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**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**

**CIVIL 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** |

 **CIVIL ENGINEERING YEAR: II SEMESTER: III**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **SL.****NO.** | **Course****No** | **Subject** | **Periods** | **Credit Points** |
|  **THEORY** | **L** | **T** | **P** |  |
|
| 1. | CS 1312 | NUMERICAL ANALYSIS & COMPUTER PROGRAMMING (C, C++) | 2 | - | - | 2 |
| 2 | ME 1302 | MATERIAL SCIENCE | 2 | - | - | 2 |
| 3. | ME 1303 | STRENGTH OF MATERIALS | 3 | 1 | - | 4 |
| 4. | CE 1301 | FLUID MECHANICS | 3 | - | - | 3 |
| 5. | CE 1302 | SURVEYING – I | 3 | - | - | 3 |
| 6. | MH 1305 | MATHEMATICS –III | 3 | 1 | - | 4 |
| **PRACTICAL/DRAWING/DESIGN** |
| 7. | CE 1303-P | FLUID MECHANICS LAB | - | - | 3 | 2 |
| 8. | CE 1304-P | SURVEYING – I FIELD WORK | - | - | 3 | 2 |
| 9. | ME 1307-PME 1308-P | MATERIAL SCIENCE/SOM LAB(TO BE TAKEN ALTERNATIVE WEEK) | - | - | 3 | 2 |
| 10. | CS 1301-P | NUMERICAL ANALYSIS & COMPUTER PROGRAMMING (C, C++) | - | - | 3 | 2 |
| 11. | HS 1303 – P | GENERAL PROFICIENCY | - | - | - | 2 |
| **TOTAL** | **16** | **2** | **12** | **28** |

**CIVIL ENGINEERING YEAR: II SEMESTER: IV**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **SL.****NO.** | **Course****No** | **Subject** | **Periods** | **Credit Points** |
| **THEORY** | **L** | **T** | **P** |
| 1. | CS 1412 | COMPUTER GRAPHICS | 2 | - | - | 2 |
| 2. | CE 1401 | ENGINEERING GEOLOGY | 2 | - | - | 2 |
| 3. | CE 1402 | FLUID MECHANICS – II | 3 | - | - | 3 |
| 4. | CE 1403 | STRUCTURAL ANALYSIS – I | 3 | 1 | - | 4 |
| 5. | CE 1404 | SURVEYING – II | 3 | - | - | 3 |
| 6. | CE 1405 | BUILDING MATERIAL & CONSTRUCTION | 3 | - | - | 3 |
| **PRACTICAL/DRAWING/DESIGN** |
| 7. | CE 1406-P | FLUID MECHANICS – II | - | - | 3 | 2 |
| 8. | CS 1413-P | COMPUTER GRAPHICS LAB | - | - | 3 | 2 |
| 9. | CE 1407 | SURVEYING FIELD WORK | - | - | 3 | 2 |
| 10. | CE 1408-P | ENGINEERING GEOLOGY LAB | - | - | 3 | 2 |
| 7. | HS 1404 P | GENERAL PROFICIENCY | - | - | - | 2 |
| **TOTAL** | **16** | **1** | **12** | **27** |

**CIVIL ENGINEERING YEAR: III SEMESTER: V**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **SL.****NO.** | **Course****No** | **Subject** | **Periods** | **Credit Points** |
|  **THEORY** | **L** | **T** | **P** |
| 1. | HS 1501 | MANAGEMENT SCIENCE | 2 | - | - | 2 |
| 2 | CE 1501 | TRANSPORTATION ENGINEERING - I | 2 | - | - | 2 |
| 3. | CE 1502 | STRUCTURAL ANALYSIS - II | 3 | - | - | 3 |
| 4. | CE 1503 | CONCRETE STRUCTURES - I | 3 | - | - | 3 |
| 5. | CE 1504 | GEO-TECH ENGINEERING - I | 3 | - | - | 3 |
| 6. | CE 1505 | ENVIRONMENT ENGINEERING - I | 3 | - | - | 3 |
| **PRACTICAL/DRAWING/DESIGN** |
| 7. | CE 1506-P | STRUCTURAL ANALYSIS LAB – II | - | - | 3 | 2 |
| 8. | CE 1507-P | TRANSPORTATION ENGINEERING LAB - I | - | - | 3 | 2 |
| 9. | CE 1508-P | GEO-TECH ENGINEERING LAB - I | - | - | 3 | 2 |
| 10. | CE 1508-P | ENVIRONMENT ENGINEERING LAB - I | - | - | 3 | 2 |
| 11. | HS 1505 P | GENERAL PROFICIENCY | - | - | - | 2 |
| **TOTAL** | **16** | **-** | **12** | **26** |

**CIVIL ENGINEERING YEAR: III SEMESTER: VI**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **SL.****NO.** | **Course****No** | **Subject** | **Periods** | **Credit Points** |
| **THEORY** | **L** | **T** | **P** |
| 1. | CE 1601 | OPEN CHANNEL FLOW | 2 | - | - | 2 |
| 2 | CE 1602 | CONSTRUCTION MANAGEMENT | 2 | - | - | 2 |
| 3. | CE 1603 | TRANSPORTATION ENGINEERING - II | 3 | - | - | 3 |
| 4. | CE 1604 | CONCRETE STRUCTURES - II | 3 | - | - | 3 |
| 5. | CE 1605 | GEO-TECHNICAL ENGINEERING - I | 3 | - | - | 3 |
| 6. | CE 1606 | ENVIRONMENTAL ENGINEERING - II | 3 | - | - | 3 |
| **PRACTICAL/DRAWING/DESIGN** |
| 7. | CE 1607-P | CONCRETE STRUCTURES – II LAB | - | - | 3 | 2 |
| 8. | CE 1608-P | OPEN CHANNEL FLOW LAB | - | - | 3 | 2 |
| 9. | CE 1609-P | GEO-TECHNICAL LAB – II | - | - | 3 | 2 |
| 10. | CE 1610-P | ENVIRONMENTAL ENGINEERING LAB - II | - | - | 3 | 2 |
| 11. | HS 1606 P | GENERAL PROFICIENCY | - | - | - | 2 |
| **TOTAL** | **16** |  | **12** | **26** |

**CIVIL ENGINEERING YEAR: IV SEMESTER: VII**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **SL.****NO.** | **Course****No** | **Subject** | **Periods** | **Credit Points** |
|  **THEORY** | **L** | **T** | **P** |  |
|
| 1. |  | OPEN ELECTIVE I | 3 | - | - | 3 |
| 2 | EC 1712 | PHOTOGRAMMETRY & REMOTE SENSING | 3 | - | - | 3 |
| 3. | CE 1701 | WATER RESOURCE ENGINEERING - I | 3 | - | - | 3 |
| 4. |  | ELECTIVE (PROFESSIONAL ELECTIVE) | 3 | - | - | 3 |
| 5. | CE 1702 | STEEL STRUCTURES - I | 3 | - | - | 3 |
| **PRACTICAL/DRAWING/DESIGN** |
| 6. | CE 1703-P | STRUCTURAL DETAILING | - | - | 3 | 2 |
| 7. | CE 1704 – P | ESTIMATION & EVALUATION | - | - | 3 | 2 |
| 8. | CE 1705-P | WATER RESOURSES ENGINEERING LAB | - | - | 3 | 2 |
| 9. | CE 1706-P | PROJECT - I | - | - | 3 | 2 |
| 10. | HS 1707-P | GENERAL PROFICIENCY | - | - | - | 2 |
| **TOTAL** | **15** |  | **12** | **25** |

**CIVIL ENGINEERING YEAR: IV SEMESTER: VIII**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **SL.****NO.** | **Course****No** | **Subject** |  **Periods** | **Credit Points** |
|  **THEORY** | **L** | **T** | **P** |  |
|
| 1. | CE 1801 | STEEL STRUCTURE - II | 3 | - | - | 3 |
| 2 | CE 1802 | WATER RESOURCES ENGINEERING - II | 3 | - | - | 3 |
| 3. | - | OPEN ELECTIVE - II | 3 | - | - | 3 |
| 4. | - | PROF. ELECTIVE - II | 3 | - | - | 3 |
| 5. | - | PROF. ELECTIVE - III | 3 | - | - | 3 |
| **PRACTICAL/DRAWING/DESIGN** |
| 6. | CE 1803 – P | PROJECT - II  | - | - | 12 | 6 |
| 7. | HS 1808-P | GENERAL PROFICIENCY | - | - | - | 2 |
| **TOTAL** | **15** | **-** | **12** | **23** |

**Total Credits = 212 L = Lecture T = Tutorial P = Practical**

**Civil Engineering Semester –III**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sl.No** | **Course No.** | **Subject** | **Periods** | **Credits** |
| **L** | **T** | **P** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | **Theory** |  |  |  |  |
| 1. | CS 1301 | Numercial Analysis & Computer Programming (C, C++) | 2 | - | - | 2 |
| 2. | ME 1302 | Material Science  | 2 | - | - | 2 |
| 3. | ME 1303 | Strength of Materials  | 3 | 1 | - | 4 |
| 4. | CE 1301 | Fluid Mechanics-I  | 3 | - | - | 3 |
| 5. | CE 1302 | Surveying – I | 3 | - | - | 3 |
| 6. | MH 1305 | Mathematics – III | 3 | 1 | - | 4 |
|  |  | Practical/Drawing/Design |  |  |  |  |
| 7. | CE 1303-P | Fluid Mechanics Lab. | -  | - | 3 | 2 |
| 8. | CE 1304-P | Surveying-I Field Work | - | - | 3 | 2 |
| 9. | ME 1307-PME 1308-P | Material SC/S.O.M. Lab (to be taken alternatively) | - | - | 3 | 2 |
| 10. | CS 1302-P | Numerical Analysis & Computer Programming (C, C++) | - | - | 3 | 2 |
| 11. | HS 1303-P | General Proficiency | - | - | - | 2 |
| **Total** | **16** | **2** | **12** | **28** |

**Civil Engineering Semester –IV**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sl.No** | **Course No.** | **Subject** | **Periods** | **Credits** |
| **L** | **T** | **P** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | **Theory** |  |  |  |  |
| 1. | CS 1412 | Computer graphics | 2 | - | - | 2 |
| 2. | CE 1401 | Engineering Geology | 2 | - | - | 2 |
| 3. | CE 1402 | Fluid Mechanics – II | 3 | - | - | 3 |
| 4. | CE 1403 | Structural Analysis – I | 3 | 1 | - | 4 |
| 5. | CE 1404 | Surveying – II | 3 | - | - | 3 |
| 6. | CE 1405 | Building Material & Construction  | 3 | - | - | 3 |
|  |  | Practical/Drawing/Design |  |  |  |  |
| 7. | CE 1406-P | Fluid Mechanics – II Lab | - | - | 3 | 2 |
| 8. | CS 1413-P | Computer graphics Lab | - | - | 3 | 2 |
| 9. | CE 1407-P | Surveying Field Work | - | - | 3 | 2 |
| 10. | CE 1408-P | Engg. Geology Lab | - | - | 3 | 2 |
| 11. | HS 1404-P | General Proficiency  | - | - | - | 2 |
| **Total** | **16** | **1** | **12** | **27** |

**Civil Engineering Semester –V**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sl.No** | **Course No.** | **Subject** | **Periods** | **Credits** |
| **L** | **T** | **P** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | **Theory** |  |  |  |  |
| 1. | HS 1501 | Management Science | 2 | - | - | 2 |
| 2. | CE 1501 | Transportation Engineering-I | 2 | - | - | 2 |
| 3. | CE 1502 | Structural Analysis II | 3 | - | - | 3 |
| 4. | CE 1503 | Concrete Structures I | 3 | - | - | 3 |
| 5. | CE 1504 | Geo-Tech Engineering I  | 3 | - | - | 3 |
| 6. | CE 1505 | Environment Engineering I  | 3 | - | - | 3 |
|  |  | Practical/Drawing/Design |  |  |  |  |
| 7. | CE 1506-P | Structural Analysis Lab-II | - | - | 3 | 2 |
| 8. | CE 1507-P | Transportion Engg. Lab. I | - | - | 3 | 2 |
| 9. | CE 1508-P | Geo-Tech Engg. Lab. I | - | - | 3 | 2 |
| 10. | CE 1509-P | Environment Engg. Lab. I | - | - | 3 | 2 |
| 11. | HS 1505-P | General Proficiency | - | - | - | 2 |
| **Total** | **16** | **-** | **12** | **26** |

**L=Lecture T=Tutorial P=Practical** -6

**Civil Engineering Semester –VI**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sl.No** | **Course No.** | **Subject** | **Periods** | **Credits** |
| **L** | **T** | **P** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | **Theory** |  |  |  |  |
| 1. | CE 1601 | Open Channel Flow | 2 | - | - | 2 |
| 2. | CE 1602 | Construction Management | 2 | - | - | 2 |
| 3. | CE 1603 | Transportation Engineering II | 3 | - | - | 3 |
| 4. | CE 1604 | Concrete Structures II | 3 | - | - | 3 |
| 5. | CE 1605 | Geo-Technical Engineering II | 3 | - | - | 3 |
| 6. | CE 1606 | Environmental Engineering II | 3 | - | - | 3 |
|  |  | Practical/Drawing/Design |  |  |  |  |
| 7. | CE 1607-P | Concrete Structure-II Lab. | - | - | 3 | 2 |
| 8. | CE 1608-P | Open Channel Flow Lab. | - | - | 3 | 2 |
| 9. | CE 1609-P | Geo. Technical Lab. II | - | - | 3 | 2 |
| 10. | CE 1610-P | Environmental Engineering Lab. II | - | - | 3 | 2 |
| 11. | HS 1606-P | General Proficiency | - | - | - | 2 |
| **Total** | **16** | **-** | **12** | **26** |

**Civil Engineering Semester –VII**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sl.No** | **Course No.** | **Subject** | **Periods** | **Credits** |
| **L** | **T** | **P** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | **Theory** |  |  |  |  |
| 1. | HS 2751 | Open Elective I Open Research Technique | 3 | - | - | 3 |
| 2. | EC 1712 | Photogrammetry & Remote Sensing | 3 | - | - | 3 |
| 3. | CE 1701 | Water Resources Engineering I | 3 | - | - | 3 |
| 4. | - | Elective (Professional Elective) | 3 | - | - | 3 |
| 5. | CE 1702 | Steel Structure-I  | 3 | - | - | 3 |
|  |  | Practical/Drawing/Design |  |  |  |  |
| 6. | CE 1703-P | Structural Detailing | - | - | 3 | 2 |
| 7. | CE 1704-P | Estimation & Evaluation | - | - | 3 | 2 |
| 8. | CE 1705-P | Water Resources Engg. Lab. | - | - | 3 | 2 |
| 9. | CE 1706-P | Project I | - | - | 3 | 2 |
| 10. | HS 1707-P | General Proficiency | - | - | - | 2 |
| **Total** | **15** | **-** | **12** | **25** |

**Civil Engineering Semester –VIII**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sl.No** | **Course No.** | **Subject** | **Periods** | **Credits** |
| **L** | **T** | **P** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | **Theory** |  |  |  |  |
| 1. | CE 1801 | Steel Structure II | 3 | - | - | 3 |
| 2. | CE 1802 | Water Resources Engineering II | 3 | - | - | 3 |
| 3. | CE 2860 | (Open Elective-II)Earth Quakes Engineering | 3 | - | - | 3 |
| 4. | CCE 2738 | (Professional Elective-II)Environmental Pollution & Management | 3 | - | - | 3 |
| 5. | CE 2863 | (Prof. Elective-III)Traffic Engineering | 3 | - | - | 3 |
|  |  | Practical/Drawing/Design |  |  |  |  |
| 6. | CE 1803-P | Project II | - | - | 12 | 6 |
| 7. | HS 1808-P | General Proficiency | - | - | - | 2 |
| **Total** | **15** | **-** | **12** | **23** |

**Total Credits=212 L=Lecture T=Tutorial P=Practical**

CIVIL ENGINEERING DEPARTMENT

 (LIST OF OPEN & PROFESSIONAL ELECTIVES)

|  |  |  |  |
| --- | --- | --- | --- |
| **Elective Subjects** | **Sl.No.** | **Code** | **Paper / Subject** |
| **Open Elective – I****(Sem - VII)** | 01 | HS 2751 | Operation Research Technique |
| 02 | CE 2759 | Pre-stressed Concrete Structures  |
| 03 | CE 2752 | Statisticall Methods in Engineering |
| 04 | HS 2752 | Science & Religion  |
| **Prof. Elective – I****(Sem – VII)** | 01 | CE 2756 | Bridge & Tunnel Engineering |
| 02 | EC 2751 | Remote Sensing and Its Application  |
| 03 | CE 2755 | Building Design  |
| 04 | CE 2753 | Construction Equipments & Project Management |
| 05 | CE 2757 | Quality Control & Management |
| **Open Elective – II****(Sem – VIII)** | 01 | CE 2758 | Earthquake Engineering |
| 02 | CE 2860 | Air Pollution and Control Measures & Management |
| 03 | ME 2851 | Advanced Structural Analysis |
| 04 | HS 2853 | Energy Management  |
| 05 | CE 2851 | Advanced Engineering Systems |
| **Prof. Elective – II****(Sem – VIII)** | 01 | CE 2858 | Environmental Pollution and Management |
| 02 | CE 2857 | Rock Mechanics  |
| 03 | CE 2854 | Water Resources, Planning and Management |
| 04 | CE 2852 | GIS And Its Applications |
| 05 | CE 2859 | Industrial Wastes Treatment |
| **Prof. Elective – III****(Sem – VIII)**  | 01 | CE 2863 | Traffic Engineering |
| 02 | CE 2864 | Advanced Highways Engineering |
| 03 | ME 2854 | Composite Materials |
| 04 | CE 2861 | Rural Water Supply and Sanitation |
| 05 | CE 2865 | Transport , Planning & Management |

Syllabus for following subjects / papers has been enclosed herewith:-

a/ Open Elective - I - HS 2751 Operation Research Technique

CE 2759 Pre-stressed Concrete Structures

b/ Prof. Elective - I - CE 2756 Bridge & Tunnel Engineering

 CE 2753 Construction Equipments & Project Management

c/ Open Elective - II - CE 2758 Earthquake Engineering

 CE 2860 Air Pollution and Control Measures & Management

 ME 2851 Advanced Structural Analysis

d/ Prof. Elective - II - CE 2858 Environmental Pollution & Management

 CE 2857 Rock Mechanics

e/ Prof. Elective - III - CE 2863 Traffic Engineering

 CE 2864 Advanced Highways Engineering

 ME 2854 Composite Materials

**B. TECH COURSE STRUCTURE**

**COMMON TO ENGINEERING**

**BRANCHES**

**1ST & 2ND 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.

**MH 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**

**CIVIL 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

**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

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

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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 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

**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

**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

**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.

**CE 1301 - Fluid Mechanics -I (3-0-0) 30 Lectures**

Module – I - **Introduction :** Fluids and continuum, Physical of fluids idela and real fluids, Newtonian and non-Newtonian fluids, measurement of surface tension

Module-II - **Kinematics of Fluid Flow** : Steady and unsteady, uniform and non-uniform, laminar and turbulent flows, one, two and three dimensional flows, streamlines, streak lines and path lines, continuity equation, rotation and circulation, elementary explanation of stream function and velocity potential, graphical and experimental methods of drawing of pressure.

Module-III - **Fluid Statics :** Pressure-density-height relationship, manometers, pressure on plane and curved surfaces, Centre of pressure, buoyancy, stability of immersed and floating bodies, fluid masses subjectd uniform accelerations, measurement of pressure.

Module-IV - **Dynamics of Fluid Flow :** Buler's equation of motion along a streamline and its integration, Bernoulli's equation and its applications Pitot tube, flow through orifices, mouthpieces, nozzles, weirs, sluice gates under free and submerged flow conditions. Aeration of nappe, cavitation, free and forced vortex, momentum equation and its application to stationary and moving vanes, pipe bends problems related to combined application of energy and momentum equations.

Module-V - **Dimensional Analysis and Hydraulic Similitude :** Dimensional analysis- Buckingham's theorem important dimensionless numbers and their significance, geometric, kinematic and dynamic similarly model studies.

**CE 1303 P FLUID MECHANICS - I LAB (0-0-3)**

**List of Experiments**

1. To determine experimentally the metacentric of a ship model.

2. To verify the momentum equation experimentally.

3. To determine the coefficient of discharge of an orfice( or a mouth piece) of a given shape. Also to determine the coefficient of velocity and the coefficient of contraction of the orifice (or the mouth piece)

4. To plot the flow net for a given model using the concept of electrical analogy.

5. To measure surface tension of a liquid.

6. To obtain the surface profile and the total head distribution of a forced vortex.

7. To calibrate an orifice meter and study the variation of the coefficient of discharge with the Reynolds number.

**Text Books and Reference Books**

1. Gupta & Gupta, Fluid mechanics and its applications, Wiley Eastern Ltd.
2. Dr. Bansal R. K., Fluid mechanics
3. Dr. Jain, A. K., Fluid mechanics including hydaulic machines, Khanna Publ. 2009
4. Arora K. R., Fluid mechanics, hydraulics and hydraulic machines, Standard Publishers and Distributors, Delhi.

**CE 1302 - Surveying -I (3-0-0)**

**35 Lectures**

Module – I - **Introduction :** Importance of surveying to Engineers – Examples from different branches; plane and Geodetic surveying, Control points, Classification of surveys, Methods of location a point. Sources and types, principle of working from whole to part, Organisation of field and office work, Conventional signs, surveying instruments, their care and adjustment. Principle of reversal.

Module – II - **Measurement of distances :** Principles of different methods and their accuracies, Measurement by chain and tape. Source auxiliary instruments. Modern trends EDM and Total Station

Module-III - **Measurement of Angles and Directions :** Reference medians. Bearing and azimuths declination and its variations. Use and adjustment of compass. Vemier and microptic theodolites, Temporary and permanent adjustments, Requirements of non-adjustable parts measurement of horizontal and vertical angles by different methods.

Module-IV - **Traversing :** Principles of traversing by compass and theodolite, Field work and checks, Computatio nof coordinates, Sources of errors, Precision of traversing, Checking and adjusting of traverses, Omitted measurements

Module-V - Different methods of determining elevations : Spirit Trigonometric, Barometric and Photogrammetric method spirit level – Definitions of terms, Principles, Construction, Temporary and Permanent adjustment of levels, Sensitivity of bubble tube Automatic levels, Leveling staves, Methods of spot leveling booking and reduction of fields notes. Curvature and refraction, Reciprocal leveling, plotting of levels, Barometric levelling, Construction and field use of altimeter, trigonometric levelling – Simple and reciprocal observation, sources of errors and precision auto-levelling procedures.

Module - VI **Tachometry :** Difinitions, Principles of stadia systems, Instrument constants, Substance and Tangential Systems, Construction and use of Reduction Tachometers, Range finders, Error and Precision.

Module – V - **Contouring :** Methods of relief representations. Definition and characteristics of contours, Use of contour maps. Direct and Indirect methods of contouring.

Module-VI - **Sheet numbering systems :** IM and L and A C series. Scales and Numbering of Indian Topographic maps.

**CE 1304 P SURVEYING- I FIELD WORK (0-0-3)**

**List of Experiments**

1. Study of different levels and levelling staff

2. Practice for temporary adjustment, to find out the reduced levels of given points using dumpy levels (reduction by height of Collimation Method)

3. Study of a tilting level (LOP) & to find out the levels of given point (reduction of data by rise and fall method)

4. Visit to lab for the study of map in the making – survey of India publication and conventional symbol charts and different types of map.

5. To etablish a bench mark by check leveling with a LOP level and closing the work at the starting bench mark.

6. To perform HV leveling with a LOP level. -13

7. To draw the longitudinal and cross section profiles along a given route.

8. Practice for temporary adjustments of a vermier theodolite and taking horizontal work by measurements by reitertion method.

9. Measurements of a Horizontal angles by repetation method at three zeroes and four reputation.

10. Determination of elevation and horizontal distance of a given point using Substance bar and a vernier theodolite.

11. Determination of the Tacho-matric constraints by a given theodolite.

12. To determine the gradient between two given points using techo-metric method.

13. To determine the Bearing of a given tranverse using prismatic compass and plotting of the traverse.

14. To determinate the elevation of a given point by trigono-metric leveling.

**Text Books and Reference Books**

1. Punimia B. C., Surveying Vol. I & II, Laxshmi Publications, New Delhi-1996
2. Arora K. R., Surveying Vol. I 7 II, Standard Book House, Delhi – 1993
3. Agor R., Surveying Vol. I & II, Khanna Publications, Delhi - 1995

MH 1306  **Mathematics-III**

**Unit-1**

Fourier series:- Periodic Funcions, Euler’s Formula, Fourier Series of Periodic Function, Fourier

Series of discontinuous functions,Change of Intervl, 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**

 Complex Integration:- Conformal mapping ,Bilinear Transformations, w=zn ,w=sinz ,w=ez, w=z+$ \frac{1}{z}$ . 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. **(08 Classes)**

**Unit-6**

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

 **Unit-7**

 Boundary Value Problems:- Equations of vibration of string and one dimensional heat flow ,Their solution by separation of variables. **(06 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)

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

**B. TECH COURSE STRUCTURE**

**MECHANICAL ENGINEERING**

**4th SEMESTER**

**RANCHI UNIVERSITY, RANCHI**

**SEMESTER IV**

**(CS 1412) COMPUTER GRAPHICS**

**Module 1 : [9 Hrs]**

***Basic concepts* :** Graphics hardware and display devices, input devices.

***Graphics primitives* :** Drawing lines and curves-line-drawing Algorithm, DDA Algorithm, Breshemham’s line Algorithm, Circle-generative Algorithms (Breshemham’s) Midpoint circle Algorithms, Ellipse-generating, Filled Area Primitives

**Module 2 : [8 Hrs]**

***Two–Dimensional geometric Transformations* :** Basic Transformation, Homogeneous coordinates , composite Transformation, Reflection, shear candidate Transformations. Two Dimensional viewing –clipping

**Module 3 : [7 Hrs]**

***Geometric modeling* :** Elementary geometric algorithms for polygons boundary representations,

constructive solid geometry, spatial data structures, composite transformation, Basic transformation.

**Module 4 : [6 Hrs]**

***Illumination Model & Surface-Rendering Methods* :** Rendering, shading, lights models, textures and image-based rendering.

**Text Books :**

* Newman & Sproull, “*Principles of Interactive Computer Graphics*”, McGraw Hill.

 1987.

* Henary Baper,”*Computer Graphics*”.
* Ze Nian and Mark S Drew “*Fundamentals of Multimedia*” PHI.

**References Books :**

* Rogers “*Procedural Elements of Computer Graphics*”, McGraw Hill.
* Harringtones. S., “*Computer Graphics*”, A Programming Approach 2nd Edition,

 McGraw Hill 1987

* Rogers & Adams “*Mathematical Elements of computer Graphics”*, 2nd Edition, McGraw Hill

**(CS 1413 – P) LAB ASSIGNMENT**

* Point plotting, line & regular figure algorithms
* Raster scan line & circle drawing algorithms
* Clipping & Windowing algorithms for points, lines & polygons
* 2-D transformations
* Simple fractals representation
* Filling algorithms
* Web document creation using Dreamweaver.
* Creating Animation using Flash.

**CE 1401 ENGINEERING GEOLOGY (2-0-0)**

**SEMESTER IV**

 Module-I - Minerals: Their physical and detailed study of certain rock forming minerals.

Module-II - Rocks: Their origin, structure, texture and classification of igneous, sedimentary

 and metamorphic rocks and their suitability as Engineering materials, Building

 tones, Engineering properties of rooks.

Module-III - Stratification, lamination bedding, and dip strike of bed, overlap.

Module-IV - Rock deformation

 Folds, Faults, joints unconformity and their classification, causes and relation to engineering behaviour of rock masses.

Module-V - Earthquakes, its causes, classification, seismic zones of India and Geological

 cosideration for construction of building

Module-VI - Landslides, its causes, classification and preventive measures

Module-VII - Underground water, origin, aquifier, aquicludes, artesian wells, Underground

 provinces of India and its role as geological hazard.

Module –VIII - Geological investigations for sitr selection of Dams and Reservoirs

 tunnels,bridges and highways

Module -IX - Priciples of geophysical explorationd, methods for subsurface structure.

**CE 1408-P GEOLOGY LAB (0-0-3)**

**LAB**

1. Study of rock forming and Economic minerals, study of different rock.

2. Methods of completing the outcrop of rocks on a map.

3. Drawing the geological sections of geological maps.

4. Inter-relation of geological maps and sections with respect to subsurface Structure.

5. Problems of locating sites of projects like Dams, Tunnels, Highways et. In the geological sections.

**Text Books & Reference Books**

1. Prabin Singh, “Engineering and General Geology”, Katson Publishing House

2. Leggot, R. F. “Geology and Engineering”, McGraw Hill, New York.

3. Blyth, F.G.M., “A Geology for Engineering”, Arnold, London.

4. P. K. Mukherjee, “A Text Book of Geology” Calcutta, Work publisher

**CE 1402 FLUID MECHANICS II (3-0-0)**

**Module 1. Laminar and Turbulent Flow**

Equation of motion for laminar flow through pipes, Stoke’s law, flow between parallel plates, flow through porous media, fluidization” measurement of viscosity, transition from laminar to turbulent flow, turbulent flow, equation for turbulent flow, eddy viscosity, mixing length concept and velocity distribution in turbulent flow. Hot. ,, wire anemometer and L D A.

**Module II Boundary Layer Analysis**

 Boundary layer thicknesses, boundary layer over a flat plate, laminar boundary layer, application of momentum equation, turbulent boundary layer, laminar sub-layer, smooth ad rough boundaries, atmospheric boundary layer, local and average friction coefficient, separation and its control measurement of shear.

**Module III. Pipe Flow**

Nature of turbulent flow in pipes, equation for velocity distribution over smooth and rough surface resistance coefficient and its variation, flow in sudden expansion, contraction, diffusers, bends, valves and siphons, concept of equivalent length, branched pipes, pipes in series and parallel simple networks pumps and turbines, transmission of power.

**Module IV. Flow Past submerged Bodies**

Drag and lift, drag on a sphere, cylinder and disc., lift, Magnus effect and circulation.

**Module V. Compressibility Effects in Pipe Flow**

Transmission of pressure waves in rigid and elastic pipes, water hammer, analysis of simple surge tank excluding friction.

**CE 1406 P FLUID MECHANICS II LAB. (0-0-3)**

**List of Experiments :-**

1. To verify Darcy’s law and to find out the coefficient of permeability of the given medium.

2. To study the transition from laminar to turbulent flow and to determine the lower critical Reynolds number.

3. To study the velocity distribution in a pipe and also compute the discharge by integrating the velocity profile.

4. To study the variation of friction factor “f” for turbulent flow in smooth and rough commercial pipes.

5. To determine the loss coefficients for the pipetltting.

6. To study the flow behavior in a bend to calibrate the pipe bend for discharge measurement.

7. To study the boundary layer velocity profile and to determine boundary layer thickness and displacement thickness. Also to determine the exponent in the power law of velocity distribution.

8. to measure the pressure distribution around a cylinder placed in a wind stress and to calculate the coefficient of drag.

9. To calibrate a venture-meter and to study the variation of coefficient of discharge with the Reynolds number.

**References**

1. Grade, R.J., and A.G. Mirajgaoker, “Engineering Fluid Mechanics (including Hydraulic Mechanics)” 2nd Ed., Nem Chand & Bros… Roorkee, 1983.

2. Grade, R. J., “Fluid Mechanics through problems” wiley Eastern Limited, New Delhi 1989.

3. Streeter, V. L. and Wylie, E.B. “Fluid Mechanics” McGraw Hill, New York. 8th Ed. ..1985.

**CE 1403 STRUCTURAL ANALYSIS I (3-1-0)**

**Module** I. Classification of Structures, Stress resultants, degrees of freedom per node static

and Kinematic Indeterminacy.

**Module** II. Classification of Pin Jointed determinate trusses, Analysis of determinate plane

and space trusses (compound and complex). Method of substitution and Method of

 tension coefficient.

**Module** III. Analysis of determinate beams & plane frames, bending moment.

**Module** IV. Rolling loads influence lines for beams and trusses, Absolute maximum ending

moment.

**Module** V. Analysis of Arches. Linear arch, Eddy’s theorem and three hinged parabolic arch,

spandrel braced arch. Moving load & influence lines.

**Module** VI. Strain Energy of deformable systems maxwell’s reciprocal and Betti’s theorem.

Castigliano’s first theorem unit load & Conjugate beam methods.

**Module** VII. Unsymmetrical bending, location of neutral axis computation of stresses and

deflection, shear center-its location for common structural section.

**Module** VIII. Bending of curved bars in plane of bending stresses in bars of small & large initial

curvatures.

**Text Books and Reference Books:**

1. Wilbur and Norris, “elementary structural analysis” Tata McGraw Hill.

2. Reddy, C.S., “Basic Structural Analysis”, Tata McGraw Hill.

3. Jain, a.p. andjain B. K. , “Theory & Analysis of structures : Vol-I & II, Nem Chand.

4. Coastes, R. C., Coutie, M. G. & King F. K., “Structural Analysis”, English language Book society & Nelson 1980.

5. Ghali, A. & Neville. M., “structural Analysis” Nem Chand & Bros.

6. Jain, O. P. & Arya A. S., “Theory of Structures”, Vol. II, Nem Chand & Bros., Roorkee, India 1996

7. Jain, O.P. & Arya A. S., “Theory of Structures”, Vol. II, Nem Chand Bros., Roorkee, 1976.

8. Kinney, I.S., ….,Indeterminate Structural Analysis”, McGray\: Hill Book Company, 1957.

9. Wang, C. K….., Intermediate Structural Analysis”, McGraw Hill Book Company, 1983

**CE 1404 SURVEYING II (3-0-0)**

 **30 Lectures**

**Module I. Plane Table Surveys**

Principles, Advantages and disadvantages. Plane Table equipment Use of Telescopic Alidade and Indian Pattern Tangent Clinometer, Different methods of Plane Surveying, Resection – Two and three point problems, Fields works in Plane Table surveying and contouring.

**Module II. Trilateration and Triangulation**

Principle of Trilateration, EDM instrument and their uses, Reduction of observation, Principle and classification of Triangulation system, Triangulation chains, Strength of Figures. Station marks and Signals, satellite station, Intersected point, field work\_. Reconnaissance, Intervisibility of station, Angular Measurement, Base Line measurement and extension, Adjustment of fields observation and Computation of Coordinates.

**Module III. Adjustment Computations**

Weighting of observations, Treatment of random errors, probability equation, Normal law of errors Most probable value & measures of precision, Propagation of errors and variances, Most probable value principle of Least square, Observations and correlative Normal Equations. Adjustment of triangulation figures and level nets.

**Module IV. Curves**

Classification of Curves : Elements of Cricular, Transition and Vertical curves, Theory and methods of setting out Simple, Transition and Vertical curves, special field problems.

**Module** V. Project Surveys

General requirements and specifications for Engineering project surveys, Reconnaissance, Preliminary and Locations surveys for highways, railways and canals. Correlation of surface and underground surveys in case of culvers. Bridges and Tunnels : Principles and practice of hydrographic surveys, Layout of culverts, bridges and buildings.

**CE 1407-P SURVEY II FIELD WORK (0-0-3)**

**List of Experiments**

1. To carry out Triangulation and Trilateration of a given area (2-3 turns are needed)

2. To adjust the angular observations taken in exercise 1.

3. To compute the adjusted coordinates of Triangulation stations.

4. To plot the coordinates at a given scale on Plane Table and their field checking.

5. To plot the details as well contours (topographic mapping) for area, using Radiaton and Intersection methods (6-7 turns are needed)

6. To solve two Point and Three Point Problems in Plane Tabling.

7. Layout at simple circular curve on the ground using two Theodolite method.

8. Layout a building and a culvert on the ground.

**Text Books and Reference Books:**

 1. Arora K. R., “Surveying”, Vol. II & III Standard Book House, Delhi 1993.

2. Bannister, A. and Baker, R., “Solving problems in surveying, “Longman Scientific Technical U.K. 1990.

3. Kennie, T. J. M. and Petrie, G., “Engineering Surveying Technology”, Blackie & Sons Ltd., London’ 1990.

4. Punamia, B.C., “Surveying; Vol II & III. Laxmi Publications, New Delhi. 1996.

**SEMESTER – IV**

 **30 Lectures**

**CE 1405 - Building Materials & Construction (3-0-0)**

Module – I - **Building Materials :** Bricks, Stone, Lime, timber, Plywood, glass, plastics, steel aluminium : classification, properties and selection criteria, Cement, aggregate, admixtures : types properties, selection criteria and tests. Preparation and properties of concrete. Concrete mix design, I. S. codes Testing of materials, I. S. codes.

 Metal : Types, classification and strength L. S. specifications.

Module-II - **Building Construction** : Building byelaws, modular co-ordination. Loads on buildings, Types of foundations and selection criteria, Brick masonry, stone masonry, bonds. Types of walls, partition and davity walls, design criteria, Prefabricated construction, Treatment for Water proofing & Termite attach, Doors and windows : sizes and locations, materials, Stair and Staircases : Types, materials, proportions.

Module – III - Ventilation in Building & Air conditioning

Module – IV - Construction equipments & machineries

Module – V - Building Codes

**Text Books and Reference Books**

1. Arora, S. P. & Bindra, S. P., "A text book of Building Construction" Dhanpat Rai & S Delhi, 1977.
2. Jha. J. & Sinha, S. K., "Building Construction", Khanna Publishers, Delhi, 1977.
3. Kulkarni. C. J. "A text book of Engineering Materials". Ahmedabad Book Depot, Ahmedabad 1968.

Kulkarni. C. J. " A text book of Engineering Construction", Ahmedabad Book Depot.

**B. TECH COURSE STRUCTURE**

**CIVIL ENGINEERING**

**5th SEMESTER**

**RANCHI UNIVERSITY, RANCHI**

**HS 1501 - Management Science (2-0-0)**

 **30 Lectures**

Module-I **- Basic Concepts and Functions of Management:** Planning Nature, Purpose and Objectives, Planning Organizing nature and Purpose, Authority and Responsibility, Staffbug, Supply of Human Resources, Performance Appraisal, Controlling System and Process of Controlling, controlling Techniques.

Module-II - **Human Resources Management :** Nature and Scope of Human Resource planning, Training and Development, Recruitment and Selection, career growth grievances, motivation and its types, leadership styles, roads and function of leaders, conflict managemnet – kinds and cause of conflicts, settlement of conflict, group and team working, organisation design and development.

Module-III - **Marketing Management:**  Marketing environment – Consumer markets and buyer behaviour, marketing, marketing mix, advertising, sales promotion, channels of distribution.

Module-IV - **Financial Management:** Accounting Concepts, book keeping, financial statement, Analysis, Financial ratio, capital budgeting, break-even analysis

 **Production / Operation Management:**  Planing & Management of production and operation system, facilities planning, location layout and movement of materials, materials management and inventory control, maintenance management, Perk and C.P.M.

Module-V - **MIS:** Role of information in decision making, information system, planning, design and implementation, evaluation and effectiveness of information system

Module-VI - **Statistical Quality Control, TQM and ISO Certification:** Social and ethical isues in management – ethics in management, social factors, unfair and restrictive treat practices.

Module-VII - **Strategic and Technology Managemetn:** Need, Nature, scope and strategy, SWOT Analysis, Values, and concepts

**Text books and reference books:**

1. K.K. Ahuja, Endustrial Management, Khanna Publications, 1998

2. Y.K. Bhushan, Fundamentals of Business Organisation and Management, S. Chand & Sons, 1998

3. Philip Kotler, Marketing Management, Prentice Hall of India, 1997

4. M.Y. Khan & P.K. Jain, Financial Management, Tata McGraw Hill, 1997

CIVIL ENGINEERING **SEMESTER – V**

 **35 Lectures**

**CE 1501 - Transporation Engineering – I (2-0-0)**

Module – I - **Introduction and Highway Development in India :** Different modes of Transporation, Characteristics of road Transport, Brief History and Development of Road Construction, Jaykar Committee Recommendations, Long Term Road Plans, Vision-2021, Road Classification, NHDP, Rural Roads Development Plan, Pradhan Mantri Gram Sadak Yojna PMFSY, Central Road Fund, BOT (Build-Operate-Transfer), BOT with Annuity, PPP (Public – Private – participation)

Module – II - **Highway Alignment, Survey and Detailed Project Report :** Fundamental Principles of Highway Alignment, Factors Controlling the Selection of Alignment, Engineering Surveys for a Highway Project, Drawings, and Preparation of Detailed Project Reports.

Module – III - **Geometric Design of Highways and Road Structure :** Road Cross-Sectional Elements, Width of Carriageway, Formation width, Right of way, Camber, Shoulder, Kerb, Road Margins, Design Speed, Sight Distances, Design of Horizontal Curves, Super elevation, Extra Widening on Horizontal Curves, Transition Curves, Setback Distance at Curves, Gradient, Deisgn of Vertical Curves – Summit and Valley Curves.

Module- IV - **Pavement Design :** Types of Pavement – Flexible and Rigid, Pavement Composition, Unconvential pavements, Different methods of Flexible Pavement Design, Pavement Design as per IRC, Stresses in Concrete Pavements, Modulus of Subgrade Reaction, Design of Rigid Pavement as epr IRC, Highway Drainage.

Module – V - **Highway Materials and Construction :** Subgrade Soil, Aggregates, Bitumen, Tar, Emulsion, Modified Bitumen, Fly ash, Cement Concrete, Tests on Aggregates, Tests on Bitumen, Bituminous Mix Design, Construction of WBM Roads, Soil Stabilized Roads, Different Types of Bituminous Constructions, Construction of Cement Concrete Pavements, Equipments used in Highway Construction.

Module – VI - **Pavement Evaluation and Maintenance :** Pavement Evaluation – Structural and Functional, Benkelman Beam, Falling Weight Deflectometer (FWD), Dynamic Cone Penetrometer (DCP), Roughness Measurement using Merlin and Bump Integrator, Distresses in Flexible and Concrete Pavements, Maintenance and Rehabilitation of Pavements, Overlay Design as per IRC.

Module – VII - **Environmental Aspects of Highways :** Tree Plantation along Road side and Median.

**Text Books and Reference Books**

1. Highway Engineering by Justo and S. K. Khanna

2. Highway Engineering by L. R. Kadiyali and N. B. Lal

3. Principles of Transporation Engineering by P. Chakraborty and A. Das

4. A Course in Highway Engineering by S. P. Bindra

**CE 1507-P TRANSPORTATION ENGINEERING LAB (0-0-3)**

**List of Experiments**

1. CBR test on soil

2. Impact test on aggregates

3. Crushing test on aggregates

4. Hardness test on aggregates

5. Soundness test on aggregates

6. Shape test on aggregates

7. Specific gravity on aggregates

8. Penetration test on bitumen

9. Ductility test on bitumen

10. Softening point test on bitumen

 **CE 1502 STRUCTURAL ANALYSIS II (3-0-0)**

 **30 lectures**

Module I. Analysis of Fixed beams, Continuous beam and Simple frames with and without

 translation of joints. Method of Consistent Deformation, Slope-Deflection method,

 Moment Distribution Method, Strain Energy method.

Module II. Muller-Breslau’s principle and its application for drawing influence lines for

 indeterminate beams.

Module III. Analysis of two-hinged arched, influence line diagrams for maximum bending

 moment, shear force and thrust.

Module IV. Suspension bridges, Analysis of cables with concentrated and continuous

 loadings, Basics of two and three hinged stiffening girders, Influence line diagram

 for B.M., S.F. in the stiffening girders.

Module V. Basics of force and displacement matrix methods for beams, plane frames (rigid

 and pin jointed)

Module VI. Basics of Plastic Analysis, Application of Static and Kinematic theorem foc

 plastic analysis of beams and plane frames.

 **CE 1506 – P STRUCTURAL ANALYSIS LAB. (0-0-3)**

**List of Experiments**

1. Clark Maxwell’s Reciprocal theorem using a beam

2. Analysis of a redundant joint

3. (a) Deflections of a truss

 (b) Maxwell’s reciprocal theorem

4. Elastic displacements of curved members

5. Elastic properties of beams

6. Three hinge Arch. / Two hinge Arch

7. Behaviour of Shuts

8. To find carry out factor for the beam with farmed fixed.

9. Verification of Muller – Breslan Principle.

10. Three hinged arch

11. Two hinged arch

12. Behaviour of Struts

13. Experimental and Analytical study of 3 bar pin-jointed truss

14. Experimental and Analytical study of deformations in bar-beam combination.

15. Verification of Muller-Breslau principle –Arch/continuous beam/frame models.

16. Verification of Muller-Breslau principle-Begg’s deformeter.

17. To find carryover factor for the beam with far end fixed.

**Text books and reference books:**

1. Coates R.C., Coutic, M.G. & Kong F.K., “Structural Analysis”, English Language Bo Society & Nelson 1980.

2. Ghali A & Neville, M. “Structural Analysis”, Nem Chand & Bros., Roorkee, India 1996

3. Jain A. K. “Advanced Structural Analysis”. Nem Chand & Bros., Roorkee, India, 1996.

4. Jain, a.p. & Arya A.S., “Theory of Structures”, Vol. II, Nem Chand Bros., Roorkee, 1976.

5. Kinney, J.P., “Indeterminate Structural Analysis”, McGraw Hill Book Company, 1957.

6. Prakash Rao, D.S., “Structural Analysis”, Universal Press (India) Limited, Hyderabad, 1997

7. Wang C.K., “Intermediate Structural Analysis”, McGraw Hill Book Company? 1983

8. Weaver, W. & Gere, J.M., “Matrix Analysis of Framed Structures”, CBS Publishers and Distributors, Delhi 1990

**CE 1503 CONCRETE STRUCTURES I (3-0-0)**

 **30 Lectures**

**Module I. Material Properties**

 Properties of concrete and reinforcing steel, characteristic strengths, stress-strain curves, I.S. specifications.

**Module II. Design Philosophies**

 Working stress, ultimate strength and limit states of design

**Module III. Analysis and Design of Sections in Bending**

 Flexure of beams by working stress and limit state methods, ‘singly and doubly

 sections, T and L sections.

**Module IV. Shear and Bond**

 Behavior of beams in shear and bond. Design for shear, anchorage and splicing of

 reinforcement, detailing of reinforcement.

**Module V. Serviceability Conditions**

 Limit states of deflection and checking, calculation of deflections.

**Module VI. Design of Columns**

 Short and long columns, eccentrically loaded columns.

**Module VII. Slabs, Lintels & Staircases**

 Design of one way and two way slabs ; circular slabs, yield line theory for slabs,

 beam and slab construction, lintels and staircases.

**Module VIII. Flat Slabs**

 Introduction to flat slabs.

**Module IX. Torsion**

 Design of beams for torsion

**Module X. Column Footings**

 Isolated and combined column footings.

**Module XI. Cantilever Retaining Walls**

 Design of cantilever type retaining walls.

**Text books and reference books:**

1. Dayaratnam P., “Reinforced Concrete Structures”, Oxford and IBH Publishing Co., 1986

2. Sinha S. N., “Reinforced Concrete Design”, Tata McGraw Hill Pub. Co., New Delhi, 1990

3. Krishna J. and Jain O.P., “Plain and Reinforced Concrete”, Vol. I, Nem Chand & Bros, Roorkee 1990.

4. Jain A. K., “Reinforced Concrete – Limit State Design”, Nem Chand & Bros, Roorkee, 1993.

5. Syai, I.C. and Ummat, R. K., “Analysis and Design of Reinforced Concrete Elements”, A.H. Wheeler and Co. Ltd., Allahabad, 1992.

6. Ram Chandra, “Design of Concrete Structures”, Vol. I, Standard Book House, New Delhi 1995.

7. Nilson, A. H. and George winter, “Design of Concrete Structure”, McGraw Hill Hook Col. Gth Ed. 1986.

8. Wang C. K. and Salmon, C.G., “Reinforced Concrete, Design”, International Text Book Co. 1985.

9. Park R. and Pauley T., “Reinforced Concrete Structures”, Jolm Wiley and Sons, 1975.

10. “Design Aids for Reinforced Concrete to LS – 456 – 1978”. SP – 16, 1980, Bureau of India Standards, New Delhi

**CE 1504 - Geo-Technical Engineering-I (3-0-0)**

**35 Lectures**

Module-I - **Introduction** : Definition of soil, Rock, Soil Mechanics & Foundation Engg., Soil Formation and Soil Types, Soil Map of India,

 Soil Properties-Basic definitions, Phase Diagram, Water Content, Specific Gravity, Void Ratio, Porosity, Unit weight, weight-volume relationships, index properties of soil and their determinationm classification of soil, Degree of saturation

Module-II - **Permiability and Seepage**: One Dimentional flow, Darcy's law and its validity, seepage velocity, discharge velocity, laboratory methods of determination of permiability as a function of soil type, permea meter, pumping out test for field determination of permiability, factors effecting permeability, laplases equation, flow potential, flow potential, flow nets and its properties, defferent methods of drawing flownets, seepage pressure, quick sand, exit gradiant, falure due to piping, design of filters,

Module-III - **Principle of Effective Stress and related phenomena:** principle of effective stress, capilarity condition in soil, Total pressure and alevation head.

 **Stresses in Soil**: Need for finding stress distribution in soil, assumption in elastic theory, Boussinesq's equation for finding point load, Circular and rectangular loads, Wester gard's formula for point load, Comparison of Boussinesq's and Wester gard's equation, Concept and use of pressure bulb, Principle and use of new marks influence chart, Contact pressure.

Module-IV - **Compressibility and consolidation behaviour:** Clay mineral and soil structure, Theory of compaction, Laborary Compaction Test, Different methods of compaction control, Mechanism of consolidation, e Log (P) curves, basic definitions, Stimation of pre consolidation pressure, normal consolidation and over consolidation, Different forms of primary consolidation equation, Terzaghi theory of one dimensional consolidation and time rate of consolidation, Laboratory determination of consolidation proerties of soil, Consolidation Settlement, second consolidation equation of compressibility and consolidation parameters from consolidation test,

Module-V - **Sher strength behaviour:** Normal sher, and principal stresses, Coulomb's equation, Mohr's stress circle, Mohr's coulomb's falure criteria, laborary determination of sher parameters of soil by direct sher test, unconfind compressure test, Vane sher test, Consolidated drained-undrained and unconsolidation undrained test and their relevance to field problems, sher strength characteristics of normally consolidated clays, sher strength characteristics of sand,

**Text books & reference books:**

1. Basic amd Applied Soil Mechanics by Gopal Ranjan and A.S.R. Rao

2. Introduction to Soil Mechanics by T.W. Lambe and R.V. Whitman

3. Soil Mechanics and Foundation Engineering by B.C. Punmia

4. Principle of Soil Mechanics and Foundation Engineering by V.N.S Murthy

**CE 1508-P - Geo-Technical Engineering-I Lab(0-0-3)**

**List of Experiments:**

1. Visual soil Classification

2. Different methods of determining water content, Specific Gravity Test

3. Core Cutter and Sand Replacement method of determining the in-situ density

4. Sieve Analysis

5. Hydrometer Analysis

6. Atterberg Limits

7. Determination of Coefficient of Permeability by

 (a) constant Head Method

 (b) Variable Head Method

**Text books and Reference books**

1. Gopal Ranjan and Rao, A.S.R. “Basic and Applied Soil Mechanics.” (Revised Edition). New Age International New Delhi, 1998.

2. Holtz R. and Kovacs W.D. “Introduction to Geotechnical Engineering”, John Wiley, New York, 1981.

3. Lambe. T.W. and Whitman R.Y. “Soil Mechanics”, John Wiley, New York, 1969.

4. Terzaghi K. and Peck R. 8., “Soil Mechanics in Engineering Practice”, John Wiley, N. York, 1968.

5. Taylor, D.W., “Fundamentals of Soil Mechanics”, John Wiley, New York, 1948.

6. Lambe, T.W., “Soil Testing for Engineers”, John Wiley, New York, 1951.

**CE 1505 - Environmental Engineering-I (3-0-0)**

 **30 Lectures**

Module-I **- General:** Importance of Water, Role of an Environmental Engineer, Historical overview of Water Supply System.

Module-II - **Municipal Water Demand:** Water Requirements, Design periods,Design Population, Factors affecting Water Consumption, Variation of Water Demand.

Module-III - **Sources of Water:** Hydrologic Cycles, Ground Water Sources, Quality and Quantity of Ground Water Sources, Collection and Development of Ground Water Sources, Assessment of yield of a well, Infiltration Galleries, Quality and Quantity of surface sources, Collection from surface sources- Intakes, Yield of Surface Sources, Impounded Researvoirs.

Module-IV - **Distribution of Water:** Distribution System, Storage necessity and Design Capacity, Distribution Mains, Pressures, Design and layout of Distribution System, Construction and Maintenance of Distribution System, Materials for water pipes, Valves and fittings in Distribution Networds, Pumps and Pumping Stations in Water Supply.

Module-V - **Water Quality Parameters:** Impurities of Water, Water Borne diseases, Drinking Water Standards, Standard Tests of Water-Physical, Chemical and Biological Tests.

Module-VI - **Treatment of Water:** Location of Treatment Plant, Layout of Treatment Plant and Flow Diagram, Water Treatment Processes – Aeration, Sedimentation, Coagulation Filtration, Disinfection, Softening, Treatment, Plant Design and Preparation of Hydraulic Profile.

Module-VII - **Plumbing of Building Water Supply:** Service Connection, Fixture Units,Internal Distribution System, Layout, Storage, Design of Plumbing System.**Text book & reference book:**

1. H.S. Peavy, D.R. Rowe and G. Tehobanoglous – "Environmental Engineering"

2. A.K. Chatterjee – "Water Supply Waste Disposal and Environmental Engineering"

**CE 1509 - Environmental Engineering-I Lab (0-0-3)**

1. Determination of Alkalinity and Acidity

2. Determination of Turbidity

3. Determination of Hardness

4. Determination of Dose of Coagulant

5. Determination of Residual Chlorine

6. Determination of Salinity

7. Determination of Iron

8. Determination of Arsenic

**B. TECH COURSE STRUCTURE**

**CIVIL ENGINEERING**

**6th SEMESTER**

**RANCHI UNIVERSITY, RANCHI**

**CE 1601 OPEN CHANNEL FLOW (2-0-0)**

 30 Lectures

**Module I. Introduction**

Difference between open channel flow and pipe Flow’, geometrical Parameters of a channel continuity equation.

**Module II. Uniform Flow**

Chezy’s and Manning’s equations for uniform flow in open channel, velocity distribution, most efficient channel section.

**Module III. Energy and Momentum Principles**

Critical depth, concepts of specific energy and specific force, application of specific energy principle for interpretation of open channel phenomena, flow through vertical and horizontal contractions.

**Module IV. Non – Uniform Flow in Open Channel**

Equation of gradually varied flow and its limitations, flow classification and surface profiles, integration of varied now equation by analytical, graphical and numerical methods, flow channels.

**Module V. Hydraulic Jump, Surges, Water Waves**

Classical hydraulic jump, evaluation of the jump elements in rectangular and non-rectangular channels on horizontal and sloping beds, equation of motion for unsteady flow, open channel surge,   , celerity of the gravity wave, deep and shallow water waves.

**CE 1608 OPEN CHANNEL FLOW LAB. (0-0-3)**

**List of Experiments**

1. To determine the Manning’s coefficient of roughness ‘n’ for the bed of a given flume.
2. To study the velocity distribution in an open channel and to determine the energy and momentum correction factors.
3. To study the flow characteristics over a hump placed in an open channel.
4. To study the flow through a horizontal contraction in a rectangular channel.
5. To calibrate a broad-crested weir and study the pressure distribution on the upstream face of weir.
6. To study the characteristics of free hydraulic jump.
7. To study the flow over a free overfall in an open channel and to determine the end depth.

**Text Books and Reference Books:**

1. Grade. R.J. and A.G. Mirajgaoker, “Engineering Fluid Mechanics (including Hydraulic Mechanics)” IInd Ed., Nem Chand and Bros., Roorkee. 1983

2. Ranga Raju K.G. “Flow Through Open Channels’. Tata McGraw Hill, New Delhi, 1993.

3. Asawa G.L., “Experimental Fluid Mechanics”. Vol. 2. Nem Chand and Brs., 1992.

**CE 1602 CONSTRUCTION MANAGEMENT (2-0-0)**

 30 lectures

**Module I. Introduction**

Objectives and functions of project management. Finance and cost accounting, Quality con Methods of motivation and incentives, Importance of safety and safety measures.

**Module II. Network Techniques**

Introduction to CPM/PERT methods and their use in construction planning, preparation construction Schedules for jobs, materials, equipments, Labour and funds, and project monitoring.

**Module III. Construction Equipments**

Different types of construction equipments viz. earth moving equipments, dewatering and pumping equipments, grouting equipments pile driving equipments and other construction equipment such as conveyors, cranes, concrete mixers, vibrators, road construction machine compactors etc. Factors affecting the selection of construction equipments.

**Module IV. Contract Management**

Legal aspects of contraction, laws related to contracts, land acquisition, Labour safety and welfare. Different type of contracts, their relative advantages and disadvantages. Elements of tender operation prequalification of contracts, Evaluation o tender, Contract negotiation and award of works, settlement of disputes, arbitration and commissioning of the project.

**Text Books and Reference Books:**

1. Sreenath L.S., “PERI and CPM”, Affiliated East West Press, New delhi, 1975.
2. Punmia B.C., and Khandelwal K.K., “PERT and CPM “, Laxmi Pub., New Delhi, 19
3. Peurifoy R.L., “Construction Planning, Equipments and Methods”, McGraws Hill Book Co., Inc., New York, 1979.
4. Verma Mahes!}, “Construction Planning and Management” Delhi Metropolitan, 1996.
5. R.L. Peurify, “Construction Planning : Equipments and Methods”, Tata McGraw Hill. Inc.
6. Satyanarayanan & Saxena, “Construction Planning and Equipment”, Standard Publishers Distributors, New Delhi, 1994.

**CE 1603 TRANSPORTATION ENGINEERING II (3-0-0)**

 35 lectures

**Module I. History of Indian Railway**, Component parts of railway track, Problems of multigauge system wheel and axle arrangements, Coning of wheels, various resistances and their evaluation, hauling capacity and tractive effort, stresses in rail, sleepers, ballast and formation.

**Module II. Permanent Way Component Parts**

Types of rail sections creep, Wear and failure in rails, Rail joints, Welding of rails, SWR and LWR sleepers requirements and types. Rail fittings, bearing plates, anti-creep devices, check and rails. Ballast requirements. Specifications, Fomlation, cross section, drainage.

**Module III. Geometrico Design**

Alignment, horizontal curves, super elevation, equilibrium cant and cant deficiency, Length oftr, curves, Gradients and grade compensation, vertical curves.

**Module IV. Points and Crossing**

Design of simple turn out, various tYPI:S of track jWI ction and their configurations.

**Module V. Signalling and Interlocking**

Control of train movements and monitoring, types of signals, principle of interlocking, Modernisation of railways and railway tracks. High speed tracks.

**Module VI. Air Transport Development**

Airport scenario in India-Stagl:s ofdcvdopment, Aircmft characteristic airport planning, site scleeti Obstruction and Zoning Laws, Imaginary surfaces, Approach zones and turning zones.

**Module VII. Runway and Taxiway Design**

Elements of runway, orientation and configuration, Basic runway length and corrections, Gcome design elements. taxiway design. iv lain and exit Taxiways. Separation clearance, Holding apro Typical airport layouts. Terminal building, gate position.

**Module VIII. Visual Aids and Air Traffic Control**

Airport marking and lighting, Airway and airport traffic control, Instrumental landing systems and other air navigation aids.

**Module IX. Harbours**

Types of harbors, Size and accessibility. Tides, wind and wave. Dynamic effect of wave action.

**Module X. Docks**

Types of Docks, Shape and size. Caissons for dock entrances, Floating docks and their design considerations.

**Text Books and Reference Books:**

1. Aggarwal, M.M., “Raihvay Engineering”, Student Edition : Prabha & Co., New Delhi 1997

2. Saxena, S. C. and Arora, S.P., “A Text Book of Railway Engineering, Dhanpat Rai & Sons, 1997

3. Mundrey, I.S., “Railway hack Engineering”, Tata McGraw-Hill Publishing Company Ltd., New Delhi 1994.

4. Track Manuals of Indian Railways.

5. Indian Railways Permanent Way Manual, 1986.

**CE 1604 Concrete Structures II (3-0-0)**

 30 lectures

**Module I. Elements of Prestressed Concrete**

Principles and systems, material properties, losses of prestress, I.S. specifications, analysis and design of sections for flexure and shear. Introduction to continuous beams.

**Module II. Continuous and Curved Beams**

Design of continuous R.C. beams, moment redistribution, beams curved in plan.

**Module III. Shrinkage and Creep**

Effect of shrinkage and creep on stresses in R.C. columns and beams

**Module IV. Multistoreyed Building Frames**

Analysis by approximate methods, design and detailing, I.S. specification and loading standard.

**Module V. Water Tanks and Towers**

Water Tanks and Water Towers-design of rectangular, circular and Intzc type tanks, column brace type staging and circular rat foundations.

**Module VI. Culverts and Bridges**

Design of slab culverts, bridge decks, cross and main beams for bridges, T-beam bridge design for I.R.C. loading.

**CE 1607-P CONCRETE II LAB (0-0-3)**

**List of Experiments**

1. Initial drying shrinkage, moisture movement, and coefficient of expansion of concrete.
2. Stress strain curve of concrete.
3. Behavior of under reinforce and over reinforced R.C. beams in flexure.
4. Behavior of R.C. beams, with and without shear reinforcement in shear.
5. Bond strength between steel bar and concrete (a) in a beam specimen and (b) by pull-out test.
6. (a) Fineness of cement by Air Permeability method.

(b) Soundness of cement by Le-Chatalier’s Apparatus.

(c) Compressive strength of cement.

 7. (a) Water content for standard consistency of cement.

 (b) Initial and final setting times of cement.

 8. Moisture content and bulking of fine aggregate.

 9. Fineness modulus of coarse and fine aggregates.

 10. Workability of cement concrete by (a) Slump test, and (b) compaction factor test.

 11. Concrete mix design for a given concrete strength and slump by LS. Code method.

**Text Books and Reference Books:**

1. Krishna, Jai and Jain, O.P., “Plain and Reinforced Concrete”, Vol. II, Nem Chand and Bros., Roorkee, 1998.

2. Chandra Ram, “Design of Concrete Structure”, Vol. II, Standard Book House, New Delhi, 1986.

3. Gray, W.S. and Mannings, G.!., “Reinforced Concrete Water Towers”, Bunkers, Silos & Grantries’ Concrete Publication Limited. 1073

4. Reynolds, C.E. and Steadman, J.C., “Reinforced Concrete Design Hand Book”, Cement and Concrete Association, London, 1976.

**CE – 1605 GEOTECHNICAL ENGINEERING II (3-0-0)**

 35 lectures

**Module I. Soil Exploration**

Purpose; Methods of soil exploration: Boring sampling: Standard penetration test; Static and dynamic cone tests: Correlations between penetration resistance and strength parameters; Plate load test.

Planning of soil investigation; Number of bore holes and depth of exploration; Types of test to suit soil conditions.

**Module II. Earth Pressures and Retaining Structures**

Earth pressure at rest; Active and passive earth pressure computations using Rankine’s and Coulomb’s earth pressure theories; Culmann’s graphical construction: Additional earth pressure due to surcharge and earthquake loading.

Stability analysis for retaining walls; Choice of backfill material and importance of drainage. Bracings for open cut-Recommended design diagrams of earth pressure for typical soils. Arching and its practical implications.

**Module III. Foundations**

Common types of foundations with examples; Brief illustration of situations where each one of them is adopted; Basis for design; Review of major soil parameters used in proportioning of foundations.

**Module IV. Shallow Foundations**

Types and their selection; Terminology;

Bering capacity – Terzaghi’s equations; Computation o[bearing capacity in cohesionless and cohesive soils; Effect of various factors on bearing capacity : Use of field test data.

Settlement; Components of settlement; Limits of settlement; Stresses in soil below loaded areas; Boussinesq equation for vertical stress; Concept of pressure bulb; Newmark chart; Estimation of settlement of footings and rafts on sand using penetration and load test data; Estimation of settlement footing / rafts on cohesive soils using consolidation test data; Corrections for rigidity and SD effect; Proportioning of footing.

**Module V. Pie Foundations**

Situations where adopted; Types of piles; Outline of steps involved in proportioning; Bearing capacity and settlement of single and group of piles: Proportioning with field/lab data as input.

**Module VI. Well Foundation**

Situations where adopted; Elements of wells: Types; Methods of construction; Tilt and shift; Remedial measures.

Proportioning – Depth and size of well I son the basis of scour depth, bearing capacity and settlement. Terzaghi’s lateral stability analysis.

**Module VII. Embankment Slopes**

Examples of embankments – Road and earth dam embankments: Modes of failure and the usual protective measures; Slope inclinations usual adopted; Stability Analysis; Infinite slopes and the concept of factor of safety; Friction circle method; Method of slices Bishop’s simplified method; Acceptable values of factor of safety; Critical conditions for the stability of earth dams, and approximate analyses.

**Module VIII. Introduction to Machine Foundations**

Types of machine and their foundation Terminology; Design criteria; Field methods of determination design parameters – Cycle plate load test; Block vibration test; Response of block foundation under vertical vibrations.

**Module IX. Foundation on Expansive Soil**

Identification of expansive soil, Problems associated with expansive soil, Design consideration of foundation on expansive soil, Under reamed piles.

**CE 1609 – P GEOTECHNICAL ENGINEERING II LAB. (0-0-3)**

**Laboratory Experiments**

1. Direct Shear test.

2. Triaxial test.

3. CRB test

4. Consolidation test

5. Plate load test

6. Boring, Sampling and SPT

7. Vane shear test

8. Block vibration test

9. Static and dynamic cone tests

**Text Books and Reference Books:**

1. Gopal Ranjan and Rao A.S.R. “Basic and Applied Soil Mechanics :” (Revised Edition) New Age, New Delhi, 1998.

2. Peck, R.B., Hanson, W.E. and Thom burn W.H. “Foundation Engineering”, 2nd Edition, John Wiley, New York, 1976

3. Tomhnson, M. J., “Foundation Design and Construction”, 5th Edition, ELBS, Singapore, 1988

4. Alam Singh “Soil Engineering in Theory and Practice”, Vol. n. Asia Publishing House, New Delhi. 1981

**CE 1606 ENVIRONMENTAL ENGINEERING II (3-0-0)**

 30 lectures

**Module I. General**

Terms : Sewerage, domestic sewage, sewage treatment, disposal, scope, role of an environmental engineer, historical overview.

**Module II. Sewage Characteristics**

Quality parameters : BOO, COD, TOC, Solids, DO, Nitrogen, Phosphorus, Standards of disposal into natural water courses and on land, Indian Standards.

**Module III. Collection of Sewage**

Systems of sewerage : separate, combined, and partially separate, components of sewerage systems, systems of layout, quantity of sanitary sewage and variations, quantity of stoffil water, Rational method, shapes of sewer, circular and egg shaped, Hydraulic design of sewers: diameter, self cleansing velocity and slopes, Construction and testing of sewer lines, Sewer materials, joints and appurtenances, Sewage pumping and pumping stations, Maintenance of sewerage system.

**Module IV. Sewage Treatment**

Various units : their purposes sequence and efficiencies, Preliminary treatment: screening and grit removal units, oil and grease removal, Primary treatment, Secondary treatment : activated sludge process, trickling filter, Sludge digestion and drying beds, Stabilization pond, Septic tank, Soakage systems, Imhoff tank, Recent trends in sewage treatment, adv nced wastewater treatment nutrient removal, solids removal.

**Module V. Wastewater Disposal and Reuse**

Disposal of sewage by dilution, self purification of streams, sewage disposal by irrigation and sewage farming, wastewater reuse.

**Module VI. Plumbing for Drainage of Buildings**

Various systems of plumbing – one pipe, two pipe, single stack, traps, Layout of house drainage.

**CE 1610–P ENVIRONMENTAL ENGINEERING II LAB (0-0-3)**

**List of Experiment**

1. Determination of B.O.D. of sewage

2. Determination of C.O.D. of domestic and industrial sewage

3. Determination of kjeldal nitrogen

4. Determination of volatile, mixed, filterable and dissolved solids

5. Determination of optimum dose of coagulants.

6. Determination of iron and two heavy metals.

7. Measurement oh SO2 in the ambient air

8. Measurement of particular mater in air

**Text Books and Reference Books:**

1. Peavy. H.S, Rowe, D.R. and Tchobanoglous, G., “Environmental Engineering”, McGraw Hill Company, 1985.

2. Fair, G.M., Geyer, i.e. and Okun, D.A., “Water and Wastewater Engineering”, John and Sons, Inc., 1966.

3. Viessman, Jr. and Hammer, MJ., “Water Supply and Pollution Control”, Harper Coil College Publishers. 1985.

4. Standard Methods for the Examination of Water and Wastewater, 19th Edition, Prepared and Published jointly by APHA, AWWA, WEF, 1985

5. AK Chatterjee- Water supply, waste disposal and environmental engineering.

**Semester – VII**

**Open Elective – I**

**HS – 2751 OPERATION RESEARCH TECHNIQUE**

**(3-0-0)**

1. **Introduction:**

History of operation research, nature and scope of operation research, Allocation.

1. **Linear Programming:**

Mathematical formulation of the problem, Graphical solution methods.

Mathematical solution of L-P problems, Matrix formulation of general linear programming problems. Simplex method : algorithm the computational procedures, Two phase Simplex method, problem of degeneracy, Principles of duality in simplex method , Sensitively analysis.

TRANSPORTATION PROBLEM

1. **Game Theory:**

Introduction, Two persons zero sum games. The maximum and minimum principles.

1. **Integer Programming**

Formulation and solution of integer programming problems.

**B. TECH COURSE STRUCTURE**

**CIVIL ENGINEERING**

**7th SEMESTER**

**RANCHI UNIVERSITY, RANCHI**

**EC 1712 PHOTOGRAMMETRY AND REMOTE SENSING (3-0-0)**

 **30 lectures**

**Module I. Photogrammetry**

Definition of Photogrammetric Terms, Geometry of aerial and terrestrial photographs, Arial camera and photo – theodolite, Scale of a Photograph, Tilt and Height displacements, Stereoscopic vision and stereoscopes, Height determination from parallax measurements, Flight planning. Maps and Map substitutes and their uses.

**Module II. Remote Sensing**

Introduction and definition of remote sensing” terms, Remotes Sensing Systems, Electromagnetic radiation and spectrum; Spectral signature, Atmospheric windows, Different types of platforms, sensors and their characteristics, Orbital parameters of a satellite, Multi concept in Remote Sensing.

**Module III. Image Interpretation**

Principles of interpretation of aerial and satellite images, equipments and aids required for ground truth collection and verification. Advantages of multidate and multiband images. Digital image processing concept.

**Text Books and Reference Books:**

1. Campbell, J.B., “Introduction to Remote Sensing”, The Guilford Press, London, 1986

2. Curran, P.J., “Principles of Remote Sensing”, Longman, London, 1985.

3. Kennie, T.J.M. and Petric, G., “Engineering Surveying Technology”, Blackie & Sons Ltd., London. 1990.

4. Wolf, P.R., “Elements of Photogrammetry”, Tata McGraw Hill Book Company, New Delhi, 1986.

**CE 1701 WATER RESOURCES ENGINEERING I (3-0-0)**

 35 lectures

**Module I. Introduction**

Definitions, functions and advantages of irrigation, present status of irrigation. In classification for agriculture, soil moisture and crop-water relations, irrigation water quality, consumptive use of water, principal Indian crop seasons and water requirement, multiple cropping, hybrid crops.

**Module II. Canal Irrigation**

Types of canals, parts of a canal irrigation system, channel alignment, assessment of water requirements, estimation of channel losses, design of Channels, regime and semi-theoretical approaches (Kennedy’s Theory, Lacey’s theory), cross-sections of channels, silt control in canals.

**Module III. Water Distribution System**

Roatational delivery (warabandi), continuous delivery and delivery on demand, Role of command area development authority. Functions and organization structures.

**Module IV. Distribution of Canal Water**

System of regulation and control, outlets, assessment of canal revenue.

**Module V. Hydraulics of Alluvial Rivers**

Critical tractive force, regimes of flow, resistance relationship for natural, streams, bed load, suspended load and total load equations, different stages of rivers, meandering, meandering and degradation, river training & bank protection works.

**Module VI. Water Logging**

Causes, preventive and curative measures, drainage of irrigated lands, saline and alkaline lands, types of channel linings and design of lined channel.

**Module VII. Principles of Design of Masonry and Other Structures for Canals**

Design for surface and sub-surface flows, Blight’s, Lane’s and Khosla’s methods, design of falls, distributary and cross-regulators, energy dissipation.

**Module VIII. Well Irrigation**

Open wells and tube wells, types of tube wells, duty of tube well Water.

**Module IX. Hydrology**

Definition. Hydrologic cycle, Application to Engineering problems, Measurement of rainfall, raingauge, Peak flow, Flood frequency method. Catchment area formulae, Flood hydrograph, Rainfall analysis, Infiltration, Run off, Unit hydro graph and its determination. Estimation of run off.

**Text Books and Reference Books:**

1. Asawa, G.L., “Irrigation Engineering”, New Age International Publishers, Hnd ed., New Delhi, 1996.

2. Bharat Singh, “Fundamentals of Irrigation Engineering”, 7th Ed., Nem hand & Bros., 1983

3. Varshney, R.S., Gupta and Gupta, “Theory and design of Irrigation Structures vol. I & II.

4. Punami CI, B.C. and Pandey, ‘B.B.Lal, “Irrigation and Water Power Engineering”.

5. Allam Sighh irrigation and water power engineering

6. SK Garg irrigation engineering

**CE – 1705 P WATER RESOURSES ENGG. LAB. (0-0-3)**

***List of Experiments*:**

1. Measurement of Rainfall by non-recording rain gauge.
2. Measurement of Rainfall by recording rain gauge.
3. To determine mean rainfall of an area by Thiessen mean polygon method.
4. To determine mean rainfall of an area by Isoliyetal method.
5. To determine the velocity of a running stream in a canal by current metre and calculate the approximate discharge of the canal.
6. To design a regime channel by Lacey’s theory for a given pattern of crops and area to be irrigated.
7. To determine the yield of an open well by recuperation test.
8. To determine the yield of an open well by constant level pumping test.
9. To visit a Multipurpose River valley, Project and to prepare a report of the solid project.

**SEMESTER VII**

**OPEN ELECTIVE**

**CE 1702 STEEL STRUCTURES (3-0-0)**

 **30 Lectures**

**Module I. Introduction**

 Properties of Structural Steel, I.S. Rolled Sections, L.S.

**Module II. Design Approach** Factor of Safety, Permissible and working Stresses, Elastic

method, Plastic method, Introduction to limit states of design.

**Module III. Connections**

 Riveted, bolted and welded connections, Strength & Efficiency and Design of

 Joints, Introduction to high strength friction grip bolts.

**Module IV. Tension Members**

 Steel members and high strength steel cables.

**Module V. Compression Members**

 Struts and Columns including built-up columns, lacings and battens.

**Module VI. Beams**

 Stability of flange and web, Build-up sections. Plate girders including stiffeners,

 connections and curtailment of flange plates.

**Module VII. Beam-columns**

 Stability base, Gusseted base and Grillage footing.

**Module VIII. Column bases**

 Stability base, Guessted base and Grillage footing.

**Text Books and Reference Books:**

1. Arya A.S. & Ajmani I.L., “Design of Steel Structures”, Nem Chand & Bros., Roorkee (UP), 1992

2. Bresler, B. Lin, T.Y. and Scalzi, J.B., “Design of Steel Structures”. Wiley Eastern Pvt. Ltd., New Delhi, 1970.

3. Duggal, S.K., “Design of Steel Structures”, Tata McGraw – Hill Book Pub. Co. Ltd., New Delhi, 1993.

4. Kazimi, S.M.A. and Jindal, S.K., “Design of Steel Structures”. Prentice Hall of India Pvt. Ltd., New Delhi 1989.

5. Krishnamachar, B.S. and Sinha, D.A., “Design of Steel Structures”, Tata McGraw Hill Pub. Co. Ltd., New Delhi 1987.

6. Negi L.S., “Design of Steel Structures”, Tata McGraw Hill Pub. Co. Ltd., New Delhi, 1985.

7. Punmia B.C., Jain, AX and Jain, AX, “Design of Steel Structures”. Vol. I, Arihant Publications, Bombay – Jodhpur, 1985.

8. Raghupathi, M., Design of Steel Structures”, Tata McGraw – Hill Pub. Co. Ltd., New Delhi, 1995.

9. Chandra, Ram, “Design of Steel Structures”, Standard Book House, Nai Sarak, Delhi – 6, 1975.

**CE 1703 – P STRUCTURAL DETAILING (0-0-3)**

To prepare working drawings manually as well as on computer for the following

1. Simple beam/Lintel

2. T-Beam floor

3. Rectangular slabs

4. Bricks wall and isolated footing

5. Combined rectangular and Trapezoidal footing

6. Water tank

7. T – Shape retaining wall

8. Detailing of Retaining walls

9. Water Tanks

10. Rolled sections and connections

11. Built – up columns and bean’s

12. Guesset base

13. Grillage footing

14. Trusses

**CE 1704-P ESTIMATION AND EVALUATION (0-0-3)**

 30 lectures

**Module I. Building Drawing**

Objective of p(an) elevation and sectional elevations Scale and types of drawings. I.S. Specifications.

**Module II. Quantity Estimation**

Principles of estimation, methods and units. Estimation of materials in buildings : walls, floors and roofs. R.B. and R.C.C. works, plaster, white washing, distempering and doors and windows, lump sum items, Principles of general and detailed specifications for building works, analysis of rates and schedule of rates.

**Module III. Drawing Estimation**

Survey of an existing building on the campus. Preparations of a report giving its salient features including the following details on the drawing sheets: Ground floor plant, two sectional elevations, front and side elevations, plan and sectional elevation of a stair case, window/ventilator. Floor and roof.

**Module IV. Analysis of Rates**

Definition of analysis of rates, Prime cost, Work charged establishment, Resource planning through analysis of rates, P.W.D. Schedules and cost for building material and Labour, Measurement and measurement book.

**Module V Valuation**

Purposes of valuation, Terminology, Factors affecting the value of a property, valuation and its different aspects, methods of valuation such as Rental method, Direct compensation method, profit based method and development method, Capitalized value and depreciation.

**Text Books and Reference Books:**

1. Arya, A.S., “Masonry and Timber Structures including Earth Resistant Design, Nem Chand Bros. Roorkee (U.P.), 1987.

2. Bellis, H.F. & Schmidt, W.A. “Architecture Drafting”, McGraw Hill Book Co. Inc., London, 1961

3. Dutta B.N., “Estimating and Costing in Civil Engineering – Theory & Practice” UBS Publishers Distributors Ltd., New Delhi 1994.

4. Goyal S.C. and Jain O.P., “Mannual of Estimating”, Nem Chand & Bros., Roorkee (U.P.) 1960

5. Hoelscher, R.P. & Springer, C.H., “Engineering Drawing & Geometry”, John Wiley & Sons Inc. London 1958

6. Shah M.G., Kale, C.M. and Patki, S.Y. “Building Drawing”, Tata McGraw Hill Publishing Co. Ltd., 2nd Edition, New Delhi. 1985.

7. Chakraborty M., “Estimating costing and valuation in Civil Engg.”

**B. TECH COURSE STRUCTURE**

**CIVIL ENGINEERING**

**8th SEMESTER**

**RANCHI UNIVERSITY, RANCHI**

**VIII Semester**

**CE 1801 STEEL STRUCTURES II (3-0-0)**

 30 lectures

**Module I. Moment-resistant Connections**

Connections for frames, brackets.

**Module II. Industrial Buildings**

Loads, General arrangement and stability considerations, Design of purl ins, roof trusses, industrial building frames, gantry girder and bracings.

**Module III. Bridge**

Plate girder and truss bridges, General arrangement, Design loads for highway/railway bridges, Design of truss bridge for railway loading.

**Module IV. Tanks**

Cylindrical tanks, Pressed steel tanks, Stagings for tanks.

**Module V. Towers**

Transmission line towers, Microwave towers, Design loads, Classification, design procedure and specifications.

**Module VI. Plastic Methods**

Analysis and design of beams and frames.

**Text Books and Reference Books:**

1. Arya, A.S., Ajmani, J.L. “Design of Steel Structures”, Nem Chand & Bros., Roorkee (U.P.), 1992.

2. Bresler, B. Lin, T.Y. and Scalzi, IB, “Design of Steel Structures”, Wiley Eastern Pvt. Ltd., New Delhi, 1970.

3. Duggal S. K., “Design of Steel Structures”, Tata McGraw – Hill Book Pub. Co. Ltd., New Delhi, 1993.

4. Kazimi, S.M.A. and Jindal, S.K., “Design of Steel Structures”, Prentice Hall of India Pvt.

5. I….tisIIIL IIIIdL Jar, B.S. aud Sinha, U.A.”Jc igJI of Steel Structures” Tata McGraw I fill Pub. Co. Ltd., New Delhi, 1979 Negi, L.S., “Design of Steel Structures”, Tata McGraw Hill Publishing Co. Ltd., New Delhi, 1995, Punmia, B.C., Jain, AK and Jain, AK, “Design of Steel Structures”, Vol. I Arihani Publications, Bombay – Jodhpur, 1995.

6. Raghupathi M., “Design of Steel Structures”, Tata McGraw-Hill Pub. Co. Ltd., New Delhi, 1995

 ‘Steel Table’ should be provided to the examinee.

7. Run Chandra “Design of Steel Structures”, Standard Book House, Nai Sarak, Delhi – 6, 1975.

8. Cooper, S.E. and Chen, A.C., “Designing Steel Structures”, International Student Edn. McGraw Hill Book Co., Inc/Koga-kusha Co. Ltd., 1975

9. Gaylord, E.H., Jr. and Gaylord, C.N. Charles, “Design of Steel Structures”, International Student Edn., McGraw Hill Book Co., Inc./Koga-Kusha Co. Ltd., 1975

10. Mar ow, H.W., “Elements of Steel Design”, Prentice - Hall Inc., N.J., USA, 1987.

11. McCormac, J.C., “Structural Steel Design”, International Text Book co. Pennsylvania, USA, 1967

12. McGuire, Willam, “Steel Structures”, Prentice Hull Inc., N.J., U.S.A., 1968

**CE 1802 WATER RESOURCES ENGINEERING II (3-0-0)**

 30 Lectures

**Module I. Regulation Works**

Falls, classification of falls. Design of falls, Distributary head regulator and cross-head regulator, Escape. Bed bars.

**Module II. Cross – Drainage Structures**

Necessity of cross-drainage structures, their types and selection, comparative merits and demerits, designs of various types of cross-drainage structures-aqueduct, siphon aqueducts, super passage, syphon, level crossing and other types.

**Module III. Diversion Headworks**

Selection of site and layout, different parts of diversion-head works, types of weirs and barrages.

Design of weirs on permeable foundation, silt excluders and different types of silt ejectors.

**Module IV. Dams**

Suitable sites, different types, principles of design of straight gravity and earth dams, mass concreting of dams.

**Module V. Spillways**

Spillway capacity, flood routing through spillways, different types of spillways and gates, energy Dissipation below spillways.

**Module VI. Hydro-Power Plants**

General features of hydroelectric schemes, elements of power house structure, selection of turbines draft tube and setting of turbine, cavitation.

**Module VII. Ground Water**

Occurrence and distribution of ground water, acquifers, movement of ground water, Darcy’s law, safe yield of a basin, steady flow towards well in confined and unconfined acquifers, well losses and specific capacity of well, ground water quality and ground water budget, types of wells, construction and design of wells – screens, and gravel packs, pumping equipment.

**Text Books and Reference Books:**

1. Asawa G.L., “Irrigation Engineering”, 2nd Ed., New Age International Publishers, New Delhi, 1996.

2. Bharat Singh, “Fundamentals of Irrigation Engineering”, 7th Ed., Nem Chand & Bros., Roorkee 1983

3. Varshney, R.S., S.C. Gupta and R.L. Gupta, “Theory and Design of Irrigation Structures”, Nem Chand & Bros., Roorkee, 1982.

4. Sharma, H.D. and Chawla, A.S., “A Manual on Ground Water and Tube Wells”, Report No. 18, CBIP, New Delhi, J 1977.

**Semester - VIII**

**(Open Elective – II)**

**CCE – 2738 Earth Quake Engineering (3-0-0)**

(30 Lecture)

1. **Elements of Seismology:**

Definitions of Magnitude, Intensity, Epicenter, ect., General features of tectonic of seismic regions, Seismographs.

1. **Theory of Vibrations:**

Free vibrations of single degree, two degree and multiple degree freedom system. Computation of dynamic response to time dependent forces. Vibration isolation. Vibration absorbers. Vibration absorbers.

1. **Principles of Earthquakes Resistant Design:**

Response spectrum theory. Brief introduction to accelerographs and S.R.R.’s. Nature of dynamic loading resulting from earthquakes. Application of Response spectrum. Theory to a seismic design to structures. Resistance of structural elements and structures for dynamic loads, design criteria-strength and deflection. Ductility and absorption of energy.

1. **Dynamic Properties of Soils**
2. **Remedial measures and management of earthquakes disaster.**
3. **Introduction to Indian Standard Codes**

IS : 1893 – 1984 and IS : 4326 - 1993

**Professional Elective – III**

**Semester – VIII**

**CE – 2863 TRAFFIC ENGINEERING (3-0-0)**

**30 LECTURER**

1. **Introduction:**

3 E’s of traffic Engineering, Special problems due to mixed traffic and other conditions in developing, Concepts of PCU.

1. **Traffic Characteristics:**

Road user characteristic, Vehicular characteristics, Traffic flow characteristics, Capacity, Traffic studies, Volume, Spot speed and delay, Origin and destination, Parking and accident.

1. **Traffic facilities Design:**

Design of interaction – Rotary intersections, grade separated intersection, design of off-street facilities.

1. **Traffic Operation Safety:**

Traffic regulations, Control on vehicles, Drives and flow , one way street tidal flow operation, priority for high occupancy vehicles, Traffic control devices, Signs, Signals, Islands and marketing, Design of isolated traffic signals by IRC method, Analysis of traffic accidents, Highway lighting, Effect of road conditions and road geometries on traffic safety, Traffic safety awareness.

1. **Traffic and Environment:**

Pollution problems of cites, Noise pollution, Air pollution, Vibration, Environmental Impact Assessment, Mitigative Measures.

**HS 1808-P GP/Colloquium/Seminar (0-0-0)**

 30 lectures

Students has to select a topic of current interest in his branch of Engg. and finally to be approved by his head.

Then he has to prepare his interest in writing with suitable diagrams and references and then to present it in about 1 5 minutes, before a panel of teacher of his department who will mark them\* each teacher will give marks separately and an average of these marking (round off) should be entered in the final marks sheets.

This gives a chance to the student to present the subject matter before the audience (his class fellows and teachers of the department), which will further increase their confidence in facing the audience.