steam, hydro, gas and nuclear power generation. **4Hrs**

**Suggested text books & references**

1 ”Basic Electrical” Mittal & Mittal, Tata McGraw Hill

2 “Theory and Practice of Basic Electrical Engg.” Kothari & Nagraaj ,Prentice Hall of India

3 “Basic Electrical Engg.” G.K. Lal, 3-D Publication

4 ”Fundamental of Electrical Engg.” Ashfaq Hussain, Dhanpat Rai Publication.

**SYLLABUS OF ENGINEERING CHEMISTRY OF PRACTICAL PAPERS**

**CH1102-P**

1. Acide – base titration (estimation of commercial caustic soda).
2. Redox titration (estimation of iron using permanganometry)
3. Perparation and analysis of a metal complex (for example thiourea/copper sulfate or nickel chloride/ammonia complexes.
4. Chemical kinetics (determination of relative rates of reaction of iodide with H2O2 at room temperature (clock reaction)
5. Heterogeneous equilibrium (determination of partition coefficient of acetic acid between n-butanol and water.
6. Photochemical oxidation-reduction(study of Photochemical reduction of ferric salt)
7. Viscosity of solutions (determination of percentage composition of sugar solution from viscosity)
8. Synthesis of aspirin
9. Synthesis of P-nitro aniline from acetanilide.
10. Detection of functional groups in organic compounds.
11. Radical polymerization of vinyl monomers such as styrene, acrylonitrile etc.
12. Conductometric titration (determination of the strength of a given HCL solution by titration against a standard NaOH solution.

**Reference Books:-**

1. Essentials of experimental Engg. Chemistry by Shashi Chawla & Dhanpat Rai & Company.

**PH1102-P ENGINEERING PHYSICS-1**

**List of Experiment**

* To determine the coefficient of viscosity of water by capillary flow.
* To determine the thermal conductivity of a bad and good conductor by Lee’s method and Searl’s methods respectively.
* To determine the wave length of light by Newton’s ring method.
* To determine the wave length of light by Fresnel’s biprism.
* To determine the dispersive power of the given material of the prism.
* To determine the focal length of light combination of two thin lenses by nodal slide assembly and its verification.
* Determination of c/m by J. J. Thomson’s method.
* Measurement of thermo emf between different types of thermocouples as a function of temperature difference between the junction, measurement of an unknown temperature.
* Use of Carry Foster Bridge.
* Study of electromagnetic Induction.
* Study of electromagnetic damping and determination of terminal velocity reached by magnet falling in a metallic tube.
* Study of electromagnetic damping and determination of terminal velocity reached by magnet falling in a metallic tube.
* Study of L.C.R circuits with AC circuits.
* Determination of Plancks’s constant using photocells.

**ME 1102-P ENGINEERING MECHANICS (0-0-3/2)**

**List of Experiments**

To determine the Newton’s second law of motion by Fletcher’s trolley apparatus.
To determine the moment of inertia of a flywheel about its axis of rotation.
To verify: (a) The condition of equilibrium of forces by parallel force apparatus.
 (b) The principal of moments by crank lever.
To determine the dry friction between inclined plane and slide boxes of different materials.
To determine the coefficient of friction between the belt and rope and the fixed pulley.
To determine the velocity ratio of a simple screw jack and to plot graph between
 (a) Effort- Load
 (b) Friction-Load
 (c) Efficiency- Load.
To measure the area of a figure with the help of a Polar Planimeter.

**Semester I**

**EE 1102-P – Basic Electrical Engineering (0-0-3/2)**

**List of Experiments**

* To measure the armature and field resistance of a DC machine.
* To calibrate a test (moving iron) ammeter and a (dynamometer) wattmeter with respect to standard (DCPMMC) ammeter and voltmeters.
* Verification of circuit theorems, Thevenin’s and Superposition theorems (with DC Sources only).
* Voltage-current characteristics of incandescent lamps and fusing time-current characteristics of
fuse wire.
* Measurement of current, voltages and power in R-L-C series circuit excited by (single phase) AC
supply.
* Open circuit and short circuit tests on a single – phase transformer.
* Connection and starting of a three – phase induction motor using direct online (DOL) or star – delta starter.
* Connection & measurement of power consumption of a fluorescent lamp.
* Determination of open circuit characteristics (OCC) of a DC machine.
* Starting and speed control of a DC shunt motor.
* Connection andtesting of a single - phase energy meter (unity power factor load only).
* Two – wattmeter method of measuring power in three – phase circuit (resistive load only).

**1st semester**

**ED 1101-P ENGINEERING GRAPHICS – I (0-0-3)**

 **General**

Importance, Significance & scope of engineering drawing, Lettering, Dimensioning, Scales, Sense of proportioning, Different types of projections, B.I.S. Specifications. **(5 Lectures)**

**Projections of Points & Lines**

Introduction of planes of projection, Reference and auxiliary planes, projections of points and lines in different quadrants, traces, inclinations, and true lengths of the lines, projections on auxiliary planes,
shortest distance, intersecting and non- intersecting lines. **(5 Lectures)**

**Planes Other than the Reference Planes**

Introduction of other planes (perpendicular and oblique), their traces, inclinations etc., projections of points and lines lying in the planes, conversion of oblique plane into auxiliary plane and solutions of related problems. **(5 Lectures)**

**Projections of Plane Figures**

Different cases of plane figures (of different shapes), making different angles with one or both reference planes and lines lying in the plane figures making different given angles (with one or both reference planes, Obtaining true shape of the plane figure by projection. **(5 Lectures)**

**Projection of Solids**

Simple cases when solid are placed in different positions, Axis faces and lines lying in the faces of the solid making given angles. **(5 Lectures)**

**Development of Surface (5 Lectures)**

Development of simple objects with & without sectioning.

**Isometric Projection (5 Lectures)**

Nomography

Basic concepts and uses

**1st and 2nd semester**

**WP 1101 – P WORKSHOP PRACTICE I & II (0-0-3)**

**Carpentry:** Definition, engineering applications, seasoning and preservation, plywood and plyboards.
**Foundry:**  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.
**Metal Joining:** Definition of welding, brazing & soldering processes and their applications, Oxy – acetylene gas welding process, equipment and techniques, types of flames and their applications, Manual metal are welding techniques and equipments, AC & DC welding, electrodes, constituents and functions of electrode coating, Welding positions, Type of weld joint, common welding defects such as cracks, undercutting, slag inclusions, porosity.
**Metal Cutting:** Introduction to machining and common machining operations. Cutting tool materials, Definition of machine tools, specification and block diagram of lathe, Shaper, drilling machine & grinder, Common
Lathe operations such as turning, chamfering and facing, Quick return mechanism of shaper, Difference between drilling and boring, Files – material 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 workshop
Group A**1. T – Lap joint and Bridle joint (Carpentry shop)
2. Mould of any pattern (Foundry shop)
3. Casting of any simple pattern (Foundry shop)
**Group B**1. (a) Gas welding practice by student on mild steel flat
 (b) Lap joint by Gas Welding
2. (a) MMA Welding practice by students
 (b) Square butt joint by MMA Welding
3. (a) Lap joint by MMA Welding
 (b) Demonstration of brazing
4. Tin smithy for making mechanical joint and soldering of joints.
**Group C**
1. Job on lathe with one step turning and chamfering operations
2. Job on shaper for finishing two sides of a job
3. (a) Drilling two holes of size 5 & 12 mm diameter on job used/to be used for shaping
 (b) Grinding a corner of above job on bench grinder
4. Finishing of two sides of a square piece by filling

**B. TECH COURSE STRUCTURE**

**COMMON TO ENGINEERING**

**BRANCHES**

**2ND SEMESTER**

**RANCHI UNIVERSITY, RANCHI**

**(CS 1201) INTRODUCTION TO COMPUTING**

**Module I [5 Hrs]**

Fundamentals of Computer:

History of Computer, Generation of Computer, Classification of Computers

Basic Anatomy of Computer System, Primary & Secondary Memory, Processing Unit, Input & Output devices

**Module II [6 Hrs]**

Number systems representation of signed and unsigned numbers, BCD, ASCII, Binary, Arithmetic & logic gates.

Assembly language, high level language, compiler and assembler (basic concepts)

**Module III [4 Hrs]**

Basic concepts of operating systems like MS DOS, MS WINDOW, UNIX.

Introduction to typesetting software such as Microsoft office, Introduction to emails, FTP, R-login, Network Services, Internet.

**Module IV [20 Hrs]**

Concepts of Algorithm & flow chart, notion of programs, programmability and programming languages.

Structure of programs, object codes.

Introduction to Programming Languages - BASIC, FORTRAN and PASCAL.

**Text Books:**

Kerninghan, B.W. The Elements of Programming Style

Gottfried Programming with Pascal, Shaum Series, TMH

Rajaraman V. Fundamental of Computers

**Reference Books:**

Kerninghan B.W. & Ritchie D.M. The C Programming Language

Balaguruswamy Programming in C

M.M.Oka Computer Fundamentals, EPH

Leon Introduction to Computers, Vikas

Leon Fundamental of Information Technology, Vikas

*ENVIRONMENT & ECOLOGY* (CH1201)

***Unit – I*** **4 Lecture**

1. Environment:

Definition Components of Environment importance of study, Environmental degradation and human activity.

***Unit – II***

1. Ecology: **5 Lecture**

Definition elements of Ecology, Scope/object of Ecology, Different kind of Ecosystem (structure & function), Principles of Environmental impacts assessment.

***Unit – III*** **5 Lecture**

1. Air Pollution:

Atmospheric composition, energy balance, climate, weather, dispersion, soures and effects of pollutants, primary and secondary pollutants, green house effect, depletion of ozone layer, standards and control measures.

1. Water pollution:

Hydrosphere, natural water , pollutants their origin and effects river/lake/ground water pollution standards and control

***Unit – IV*** **4 Lecture**

1. Land pollution:

Lithosphere, pollutants (municipal, industrial, commercial, agricultural, hazardous solid waste) their origin and effects, collection and disposal of solid waste, recovery and conversion methods.

1. Noise Pollution

Sources, effects standards and control

***Unit – V*** **5 Lecture**

1. Energy:

Definition different kind of sources of energy (conventional & nonconventional) and its impact on environment. Solar, Biomass, Bio-gas, hydrogen as an alternative Future source of energy.

***Unit – VI*** **6 Lecture**

Current environmental issues of importance population growth, climate change and/or Global warming – definition and its effect, Acid Rain, ozone layer Depletion

***Unit – VII*** **3 Lecture**

Environmental protection – Role of Government and Civilians. Environmental education.

***Unit – VIII*** **3 Lecture**

 Solid Waste Management – Definition and methodology.

Reference:-

1. Environmental Chemistry B. K. Sharma
2. Environmental Studies by Ritu Bir, Vayu education of India.
3. Environmental Studies by S. Deswal, A. Deswal, Dhanpat Rai & company.

**PH 1201 ENGINEERING PHYSICS-II (3-0-0)**

**Module 1. Vector analysis**

Scalar and vector fields, Gradient of a scalar field, Divergence and curl of vector fields, Line integral of a vector field, Gauss-divergence theorem, Stoke’s theorem. **[5]**

**Module 2. Electrostatics**

Quantization & conservation of charge, Coulomb’s law (vectorial form) and superposition principle, Concept of electric field lines, flux of electric field, Gauss’s law, Electric Potential and potential energy, Conductors, Capacitors and dielectric materials. **[5]**

**Module 3. Electromagnetism**

Magnetic field, Force on a moving charge in a magnetic field, Force on a current element, Torque on current loop, Biot-Savart law, Ampere’s circuital law, Electromagnetic induction and Faraday’s law, Magnetism in materials, Maxwell’s equations, Electromagnetic Waves. **[7]**

**Module 4. Thermoelectricity**

Seebeck effect, Law of successive temperatures, Law of intermediate metals, Peltier effect, Thomson effect, Thermoelectric power, Application of thermodynamics on thermocouple. **[6]**

**Module 5. Matter waves**

Elements of wave properties of particles**,** Elements of particle properties of waves, Nuclear Energy. **[3]**

**Module 6. Laser**

Spontaneous and Stimulated emission of radiation, Einstein coefficient, Parts of laser, Types of laser and their application. **[3]**

**Module 7. Energy Bands and charge carrier in semiconductors**

Energy band diagram, Covalent bonds, Bound and free electrons, Holes, Electron and hole mobilities, Intrinsic and extrinsic semiconductors, Fermi and impurity levels. **[3]**

**Module 8. Conductivity in semiconductors**

Impurity compensation, Charge neutrality equation and semiconductors conductivity, Einstein relation, Drift and diffusion current, Photo conductivity and Hall effect. **[3]**

Books Recommended:

1. Mathew N.O. Sadiku ( SAD), Elements of Electromagnetics, Oxford University Press(2001).
2. Arthur Beiser (AB), Concept of Modern Physics, 6th edition 2009, Tata McGraw- Hill.
3. Halliday, Resnick, Walker , Fundamentals of Physics 6/e, John Wiley & Sons 2004.
4. Streetman and Banerjee, Solid State Electronic Devices, PHI Publication India.

1201 **Mathematics-II**

**Unit-1**

Matrices and Determinant:-Review and operation on Determinant and Matrices, Rank of a Matrix, Elementary Transformations, Reduction to Normal form, Solution of simultaneous Equations, Gauss Jordan Method. Cayley Hamilton’s Theorem, Eigen Values and Eigen Vectors. **(05 Classes)**

**Unit-2**

Vector Space:- Definition, Linear dependence and linear independence of vectors. **(03 Classes)**

**Unit-3**

First Order Ordinary Linear differential Equation:- Method of solution of first order differential equations (Types: Variable Separable, Homogeneous and non Homogeneous differential equations, linear differential equations, Bernoulli’s differential equations and Exact differential equations. **(06Classes)**

**Unit-4**

Higher Order Linear differential equation:- Solution of Higher Order linear differential equations with constant coefficient, Method of Variation of Parameters, Cauchy’s Homogeneous and Legendre differential equations. **(06 Classes)**

**Unit-5**

Laplace Transformations:-Definition, Existence of Laplace Transform, Laplace Transform of Basic and Periodic function, Shifting Theorems, Properties of Laplace Transformations **(05 Classes)**

**Unit-6**

Laplace Inverse Transformation:- Laplace Inverse Transformation of basic functions, Convolution theorem, Laplace Transform of Unit Step function and Unit Impulse function, Application of Laplace Transformation to differential equations. **(05 Classes)**

**Unit-7**

Numerical Analysis:-Operators ($∆,∇,μ,δ$,*Е*) and relation between operators, Factorial Polynomial. **(03 Classes)**

**Unit-8:**

Interpolation and Extrapolation:- Newton’s Forward and Backward Formula, Lagrange’s Interpolation formula and Newton’s divided difference formula for unequal intervals, Numerical Differentiation and Numerical Integration (Newton’s cote’s Method, Trapezoidal rule, Simpson’s $\frac{1}{3}$rule and $\frac{3}{8}$rule). **(06 Classes)**

**Reference Books**:-

 1. Advanced Mathematics for Engineers, by “Erwin Kreyszig”(Wiley Eastern Publication)

 2. Higher Engineering Mathematics, by “B.S.Grewal”( Khanna Publication)

 3. Introductory Method of Numerical Analysis, by “ S.S.Shastri” (PHI Publication)

 4. Advance Mathematics for Engineer,by’Gorakh Prasad”(Torrent Publication).

**Semester II**

**ME1201 ENGINEERING THERMODYNAMICS (3-1-0)**

**Fundamentals and definition (5 Lectures)**System, properties, state, state change, diagram, Dimension and units

**Work mechanism and thermodynamics (6 Lectures)**Definitions, Displacement work at part of a system boundary, Engine indicator, Displacement work in various quasi static processes, Shaft work, electrical work, Heat, temperature, thermal equilibrium, Zeroth law of thermodynamics, sign convention for heat transfer.

**First law of thermodynamic (5 Lectures)**Statement, application to non cyclic and cyclic process, Energy, mode of energy, pure substances, specific heats, and first law applied to flow processes.

**Second law of thermodynamics (5 Lectures)**Direct and reversed heat engine, Kelvin – Plancks and clausius statement of second law and their equality, reversible and irreversible process, Carnot cycle, carnot Theorem, thermodynamic temperature scale.

**Entropy (5 Lectures)**Definition, calculation through T – ds relation, T – S diagrams, entropy as a measure of irreversibility, Clausius inequality

**Properties of pure substances including steam tables and Mollier diagram
 (5 Lectures)

Psychometrics: (5 Lectures)**Properties of ideal gas and ideal gas mixture with a condensable vapour.

Second law analysis of engineering processes, Avaibility and irreversibility and their application in thermal engineering. **(4 Lectures)**

**Suggested Text Books & References:-**

* Engineering Thermodynamics - R.K.Rajput ,Laxmi Publications
* Engineering Thermodynamics - P.K.Nag ,TMH
* Thermal Science & Engineering - Dr. D.S. Kumar , Kataria & sons
* Thermal Engineering-D r. P. L. Ballaney , Khanna Publication

**EC 1201**

**Semester - II**

**Basic Electronics**

**(3 – 0 – 0)**

**Module – I [10 Hrs]**

Introduction Ideal diode, Introduction to P – N Junction diodes, Characteristics of semiconductor diode, analysis of simple diode circuits, DC and AC load lines, Zener diodes its characteristics and application.

**Module – II [6 Hrs]**

Application of Rectifier diode, Half wave & Full wave Rectifier, L, C, L – C & π Filter clipper and clamper Circuits, Voltage multiplier Circuit

**Module – III [7 Hrs]**

Introduction to BJT, Transistor operation Common Base, Common Collector, Common Emitter configuration, Transistor dc load line, JFETs & MOSFETs, Depletion type MOSFET & Enhancement type MOSFET

**Module – IV [4 Hrs]**

OP – AMP: Introduction, Differential &Common mode operation, virtual ground, inverting & non inverting amplifier, Adder, Subtractor, integrator, differentiator, buffer

**Module - V [4 Hrs]**

Semiconductor Devices: Introduction to SCR, DIAC, TRIAC, GTO, UJT

**Module – VI [2 Hrs]**

CRO: Introduction, Cathode Ray tube – theory and construction

**Suggested Text Books and References Books:**

* Millman and Halkias, “ Integrated and Electronics”, Tata Mc Graw Hill
* Nashelesky & Boylstead, “ Electronic Devices & Circuit Theory”, Prentice Hall of India
* D. Chattopadhay & P.C. Rakshit, “ Electronics Fundamentals and Applications”, New Age International

**EC 1202 - P**

**Basic Electronics Lab**

 **(0-0-3)**

**List of Experiments:**

* Characteristics curve for Common Base, Common Emitter & Common Collector Transistors.
* Characteristics of Field Effect Transistor.
* Verification of properties of Operational Amplifiers (Inverting, Non Inverting, Differential, Adder, Integrator, Differentiator).
* Study of CRO. (Measurement of Frequency & Amplitude of Sinusoidal, Triangular & Square Wave Signals).
* Study of working of Data Acquisition system.

**(CS 1202 – P) LAB ASSIGNMENT**

1. DOS System commands and Editors

2. UNIX system commands and vi

3. Simple Programs: simple and compound interest. To check whether a given number is a palindrome or not, evaluate summation series, factorial of a number , generate Pascal’s triangle, find roots of a quadratic equation

4. Programs to demonstrate control structure: text processing, use of break and continue, etc.

5. Programs involving functions and recursion

6. Programs involving the use of arrays with subscripts and pointers

7. Programs using structures and files

**ED1202-P ENGINEERING GRAPHICS – II ( M/c Drawings) (0-0-3)**

**Shape Description (External)**

Multiplanar representation in first and third angle systems of projections, glass box concept, sketching of orthographic views from pictorial views, precedence of lines

Sketching of pictorial (isometric and oblique) views from Multiplanar orthographic views, Reading exercise, Missing line and missing view exercises.

**Shape Description (Internal)**

Importance of sectioning, principles of sectioning, types of sections, cutting plane representation, section lines, conventional practices.

**Size Description**

Dimensioning, tools of dimensioning, Size and location dimensions, Principles and conventions of dimensioning, dimensioning exercises.

**Computer Aided Drafting**

Basic concepts and use.

**Screw Threads**

Different type of threads , Assembly drawing of nut and bolt.

**Joints and couplings**

Cotter joints and Knuckle joint , Flanged coplings

**B. TECH COURSE STRUCTURE**

**ELCETRONICS & COMMUNICATION ENGINEERING**

**3RD SEMESTER**

**RANCHI UNIVERSITY, RANCHI**

(**CS1301) NUMERICAL ANALYSIS & COMPUTER PROGRAMMING**

**Numerical Analysis:-**

**Module 1 [5 Hrs]**

Approximation and round of error, Truncation errors.

Taylor Series, Bisection Method, Determination of root of polynomials and transcendental equation by Newton-Raphson, Secant and Bairstow method.

**Module 2 [5 Hrs]**

Solutions of linear simultaneous linear Algebraic equations by Gauss Elimination and Gauss Siedel Iteration Methods. Backward, Forward and Central difference relations and their uses in Numerical Differentiation and integration .

**Module 3 [5 Hrs]**

Application of difference Relations in the solution of Partial Differential Equations. Numerical Solutions of Ordinary Differential Equations by Eular, Modified Eular, Runge-Kutta and Predictor-Corrector method. Curve fitting-Linear and Non Linear Regression analysis, Trapezoidal rule, Simpson’s rule.

**Computer Programming:-**

**Module 4 [3 Hrs]**

Introduction to Computer Programming in C Languages. Arithmetic Expressions . Simple Programs. The Emphasis should be more on Programming Techniques rather than the Language itself.

**Module 5 [3 Hrs]**

C Data Types, int , char, float etc. C Expressions, Arithmetic Operations , Relational and Logic Operations. C Assignment Statements, Extension of Assignments to the operations. C Primitive input output using getchar() and putchar(), Exposure of the scanf() and printf() Functions.

**Module 6 [5 Hrs]**

C statements , Conditional Execution using if-else. Optionally Switch and Break statements may be Mentioned. Concepts of Loops, Example of Loops in C using for, while and do-while optionally continue may be mentioned

**Module 7 [4 Hrs]**

One Dimensional Arrays and example of iterative programs using Array. 2-D Arrays. Use on Matrix Computations. Concept of Sub-Programming, Functions, Examples of Functions, Argument passing of simple Variables. Pointers relationship between arrays and Pointers, Argument passing using pointers, Array of Pointers, Passing array as arguments . String and C string library.

**Module 8 [5 Hrs]**

Structure and Union Defining C . Structures passing structures as arguments-program examples

Files I/O Use fopen and fprintf routines.

**Text Books :**

* Grewal, B.S. “*Numerical Methods*” Khanna Publication
* Gottfried, B. S. “*Programming with C*”, Tata McGraw Hill Publication
* Ritchie & Kernighan “C Programming Language” Prentice Hall

**References Books :**

* Kamthane, A. “Programming in C” Pearson
* Theraja, Reema. “Programming in C” Oxford University Press
* Balaguruswamy, E. “*Programming in C*” Tata McGraw Hill
* Venugopal, K.R “*Programming in C*” Tata McGraw Hill

**ME 1312**

**MATERIAL SCIENCE**

 **(2-0-0)**

**Module – I [5 Hrs]**

History of materials: Source of engineering materials, categorization of engineering materials [2 or 3 material, their properties and their application just to make an illustrative point] Periodic table approach to engineering materials, Atomic bonding vis-à-vis properties of materials: Crystal structure and no crystalline structure, Miller indices

**Module – II [3 Hrs]**

X-ray diffraction,

Defects, their origin, Frenkel Schottky defects, Oder-disorder transformations, association of defects, non-stoichiometric solids, role of defects in defining electronic properties of materials – Si, GaAs, Dislocations 3 hours

Diffusion in solid, atom mobilities, temperature and impurity dependence of diffusion, various diffusion processes

**Module - III [5 Hrs]**

Binary phase diagrams (Pb-Sr, AI- Si, Ge-Si & Au-Si etc), microstructure and its effect on properties. 2 hours Materials for use in electronic devices: Polymers, ceramics. Semiconductors and matals – their structure and properties, insulators, superconductors, dielectric, ferroelectric, memory and magnetic materials. Case studies, 7 hours Quantum mechanical approach to structure of materials: Energy band in solid, electrical conductivity Extrinsic and intrinsic semiconductors, carrier concentration, work function

**Module – IV [3 Hrs]**

Carrier transport mechanism: Scattering and drift of electrons and holes, diffusion and drift of carriers, Hall effect

**Module – V [5 Hrs]**

Technology of fabrication of semiconductor devices, Unit operations: Thin film deposition, oxidation, diffusion, implantation lithography, etching metallization, bonding, encapsulation and packaging, Description of a discrete device fabrication, IC fabrication technology

**Module – VI [4 Hrs]**

Sensors and actuators: classification and terminology, acoustic sensor, mechanical sensors, magnetic sensors, radiation sensors, thermal sensors, biosensors, chemical sensors and mechanical sensors Examples of integrated sensors 4 hours

**Module – VII [4 Hrs]**

Opto-electronic materials and devices: Modulation of light: birefringence, Kerr effect, magneto- optic effects, acousto – optic effects. Display devices’ CRTs. LEOs, LCDs, photoconductors, IR detectors, Photon devices, Lasers, Optical switching devices

**Module – VIII [6 Hrs]**

Structural, chemical characterization of material – introduction to X-ray Analysis, optical microscopy, ESCA

SEM-EDAX, STM, AFM, case studies of Si, GaAs, ferrites, lithium niobate

Environmental assessment of semiconductor device production retrospect and prospect

**Suggested text Books and References:**

* Ian P. Jones, “ Material Science for Electrical and Electronic Engineers”., Oxford Publication, Indian Edition
* Collister, Jr. Willium D, John Willey, “ Materials Science and Engineering – An Introduction” Singapore
* Naurula, “ Material Science”., Tata McGraw Hill Publication
* O.P. Khanna, “Material Science”., Dhanpat Rai Publication

**MH 1303 Mathematics-III** **(3-1-0)**

**(E.C.E. Branch)**

**Unit-1**

Fourier series:- Periodic Functions, Euler’s Formula, Fourier Series of Periodic Function, Fourier Series of discontinuous functions, Change of Interval, Half range series, Harmonic Analysis.

**(05 Classes)**

**Unit-2**

Series solutions:-Series solution of Second order Ordinary differential Equation, Bessel’s functions and its solution, Recurrence relations of Bessel’s functions ,Orthogonality properties of Bessel’s functions. **(05 Classes)**

 **Unit-3**

Legendre Equations and its solutions, Rodrigue’s Formula, Recurrence relations of Legendre equations, Legendre’s Polynomial. Orthogonality properties of Legendre Equations. **(02 Classes)**

**Unit-4**

Complex Variable:- Differentiation, Analytic functions,Cauchy-Riemann’s Equations. **(03 Classes)**

**Unit-5**

Conformal mapping:- Bilinear Transformations, w=zn ,w=sinz,w=ez,w=z+$\frac{1}{z}$ . **(02 Classes)**

**Unit-6**

Complex Integration:- Complex Integration, Cauchy’s Integral Theorem, Cauchy’s Integral Formula, Taylor’s and Lorentz’s Expansion, Zeros ,Poles and Residues, Cauchy’s residues Theorem, Contour Integration of trigonometric functions and algebraic functions without a pole on real axis. **(06 Classes)**

**Unit-7**

Partial differential equation:-Linear and non-linear partial differential equations of first order, four standard forms.  **(04 Classes)**

**Unit-8:**

Fourier Transform:- Fourier Integral Transform, Fourier Transform, Convolution theorem and Inversion .Formula of Fourier transform. **(06 Classes)**

**Reference Books**:-

 1. Advanced Mathematics for Engineers, by “Erwin Kreyszig”(Wiley Eastern Publication)

2. Higher Engineering Mathematics, by “B.S.Grewal”( Khanna Publication)

3. Engineering Mathematics, by “ S.S.Shastri” (PHI Publication) or by N.P.Bali (Laxmi Publicaton)

4. Advance Mathematics for Engineer,by’Gorakh Prasad”(Torrent Publication).

**III Semester**

**ME 1303 STRENGTH OF MATERIALS (3-1-0)

Stress:**  Axial load-safety concept, general concepts; stress analysis of axially loaded bars, member strength of design criteria. (4 Lectures)

**Strain:** Axial strain and deformation; strains and deformation in axially loaded bars, stress-strain relationship, poison’s ratio, thermal strain and deformation, strain concentration.
 (4 Lectures)

Generalized Hook’s law, Pressure vessels, constitutive relationship-generalized concepts, relationship between elastic constants, thin wall pressure vessel. (6 Lectures)

**Torsion:** Torsion stress and deformation in circular members, design of circular members in torsion, closed coil helical spring. (5 Lectures)

**SFD & BMD:** Axial force, shear and bending moment diagram, introduction-direct approach for axial force, shear and bending, bending of beams with symmetrical cross-section. (4 Lectures)

**Stresses in Beams:** Shear stress in beams; introduction-shear flow-shear stress in beams.
 (4 Lectures)

**Combined stresses:** Transformation of stress and strain; analysis of combined loading, transformation
of stress and strain-Mohr’s rule for stress information. (6 Lectures)

**Deflection of beams:** Introduction-deflection by integration-deflection by moment-area method.
 (6 Lectures)

**Stability of column:** introduction-Euler’s buckling load formula, Rankin’s formula-introduction to beam
column. (2 Lectures)

**Suggested Text Books & References:-**

* Strength Of Materials , R S Khurmi , S. Chand
* Strength Of Materials, R K Rajput , S. Chand
* Strength Of Materials , Dr Sadhu Singh , Khanna Publications
* Strength Of Materials , Young & Timoshenko
* Strength Of Materials , Singer, Happer & Row Publisher

**EC 1301**

**SWITCHING AND PULSE THEORY**

 **(3-0-0)**

**Module - I [4 Hrs]**

 Introduction to logic gates, Number system, Boolean algebra, Simplification of Boolean Expression by K-maps, Quine McCluskey Method.

**Module - II [5 Hrs]**

Combination logic circuits : Adder/ Subtractor, Multiplexers/ De multiplexer Encoder /Decoders, Parity checker and generators, BCD adder/subtractors, code – converter, comparator

**Module - III [5 Hrs]**

 Sequential circuits: Basic concept of Flip-Flop flip – flop – SR,JK,T,D and Master slave, Conversion of flip - flop

**Module - IV [5 Hrs]**

Sequential Circuits continued: Shift registers and their applications, Asynchronous and synchronous counters, Up/down counters,

**Module - V**

Logic Families: RT L, DT,TTL, ECL,NMO/CMOS

**Module - VI [5 Hrs]**

Multivibrators: 555 timer,Astable, Monostable multivibrator using 555 timer.

**Suggested Text Books and References Books:**

* “Digital Integrated Electronics”, Taub & Schilling, TMH.
* “Digital Fundamentals”, 5th Edition, T.L. Floyd and R.P. Jain, Pearson Education, New Delhi.
* “Digital Electronics, Principles and Integrated Circuit”, Anil K. Jain, Wiley India Edition.
* “Digital Design”, 3rd Edition, Moris M. Mano, Pearson Education.

**EC 1302**

**ELECTRONIC MEASUREMENT**

 **(3-0-0)**

**Module – I [6 Hrs]**

**Review of fundamental and derived unit:**

 Measurement errors Standards of Measurements, Measurement using moving coil , moving iron and induction type meters, Their expression for Deflecting and restoring torque, Ammeters, Voltmeters Wattmeter’s and Energy meters.

**Module – II [3 Hrs]**

**Voltage and current measuring instruments:**

Rectifier instruments, Thermocouple instruments, VTVM, TVM

**Module – III [3 Hrs]**

**Power Measuring techniques:**

Bolometer method, Calorimeter method Principle and Operation of Q – meter

**Module - IV [6 Hrs]**

Wheat Stone Bridge, AC Wheatstone bridge – Maxwell, Bridge, Hay Bridge, Wein Bridge, Schering Bridge, T Networks – Parallel T network and Bridge T network.

**Module – V [4 Hrs]**

Wave and distortion analyzer for audio frequency

Waves, Spectrum analyzer, Wave analyzer For RF Signals

**Module – VI [4 Hrs]**

Frequency measurement using Comparison method – Heterodyne Frequency meter

Frequency measurement using Pulse counting method – Digital frequency meter

**Module – VII [4 Hrs]**

Introduction wave analyzer for audio waves - Frequency Selecting wave analyzer, Hetrodyne wave analyzer.

Wave and distortion analyzer for Radio waved – Spectrum analyzer.

 **Module – VIII [5 Hrs]**

Definition of amplification and gain – Voltage gain measurement

Insertion gain – Available power gain Impedance measurement

Phase Shift Characteristics – Sq wave testing of amplifier.

Measurement of non linear distortion

**Suggested Test book and Reference:**

* Modern Electronic Instrumentation and Measurement Techniques – Helfrick & Cooper – Pearson Education
* A Course in Electrical and Electronic Measurements and Instrumentation – A K Sawhney – Dhanpat Rai & Co.
* Elements of Electronic Instrumentation and Measurement – Joshep Carr – 3rd Edition, Pearson Education.
* Electronic Instrumentation – H C Kalsi – 2nd Edition, Tata McGraw Hill.
* Electronic Measurement and Instrumentation – Oliver & Cage – Tata McGraw Hill.

**CS 1302-P**

**LAB ASSIGNMENT**

1. Write a Program to print “ HELLO WORLD”

2. Write a Program to add two numbers.

3. Write a program to find the area of a circle.

4. Write a program to check whether the given number is palindrome or not.

5. Write a program to check whather the given number is prime or not.

6. Write a program to find the largest among three numbers using if-else statement.

7. Write a program to swap two numbers using function.

8. Write a program to store 100 elements within array and find largest and smallest element.

9. Write a program to add two matrices and display the resultant matrix.

10. Write a program to multiply two matrices and display the resultant matrix.

11. Write a program to display the output.

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12. Write a program to display the output.

 1

 0 1

 1 0 1

 0 1 0 1

 **. . . . .**

 **. . . . . .**

`13. Write a program to display the output.

 1

 1 2 1

 1 2 3 2 1

 1 2 3 4 3 2 1

 **. . . . . . . . .**

 **. . . . . . . . . . .**

14. To find the roots of non-linear equation using Bisection method/Muller’s method.

15. To find the roots of non-linear equation using Newton’s method/Miller’s method.

16. Curve fitting by least-squares approximations.

17. To solve the system of linear equations using Gauss-Elimination method.

18. To solve the system of linear equations using Gauss-Seidal iteration method.

19. To solve integral equation numerically using Trapezoidal rule.

20. To solve integral equation numerically using Simpson’s rule.

21. To find numerical solution of ordinary differential equations by Euler’s method.

22. To find numerical solution of ordinary differential equations by Runga-Kutta method.

23. To find numerical solution of partial differential equation/laplace equation/wave
equation/heat equation.

24. To find numerical solution of ordinary differential equations by Milne’s method.

25. To solve a given problem using Newton’s forward interpolation formula.

26. To solve a given problem using Lagrange’s forward interpolation formula.

**ME 1307 – P**

**MATERIAL SCIENCE LAB**

 **(0-0-2)**

**LIST OF EXPERIMENTS:**

* To study the lattice structure of various type of unit cell. Observe the Miller Indices for various Planes and direction in a unit cell.
* To study the microstructure of cast iron, mild steel, solder under annealed, cold worked, forged / rolled condition.
* To verify the Hall effect
* To determine the fracture characteristics of ductile and materials
* To determine the chemical composition of a few common alloys
* To determine percentage of C and S content in an alloy with Fe as main constituent

**ME 1308-P STRENGTH OF MATERIALS LAB (0-0-3)**

**List of Experiments**

1. Tensile Test: -To prepare the tensile test upon the given specimen (Mild Steel).
 2. Compression Test: -To determine the compressive strength of the given specimen.

 3. Torsion Test: - To perform the Torsion test on given specimen.
 4. Impact Test: - To determine the impact toughness of the given material.
 5. Brinell Hardness Test: - To determine the hardness of the given specimen.
 6. Vicker’s Hardness Test: - To determine he hardness of the given specimen.
 7. Rockwell Hardness Test: - To determine he hardness of the given specimen.

**EC 1302 - P**

**SWITCHING & PULSE THEORY LAB**

 **(0-0-3)**

**LIST OF EXPERIMENTS:**

* Verification of logic gates.
* Verification and realization of different flip – flops (RS, JK, D and T).
* Study of 4 – bit register.
* Study of BCD counter.
* Study of Bi – stable multivibrator using 555 timer.
* Study of Astable multivibrator.
* Study of high pass and low pass single order filter.

**EC 1303 – P**

**ELECTRONICS MEASUREMENTS LAB**

**(0-0-3)**

**LIST OF EXPERIMENTS:**

* Study of Thermocouple using Digital Multimeter (4$\frac{1}{2} digit$).
* Study of Power Measuring Techniques – Bolometer and Calorimeter method.
* Study of AC Wheatstone bridge.
* Measurement of low value capacitances.
* Measurement of Incremental Inductances.
* Study of Digital Frequency meter.
* Phase measurement using (CRO).
* Study of Square wave Testing amplifier.

**HS 1303 – P**

**GENERAL PROFICIENCY**

G.P. classes are conducted for personality development of students. It includes Group Discussion, Presentation, Seminar, Quiz, C V Writing, Technical Report Writing and also inculcates Human Values and Professional Ethics. There will be assignments and class tests also.

**B. TECH COURSE STRUCTURE**

**COMMON TO ENGINEERING**

**BRANCHES**

**4th SEMESTER**

**RANCHI UNIVERSITY, RANCHI**

**EC 1401**

**ELECTROMAGNETICS**

 **(2-0-0)**

**Module - I (2 hrs)**

**Coordinate systems and transformation**

Cartesian coordinates, Cylindrical coordinates and spherical Coordinate system

**Module – II (5 hrs)**

**Vector Calculus**

Scalar and vector fields, differential length, area and volume, line surface and volume integrals,Vector representation of surfaces, Del operator, physical interpretation of gradient, divergence and curl, poynting vector and polyting theorem, Gauss Divergence theorem, Stoke’s theorem, Helmholtz theorem.

**Module - III (7 hrs)**

**Time varying Fields**

 Electric Flux density, Gauss’s Flux theorem, Laplace and Poisson’s Equation, displacement current, Continuity equation for time varying Fields, Inconsistency of Ampere’s law, Maxwell’s Equations, Boundary conditions.

**Module – IV (7 hrs)**

**Electromagnetic Waves**

Wave equation and its solution in different media, phasor notation, polarization, reflection and refraction of travelling waves at plane boundaries, phase and group velocity.

**Module - V (6 hrs)**

**Transmission Lines**

Evaluation of line parameters, design concept, cut off frequency attenuation, dispersion, power handling capacity, travelling wave, standing waves, smith chart and matching techniques, waveguides.

**Module – VI (5 hrs)**

**Antennas**

Radiation concept, elementary dipole, half wave dipole, radiation pattern, gain pattern multiplication, basic antenna.

**Suggested Textbooks and References:**

1. Matthew N.O Sadiku, “ Principles of Electromagnetics”, oxford publications
2. Jordan and Balmain, “ Electrmagnetic Waves and Radiating Systems, PHI
3. S.P Seth, “ Elements of Electromagnetic Fields”, Dhanpat Rai and Co. Publication.
4. K.D Prasad, “ Electromagnetic Fields and Waves” , Satya Prakashan.

**EC 1402**

**LINEAR IC’S & APPLICATIONS**

 **(2-0-0)**

**Module - I [5 Hrs]**

**Operational Amplifiers**

Ideal op-amp, characteristics, Inverting and non- inverting op-amp, Difference Amplifier- Transfer characteristics, offset error voltages and currents, CMRR, PSRR, slew rate, measurement of op-amp parameters.

**Module - II [9 Hrs]**

**Analog System with Operational Amplifier as a Building Block**

Basic applications- Inverter, scale changer, adder, voltage to current & current to voltage converter, voltage follower , Differential amplifier, Bridge amplifier, Instrumentation amplifier, Analog Integrator and differentiator, Non linear system-comparator, zero crossing detector, timing mark generator, sample & hold circuit, precision diode, precision rectifier, average detector , peak detector, Logarithmic amplifier, anti-log amplifier, logarithmic multiplier.

**Module - III [5 Hrs]**

**Active Filters**

Introduction, frequency response characteristics, First order LP and HP filter. Second order filter model, Sallen-key unity gain filters, Sallen-key equal component filters, higher order filter, Band pass and Band reject filter.

**Module - IV [6 Hrs]**

**Wave shaping and wave form Generation**

Oscillators – RC phase shift oscillator, Colpitts and Hartley oscillator, Square wave generator, Pulse generator, Triangular wave generator, Schmitt Trigger , Voltage controlled oscillator (VCO).

**Module - V [5 Hrs]**

**Regulated Power supplies**

Transistorized series pass regulator, overload, short- circuited and thermal shutdown protection, Three terminal IC regulators, basic ideas of switching regulators.

**Module - VI [5 Hrs]**

**Analog to Digital & Digital to Analog conversion**

Weighted resistor and Binary ladder D\A converters, Single and Dual slope integration, counter, servo, successive approx., Resistor type analog to digital converters.

**Suggested Text Books and References:**

* Schilling and Belove, C., “Electronics Circuit: Discrete and integrated”, Mcgraw Hill, 1989.
* Socolf, “ Applications of analog Integrated Circuits”, Printice Hall of India, 1996.
* Franco, “ Design with op- amps & Analog Ics”, Tata Mcgraw Hill, 1997.
* Jacob, “ Applications & design with analog Ics”, Printice Hall of India, 1996.
* Ramakant A. Gayakyad, “ Op-Amps and Linear Integrated Circuits” PHI Private Limited, 2012.
* Tietze and Schenk, “ Advanced Electronics Circuits”, Springer- verlag, 1978.

**EC 1403**

**ELECTRONIC CIRCUITS**

**(3-1-0)**

**Module - I [7 Hrs]**

**Biasing of BJT and FETs**

Fixedbias, Emitter bias, voltage divider bias, collector feedback bias, load line, operating point and bias stabilization

**Module - II [7 Hrs]**

**Small Signal Amplifiers**

General Principle of operation; Classifications: RC coupled amplifiers-Gain Frequency Response, input and output impedance calculations; Transformer coupled amplifiers-equivalent circuit at low, medium and high frequencies, analysis and frequency response.

**Module – III [7 Hrs]**

**Feedback amplifiers**

Basic concept of Feedback amplifiers, Characterization, Effect of negative feedback on Gain, Gain Stability, Distortion, Bandwidth, Input and Output impedance, Voltage and Current feedback circuits, Types of connection in feedback.

**Module – IV [7 Hrs]**

**Harmonic Oscillators**

Barkhausen criteria, Hartley, Clapp and Collpit’s Oscillator, RC Phase shift Oscillators, Wein Bridge Oscillators, Frequency stability of Oscillators, Crystal Oscillators.

**Module – V [7 Hrs]**

**Power Amplifiers**

Classification- Class A/B/C, single ended and push pull configuration, Power dissipation and output power conversion efficiencies, complementary symmetry power amplifier.

**Suggested Text Books and References Books:**

* Millman and Halkias, “Integrated Electronics”, McGraw Hill, 5th Edition Reprint, 1993
* Boylstead, Robert L. and Louis Nashelsk, “ Electronic Devices and Circuit Theory”, Prentice Hall of India.
* Schillin g., and Belove., “Electronics Circuits – Discrete and Integarted” McGraw Hill international edition 1989.
* Mottershead, A., “Electronic Devices & Circuits: An introduction”, Prentice Hall of India, 1996.

**EC1404**

**SOLID STATE DEVICES**

 **(3-0-0)**

**Module-I [6 Hrs]**

Carrier Concentration: Energy band diagram, intrinsic and extrinsic Semiconductor, mobility of free electron and hole. Fermi level, Electron and Hole Concentration of equilibrium. Direct and Indirect recombination of electrons and holes, Hall Effect

**Module-II [4 Hrs]**

Transport phenomena: Drift and Diffusion of carriers, Continuity and Diffusion equations, Hynes Shockley experiment.

**Module-III [5 Hrs]**

PN junctions: Barrier potential, space charge at a junction, steady state condition. I-V Characteristics, effect of temperature on diode current Break down mechanism- avalanche and Zener P.N junction capacitance

**Module-IV [6 Hrs]**

Semiconductor diodes: Zener diode, LED, Tunnel Diode, photo diode, photo detector, photo diode materials, solar cell, Metal Semiconductor Junction .

**Module-V [7 Hrs]**

Bipolar junction transistor: Basic structure and principle of operation of BJT. Current components and amplifying property of characteristics, current gain and active, saturation and cut- off region of output characteristic

**Module-VI [6 Hrs]**

Field effect transistor: Basic structure, principle of operation and I-V characteristic of JFET, MESFET, MOSFET. FET parameters

**Suggested Test and Reference Books:**

* “Solid state Device’’, B.G. Streetman, PHI.
* “Electronic Devices and circuits’’, Milliman, J. and Halkias, C.C.,TMH.
* “Physics of semiconductor Devices’’ – S.M. Sze.
* “Semicoductor Device’’, Tusprit singh, John Wiley Eastern.

**EC 1405**

**NETWORK THEORY**

 **(3-0-0)**

**Module – I [6Hrs]**

Network Theorems: super position, Thevenin, Norton, maximum power transfer theorem Tellegen’s theorem and reciprocity theorem

**Module – II [4Hrs]**

Coupled Circuit:Self and mutual inductance, coefficient of coupling, Dot convention, Analog of coupled circuits.

**Module – III [6Hrs]**

Network Transients: Transient response of simple RL, RC and RLC series and parallel circuits. Solution of RL, RC, RLC series and parallel circuits for step and sinusoidal excitation using Laplace transform method

**Module – IV [5Hrs]**

Two port network: Open circuit and short circuit parameters, transmission and Hybrid parameters and their inter – relations

**Module – V [4Hrs]**

Network Function: Two port network parameters – poles and zeros, properties of network functions, Time – domain behavior pole – zero plot

**Module – VI [7Hrs]**

Network Synthesis: Stability concept – Hurwitz property, positive realness properties of positive real functions, synthesis of RL, RC,LC driving point impedance function using simple canonical networks – Foster and Caour forms

**Module – VII**  **[3Hrs]**

Filter: Filter specifications, Butterworth approximation, chebyshev approximation, comparision between Butterworth and chebyshev transfer function

**Suggested Text Books and References Books:**

* “Network Theory” A K Chakraborty – Dhanpat Rai Publication.
* “Network Synthesis”, M E Van Valkenburg – Pearson Education.
* “Network Analysis and Synthesis”,Franklin F. Kuo – Wiley Student Edition.
* “Fundamentals of Electric Circuits”,Alexander & Sadiku – Tata McGraw Hill.
* “Linear Circuits Analysis and Synthesis”,A Ramakalyan – Oxford University Press.
* “Problems & Solutions in Electric Circuit Analysis”, Sivananda & Deepa – Jaico Book.
* “Network Theory”, Smarajit Ghosh, PHI.

**Suggested Text book and reference books:**

* **“**Network Theory” A.K. Chakraborty - Dhanpat Rai Publication.
* **“**Network Synthesis”, M E Van Valkenburg – Pearson Education.
* **“**Network Analysis and Synthesis”, Franklin R. Kuo – Wiley Student Edition.
* **“**Fundamental of Electric Circuit”, Alexander & Sadiku – Tata Mc Graw Hill.
* **“**Linear Circuit Analysis and Synthesis”, A. Ramakalyan – Oxford University Press.
* ”Problem & Solution in Electric Circuit Analysis”, Sivananda & Deepa- Jaico Book.
* “Network Theory”, Samrajit Ghosh, PHI

**CS 1413**

**COMPUTER PROGRAMMING** c++

**(3-0-0)**

**Module I [6 Hrs]**

**PROGRAMMING BASICS**

Basic Program Construction, Functions , Program Statements , White Space , Output Using *cout*, String Constants , Preprocessor Directives , Header Files , Integer Variables , Defining Integer Variables , Character Variables , Input with *cin,* Type Float, Manipulators , arithmetic Operator , Library Functions

Relational Operators, Loop: *for* Loop , The *while* loop, The *do* loop , Decisions: The *if* ….Statement , The *if ………..else* Statement, The *switch* Statement , Logical Operators , Other Control Statements: The break Statement , The break Statements , The continue Statement

**MODULE II [6 Hrs**

**STRUCTURES:**

Structures, Accessing Structure Members, Structures within Structures, Structures and Classes, Enumerated Data Types

**FUNCTIONS:**

Simple Functions: The Function Declaration , Calling the Function , The Function Definition , Comparison with Library Functions , Passing Arguments of Functions: Passing Constants , Passing Variables , Passing by Value , Passing Structure Variables , Returning Values from Functions: The return Statement , Passing Simple Data Types by Reference , Overloaded Functions , Inline Functions , Default Argument, Variables and Storage Classes: Automatic Variables , External Variables , Static Variables , Storage

**MODULE III: [5 Hrs]**

**OBJECTS AND CLASSES:**

A Simple Class: Classes and Objects , Specifying the Class , Constructors , Destructors , Objects as Function Arguments: Overloaded Constructors , Member Function Defined Outside the class, Objects as Arguments , Classes Objects and Memory.

**MODULE IV: [5 Hrs]**

 **ARRAYS:**

Array Fundamentals: Defining Arrays, Accessing Array Elements , Initializing Arrays , Multidimensional Arrays, Passing Arrays to Functions , Arrays of Structures , Arrays of Structures , Arrays of Objects , Strings

**MODULE V: [5 Hrs]**

**OPERATOR OVERLOADING:**

Overloading Unary Operators**:** The operator Keyword , Operator Arguments , Operator Return Values , Nameless Temporary Objects , Limitation of Increment Operators , Overloading binary operators: Arithmetic Operators , Adding Polar Coordinates , Concatenating Strings, Multiple Overloading , Comparison Operators , Arithmetic Assignment Operators

**MODULE VI: [5 Hrs]**

**INHERITANCE:**

Derived Class and Base Class: Specifying the Derived Class , Accessing Base Class Members , The protected Access Specifier , Derived Class Constructors, Overriding Member Functions , Scope Resolution with Overridden Functions , Class Hierarchies: “Abstract” Base Class , Constructors and Member Functions , Multiple Inheritance , Member Functions in Multiple Inheritance , Constructors in Multiple Inheritance

**Virtual Functions and other Subtitles**

 Virtual Functions, Friend Functions , Static Functions , Assignment and copy initialization , The This pointer ,

**MODULE VII: [4 Hrs]**

**pointers**

Addresses and Pointers: The Address of Operator & , Pointer Variables, Accessing the variable pointed to , Pointer to void , Pointers and Arrays: Pointer constants and pointer variable , Pointer and Functions: Passing Simple Variables , Passing Arrays , Sorting Arrays Elements , Pointer and strings: Pointer to string Constants : String and Functions arguments , Copying a string using pointers, Library string Functions , Pointers to pointer , Sorting pointers .

**MODULE VIII: [4 Hrs]**

**FILES AND STREAMS**

Streams: The streams class Hierarchy, The string classes, header files, String I/O: Writing Strings , Reading Strings , Detecting End of file, Character I/O, Object I/O, I/O with Multiple Objects , File Pointers , Disk I/O with member Functions , Closing files , Error handling .

Text Books:

* Object Oriented Programming in Turbo C++, Robert Lafore, Galgotia Publication.

Reference Books:

* Object Oriented Programming with C++, E. Balaguruswamy, TMH Publication
* C++ and Object Oriented Programming, Jana, PHI
* Ashok N. Kamthave – Object oriented Programming with ANSI & Turbo C++, Pearson.

**Suggest Text Books and Reference:**

* Object Oriented Programming with C++ - E. Balagurusamy, McGraw – Hill Education (India).
* ANSI and Turbo C++ - Ashoke N. Kamthane, Pearson Education.
* Big C++ - Wiley India
* C++ : The Complete Reference Schildt, McGraw – Hill Education (India)
* C++ and Object Oriented Programming Jana, PHI Learning.
* Object Oriented Programming with C++ - Rajiv Sahay, Oxford.

**EC 1403 - P**

**LINEAR IC’S & APPLICATIONS LAB**

 **(0-0-3)**

**LIST OF EXPERIMENTS:**

* Study of Transfer characteristics of Op – Amp.
* Fabrication of voltage to current/ current to voltage converter using op – amp.
* Fabrication of Non Linear system comparator, Zero crossing Detector using Op – amp.
* Study of Band Pass & Band Reject Filter.
* Study of R – C Phase shift Oscillator.
* To generate Square Wave using Op – Amp..
* To generate Pulse using Op – Amp..
* To generate triangular Wave using Op – Amp...
* Study of Switching Regulator.
* Study of Binary Ladder D/A Converters.

**EC 1404 - P**

**ELECTRONIC CIRCUITS LAB**

**(0-0-3)**

**LIST OF EXPERIMENTS:**

* Generation of Square and Triangular wave using Op – Amp IC.
* Study of Class A Amplifier and its waveform.
* Study of Class B Amplifier and its waveform.
* Determining the frequency of a Wein Bridge Oscillator.
* Determining the frequency of a Phase Shift Oscillator.
* Determining the frequency of a Hartley Oscillator.
* Determining the frequency of a Colpitt Oscillator.

**EC 1405 - P**

**SOLID STATE DEVICES LAB**

 **(0-0-3)**

**List of Experiments:**

* Rectifying and Breakdown Characteristics of P-N Junction and point contact diodes.
* Input and Output characteristics of Bipolar Transistor in Common Base and Common Emitter Configurations.
* Drain Current (ID) – Drain to source voltage (VDS), Characteristics of Junction Field Effect Transistor (JFET).
* Study of SCR Characteristics.
* Measurement of h – Parameters of Bipolar Junction Transistor.
* Study of Basic properties of Operational Amplifier.
* Measurement of Energy Band Gap and Resistivity of Semiconductor sample.
* Measurement of Carrier Concentration in a Semiconductor by Hall Measurements.
* Measurement of Junction Capacitance and Ideality factor of Semiconductor diode.
* Study of effect of Temperature on Leakage Current and Breakdown voltage of P – N Junction.
* Study of UJT and Relaxation Oscillator.
* Study of Frequency response of R – C Coupled Amplifier.

**EC 1406 – P**

**NETWORK THEORY LAB**

**(0-0-3)**

**LIST OF EXPERIMENTS:**

* Measurement of power in three phase circuit by two watt meter method for Balanced and Unbalanced Load and (i) Power Factor Calculation (ii) Reactive power calculation
* Polarity test of Transformer.
* Transient response of R – L, R – C, R – L – C Series & parallel circuits for (a) step input, (b) sinusoidal method using Laplace Transform Method.
* Synthesis of R- L, R – C and driving point impedance pull using Foster and Cauer forms.

**CS 1414- P**

**COMPUTER PROGRAMMING** c++ lab

**(0-0-2)**

**LIST OF EXPERIMENT:**

* Programs on concept of classes and objects.
* Programs using inheritance.
	+ Single inheritance
	+ Multiple inheritance
	+ Multi level inheritance
	+ Use of virtual base classes
* Programs using static polymorphism.
	+ Function overloading
	+ Ambiguities while dealing with function overloading
* Programs on dynamic polymorphism
	+ Use of virtual functions
	+ Use of abstract base classes
* Programs on operator overloading
	+ Operator overloading using member operator functions.
	+ Operator overloading using non member operator functions.
	+ Advantages of using non member operator functions.
* Programs on dynamic memory management using new, delete operators.
* Programs on copy constructor and usage of assignment operator.
* Programs on exception handling .
* Programs on generic programming using template function and template class.
	+ Programs on file handling.

**HS 1404-P**

**GENERAL PROFICIENCY**

General Proficiency classes are conducted for personality development of students. It includes Group Discussion, Presentation, Seminar, Quiz, CV Writing, Technical Report Writing,NSS and also inculcates Human Values and Professional Ethics. There will be assignments and class Tests also.

**B. TECH COURSE STRUCTURE**

**ELCETRONICS & COMMUNICATION ENGINEERING**

**5th SEMESTER**

**RANCHI UNIVERSITY, RANCHI**

**HS 1501**

**MANAGEMENT SCIENCE**

 **(2-0-0)**

**MODULE - I [5 Hrs]**

Definition and concept of management, Evolution of management thought, systems approach and decision, Theory approach to management, process of decision-making.

**MODULE - II [12 Hrs]**

Function of management planning, Types and plans , Major steps in managerial planning, Strategies MBO Organization, nature and purpose, process of organization, Basic departmentation, Co-ordinating supervision, communication and direction, Leadership, Motivation, Controlling, Nature and purpose control techniques and information technology, International Management, Japanese Management vs. U.S. Management managerial functions in international business.

**MODULE –** **III [5 Hrs]**

Organization Theory, Group dynamics, Defining and classifying groups process, Group task.

**MODULE – IV [6 Hrs]**

Group cohesiveness, Conflict Management, Discovery of conflicts, Processing of grievances, conflicts resolution, conflict and intergroup relations.

**MODULE - V [5 Hrs]**

Stress Management, nature of stress, potential sources of stress, consequences strategies.

**Suggested Books and references:**

* Koontz, H. and Weihrich, H., “Essential of Management”.
* Mathur, S.S, “Principles of Management”.
* Agarwal , R. D. , “Organization and Management”.
* Robbin , S.P., “Organizational Behavior”.
* Hicks and Gullet, “Organizations: Theory and Behavior”.
* Allen , “Management and Organization”.

**EC 1501**

**ELECTRONICS Instrumentation**

 **(2-0-0)**

**Module - I [2 Hrs]**

**Errors**

Errors, Resolution, unit of measurement and standards.

**Module - II [3 Hrs]**

**Measuring instruments**

Moving coil Instrument and its variation, Microvoltmeter, Gain Phase Meters.

**Module – III [8 Hrs]**

**Cathode Ray Oscilloscope**

Basic block Diagram, function of blocks, dual trace oscilloscope, angular and digital storage oscilloscope.

**Module – IV [10 Hrs]**

**Transducers**

Transducers for measurement of temperature, pressure level, flow, linear and angular position, velocity and angular position, Digital transducers.

**Module – V [5 Hrs]**

**Interfacing**

Transducer interfacing and data acquisition, computer controlled instrumentation and IEEE 488 Interfacing

**Module – VI [5 Hrs]**

**Process Instrumentation**

First and second order process, controllers, final control elements, close loop response of process, complete process stability analysis, distributed digital control system, computer based control system- case study.

**Suggested Textbooks and References:**

1. Helfrick and Cooper, W.O., “ Modern Electronic Instrumentation and Measurement Techniques”, PHI 1992
2. Barney, “ Intelligent Instrumentations”, PHI 1992
3. Sahwney , A.K., “ Elecrical and Electronic Measurements and Instrumentaion” , Dhanpat Roy and Sons.

**(CS 1512)**

**COMPUTER ORGANISATION**

 **(3-0-0)**

**Module – I [5 Hrs]**

Number systems, integer and floating point representation, character codes (ASCII, EBCDIC), Error detection & correction codes.

 **Module - II [8 Hrs]**

Basic building block, Boolean algebra, combinational logic design, Flip-flops, Counters, Registers.

**Module - III [5 Hrs]**

ALU, Arithmetic and logic Operations, Faster algorithms and their implementations.

**Module - IV [6 Hrs]**

Memory Organization, Basic Concepts, Memory device characteristics, Organisation and characteristic of floppy disk, hard disk, magnetic tape and compact disk, Memory controllers.

**Module - V [5 Hrs]**

Organisation of Control Modules (Hardwired and Micro-programmed), microprogramming organisation

**Module- VI [8 Hrs]**

Peripheral devices: I/O devices (tape and disks), Programmed and Interrupt control mechanisms, I/O Controllers, Bus bandwidths.

**Module - VII [10 Hrs]**

Assembly Language Programming: Programming model of a machine, Example of a typical 16 to 32 bit processor, Registers, addressing modes, instruction set, use of assembly language for specific programs for typical programs like : Table search, subroutine symbolic and numeric manipulations

**Suggested Text Books and References :**

* + - * Hayes, “*Computer Architecture and Organization”*, McGraw Hill Pub.
			* Zaky, “*Computer Organization”,* McGraw Hill Pub.
			* Donovan J. J “*System programming*”, Tata McGraw Hill
			* Henssey and Patterson, “*Computer Architecture a quantitative* *Approach”*
			* Morgan and Kaufman Pub.
			* Moris Mano, “*Computer Architecture and Organization”*, PHI.
			* Stone, “*Introduction to computer organization and Data Structure”,* McGraw
			* Hill Pub.

**EC 1502**

**COMMUNICATION SYSTEM - I**

 **(3-0-0)**

**Module – I [6 Hrs]**

Introduction to Communication system. Signals and Classification of signal. Wave spectra: Fourier series, Fourier transform: Transform of some useful functions, properties of fourier transform., Energy spectral and power spectral density. Convolution. Parseval’s Theorem. Correlation between waveforms: Auto and cross correlation. Distortionless LTI system

**Module – II [6 Hrs]**

**AMPLITUDE Modulation:**

Need of modulation. Amplitude Modulation, Double sideband suppressed carrier, Single sideband suppressed carrier,Vestigial sideband modulation: Generation, Demodulation, Frequency spectrum.Frequency division multiplexing.

**Module – III [6 Hrs]**

**ANGLE MODULATION & ITS TYPES:**

Frequency modulation and Phase modulation: Generation, Demodulation, Frequency spectra, Equivalence between FM & PM. Narrowband & Wideband FM. Stereophonic FM system. Pre-emphasis and De-emphasis

**Module – IV [4 Hrs]**

**Super heterodyne Receiver:**

Motivation & Principles of Super-heterodyne receiver, Sensitivity, Selectivity & Image frequency rejection.

**Module – V [5 Hrs]**

**Noise:** Introduction. Types of noise. Frequency domain representation of noise. Power spectral density of noise and effect of filter on power spectral density of noise. S/N ratio, Equivalent noise resistance, Noise factor, Noise temperature.

**Module – VI [5 Hrs]**

**Performance of analog modulation system:**

Noise in AM system (DSB – SC, SSB - SC) and in FM system: calculation of signal power, noise power, S/N ratio, figure of merit. Comparison of AM & FM. Frequency threshold in FM system.

**Module – VII [3 Hrs]**

Sampling theorem. Quantization. Pulse code modulation, PAM, PWM, PPM. TDM, FDM.

**Suggested Text Books & References Books:**

* Simon Haykin, “Communication Systems”, 3rd Edition, John Willey & Sons, 1997
* Taub & Schilling, “Principles of Communication Systems”, Tata McGraw Hill, 1998
* B.P.Lathi, “Modern Digital & Analog Communication Systems”, 3rd Edition, Oxford University, Delhi, 1998
* Kennedy, George, “Electronic Communication Systems”, 3rd Edition, Tata McGraw Hill, 1984
* Bruce Carlson, “Communication systems”, Tata McGraw Hill Kogakusha, 1986.
* Sbanmugam K. Sam, “Digital & Analog Communication Systems”, John Willey & Sons

**(EC 1503)**

**MICROPROCESSOR THEORY (3-0-0)**

**Module – I [6 Hrs]**

Introduction to 8 – bit Microprocessor (8085),Internal architecture in details, pin description, flags, instruction set,

**Module – II [6 Hrs]**

8 – bit Microprocessor (8085):

Addressing mode, testing and running of simple programmes using Debug/MASM assembler, interrupts and related instructions, Programs on 8 – bit addition, 16 – bit addition, data transfer.

**Module - III [5 Hrs]**

Introduction to 16 – bit Microprocessor (8086)

Architecture details, flags, addressing modes, interrupts, programming

**Module – IV [6 Hrs]**

Interfacing (with 8 bit, 16 bit processors):

Data transfer schemes; Memory interfacing RAM; ROM & Address decoding; Input output interfacing – parallel I/O; Serial I/O

**Module – V [6 Hrs]**

Keyboard and display interfacing, Memory mapped I/O, I/O mapped I/O, DMA concepts using 8255,8254,8251,8259 etc.), application programmes.

**Module – VI [6 Hrs]**

**Microcontroller:**

8051/8751 architecture programming modes, internal RAM/ROM, registers, I/O ports, interrupt system insertion set typical application. Advanced Microprocessors; Introduction to intel \* 86 processors; Pentium I, II, III of Motorola 68 xxx processors.

**Suggested Text Books and References**

* Hall, D.V., “ Microprocessor and Interfacing” Tata Mc Graw Hill (2nd Edition)
* Brey, “ The Intel Microprocessor” , Prentice Hall of India ()
* Rafiquek Kuzzman, V., “Microprocessor and Application”.

**EC 1504**

**Automatic control system**

**(3-0-0)**

**Module – I**  **[4hrs]**

**Open and closed loops**:

The control problem. Illustrative examples.

Transfer function Multivariable System and transfer function matrix.

**Module - II [4hrs]**

**Analogous System**:

 Block diagram. Signal flow graph analysis – Manson gain formula.

**Module -III [5hrs]**

**Transient and Steady State Response Test inputs**:

 First, Second and higher order Systems’ Static and dynamic error Coefficient. Transient response and performance Specifications

**Module –IV [5hrs]**

**Basic Control Actions:**

Proportional, Derivative and integral Control Tachoglnrator feedback

**Module -V [4hrs]**

**Root locus Technique**:

Introduction, general rules for Construction of root loci, Root locus analysis.

**Module – VI [5hrs]**

**Frequency Response:**

Bode diagram, gain magnitude – Phase Shift Plot, Nyquist diagram, Polar plot, Frequency response, frequency domain Specifications.

 **Module-VII [5hrs]**

**Compensation Design:**

Concept of Compensation, Design of lag and lead and lag – lead network.

 **Module-VIII [3hrs]**

**State Space Methods:**

Introduction to State Variable formulation and its Solution

**Suggested Test Books & References:**

* KUO, B.C, “Automatic Control Systems” Prentice Hall of India
* Gopal, M. “Control System” Tata Mc Graw.
* B.S Manke “Linear Control System”

**EC1502 - P**

**ELECTRONICS INSTRUMENTATION LAB**

**(0-0-3)**

 **LIST OF EXPERIMENTS**:

* Determination of unknown inductance using Maxwell’s inductance bridge.
* Determination of unknown inductance using Maxwell’s inductance capacitance bridge.
* Measurement of unknown inductance using Hay’s bridge.
* Measurement of unknown inductance using Anderson’s bridge.
* Study of Electronic type Voltmeter.
* Study of IEEE 4880 interfacing.
* Study of computer controlled instrumentation.
* Study of Transducer interfacing.
* 2 Wire RTD in a potentiometer circuit.
* 3 Wire RTD in a dc wheat stone bridge.
* Thermistor in a non – inverting op – amp circuit.
* Thermocouple.
* Diode circuit.
* LVDT characteristics.
* Transistor as temp sensor.
* Instrumentation amplifier.
* LDR as optical sensor.
* Photo transistor characteristics.
* Photo diode characteristics.

**EC 1503 -P**

**COMMUNICATION SYSTEM - I LAB**

 **(0-0-3)**

**List of Experiments:**

* Study of Amplitude Modulation and Demodulation.
* Study of SSB and DSB Modulation.
* Study of Frequency Modulation and Demodulation.
* Study of PAM/PWM/PPM Modulation.
* Study of Sampling Theorem.
* Study of PCM Modulation.
* Delta Modulator.

**EC 1504 -P**

**MICROPROCESSOR THEORY LAB**

**(0-0-3)**

**LIST OF EXPERIMENTS:**

* A Program to add: Two 8 – bit numbers and Two 16 – bit numbers.
* A Program to find the smallest number in a array.
* A Program to find multiplication of two 8 – bit numbers.
* A Program to find a square root of a number.
* Program and verification of Speed control of stepper motor.
* Program and verification of seven – segment display.

**EC 1505 – P**

**AUTOMATIC CONTROL SYSTEMS LAB**

 **(0-0-3)**

**List of Experiments:**

* Conversion of angular displacement corresponding to voltage signal by synchronous
* Study of open loop and closed loop system
* Study of P, PI and PID controllers
* Find the study of second order system by Bode- plot/ root locus techniques
* Study of techniques (Lead and Lag compensation ) for improving the stability of second order systems

**HS 1505-P**

**GENERAL PROFICIENCY**

General Proficiency classes are conducted for personality development of students. It includes Group Discussion, Presentation, Seminar, Quiz, CV Writing, Technical Report Writing, NSS and also inculcates Human Values and Professional Ethics. There will be assignments and class Tests also.

**B. TECH COURSE STRUCTURE**

**ELCETRONICS & COMMUNICATION ENGINEERING**

**6th SEMESTER**

**RANCHI UNIVERSITY, RANCHI**

**EC 1601**

**INDUSTRIAL ELECTRONICS**

 **(2-0-0)**

**Module-I [6Hrs]**

Thyristor characteristics, Two- Transistor Model of Thyristor, thyristor Turn- On di/ dt Protection, dv/dt – Thyristor Turn- On, Series Operator of Thyristor, Parallel Operation of Thyristors, Snubber reverse Recovery Transients.

**Module-II [6Hrs]**

**Thyristor Communication Techniques**

Natural Communication, Forced Communication, Self Communication, Impulse Communication; resonant pulse communication, complementary communication, External Pulse communication, Load side communication, line side communication.

**Module-III [6Hrs]**

**Controlled rectifiers**

Introduction, principle of on-of controlled converter operation, Single phase semi Converters, single phase dual converters, single phase series converters, three phase half wave converters, three phase semi converters, three phase full converters, three phase dual converters.

**Module-IV [6Hrs]**

**AC Voltage Controllers**

Introduction, principle of on- of control; principle of phase control, single – phase bi directional controllers with resistive loads, single phase controllers with Inductive loads. Three phase half wave controllers

Three phase fill wave controllers, three phase bi- directional delta connected controllers, single phase transformer tab changers, cycloconverters, single phase cycloconverters, three phase cycloconverters, reduction of output harmonics.

**Module-V [6Hrs]**

**DC Choppers**

Introduction, Principle of step- down operation, Step- down hoppers with RL Load principle of step- up operation, performance parameters, switch- mode regulators, thyristor, chopper circuits’ Impulse communicated choppers, Effects of source and load inductance, Impulse- commutated three thyristor choppers, resonant pulse choppers.

**Module-VI [6Hrs]**

**Inverters**

Introduction, Principle of operation, performance parameters, single phase bridge Inverters, three phase inverters, voltage control of three phase, Harmonic Reductions.

**Suggested Text Books & References**

* Rasid, “power Electronics’’, Prentice Hall.
* Sen, P.C., “power Electronics’’, Wiley eastern.
* Dubey, G.K., “Theimistor Engineering’’, Prentice Hall.

**EC 1602**

**RADAR AND TV ENGINEERING**

 **(2-0-0)**

**Module – I [5 Hrs]**

Basic television system and scanning principles: Block diagram of TV transmitter and receiver, sound and picture transmission, scanning process, transmission and reception of video signal,

**Module – II [6 Hrs]**

Brightness perception and photometric quantities of TV systems, aspect ratio and rectangular scanning, persistence of vision and flicker, Kell factor, vertical and horizontal resolution, interlaced scanning, composite video signal, horizontal and vertical synchronous and blanking standard signal, TV pickup tubes, Videocon, CCD

**Module – III [6 Hrs]**

Color and Digital TV Technology: Mixing of colors and colors perception, chromaticity diagram, color TV signals and transmission, NTSE and PAL system, color TV receiver and specification, fully digital TV system, Digital TV signal and transmission, Digitized video parameters, digital TV receiver, fundamental of flat panel displays, plasma display, liquid crystal display and large screen display

**Module – IV [3 Hrs]**

Introduction to Radar: Basic Radar, Radar block diagram, Radar frequencies and applications, Radar indicators

**Module – V [6 Hrs]**

Radar Equation: Detection of signal noise, receiver noise and SNR, probability of detection and false alarm, integration of radar pulses, Radar cross section of targets, PRF, system losses

**Module – VI [6 Hrs]**

MTI, CW, FMCW Radar: Introduction, delay line cancellers, Doppler filter banks, limitation of MTI, staggered PRF, Pulse Doppler Radar

**Module – VII [3 Hrs]**

Tracking Radars: Mono pulse, Sequential lobbing and conical scan tracking of targets

**Suggested Text Books and References:**

* Television and video Engineering by A. M Dhake, 2nd Edition, Tata McGraw Hill
* Modern Television practice – Principle, Technology and servicing by R.R. Gulati
* Basic television and Video Systems, Bernard Grove, Charles E Hernfon, 6th Edition McGraw Hill
* Introduction to Radar Systems by Merrill I. Skolink, 3rd Edition, Tata McGraw Hill
* Radar principle, Technology, Applications by Byron Edde, 1st Edition, Pearson 2004
* Understanding Radar system by Simon Kingsley, Shaua Quegal, Standard publication
* Principle of Radar by J.C. Toomay, PHI, 2nd Edition 2004

**EC1603**

**DATA COMMUNICATION & NETWORKING**

 **(3-0-0)**

**Module – I [7 Hrs]**

**Network Fundamentals**

Data communication & its components, Network criteria, Line configuration, Topology, Transmission mode, Categories of networks, Common network connecting devices ( NIC, Hub, Switch, Bridge, router, gateway & other Devices)

**Module – II [5 Hrs]**

**Networking Models**

The OSI Model, Layers in OSI model, Layers Task, Sender, Receiver, carrier, TCP/ IP protocol, Fundamental differences between OSI and TCP/ IP.

**Module – III [7 Hrs]**

**Transmission Media**

Digital Data Transmission, Interfaces and Modems, Guided media- Twisted pair cable with advantages and disadvantages, Co-axial cable with advantages and disadvantages, Fiber Optics cable with advantages and disadvantages. Unguided media- Radiowaves, Infrared, Bluetooth, Wi - Fi, Wi – Max.

**Module – IV [5 Hrs]**

**Multiplexing**

Frequency Division Multiplexing, Synchronous Time – Division Multiplexing, Asynchronous Time – Division Multiplexing, SONET/SDN, ATM, CSMA/ CD.

**Module – V [5 Hrs]**

**Switching**

Circuit switching, Packet switching and Message switching, Space Division switch,

Time Division switch, TDM Bus, TCP and UDP.

**Module – VI [5 Hrs]**

**Addressing**

Logical addressing, Unicasting, Multicasting, Broadcasting, Sunetting, IPV 4, IPV 6, TCP,UDP.

**Suggested Text Books and References Books:**

* Data and Computer Communication, 7/e by William Stallings
* Data Communication by Prakash C. Gupta.
* Data Communication and Networking, 3/e by Behrouz A. Forouzan.

**EC 1604**

**COMMUNICATION HARDWARE DESIGN**

**(3-0-0)**

**Module – I [10 Hrs]**

**Amplitude Modulations Systems:**

Basics of Amplitude modulation single tone & multi tone AM wave, power content, DSB – SC, SSB – SC, and USB – SC signals. Square law – modulator, Switching amplitude modulator. Envelope detector, DSB – SC modulation, balanced and ring modulators, Coherent and carrier re – insertion technique detectors. Quadrature amplitude modulator and demodulator. Generation of SSB – SC signal using frequency and phase discrimination. Detection of SSB – SC wave using coherent and carrier re – insertion technique. Costas receiver, squaring loop.

**Module – II [10 Hrs]**

**Angle Modulation systems**

Basics of frequency and phase modulation. Single tone frequency modulation. NBFM and WBFM. Transmission bandwidth of FM wave, Armstrong modulator, Reactance modulator, Varactor modulator, Modulations using VCO and frequency generator slope detectors, ratio – detector, Foster – seeley discrimatiator

**Module – III [8 Hrs]**

**Receivers:** Motivations and principal of super heterodyne receivers, sensitivity, selectivity and image frequency rejection. Sub – system of a communication receiver. Super heterodyne.

**Module – IV [6 Hrs]**

**Amplifier and Mixers:** Amplifier design using admittance – parameters, broad banding technique. Mixers using diodes, transistors, Frequency multiplication

**Module V [8 Hrs]**

**Phase locked loops:** Linear model of PLL, phase detectors, voltage controlled oscillators, loop filter. FM demodulation using PLL. All applications,Digital PLL, Stability,transient and steady state analysis of PLL. Direct frequency synthesis, PLL as a frequency synthesizer. Direct Digital synthesis.

**Suggested Test Books Reference Books:**

* “Communication system” 2/e, S. Hay*kin*
* “Electronic Communication system” kennedy & George, Mc Graw Hill, 3rd Ed.
* “Modern Communication circuit”,Jact Smith.
* “Analog Communication”, Sanjay Sharma.

**EC 1605**

**MICROWAVE ENGINEERING**

 **(3-0-0)**

**MODULE – I [2 Hrs]**

Introduction, advantage and application of microwave frequency

**MODULE – II [5 Hrs]**

Microwave frequency limitation of conventional tubes, standing wave ratio, Expression for resonant frequency in circular and rectangular waveguide

**MODULE – III [6 Hrs]**

Microwave tubes – Two cavity Klystron amplifier, Analysis and operation of Klystron amplifier, Reflex Klystron oscillator. Travelling Wave Tube, Backward wave oscillator, Cavity Magnetron.

**MODULE – IV [6 Hrs]**

Gunn oscillator, Avalanche diode oscillator, Transferred electron oscillator

**MODULE – V [ 5Hrs]**

Microwave components – Scattering Matrix representation and Properties, Tees-E-plane tee, H-plane tee, Magic tee, Two-hole directional coupler, isolater, Phase shifter, Microwave variable attenuator, Matched loads.

**MODULE – VI [6 Hrs]**

Microwave integrated circuits- Strip line, Microstrip line, slotted line, microstrip antenna, Ferrite devices- property, Faraday rotation in isolater, Faraday rotation in two and four port circulater.

**MODULE – VII [5 Hrs]**

Microwave devices- Basic principle of IMPATT didode, Gunn diode, Pin diode, Tunnel diode

**Text Books/ Reference Books:**

* **“**Microwave Devices & Circuits”, Liao.
* “Microwave & Radar Engineering”, Kulkarni.
* “Microwave Principles”, Reich.
* “Microwave Semiconductor Devices & Their Circuit Applications”, Watson.

**EC 1606**

**COMMUNICATION SYSTEMS – II**

 **(3-0-0)**

**MODULE- I [5 Hrs]**

Sampling theorem, Signal Reconstruction, Anti-aliasing effect, Application of Sampling theorem: PAM, PPM, PWM Signals

Pulse Code Modulation: Quantization of Signals, Quantization error, Non-uniform Quantization. Compander. Delta and Adaptive Delta Modulation

**MODULE- II [6 Hrs]**

Digital Communication Techniques:

Generation, Transmission, Reception, Spectrum and Geometrical Representation in Signal Space of: ASK, BPSK, DPSK, DEPSK, QPSK, П/4 QPSK, FSK, MSK

**MODULE- III [3 Hrs]**

Noise in PCM: Calculation of Quantization of Noise Power, Output Signal Power. Output SNR of PCM

**MODULE- IV [6 Hrs]**

Principles of Digital Baseband Transmission:

Digital baseband transmission. Line Coding-Various line codes ( Unipolar, Polar, Bipolar). Pulse Shaping: Nyquist Criterion for Zero ISI, Partial Response signaling. Regenerative Repeater- Preamplifier, Equalizer. Timing Extraction. Eye diagram. Matched Filter

**MODULE- V [4 Hrs]**

Calculation of Error Probability of ASK, BPSK, DPSK, FSK. Probability of Error of Matched filter

**MODULE- VI [5 Hrs]**

Information Theory:

Information, Entropy, Information Rate, Source Coding Theorem: Shanon-Fanon, Huffman Coding. Mutual Information and Channel capacity. Bandwidth- S/N Trade off.

**MODULE- VII [6 Hrs]**

Error Control Coding:

Parity Checkbit Coding for Error detection, Hamming distance. Channel Coding Theorem: Block Code, Cyclic Code. Introduction to Convolution Codes and Viterbi Algorithm.

**Suggested Text Books & References Books:**

* Simon Haykin, “Communication Systems”, 3rd Edition, John Willey & Sons, 1997
* Taub & Schilling, “Principles of Communication Systems”, Tata McGraw Hill, 1998
* B.P.Lathi, “Modern Digital & Analog Communication Systems”, 3rd Edition, Oxford University, Delhi, 1998
* Kennedy, George, “Electronic Communication Systems”, 3rd Edition, Tata McGraw Hill, 1984
* Bruce Carlson, “Communication systems”, Tata McGraw Hill Kogakusha, 1986.
* Sbanmugam K. Sam, “Digital & Analog Communication Systems”, John Willey & Sons

**EC 1604 – P**

**DATA COMMUNICATION & NETWORKING LAB**

 **(0-0-3)**

* Simulation Experiments for protocol performance.
* Configuring, testing and measuring Network devices and parameters/policies.
* Network management experiments.
* Exercises in Network programming.

**EC 1605 – P**

**COMMUNICATION HARDWARE DESIGN LAB**

 **(0-0-3)**

**List of Experiments:**

* Study of SSB –DSB modulators.
* Study of square law detectors.
* Design of Super Heterodyne Receiver.
* Design of EN modulation using PLL and its application.
* Design of FM Communication system.

**EC 1606 – P**

**MICROWAVE ENGINEERING LAB**

 **(0-0-3)**

**List of Experiments:**

* Study of Microwave bench and its components and instruments.
* Measurement of Klystron Characteristics.
* Measurement of VSWR and standing wave ratio.
* Measurement of Dielectric Constants.
* Measurement of Directivity and coupling coefficient of a directional coupler.
* Determination of Attenuation constant of an Attenuator.
* Determination of phase shift of a phase shifter.
* Measurement of Q of a cavity.

**EC 1607 - P**

**COMMUNICATION SYSTEM – II LAB**

 **(0-0-3)**

 **LIST OF THE EXPERIMENTS:**

* Study of Sampling Theorem and Reconstruction of a signal.
* Study of Delta Modulator.
* Study of Amplitude Shift Keying.
* Study of Frequency Shift Keying.
* Study of Phase Shift Keying.

**HS 1606-P**

**GENERAL PROFICIENCY**

General Proficiency classes are conducted for personality development of students. It includes Group Discussion, Presentation, Seminar, Quiz, CV Writing, Technical Report Writing, NSS and also inculcates Human Values and Professional Ethics. There will be assignments and class Tests also.

**B. TECH COURSE STRUCTURE**

**ELCETRONICS & COMMUNICATION ENGINEERING**

**7th SEMESTER**

**RANCHI UNIVERSITY, RANCHI**

**EC 1701**

**OPTICAL COMMUNICATION**

 **(3-0-0)**

**Module – I [2 Hrs]**

**Introduction:**

Generations of Optical Communication, Advantages, Elements of an optical fiber transmission link

**Module – II [4 Hrs]**

**Optical Fiber**

Classification of Fiber, step index graded index, single mode, Multimode – Ray optics representation, Numerical aperture, modes phase and Group velocity, Fiber materials.

**Module – III [5 Hrs]**

**Attenuation and Dispersion in Optical fiber:**

Signal attenuation and distortion in optical fibers, Dispersion effects in optical fibers splicing technique.

**Module – IV [5 Hrs]**

**Optical Source:**

Structure and Materials of LED and LD Sources, characteristic of LED, Semiconductor- optical Amplifier.

**Module –V [4 Hrs]**

**Optical detectors**

Si, Ge, GaAs detection characteristics, PIN photodiode, Avalanche Photodiode.

**Module – VI [5 Hrs]**

**Modulation and Demodulation:**

Internal and External modulation Electro optic effect, Accousto Optic effect, Intensity modulation, PAM – IM, PWM – IM, PPM – IM, PFM – IM, Direct detection, Coherent detection, Homodyne and Heterodyne, phase Locked Loops.

**Module –VII [5 Hrs]**

**Noise Source:**

Noise in photo diode – shot noise, thermal noise Dark noise, ASE Noise in optical amplifiers. Phase noise , polarization fluctuation noise.

**Module – VIII [5 Hrs]**

**Application:**

Optical WDM, CDM and TDM networks. SDH/SONET architecture optical ATM.

**Suggested Text and Reference Books:**

* G. Keiser, “Optical Fiber Communications’’, MC Graw Hill, 3rd Ed.
* J.M Senior, “Optical Fiber Communications” PHI, 2nd Ed.
* Johan Gowar, “Optical Communication Systems’’ Prentice Hall of India.
* G.P. Agrawal, “Optical Communications systems ‘’, Tohn Wiley.

**EC 1702**

**DIGITAL SIGNAL PROCESSING**

 **(3-0-0)**

**Module – I [2 Hrs]**

**Introduction**

Limitations of analog signal processing, Advantages of digital signal processing.

**Module – II [4 Hrs]**

**Discrete Time Characterization of Signals and System**

Some elementary discrete time sequences and systems, Concepts of stability, causality, linearity, time invariance and memory, Linear time invariant systems and their properties, Linear constant coefficient difference equations.

**Module – III [4 Hrs]**

**Frequency Domain Representation of Discrete Time Signal and Systems**

Complex exponentials as eigen functions of LTI systems, Fourier Transform of sequences, Fourier Transform theorems and symmetry properties of Fourier Transform.

**Module – IV [5 Hrs]**

**Sampling of Continuous Time Signals**

Frequency Domain Representation of Uniform sampling Reconstruction of a continuous time signal from its sample, Discrete Time Processing of Continuous time signals and vice- versa, Decimation & Interpolation, Changing the sampling rate by integer and non integer factors using discrete time processing.

**Module – V [6 Hrs]**

**The Z transform**

Limitations of the Fourier Transform, Z- Transform, Region of convergence, Properties of the Z- Transform, Inverse Z- Transform using contour integration, Complex convolution theorem, Parseval’s relation, Unilateral Z- Transform and its application to difference equations with non zero initial conditions.

**Module – VI [5 Hrs]**

**Discrete Fourier Transform**

DFT and its properties, Linear, Periodic and Circular convolution, Linear Filtering Methods based on DFT, Filtering of long data sequences, Fast Fourier Transform algorithm using decimation in time and decimation in frequency techniques, Linear filtering approaches to computation of DFT.

**Module – VII [4 Hrs]**

**Transform Analysis of LTI systems & Structure for Discrete Time Systems**

Frequency response of LTI systems, System functions for systems characterized by linear constant coefficient difference equations, relationship between magnitude and phase, All pass systems, Minimum phase systems. Signal flow graph representation, Transposed forms, Lattice structure.

**Module - VIII [5 Hrs]**

**Design of Digital Filters**

Linear phase FIR filters, FIR Differentiators and Hilbert Transforms, IIR filter design by impulse invariance, Bilinear Transformations, Matched Z- Transformation, Frequency transformations in the Analog and Digital Domain.

**Suggested Text books & References:**

* Proakis, J. G. & Manolakis, D.G., “Digital Signal Processing”, Prentice Hall, 1992.
* Oppenheim, A.V. & Schafer, R.W., “ Discrete Time Signal Processing”, Prentice Hall,1989.
* S. Salivahnan, A. Vallavaraj, & C. Gnanapriya, “ Digital Signal Processing” TMH

**EC 1703**

**MICRO ELECTRONIC DEVICES AND VLSI TECHNOLOGY**

 **(3-0-0)**

**MODULE I: [4 Hrs]**

**Basic device technology:**  Single crystal growth and purification, Epitaxy, Oxidation Diffusion, Ion implantation and pn junction formation, Semiconductor measurements.

**MODULE II: [6 Hrs]**

**Integrated Circuits Fabrication Process:** Monolithic, Hybrid, thick film technology, pattern generation and photo mask fabrication, photolithography, Isolation technique, metallization, interconnection, encapsulation and testing.

**MODULE III: [5 Hrs]**

**Monolithic Circuit Components:** Epitaxial diffused system, Diffused collector process, Triple diffused process, Bipolar transistor formation, Diode formation , Basic diode connections of IC transistors, Diode as a capacitor, thin film capacitor , Sheet resistance, Diffused resistor, Thin film resistor, parasitic in integrated circuits, Layout considerations.

**MODULE IV: [6 Hrs]**

**MOS Technology:** MOSFET as basic IC component, comparison of MOSFET with BJT as IC component, MOS isolation techniques, poly-silicon gate technology , Self aligned gate technology, NMOS process sequence, NMOS inverter, Pass transistor and gates, N-tub, P-tub and twin-tub CMOS structures, CMOS-process sequence.

**MODULE V: [8 Hrs]**

**VLSI Technology:** Scaling theory and devices miniaturization, E beam masks, plasma etching choice of photo resists, Stick Diagram , VLSI design rules and layout diagrams, Computer aids. VLSI.

**MODULE VI: [6 Hrs]**

**Circuit Concepts:** Inverter delays, Driving large capacitive lodes , Propagation delay and effect of wiring capacitances, pull up and pull down ratios of NMOS and CMOS inverter, Alternative forms of pull up , NMOS and CMOS inverter transfer characteristics , CMOS gates.

**Suggested Books & references:**

* Warner, Jr. M. (Ed.), “Integrated Circuits-Design Principles and Fabrication”, McGraw Hill Book Company, New York,1965.
* Veronis , “Integrated Circuits Fabrication Technology”, Reston Publishing Company Inc. Virginia ,1979.
* Allison, “Electronic Integrated circuits their Technology and Design”, McGraw Hill Book Company, 1975.
* Mead and Conway, L.A., “Introduction to VLSI Systems”, Addison Wesley, USA, 1980.

**EC 1702 - P**

**OPTICALCOMMUNICATION LAB**

 **(0-0-3)**

**List of Experiments:**

* Splicing Techniques of optical fiber.
* Study of PIN photodiode and its application.
* Study of fiber LASER, Semiconductor LASER.
* Study of Heterodyne and Homodyne receiver.
* Study of optical ATM.

**EC1703 – P**

**DIGITAL SIGNAL PROCESSING LAB**

 **(0-0-3)**

**List of Experiments:**

* Generation of unit step, exponential, sinusoidal sequences on MATLAB.
* Generation of Impulse and Ramp sequences on MATLAB.
* To compute the linear convolution of two sequences.
* To compute the DFT of a sequence and plot magnitude and phase response.
* To design a Butterworth Low pass filter for given specifications.
* To plot the frequency response of low pass filter using Kaiser window.
* To generate a triangular wave using Fourier series.

**EC 1704 - P**

**MICRO ELECTRONICS DEVICES AND VLSI TECHNOLOGY LAB**

 **(0-0-3)**

**LIST OF EXPERIMENTS:**

* Design Entry and simulation of combinational logic circuits (8 bit adders, 4 bit multipliers, address decoders, multiplexers), Test bench creation, functional verification, and concepts of concurrent and sequential execution to be highlighted.
* Design Entry and simulation of sequential logic circuits (counters, PRBS generators, accumulators). Test bench creation, functional verification, and concepts of concurrent and sequential execution to be highlighted.
* Synthesis, P&R and Post P&R simulation for all the blocks/codes developed in Expt. No. 1 and No. 2 given above. Concepts of FPGA floor plan, critical path, design gate count, I/O configuration and pin assignment to be taught in this experiment.
* Generation of configuration/fuse files for all the blocks/codes developed as part of Expt.1. and Expt. 2. FPGA devices must be configured and hardware tested for the blocks/codes developed as part of Expt. 1. and Expt. 2. The correctness of the inputs and outputs for each of the blocks must be demonstrated at least on oscilloscopes (logic analyzer preferred).
* Design a schematic and simple layout for CMOS Inverter, parasitic extraction and simulation.
* Design a schematic and simple layout for CMOS NAND gate, parasitic extraction and simulation.
* Design a schematic and simple layout for CMOS NOR gate, parasitic extraction and simulation.
* Design an ALU or a 4-bit Microprocessor with limited instructions.

**HS 1707-P**

**GENERAL PROFICIENCY**

General Proficiency classes are conducted for personality development of students. It includes Group Discussion, Presentation, Seminar, Quiz, CV Writing, Technical Report Writing, NSS and also inculcates Human Values and Professional Ethics. There will be assignments and class Tests also.

**CS 2712**

**OPEN ELECTIVE - I**

**E – COMMERCE STRATEGIC IT**

 **(3-0-0)**

**Module – I [5 Hrs]**

**What is E – Commerce:** E – commerce, doing business on the Internet, The scope of Internet and the web, using web to reach customers, Benefits of E – Commerce, market

**Module – II [7 Hrs]**

**E – Business Models and Markets:** E – Business Models, E – Business markets

**E – Commerce, providers and Vendors:** traditional bye build approach and vendors, online sales channels, Advantage of outsourcing an infrastructure to an ECIP.

**Module – III [6 Hrs]**

**E – Commerce Website creation:** The elements of E – Commerce

**Managing E – Commerce Website development:** Website server, developing a commerce site, Requirement of your site, Building the site, Implementation

**Module – IV [4 Hrs]**

**Building Shopping Cart Applications:** A shopping cart scenario, A customer servlet, A Real world Application Model, Loose component coupling

**Module – V [4 Hrs]**

Mobile E – Commerce; Wireless industry standards, wireless communication platforms for LANs, wireless WANs, Facilities for wireless environment, Concerns for mobile Enterprise

**Module – VI [5 Hrs]**

**Security Issues: Security Solutions:** Symmetric and Asymmetric Cryptosystems, RSA,DES and Digital Signature, Protocols for secure messaging, Secure Electronic Transaction (SET) protocol, Electronic cash over internet, Internet Security

**Module – VII [4 Hrs]**

**Electronic Payments Technology:** Issues, smart Cards, Digital Currencies

**Suggested Text Books and References:**

* Electronic Commerce – Pete Loshin & John Vacca, Laxmi Publication
* Electronics Commerce from vision to fulfillment – AWAD – PHI Publication
* Electronics Commerce by R, Goel – New Age International Publication

**CS 2712**

**OPEN ELECTIVE - I**

**SOFTWARE TECHNOLOGY**

 **(3-0-0)**

**Module – I [5 Hrs]**

**Introduction:** Problems encountered during software development and their causes; Software life cycle

**Module – II [5 Hrs]**

Software Planning: Software planning, objectives and scope, costing Estimation and scheduling

**Module – III [5 Hrs]**

Software Requirement Analysis: Fault finding techniques, information structure, data base requirements, requirement analysis tools

**Module – IV [6 Hrs]**

**Software Design Process:** System design tools and techniques, Top down technique, structural programming; Data oriented, design documentation and review

**Module – V [6 Hrs]**

**Software Testing and Reliability:** Purpose of testing,unit testing, component testing, integration testing, system testing, testing tools, debugging and reliability

**Module – VI [6 Hrs]**

**Software Maintenance:** Maintainability, documentation to facilitate maintenance, Regression testing, Reverse engineering

**Suggested Text Books and References:**

* Software Engineering, A Practitioners Approach – R.S. Pressman, McGraw Hill, 1992
* Software Testing techniques – Boris Beizer, van Nostrand Reinhold, 1990
* An integrated Approach to Software Engineering, Pankaj
* System Analysis and Design Methods – Wlutten, Bentley and Barlow; Galgotia Publications

**EC 2712**

**PROFESSIONAL ELECTIVE - I**

 **SPEECH SIGNAL PROCESSING**

 **(3-0-0)**

**MODULE - I [5 Hrs]**

Introduction of Human Speech Production mechanism, Classification of speech sounds, Nature of speech signal, Model of speech production, purpose of speech signal processing, Digital models for speech signal, Digital processing of speech signals, Normalization requirement for speech signal.

**MODULE - II [3 Hrs]**

Time domain analysis of speech processing: Time domain parameters of speech, Methods for extracting the parameters with zero crossing, Auto correlation function, Pitch estimation.

**MODULE - III [4 Hrs]**

Frequency domain analysis of speech analysis: Short time Fourier analysis, Filter- bank analysis, spectrographic analysis, Formant extraction, Pitch extraction analysis, Synthesis Systems, Mel-frequency spectrum analysis.

**MODULE - IV [5 Hrs]**

Coding of speech signals: Introduction, Quantization, Speech redundancies and quality measures, Time adaptive waveform coding, exploiting properties of the spectral envelope, Exploiting the periodicity of voiced speech, Exploiting Auditory Limitations, Spectral Coders, Vocoders, Vector Quantization.

**MODULE - V [5 Hrs]**

Linear Predictive Coding Techniques for speech: Formulation of linear prediction problem in time domain solution of normal equation, Interpretation of linear prediction in auto correlation and spectral domains.

**MODULE - VI [3 Hrs]**

Speech Synthesis: Principles of speech synthesis, Synthesizer operation, speech synthesis in other languages and Hardware required for it.

**MODULE - VII [5 Hrs]**

Speech Recognition: Introduction, Basic pattern, Recognition approach, parametric representation, Similarity and distance measures, Segmentation, Dynamic Time Warping (DTW), Search Reduction and Networks for Speech Recognition.

**MODULE - VIII [5 Hrs]**

Speaker Recognition: Introduction, Recognition techniques, Features that distinguish speakers, System design, Speaker recognition by humans.

**Suggested Text Books and References:**

* Digital Processing of Speech Signals by L.R Rabiner and R.E. Schafer, Pearson Education
* Fundamentals of Speech Recognition by L.Rabiner and Biing-Hwang Juang, Pearson Education
* Speech Communications, 2nd Edition by Douglas O’ Shaughessy, University Press

**CS 2713**

**PROFESSIONAL ELECTIVE -I**

**DIGITAL IMAGE PROCESSING**

 **(3-0-0)**

**MODULE - I [5 Hrs]**

Different Stages of Image Processing & Analysis Scheme, Components of Image Processing System, Multiprocessor Interconnections

**MODULE – II [5 Hrs]**

A review of various Mathematical Transforms: Fuzzy sets and properties; Mathematical Morphology, Wavelet Transform, Perception of color

**MODULE – III [6 Hrs]**

Image Formation: Geometric Model, Photometric Model Image Digitization: A review of Sampling and Quantization Processes, A digital Image

**MODULE – IV [6 Hrs]**

Image Enhancement: Contrast Intensification, Smoothing, Image Sharpening Image Restoration: MinimumMean- Square error Restoration by Homomorphic Filtering

**MODULE- V [5 Hrs]**

Image Compression: Schematic diagram of Data Compresiion Procedure, Lossless Compression- Coding

**MODULE – VI [6 Hrs]**

Registration: Geometric Transformation Multivalued Image Processing: Multispectral Image Processing, Processing of Colour Images

**Suggested Text Books and References:**

* Digital Image Processing and Analysis by B.Chanda & D.Dutt Majumdar, PHI 2001
* Digital Image Processing by R.C. Gonzalez, R.E. Woods, Pearson Education
* Fundamentals of Digital Image Processing by Anil K.Jain, PHI

**EC 2714**

**PROFESSIONAL ELECTIVE - I**

**OPTICAL NETWORK**

 **(3-0-0)**

**Module – I [8 Hrs]**

Optical Network Elements - I: Passive components, 2×2 fiber couplers, scattering Matrix Representation, Star couplers, Mach – Zehnder multiplexers, Fiber Grating, Phase – array – based WDM devices,Tunable Sources, Tunable Fibers, Circulators, Isolators

**Module – II [4 Hrs]**

Optical Network Elements – II: Wavelength Converters, Switching Elements, Non reconfigurable and Reconfigurable wavelength Router

**Module – III [10 Hrs]**

Optical Amplifiers: Types, Semiconductor Optical Amplifiers, Erbium doped fiber amplifier, Amplification mechanism, Conv. Efficiency, Gain, Noise, Applications, Power amplifiers, In –line amplifiers, Preamplifiers, Applications to Optical Video Distribution, Long span Transmission, Repeater less Transmission, Under Sea Transmission system

**Module – IV [6 Hrs]**

Optical Networks: Topological performance, SONET/SDH, Broadcast and select WDM networks, Signal – Hop networks, Multi – Hop Networks Testbeds

**Module – V [6 Hrs]**

Wavelength Routed Networks, wavelength Routing Testbeds, Nonlinear Effect on network performances, SRS, SBS, SPM, XPM, FWM, Dispersion Management, Optical CDMA networks

**Suggested Text Books and References Books:**

* Optical Fiber Communications, G. Keiser, 3/e, McGraw Hill
* Optical Networks, A Practical Perpective, R. Ramaswami and K.N. Sivarajan, Morgan Kaufmann

**EC 2715**

**PROFESSIONAL ELECTIVE -I**

**MOBILE COMMUNICATION**

 **(3-0-0)**

**MODULE - I [6 Hrs]**

A brief introduction to mobile Telephony, Technologies and choices, Cellular Concept- System design: Fundamentals: Frequency reuse, Channel Assignment, Handoff Strategies, Interference and System capacity, Trunking and Grade of Service; Improving coverage and capacity in cellular systems- Cells splitting, sectoring, repeaters and range extension, Microcell and Picocell zone concept. Antennas for base station and hand-held cellular phone.

**MODULE - II [5 Hrs]**

Mobile radio propagation: Large –scale path loss, ground reflection model, diffraction, scattering. Outdoor propagation model-Okumura model; Indoor propagation model: Partition losses, long distance path loss model

**MODULE - III** **[6 Hrs]**

Small scale fading and multipath, Doppler’s shift. Types of small scale fading and their effects on received signal. Modulation Techniques: FM for analogue. FM detection techniques- PLL and Quadrature detection. Digital modulation: π/4 QPSK and MSK, GMSK.

**MODULE - IV**  **[6 Hrs]**

Spread spectrum techniques: DS-SS and FH-SS. Performances of FM, π/4 QPSK and MSK in fading and interference. Fundamentals of equalization- Adaptive equalizer. Diversity techniques- space, frequency polarization and time diversity.

**MODULE - V** **[6 Hrs]**

Multiple access techniques: Frequency division multiple access(FDMA), Time division multiple access(TDMA), spread spectrum multiple access- frequency hopped multiple access (FHMA), Code division multiple access(CDMA). Frequency and channel specification for CDMA, Digital cellular standard(IS-95)

**MODULE - VI** **[6 Hrs]**

Wireless Networking: various generation of wireless networks, Fixed Networks Transmission Hierarchy, Traffic Routing in Wireless Networks- Circuit Switching, Packet Switching . The X -25 Protocol.

Global System for Mobile (GSM): Features, Architecture, channel types, Frame Structure in GSM. Signal processing in GSM.

**Suggested Text Books and References:**

* Wireless Communication, 2nd Edition by Theodore S. Rappaport, Pearson Publication.
* Mobile Cellular Communications, 2nd Edition by William C.Y. Lee, Mc Graw Hill International Edition.
* V K Garg, Wireless Communication and Networking; Morgan Kaufman Publishers India; 2008

**B. TECH COURSE STRUCTURE**

**ELCETRONICS & COMMUNICATION ENGINEERING**

**8th SEMESTER**

**RANCHI UNIVERSITY, RANCHI**

**EC 1801**

**DIGITAL HARDWARE DESIGN**

 **(3-0-0)**

**Module – I [5 Hrs]**

IEEE logic symbol: Mixed logic representation: Review of POS and SOP minimization: Multi output function: Variable entered mapping: CAD tools for minimizing functions of more than six variables: ED – CR canonic forms and minimization**.**

**Module - II [5 Hrs]**

Iterative Arrays – time and space iteration: examples of arithmetic and code conversion circuits: Wired logic: practical consideration – fan in, fan out and delay: partitioning functions.

**Module - III [5 Hrs]**

Sequential machines: Mealy and Moore machines: Counter design examples: State reduction and next state decoders: Multimode counters: Shift register sequencers: timing and triggering: clock skew.

**Module – IV [5 Hrs]**

System controllers: function partition and flow diagram development: state specification; state assignment and next state decoder: output decoder: use of MSI decoders, multiplexer ROMs and PLAs in system controllers

**Module – V [5 Hrs]**

Programmable controllers – use of shift registers and counters; controllers with fixed and variable instruction seats: Control sequencers: RTL description of simple machines: design from RTL descriptions.

**Module – VI [4Hrs]**

Interfacing with microprocessors: Using custom PLAs and ROMs for interfacing: Displays: Floppy disk storage:

**Module – VII [3 Hrs]**

Asynchronous and synchronous serial data communication

**Module – VIII [3 Hrs]**

Asynchronous machines – analysis and design: races and hazards.

**Suggested Text Books and references**

* Fletcher, W.I., “ An Engineering approach to Digital Design”, Prentice Hall of India (1990)
* Hall D.V., “ Microprocessors and Interfacing”, Tata Mc Graw Hill 1986
* Hill, F.J & Peterson, G.R., “ Digital Logic and Microprocessor”, Wiley 1984

**EC 1802**

**SATELLITE COMMUNICATION**

 **(3-0-0)**

**Module – I [3 Hrs]**

**Introduction:** Origin and brief history of satellite communication, Elements of satellite communication link; Current status of Satellite communication

**Module – II [7 Hrs]**

**Orbital Mechanism and Launching of satellite:** Equation of orbit, describing the orbit, locating the satellite in the orbit, locating the satellite with respect to earth, orbital elements, look angle determination, Elevation and Azimuth calculation, Geostationary and other orbits, orbital perturbations, orbit determination, mechanics of launching a synchronous satellite, selecting a launch vehicle

**Module – III [5 Hrs]**

**Space Craft**: Satellite subsystems, Altitude and orbit control systems (AOCS), Telemetry, Tracking and Command (TT & C), Communication systems, Transponders, space craft antennas, frequency re – use antennas

**Module – IV [5 Hrs]**

**Satellite Channel and link Design:** Basic transmission theory, Noise temperature, calculation of system noise temperature, noise figure, G/T ratio of earth stations, design of down links and uplinks using C/N ratio, FM improvement factor for multichannel signals, link Design for FDM/FM, TV signals and Digital Signals

**Module – V [4 Hrs]**

**Multiple Access Techniques:** Frequency Division Multiple Access (FDMA), FDM/FM/FDMA, Time Division Multiple Access, Frame structure and Synchronization, Code Division Multiple Access, Random Access

**Module – VI [4 Hrs]**

**Earth Station Technology:** Earth station design, Basic antenna theory, antenna noise temperature; Tracking; Design of small earth station antennas, low noise amplifiers; High power amplifiers, FDM and TDM systems

**Module – VII [5 Hrs]**

**Operational Satellite:** INTELSAT, IMMARSAT and INSAT systems, Applications of INSAT, Satellite, Television Receivers, direct broadcast Satellites, Direct Reception system for Television and other applications

 **Suggested Text Books and References:**

* Pratt, T & Bostian, C.W., “ Satellite Telecommunication”, John Wiley & sons, 1986
* Reddy, D., “ Satellite Communication”, Prentice Hall of India, 1989

**HS 1808-P**

**GENERAL PROFICIENCY**

General Proficiency classes are conducted for personality development of students. It includes Group Discussion, Presentation, Seminar, Quiz, CV Writing, Technical Report Writing, NSS and also inculcates Human Values and Professional Ethics. There will be assignments and class Tests also.

**CS 2811**

**OPEN ELECTIVE –II**

**IT IN MARKETING MANAGEMENT (3-0-0)**

**Module – I [8 Hrs]**

Computer: Block diagram of Elements of Digital computer – their functions of memory, CPU, I – O devices, secondary storages, magnetic tape, disk CD – ROM, Other recent development – scanners, digitizer, plotters, Hardware & software, Micro, mini and main frame computers – their features

**Module – II [4 Hrs]**

Software Introduction to programming, flow charts & algorithms, system software, application software, firmware, machine, assembly and higher level languages, stored program concepts

**Module – III [2 Hrs]**

Process management: FCFS, Round Robin, Priority Based

**Module – IV [8 Hrs]**

File Management- FAT, File handling functions

File: Concepts of file, File organization and accessing techniques, indexed, line sequential based File handling functions: Sorting, merging, indexing, updating

**Module – V [6 Hrs]**

Basic concept of networking networking & data communication:

Introduction to LAN and Basic communication concepts, OSI & Topology, protocols, Ethernet, Arcnet, TCP/IP

**Module – VI [3 Hrs]**

Introduction to virus applications – DTP, E- mail and Internet

**Module – VII [3 Hrs]**

Computer & marketing applications and overview

**Text Books and References:**

* Computers today, 3e – Sanders
* Computer Networks, Andrew S. Tanenbaum (McGraw Hill)
* Fundamentals of Computing, Trucker(McGraw Hill)

**EC 2814**

**PROFESSIONAL ELECTIVE - II**

**BIO MEDICAL INSTRUMENTATION**

 **(3-0-0)**

**Module – I [5Hrs]**

Introduction, Man instrumentation system, Brief idea of Cardiovascular, Nervous & respiratory system

 **Module – II [3 Hrs]**

Resting & action potential, Polarization & depolarization, Propagation of action potential, Bio electronic potential

**Module - III [4 Hrs]**

Skin contact impedance, Bio potential electrode, Biochemical transducers, Active & passive transducers

**Module – IV [4 Hrs]**

Pressure transducers, Transducer for body temperature measurement, Pulse sensor, Respiration sensor

**Module – V [5 Hrs]**

ECG electrodes & leads, Electrocardiograph, Phonocardiograph

**Module – VI [5 Hrs]**

 Electroencaphalograph, Electromyograph, Measurement of blood pressure, blood flow & heart sound

**Module - VII [4 Hrs]**

Noninvasive instrumentation, Patient monitoring system, Electrical safety of patients in hospital, defibrillator, pace maker

**Module – VIII [5 Hrs]**

Diathermy (Microwave) structure & ultrasonic, imaging system (x-ray, MRI & ultrasonic), lasers in medicine

**Suggested Text Books and References:**

* Handbook for Biomedical instrumentation by R.S Khandpur.
* Medical instrumentation by Rajarao.
* Biomedical instrumentation & Measurements, 2nd Edition by L.Cromwell, F.J Weibell and E. A Pfeiffer., Prentice Hall of India
* Biomedical instrumentation by Dr. M. Arumugham
* Medical electronic &Biomedical instrumentation by Rajarao & Guha.
* Introduction to Bio medical Equipment Technology 4th Edition by Joseph J. Carr and John M. Brown., Pearson Education

**EC 2815**

**PROFESSIONAL ELECTIVE – II**

**POWER ELECTRONICS**

 **(3-0-0)**

**Module- I [5 Hrs]**

**Power Semiconductor Devices**

Power diode, Power Transistor and Thyristors, Static V-I Characteristics of SCR, TRIAC, GTO & IGBT, Turn-On & Turn OFF Mechanism of SCR, its gate characteristics, Device Specification and rating series and parallel operation, thyristor protection circuits, design of snubber circuit.

**Module – II [4 Hrs]**

**Triggering Circuits:**

Types of triggering schemes: DC, AC & pulsed triggering, UJT triggering scheme, R-C triggering scheme, cosine – law triggering scheme.

**Module – III [4 Hrs]**

**Commutation:**

Principle of natural commutation and forced commutation circuits forced commutation (Resonant commutation voltage commutation current commutation, load commutation).

**Module- IV [6 Hrs]**

**Controlled Rectifiers (AC to DC Converter):**

Single Phase Circuit Configuration and Principle of operation of operation of half wave, full wave controlled rectifiers (full converters and semi converters) wave form of voltage and current at the output and across the thyristor for R-L & R-L-E load, effect of source inductance, importance of free wheeling diode for inductive loads. Input power factor for R & R-L load, Ripple factor. Average output voltage and currents.

**Module – V [5 Hrs]**

**Three Phase Controlled Rectifiers**:

Half wave and full wave full controlled bridge rectifiers. Three phase semi-converters, average output voltage and current for R & R-L load.

**Module- VI [7 Hrs]**

**Inverters (DC to AC Converters):**

Single Phase – Series inverters : Circuit description and principle of operation for simple and improved circuit. Parallel inverter : Basic circuit description and principle without and with feed back diodes.

**Bridge Inverters:** Principle of operation of modified Mc Murray & Mc Murray Bedford inverters. Concept of voltage source inverter & current- source inverter.

**Three Phase**: Concept of three phase bridge inverters, principle of operation (180o conduction mode & 1200 conduction mode), wave form of output voltage and current for R & RL load.

**Module-VII [4 Hrs]**

DC Chopperts of class A,B.C.D.E Choppers, voltage commuted chopper, current commutated chopper and load commutated chopper.

Jones Chopper & Morgan Chopper.

Cyclo Converter (Single Phase) :

Basic Principle of Single phase Mid Point Cyclo converters and bridge types cyclo converters.

**Application:**

Over voltage protection, Zero voltage switch, cycle triggering (or Burst Firing), Uninterruptible power supply (UPS), Arc welding, HVDC transmission.

**Text Book:**

* Power Electronics – Single Khanchandani TMH
* Power Electronics – P.S. Bhimbra

**CS 2816**

**PROFESSIONAL ELECTIVE - III**

**COMPUTER GRAPHICS**

 **(3-0-0)**

**Module – I [5 Hrs]**

Overview of Graphics System: Video Display Units, Raster-Scan and Random Scan Systems, Graphics Input and Output Devices.

Output Primitives: Line drawing Algorithms: DDA and Bresenham’s Line Algorithm, Circle drawing Algorithms: Midpoint Circle Algorithm and Bresenham’s Circle drawing Algorithm.

**Module- II [5 Hrs]**

Two Dimensional Geometric Transformation: Basic Transformation (Translation, rotation, Scaling) Matrix Representation, Composite Transformations, Reflection, Shear, Transformation between coordinate systems.

Two Dimensional Viewing: Window-to- View port Coordinate Transformation.

**Module –III [5 Hrs]**

Line Clipping (Cohen-Sutherland Algorithm) and Polygon Clipping (Sutherland-Hodgeman Algorithm).

Aliasing and Antialiasing, Half toning, Thresholding and Dithering, Scan conversion of Character.

**Module – IV [5 Hrs]**

Polygon Filling: Seed Fill Algorithm, Scan line Algorithm.

Two Dimensional Object Representation: Spline Representation, Bezier Curves and B-Spline Curves.

Fractal Geometry: Fractal Classification and Fractal Dimension.

**Module – V [5 Hrs]**

Three Dimensional Geometric and Modeling Transformations: Translation Rotation, Scaling, Reflections, shear, Composite Transformation.

Projections: Parallel Projection and Perspective Projection.

**Module –VI [5 Hrs]**

Visible Surface Detection Methods: Back-face Detection, Depth Buffer, A- Buffer, Scan- line Algorithm and Painters Algorithm.

Illumination Models: Basic Models, Displaying Light Intensities.

Surface Rendering Methods: Polygon Rendering Methods: Gouraud Shading and Phong Shading.

**Module- VII [5 Hrs]**

Computer Animation: Types of Animation, Key frame Vs. Procedural Animation, methods of controlling Animation, Morphing.

Virtual Reality: Types of Virtual reality systems, Input and Output Virtual Reality devices.

 **Suggested Textbooks and References:**

* Computer Graphics with Virtual Reality System, Rajesh K.Maurya, Wiley-Dreamtech.
* Computer Graphics, D. Hearn and M.P. Baker (C Version), Pearson Education
* Computer Graphics Principle and Practice , J.D. Foley, A.Dam, S.K. Feiner, Addison, Wesley
* Procedural Elements of Computer Graphics- David Rogers (TMH)
* Computer Graphics: Algorithms and Implementations – D.P Mukherjee & Debasish Jana (PHI)

Introduction to Computer Graphics & Multimedia – Anirban Mukhopadhyay & Arup Chattopadhyay (Vikas)

**EC 2714 C**

**PROFESSIONAL ELECTIVE - III**

**MOBILE COMPUTING**

 **(3-0-0)**

**MODULE - I [6 Hrs]**

Introduction to Personal Communications Services(PCS): PCS Architecture, mobility management, Networks signaling, Global System for Mobile Communication(GSM) System overview: GSM Architecture, Mobility management, Network signaling.

**MODULE - II [6Hrs]**

General Packet Radio Service(GPRS): GPRS Architecture, GPRS Networks Nodes, Mobile Data Communication: WLANs(Wireless LANs) IEEE 802.II standard, Mobile IP

**MODULE - III [6Hrs]**

Wireless Application Protocol(WAP): The Mobile Internet standard, WAP Gateway and Protocols, Wireless Mark-up Languages (WML), Wireless Local Loop (WLL): Introduction to WLL Architecture, Wireless Local Loop Technologies.

**MODULE – IV [5 Hrs]**

Third Generation (3G) Mobile Services: Introduction to International Mobile Telecommunications 2000(IMT2000) Vision. Wideband Code Division Multiple Access (W-CDMA), and CDMA 2000, Quality of Services in 3G.

**MODULE - V [6 Hrs]**

Global Mobile Satellite Systems; Casestudies of the IRIDIUM and GLOBALSTAR systems. Wireless Enterprise Networks: Introduction to Virtual Networks, Bluetooth Technology, Bluetooth Protocols.

**MODULE - VI [5 Hrs]**

Server-side programming in Java, Pervasive web application architecture, Device independent example application.

**Suggested Text Books and References:**

* “Pervasive Computing”, Burkhardt, Pearson
* “Mobile Computing”, J.Schiller, Pearson
* “The Wireless Application Protocol”, Sandeep Singhal, Pearson

**EC 2818**

**Professional Elective - III**

**VLSI DESIGN**

 **(3-0-0)**

**MODULE- I [4 Hrs]**

**Circuits and System Representation:** Behavioral, structural and physical representation,

Example of a triangular waveform generator and its behavioral, Structural and physical

Description

**MODULE- II [6 Hrs]**

**Basic CMOS Technology:** Basic n-well CMOS Process, P-well process, Twin-tub process,

Silicon on insulator, CMOS process enhancements, Metal interconnect, Polysilicon/ refractory

metal interconnect, Local interconnect, Circuit elements like resistors, Capacitors, EAROM,

Bipolar transistors and thin film transistor.

**MODULE-III [4 Hrs]**

**Layout Design Rules:** Layer representations, CMOS n-well rules, Design rule backgrounder,

Layer assignment, Latch-up problem, Latch-up triggering, Internal latch-up prevention

techniques, Resistance estimation, and Capacitance estimation.

**MODULE- IV [7 Hrs]**

**Basic Physical Design of Simple Logic Gates:** Invertor, NAND and NOR gates, Complex

logic gates layout, CMOS standard cell design, Gate array layout, Sea-of-gates layout, General

CMOS logic gate layout guidelines, Layout optimisation for performance, Transmission gate

layout consideration, 2-input multiplexers, I/O structures, VDD and VSS pads, Output & input

pads, Tri-state and bi-directional pads, Miscellaneous pads.

**MODULE- V [4 Hrs]**

**CMOS Analogue Design Method:** Op amp design, OP amp as a comparator, Sample and

hold, Analogue layout considerations, Transistor layouts, Centroid design, Capacitor matching,

Resistor layout, Noise consideration.

**MODULE- VI [5 Hrs]**

**CMOS Digital Design Methods:** Structured design strategies, Hierarchy, Regularity,

Modularity, Locality, Design options like PL, Re-programmable gate arrays, Standard Cell

design, Behavioral synthesis, RTL synthesis, Logic optimization, Structural to layout

Synthesis, Placement, Routing

**MODULE- VII [4 Hrs]**

**CMOS Subsystem Design:** Single bit address, Bit parallel adder, Transmission gate adder,

Asynchronous counter, Synchronous counter, RAM, Finite state machines, Multilevel logic

**Suggested Text Books and References:**

* “Principle of CMOS VLSI Design A System Perspective”, Weste Neil H E & Eshraghian K, Pearson Education, 1993
* “Principle of CMOS VLSI Design A System Perspective”, Weste Neil H E & Eshraghian K, Pearson Education, 1993
* “Analogue Integrated Circuits Design”, Johns D and Martin K, John Wiley & Sons, 1997
* “Principle of CMOS VLSI Design A System Perspective”, Weste Neil H E & Eshraghian K, Pearson Education, 1993