**CMR COLLEGE OF ENGINEERING & TECHNOLOGY**
**(An Autonomous Institute)**


**ACADEMIC REGULATIONS FOR B.TECH. DEGREE COURSE**
(Applicable for Students admitted from the academic year 2014-2015)

## 1. Award of B.Tech. degree

A student will be declared eligible for the award of the B. Tech. Degree if he/she fulfils the following academic regulations:

1.1. The student shall pursue a course of study for not less than four academic years and not more than eight academic years.

1.2. After eight academic years of course of study, a student may be permitted to write the examinations for two more years.

1.3. The student shall register for 224 credits and secure all 224 credits The candidate shall also complete the non-credit courses as per the syllabus.


1.4. The students, who fail to fulfill all the academic requirements for the award of the degree within ten academic years from the year of their admission, shall forfeit their seats in B.Tech. course.

## 2. Courses of study

The following courses of study are offered at present for specialization for the B. Tech. Course:

| Branch Code | Branch |
|---|---|
| 01 | Civil Engineering. |
| 02 | Electrical & Electronics Engineering |
| 03 | Mechanical Engineering |
| 04 | Electronics & Communication Engineering |
| 05 | Computer Science & Engineering. |

### 2.1. Eligibility criteria for admission

The eligibility criteria for admission into engineering courses by regular and lateral entry scheme students shall be as stipulated by the state government from time to time.

### 2.2. Medium of instruction
The medium of instruction and examinations for all courses is English.


## 3. Distribution and weightage of marks

3.1.  The performance of a student in each semester shall be evaluated subject – wise with **a** maximum of 100 marks for theory and 75 marks for practical subjects. In addition, an Industry oriented mini-project, Seminar, Comprehensive viva-voce, and Project Work shall be evaluated for 50, 50, 100 and 200 marks respectively.

3.2. For Theory subjects, during a semester there shall be two internal examinations. Each internal examination consists of one objective paper, one essay paper and one assignment. The objective type paper shall be for 10 marks, essay type paper shall be for 15 marks each with a total duration of 1 hour 20 minutes (20 minutes for objective and 60 minutes for essay paper). The objective paper is set with 10 short answer questions of one mark each. The essay paper shall contain 5 full questions (2 questions each from fully completed Units and 1 question from partially completed Unit) out of which, the student has to answer 3 questions, each carrying 5 marks. While the first internal examination shall be conducted from 1 to 2.5 units of the syllabus, the second internal examination shall be conducted on 2.5 to 5 units. Five (5) marks are allocated for Assignments (as specified by the subject teacher concerned). The first Assignment should be submitted before the conduct of the first internal examination and second Assignment should be submitted before the conduct of the second internal examination. The total marks secured by the student in each internal examination are evaluated for 30 marks. The final marks secured in internal evaluation by each candidate are arrived at by giving a weightage of 70% to the best secured internal examination and 30% weightage to the least secured internal examination. A student who is absent for any assignment/ internal examination for any reason what so ever shall be deemed to have secured 'zero' marks in the test/ examination and no makeup test/ examination shall be conducted.

3.3. For practical subjects there shall be a continuous evaluation during a semester for 25 sessional marks and 50 end semester examination marks. Out of 25 marks of internal evaluation, day-to-day work in the laboratory shall be evaluated for 15 marks and internal practical examination shall be evaluated for 10 marks conducted by the laboratory teacher concerned. The end semester examination shall be conducted with an external examiner and the laboratory teacher. The external examiner from other institutions or industry shall be appointed by the Controller of Examinations in consultation with Head of the Department.

3.4. For the subjects having design and / or drawing, (such as Engineering Graphics, AutoCAD, Engineering Drawing, Machine Drawing and Estimation etc.,) the internal evaluation carries 30 marks (the distribution is 15 marks for day-to-day work and 15 marks for internal examination) and 70 marks shall be for end semester examination. There shall be two internal examinations in a semester. The final marks secured by each candidate in the internal evaluation is arrived at by giving a weightage of 70% to the best secured internal examination and 30% weightage to the least secured internal examination.

3.5. There shall be an industry-oriented mini-Project, in collaboration with an industry of their specialization, to be taken up during the summer vacation after VI Semester examination. The mini project shall be evaluated during the VIII Semester. The industry oriented mini project shall be submitted in a report form and should be presented before a committee, which shall be evaluated for 50 marks. The committee consists of Head of the Department, the supervisor of mini project, a senior faculty member of the department and an external examiner. There shall be no internal marks for industry-oriented mini-project. The external examiner from other institutions or industry shall be appointed by the Controller of Examinations in consultation

with Head of the Department.

3.6. There shall be a Seminar presentation in VIII Semester. For the Seminar, the student shall collect the information on a specialized topic other than the project topic and prepare a technical report and submit to the department. The presentation demonstrating understanding of the topic and technical report shall be evaluated by a Departmental committee consisting of the Head of the department, Seminar supervisor and a senior faculty member from the department. The seminar will be evaluated for 50 marks. There shall be no internal marks for the seminar.

3.7. There shall be a Comprehensive Viva-Voce in VIII Semester. The Comprehensive Viva-Voce will be conducted by a Committee consisting of the Head of the Department and three Senior Faculty members of the Department. The Comprehensive Viva-Voce is intended to assess the student's understanding in various subjects he studied during the B.Tech. course of study. The Comprehensive Viva-Voce is evaluated for 100 marks by the Committee. There shall be no internal marks for the Comprehensive Viva-Voce.

3.8. The **project work** shall be evaluated for 200 marks out of which 60 marks for internal evaluation and 140 marks for end-semester evaluation. The project work shall be taken up in the beginning of VIII semester and shall be completed by the end of VIII semester. Internal evaluation shall be conducted by Head of the Department and the project supervisor for 60 marks. The end semester examination shall be based on the report submitted and a viva-voce exam for 140 marks by committee comprising of the Head of the Department, project supervisor and an external examiner. The external examiner shall be appointed by the Controller of Examinations from a panel of three members submitted by the Head of the Department.

## 4. Semester end Examination

### 4.1. Theory Courses

The end semester examination will be conducted for 70 marks which consists of Part-A and Part-B. The examination is of 3 hours duration. Question paper pattern is as follows

**Part-A: 20 Marks**
There shall be 10 questions each carrying 2 Marks. (Two questions from each Unit)

**Part-B: 50 Marks**
There shall be 10 questions out of which 5 questions (Internal choice within a unit i.e. two questions from each unit out of which one question from each unit to be answered) are to be answered, each question carry 10 marks.

### 4.2. Practical Courses

Each lab course is evaluated for 50 marks. The examination shall be conducted by the laboratory teacher. One examiner will be appointed by the Controller of Examinations from other institutions or industry in consultation with HOD.

### 4.3. Supplementary Examinations

The schedule for supplementary examinations shall be as notified by the institute from time to time.

## 5. Attendance Requirements

5.1. A student shall be eligible to appear for the Semester end examinations if he/she acquires a minimum of 75% of attendance in aggregate of all the subjects for Semester.

5.2. Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in a Semester may be granted by the College Academic Committee. A student will not be permitted to write the end examination and not promoted to the next Semester unless he satisfies the attendance requirement of the present semester, as applicable.

**5.3.** Shortage of Attendance **below 65% in aggregate** shall in **No case be condoned.**

5.4 Students whose shortage of attendance is not condoned in any Semester are not eligible to take their end semester examination of that semester.

5.5. A stipulated fee shall be payable towards condonation of shortage of attendance.

5.6. A student who is short of attendance in a semester may seek re-admission into that semester when offered next within 4 weeks from the date of the commencement of class work.

5.7. A student will be promoted to the next semester if he satisfies the attendance requirement of the present semester including the days of attendance in sports, games, NCC and NSS activities. The consideration of attendance in such activities is restricted to a maximum of 15 instructional days in a semester. Prior permission of the Head of the Department in writing shall be obtained by the students to avail the attendance from above mentioned activities.

## 6. Minimum Academic Requirements

The following academic requirements have to be satisfied in addition to the attendance requirement mentions in item No.5.

6.1 A student is deemed to have satisfied the minimum academic requirements if he has earned the credits allotted to each theory/ practical design/drawing subject/project and secures not less than 35% of marks in the end semester exam, and minimum 40% of marks in the sum total of the internal and end semester examinations. A student shall obtain 40% of the marks in case of external evaluation alone.

6.2 Promotion of the student from first year to second year is not based on the credits secured and is subject to meeting the attendance criterion as specified in item No. 5

6.3 A student shall be promoted from II year to III year only if he fulfills the academic requirement of 34 credits up to III semester from all the examinations, whether or not the candidate takes the examination and secures prescribed minimum attendance in IV semester.

6.4 A Student shall be promoted from III year to IV year only if he fulfils the academic requirement of 56 credits up to V semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in VI semester.

6.5 A student shall register and put up minimum attendance in all 224 credits.

6.6. In addition to the above 224 credits the student must complete the non credit courses. The non-credit courses awarded with a grade of satisfactory or not satisfactory based on meeting

the minimum attendance requirement by the student.

6.7. Students who fail to earn 224 credits as indicated in the course structure within ten academic years (8 year of study +2 years additionally for appearing for exams) from the year of their admission shall forfeit their seat in B.Tech. course and their admission stands cancelled.

## 6. Course pattern

7.1. The entire course of study is for four academic years and on semester pattern.

7.2. A student, eligible to appear for the end examination in a subject, but absent from it or has failed in the end semester examination, may write the exam in that subject during the period of supplementary exams.

7.3. When a student is detained for lack of credits/shortage of attendance, he may be re-admitted into the same semester when offered next. However, the academic regulations under which he was first admitted shall be applicable to him. After the revision of the regulations, the students of the previous batches will be given two chances for passing in their failed subjects, one supplementary and the other regular. If the students cannot clear the subjects in the given two chances, they shall be given equivalent subjects as per the revised regulations which they have to pass in order to obtain the required number of credits.

## 7. Award 0f Class:

After a student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of MBA Degree he shall be placed in one of the following classes:

| Class Awarded | % of marks to be secured |
|---|---|
| First Class with Distinction | 70% and above |
| First Class | Below 70% but not less than 60% |
| Second Class | Below 60% but not less than 50% |
| Pass Class | Below 50% but not less than 40% |

## 8. Minimum Instruction Days

**9.1.** The minimum instruction days for each semester shall be 90**.**

9.2. There shall be no branch transfers after the completion of admission process.

9.3. The decision of the Institute Academic Committee will be final in respect of equivalent subjects for those students who are transferred from other colleges. The procedure for permitting students to transfer from other colleges will be decided by the principal / Institute Academic Committee keeping the Government Rules in view.

## 9. Withholding of Results

If the student has not paid dues to College, or if any case of indiscipline is pending against him, the result of the candidate may be withheld and he will not be allowed into the next semester. The award of the degree will be withheld in such cases.

## 10. Transitory Regulations

11.1. Discontinued, detained, or failed candidates are eligible for readmission as and when next offered.

11.2. After the revision of the regulations, the students of the previous batches will be given two chances for passing in their failed subjects, one supplementary and the other regular. If the students cannot clear the subjects in the given two chances, they shall be given equivalent subjects as per the revised regulations which they have to pass in order to obtain the required number of credits.

11.3. In case of transferred students from other Universities, the credits shall be transferred to as per the academic regulations and course structure of the college.

**12.  General**

12.1.  Wherever the words "he", "him", "his" occur in the regulations, they include "she", "her", "hers".

12.2. The academic regulation should be read as a whole for the purpose of any interpretation

12.3. In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Academic Council is final.

12.4. The Academic Council may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the college.

12.5. The students seeking transfer to colleges affiliated to JNTUH from various other Universities/ Institutions, have to pass the failed subjects which are equivalent to the subjects of college, and also pass the subjects of college which the candidates have not studied at the earlier Institution on their own without the right to sessional marks. Further, though the students have passed some of the subjects at the earlier institutions, if the same subjects are prescribed in different semesters of college, the candidates have to study those subjects in college in spite of the that those subjects are repeated.

### Academic Regulations R1 For B. Tech. (Lateral Entry Scheme)

Applicable for the students admitted into II year B.Tech .(LES) from the Academic Year 2015-2016 and onwards

**1  Eligibility for award of B.Tech. Degree (LES)**

1.1. The LES candidates shall pursue a course of study for not less than three academic years and not more than six academic years.

1.2. After six academic years of course of study, a lateral entry student may be permitted to write the examinations for two more years.

1.3. The candidates shall register for 168 credits and secure all 168 credits from II to IV year B.Tech. Program (LES) for the award of B.Tech.

1.4. The students, who fail to fulfil the requirement for the award of the degree in 8 consecutive academic years (6 years of study + 2 years only for appearing in the exams) from the year of admission, shall forfeit their seats.

1.5. The attendance regulations of B.Tech .(Regular) shall be applicable to B.Tech. (LES)

**2.  Promotion Rule**

2.1. Promotion of the student from second year to third year is not based on the credits secured and is subject to meeting the attendance criterion as specified in item No. 1.5

2.2. A student shall be promoted from III year to IV year only if he fulfils the academic requirements of 34 credits up to V semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in VI semester.

**3.  Award of Class:**

Method of awarding class shall be same that of the regular entry students.

**4.**  All the other regulations as applicable to B.Tech. 4-year degree course (Regular) will hold good for B.Tech. (Lateral Entry Scheme)**.**

## 5.General

i. Where the words "he", "him", "his", occur in the regulations, they include "she", "her", "hers".

ii. The academic regulations should be read as a whole for the purpose of any interpretation.

iii. In the case of any discrepancy/ambiguity/doubt arises in the above rules and regulations, the decision of the College Academic Council shall be final.

iv. The College may change or amend any or all of the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students concerned with effect from the dates notified by the College.

### Malpractice Rules
Disciplinary Action for Malpractices/Improper Conduct in Examinations

|  | Nature of Malpractices/ Improper conduct | Punishment |
|---|---|---|
| 1.(a) | Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination) | Expulsion from the examination hall and cancellation of the performance in that subject only. |
| (b) | Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter. | Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him. |
| 2. | Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing. | Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled. |
| 3. | Impersonates any other candidate in connection with the examination. | The candidate who has impersonated shall be expelled |

| | | from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate Who has been impersonated, shall be cancelled in all  the  subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the Remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work   and   all   end semester examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him. |
|---|---|---|
| 4. | Smuggles the answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination | Expulsion from the examination hall and cancellation of  performance in that subject and all  the other subjects the candidate has  already appeared including practical examinations and project work and shall  not  be  permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work   and   all end   semester Examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. |
| 5. | Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks | Cancellation of the performance in that subject |

| 6. | Refuses to obey the orders of the Chief Superintendent/Assistant– Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the or organizes a walk out or instigates others **to** examination hall walk out, or threatens the officer- in-charge or any person on duty in or outside the examination hall of any injury, to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer- in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination. | In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates are also debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them. |
|---|---|---|
| 7. | Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall. | Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. |
| 8. | Possess any lethal weapon or firearm in the examination hall. | Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be |

| | | permitted for the remaining examinations of the subjects of That semester/year. The candidate is also debarred and forfeits the seat. |
|---|---|---|
| 9. | If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8. | If the student belongs to the college, expulsion from the examination performance in that subject and all other subjects hall and cancellation of the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them. |
| 10. | Comes in a drunken condition to the examination hall. | Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for other remaining examinations of the subjects of that semester/year. |
| 11. | Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny. | Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year. |
| 12. | If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the College Academic Committee for further action to award suitable punishment. | |

**Malpractices identified by squad or special invigilators**
Punishments to the candidates as per the above guidelines.

**Malpractice identified at Spot center during valuation**
The following procedure is to be followed in the case of malpractice cases detected during

valuation, scrutiny etc. at spot center.

1) Malpractice is detected at the spot valuation. The case is to be referred to the malpractice committee. Malpractice committee will meet and discuss/question the candidate and based on the evidences, the committee will recommend suitable action on the candidate.

2) A notice is to be served to the candidate(s) involved through the Principal to his address and to the candidate(s) permanent address regarding the malpractice and seek explanations.

3) The involvement of staff who are in charge of conducting examinations, invigilators valuing examination papers and preparing / keeping records of documents relating to the examinations in such acts (inclusive of providing in correct or misleading information) that infringe upon the course of natural justice to one and all concerned at the examinations shall be viewed seriously and recommended for award of appropriate punishment after thorough enquire.

4) Based on the explanation and recommendation of the committee action may be initiated.

5) **Malpractice committee:**
   i. Controller of Examinations        Chairman
   ii. Assistant Controller of Evaluation        Member
   iii. Chief Examiner of the subject/ subject expert        Member
   iv. Concerned Head of the Department        Member
   v. Concerned Invigilator        Member

**I SEMESTER**

| Code | Subject | L | T | P | C |
|------|---------|---|---|---|---|
| A1001 | English-I | 2 | 0 | 0 | 2 |
| A1006 | Linear Algebra & Differential Calculus | 4 | 1 | 0 | 4 |
| A1013 | ENGINEERING PHYSICS-I | 4 | 0 | 0 | 4 |
| A1016 | Engineering Chemistry | 4 | 0 | 0 | 4 |
| A1301 | Engineering Mechanics-I | 3 | 1 | 0 | 3 |
| A1302 | Engineering Graphics | 3 | 0 | 3 | 4 |
| A1303 | Engineering Workshop | 0 | 0 | 3 | 2 |
| A1003 | English Language Communication Lab | 0 | 0 | 3 | 2 |
| A1019 | Engineering Chemistry Lab | 0 | 0 | 3 | 2 |
| | **Total Credits** | 20 | 2 | 12 | 27 |

**II SEMESTER**

| Code | Subject | L | T | P | C |
|------|---------|---|---|---|---|
| A1002 | English-II | 2 | 0 | 0 | 2 |
| A1007 | Advanced Calculus | 4 | 1 | 0 | 4 |
| A1014 | Engineering Physics-II | 3 | 0 | 0 | 3 |
| A1018 | Chemistry of Engineering Materials | 3 | 0 | 0 | 3 |
| A1539 | 'C' Programming & Data Structures | 4 | 1 | 0 | 4 |
| A1304 | Engineering Mechanics-II | 3 | 1 | 0 | 3 |
| A1305 | Engineering Graphics & Auto Cad | 3 | 0 | 3 | 4 |
| A1553 | 'C ' Programming & Data Structures Lab | 0 | 0 | 3 | 2 |
| A1015 | Engineering Physics Lab | 0 | 0 | 3 | 2 |
| A1544 | IT Workshop | 0 | 0 | 3 | 2 |
| | **Total Credits** | 22 | 3 | 12 | 29 |

**III SEMESTER**

| Code | Subject | L | T | P | C |
|------|---------|---|---|---|---|
| A1008 | Mathematical Methods | 4 | 1 | 0 | 4 |
| A1101 | Strength of Materials -I | 4 | 1 | 0 | 4 |
| A1102 | Fluid Mechanics | 4 | 1 | 0 | 4 |

| A1103 | Surveying-I | 4 | 1 | 0 | 4 |
|---|---|---|---|---|---|
| A1020 | Environmental studies | 4 | 0 | 0 | 4 |
| A1215 | Basic Electrical & Electronics Engineering | 4 | 1 | 0 | 4 |
| A1104 | Strength of Materials Lab | 0 | 0 | 3 | 2 |
| A1105 | Surveying Lab-I | 0 | 0 | 3 | 2 |
| | **Total** | | | | **28** |

## IV SEMESTER

| Code | Subject | L | T | P | C |
|---|---|---|---|---|---|
| A1010 | Probability & Statistics | 4 | 1 | 0 | 4 |
| A1106 | Strength of Materials -II | 4 | 0 | 0 | 4 |
| A1107 | Hydraulics & Hydraulic Machinery | 4 | 1 | 0 | 4 |
| A1108 | Structural Analysis –I | 4 | 1 | 0 | 4 |
| A1109 | Building Materials & Construction Planning | 4 | 1 | 0 | 4 |
| A1110 | Surveying-II | 4 | 0 | 0 | 4 |
| A1111 | CAD Lab | 0 | 0 | 3 | 2 |
| A1112 | Surveying Lab-II | 0 | 0 | 3 | 2 |
| A1005 | Soft Skills and Professional Ethics | 2 | 0 | 0 | 0 |
| | **Total** | | | | **28** |

## V SEMESTER

| Code | Subject | L | T | P | C |
|---|---|---|---|---|---|
| | | | | | |
| A1113 | Concrete Technology | 4 | 0 | 0 | 4 |
| A1114 | Design of RC Structures & Drawing | 4 | 1 | 0 | 4 |
| A1115 | Geotechnical Engineering-I | 4 | 1 | 0 | 4 |
| A1116 | Structural Analysis –II | 4 | 1 | 0 | 4 |
| A1117 | Engineering Geology | 4 | 0 | 0 | 4 |
| A1118 | Water Resources Engineering-I | 4 | 0 | 0 | 4 |
| A1119 | Hydraulics and Hydraulic Machinery Lab | 0 | 0 | 3 | 2 |
| A1120 | Engineering Geology Lab | 0 | 0 | 3 | 2 |
| A1011 | Analytical Skills-I | 2 | 0 | 0 | 0 |
| | Total Credits | | | | 28 |

## VI SEMESTER

| Code | | L | T | P | C |
|---|---|---|---|---|---|
| | **Subject** | 4 | 1 | 0 | 4 |

| Code | Subject | L | T | P | C |
|------|---------|---|---|---|---|
| A1121 | Design of Steel Structures& Drawing | 4 | 1 | 0 | 4 |
| A1122 | Geotechnical Engineering-II | 4 | 0 | 0 | 4 |
| A1123 | Water Resources Engineering-II | 4 | 0 | 0 | 4 |
| A1124 | Transportation Engineering-I | 4 | 0 | 0 | 4 |
| A1125 | Environmental Engineering | 4 | 0 | 0 | 4 |
| | **Elective-I** | | | | |
| A1126 | Construction Technology and Project Management | 4 | 0 | 0 | 4 |
| A1127 | Finite Element Methods | | | | |
| A1128 | Advanced Structural Design | | | | |
| A1129 | Geotechnical Engineering Lab | **0** | **0** | **3** | **2** |
| A1004 | Advanced English & Communication Skills Lab | **0** | **0** | **3** | **2** |
| A1012 | Analytical Skills-II | **2** | **0** | **0** | **0** |
| | **Total Credits** | | | | 28 |

## VII SEMESTER

| Code | Subject | L | T | P | C |
|------|---------|---|---|---|---|
| | **Elective- II** | | | | |
| A1130 | Ground Water Development and Management | 4 | 0 | 0 | 4 |
| A1131 | Advanced Foundation Engineering | | | | |
| A1132 | Soild Waste Managment | | | | |
| A1133 | Prestressed Concrete Structures | 4 | 0 | 0 | 4 |
| A1134 | Transportation Engineering-II | 4 | 0 | 0 | 4 |
| A1021 | Managerial Economics and Financial Analysis | 4 | 0 | 0 | 4 |
| A1135 | Estimation, Quantity Survey & Valuation | 4 | 0 | 0 | 4 |
| | **Open Elective** | | | | |
| A1136 | Disaster Management | 4 | 1 | 0 | 4 |
| A1351 | Principles of Entrepreneurship | | | | |
| A1510 | Object Oriented Programming through JAVA | | | | |
| A1138 | Highway Materials and Concrete Technology Lab | 0 | 0 | 3 | 2 |
| A1139 | Environmental Engineering Lab | 0 | 0 | 3 | 2 |

| | | | | | |
|---|---|---|---|---|---|
| | Total Credits | | | | 28 |

## VIII SEMESTER

| Code | Subject | L | T | P | C |
|---|---|---|---|---|---|
| | **Elective-III** | | | | |
| A1140 | Elements of Earth quake Engineering | 4 | 0 | 0 | 4 |
| A1141 | Ground Improvement Techniques | | | | |
| A1142 | Design and Drawing of Irrigation Structures | | | | |
| A1143 | Remote Sensing & GIS | 4 | 0 | 0 | 4 |
| A1022 | Management Science | 4 | 0 | 0 | 4 |
| A1144 | Industry Oriented Mini Project | 0 | 0 | 3 | 2 |
| A1145 | Seminar | 0 | 0 | 3 | 2 |
| A1146 | Comprehensive viva | 0 | 0 | 0 | 2 |
| A1147 | Main Project | 0 | 12 | 0 | 10 |
| | **Total Credits** | | | | 28 |

## CMR COLLEGE OF ENGINEERING & TECHNOLOGY
### (AUTONOMOUS)

**B.Tech .CE - I Sem**

| L | T | P | C |
|---|---|---|---|
| 2 | 0 | 0 | 2 |

### ( A1001) ENGLISH-I

**OBJECTIVES:**
- To improve the language proficiency of the students in English with emphasis on **LSRW** skills.
- To equip the students to study academic subjects more effectively using the theoretical and practical components of the English syllabus.
- To develop the study skills and communication skills in formal and informal situations.

**SYLLABUS:**
*Listening Skills:*
**Objectives**
- To enable students to develop their listening skill so that they may appreciate its role in the LSRW skills approach to language and improve their pronunciation
- To equip students with necessary training in listening so that they can comprehend the speech of people of different backgrounds and regions.

*Speaking Skills:*
**Objectives**
- To make students aware of the role of speaking in English and its contribution to their success.
- To enable students to express themselves fluently and appropriately in social and professional contexts.

*Reading Skills:*
**Objectives**
- To develop an awareness in the students about the significance of silent reading and comprehension.
- To develop the ability of students to guess the meanings of words from context and grasp the overall message of the text, draw inferences etc.

*Writing Skills :*
**Objectives**
- To develop an awareness in the students about writing as an exact and formal skill
- To equip them with the components of different forms of writing, beginning with the lower order ones.

**TEXTBOOK PRESCRIBED:**
In order to improve the proficiency of the student in the acquisition of the four skills mentioned above, the following text and course content, divided in Five Units, is prescribed:
A Text book entitled **"Skills Annex", -Functional English to Success** Published by Orient Black Swan, Hyderabad
The course content and study material is divided into Five Units.
Unit –I:
- Chapter entitled 'Wit and Humour' from 'Skills Annex' -Functional English to Success Published by Orient Black Swan, Hyderabad. **A Tea Party**
  - L-Listening For Sounds, Stress and Intonation
  - S-Greeting and Taking Leave, Introducing Oneself and Others (Formal and Informal Situations)
  - R- Reading for Subject/ Theme
  - W- Writing Paragraphs
  - G-Types of Nouns and Pronouns
  - V- Homonyms, homophones synonyms, antonyms

Unit –II

- Chapter entitled '**Risk Management'** from "Skills Annex -Functional English for Success" Published by Orient Black Swan, Hyderabad
    - L – for main points and sub-points for note taking
    - S – giving instructions and directions; Speaking of hypothetical situations
    - R – reading for details
    - W – note-making, information transfer, punctuation
    - G – present tense
    - V – synonyms and antonyms

Unit –III
- Chapter entitled "Cyber Age" from "Skills Annex -Functional English for Success" Published by Orient Black Swan, Hyderabad.
    - L – Listening for themes and facts
    - S – Apologizing, interrupting, requesting and making polite conversation
    - R- for theme and gist
    - W- Describing people, places, objects, events
    - G- Verb forms
    - V- noun, verb, adjective and adverb

Unit –IV
- Chapter entitled 'Human Values and Professional Ethics' from "Skills Annex -Functional English for Success" Published by Orient Black Swan, Hyderabad
    - L -Listening for specific details and information
    - S- narrating, expressing opinions and telephone interactions
    - R -Reading for specific details and information
    - W- Writing formal letters and CVs
    - G- Past and future tenses
    - V- Vocabulary - idioms and Phrasal verbs

Unit –V
- Chapter entitled 'Sports and Health' from "Skills Annex -Functional English for Success" Published by Orient Black Swan, Hyderabad
    - L- Critical Listening and Listening for speaker's tone/ attitude
    - S- Group discussion and Making presentations
    - R- Critical reading, reading for reference
    - W-Project proposals; Technical reports, Project Reports and Research Papers
    - G- Adjectives, prepositions and concord
    - V- Collocations and Technical vocabulary Using words appropriately


**REFERENCES:**

1. Contemporary English Grammar Structures and Composition by David Green, MacMillan Publishers, New Delhi. 2010.
2. Innovate with English: A Course in English for Engineering Students, edited by T Samson, Foundation Books.
3. English Grammar Practice, Raj N Bakshi, Orient Longman.
4. Technical Communication by Daniel Riordan. 2011. Cengage Publications. New Delhi.
5. Effective English, edited by E Suresh Kumar, A RamaKrishna Rao, P Sreehari, Published by Pearson
6. Handbook of English Grammar& Usage, Mark Lester and Larry Beason, Tata Mc Graw –Hill.
7. Spoken English, R.K. Bansal & JB Harrison, Orient Longman.
8. Technical Communication, Meenakshi Raman, Oxford University Press
9. Objective English Edgar Thorpe & Showick Thorpe, Pearson Education
10. Grammar Games, Renuvolcuri Mario, Cambridge University Press.
11. Murphy's English Grammar with CD, Murphy, Cambridge University Press.
12. Everyday Dialogues in English, Robert J. Dixson, Prentice Hall India Pvt Ltd.,

13. ABC of Common Errors Nigel D Turton, Mac Millan Publishers.
14. Basic Vocabulary Edgar Thorpe & Showick Thorpe, Pearson Education
15. Effective Technical Communication, M Ashraf Rizvi, Tata Mc Graw –Hill.
16. An Interactive Grammar of Modern English, Shivendra K. Verma and Hemlatha Nagarajan , Frank Bros & CO
17. A Communicative Grammar of English, Geoffrey Leech, Jan Svartvik, Pearson Education
18. Enrich your English, Thakur K B P Sinha, Vijay Nicole Imprints Pvt Ltd.,
19. A Grammar Book for You And I, C. Edward Good, MacMillan Publisher

| | The students should be able to: |
|---|---|
| English | 1. understand words with their antonyms and synonyms.(**VOCABULARY**) <br> 2. Understand the application of grammar in ready. (**GRAMMAR**) <br> 3. Able to use speaking skills in communications.(**SPEAKING SKILLS**) <br> 4.  Learn all the 10 punctuation marks with appropriate examples. (**WRITING SKILLS**) |

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**(A1006) LINEAR ALGEBRA & CALCULUS**

**Unit-I: Linear Algebra-I**
Matrices and Linear Systems of Equations: Real matrices :- Symmetric, Skew-symmetric, Orthogonal, Linear Transformation- Orthogonal Transformation. Complex matrices: Hermitian, Skew- Hermitian and Unitary. Elementary row transformations- Rank – Echelon form, Normal form- Solution of Linear Systems – Direct Methods (Gauss Elimination, Gauss Jordan)-LU-Decomposition.

**Unit-II: Linear Algebra-II**

Eigen Values, Eigen Vectors- Properties, Cayley –Hamilton Theorem( without proof) – Inverse and Powers of a matrix by cayley-Hamilton theorem- Diagonolization of matrix.Calculation of Powers of matrix-Modal and spectral matrices. Quadratic forms- Reduction of quadratic form to canonical form-rank- positive , Negative definite-semi definite-Index-Signature.

**Unit-III: Sequences – Series**
Basic definitions of Sequences and Series- Convergence and divergence – Comparison test- Ratio test – Integral test-Cauchy's root test- Raabe's Test – Absolute and Conditional Convergence .

**Unit-IV: Functions of Single& Several Variables**
Rolle's theorem –Lagrange's Mean value Theorem – Cauchy's Mean value theorem- Generalized Mean value theorem(all theorems without proof)
Functions of Several Variables- Functional dependence –Jacobian- Maxima and Minima of functions of two variables with constraints and without constraints.

**Unit-V: Applications of Single Variable & Multiple Integrals**
Radius, Centre and Circle of Curvature- Evolutes and Envelopes.
Multiple integrals – double integral – Change of variables – Change of order of integration and Triple integrals.

**Text Books :**

1. Kreyszig's Engineering Mathematics – I by Dr. A. Ramakrishna Prasad,2014yr Edition John Wiley Publications.

2. Advanced Engineering Mathematics by R.K. Jain &S.R.K. Iyengar, 3$^{rd}$ edition, Narosa Publishing House, Delhi.

**References :**

1. Advanced Engineering Mathematics by Kreyszig, 8$^{th}$ Edition, John Wiley & Sons Publishers

2. Higher Engineering Mathematics by B.S. Grewal, 36$^{th}$ Edition, Khanna Publishers.

3. Advanced Engineering Mathematics with MATLAB, Dean G. Duffy, 3$^{rd}$ Edi, CRC Press Taylor & Francis Group.

4. Mathematics for Engineering and Scientists. Alan Jeffrey, 6$^{th}$ Edi, 2013, Chapman & Hall / CRC

5. Engineering Mathematics – I by T.K.V. Iyengar, B. Krishna Gandhi & Others, 2013 Yr. EditionS.Chand.

6. Engineering Mathematics – I by D.S. Chandrasekhar, Prison Books Pvt. Ltd.

7. Engineering Mathematics – I by G. ShankerRao& Others I.K. International Publications.

**Course Outcomes**
The students should be able to:
1. Understand how to collect the data and arrange it in an organized way in.
2. Understand Mean value theorems and their applications in for multiple variable functions.
3. Understand area, volume, mass, centroid and moments of inertia in plane and solid regions.
4. Understand the formation and evaluation of Different differential equations by various methods.
Understand Linear Simultaneous equations to analyze voltages, currents in AC to DC circuits. Determine the average power dissipated in a circuit. Calculate voltages and currents in single phase circuit

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### (A1013) ENGINEERING PHYSICS-I

## UNIT-I

**Optics: Interference**: Introduction, interference in thin films (reflected light), Newton rings.

**Diffraction:**Introduction, Fraunhofer diffraction due to single slit, double slit and N-slits, Diffraction grating experiment, Rayleigh criterion and resolving power of grating.

**Polarisation:** introduction, Malus law, Brewster,s law, double refraction, construction and working of Nicol's prism, polaroids, quarter wave and half wave plates.

## UNIT-II

**Crystallography:** Ionic bond, covalent bond, metallic bond, hydrogen bond, Vander-Waal's bond, calculation of cohesive energy ionic crystal, space Lattice, unit cell, lattice parameters, seven crystal system, Bravais lattices, atomic radius, co-ordination number and packing factors of SC, BCC, FCC structures,Structures of CsCl, NaCl and Diamond.

**Crystal planes and directions**, Miller indices, inter planar spacing of orthogonal crystal

**X-ray Diffraction:** Bragg's law, X- ray diffraction methods: powder method, applications of X- ray diffraction;

## UNIT-III

**Defects in Solids** Point defects: vacancies, substitutional impurities, interstitial impurities, Frenkel and Schottky defects; qualitative treatment of line defects(Edge and Screw dislocations), Burger's vector, surface defects.

**Statistical Mechanics** Maxwell-Boltzman, Bose-Einstein and Fermi-Dirac statistics (qualitative treatment), concept of electron gas, density of states, Fermi distribution function - the effect of temperature on the distribution and Fermi energy.

## UNIT-IV

**Principles of Quantum Mechanics:** Waves and particles, de-Broglie Hypothesis, matter waves, Davisson and Germer's experiment, G.P. Thomson experiment, Heisenberg's uncertainty principle, Schrödinger's time independent wave equation - physical significance of the wave function – infinite square well potential.

**Band Theory of Solids:** Assumptions of classical and quantum free electron theory of metals and their limitations,origin of energy band formation in solids,electron in a periodic potential: Bloch theorem, Kronig- Penny model (qualitative treatment), E-K curve, concept of effective mass of an electron, classification of materials into conductors, semiconductors & insulators.

## UNIT-V

**Semiconductor Physics:** Introduction, Fermi level in intrinsic and extrinsic semiconductors, calculation of carrier concentration in intrinsic and extrinsic semiconductors, direct & indirect band gap semiconductors, Hall effect.

**Physics of Semiconductor Devices:**Formation of PN junction, open circuit pnjunction, energy diagram of PN diode, diode equation, I-V Characteristics of PN junction diode, LED photo diode and solar cell.

**TEXT BOOKS:**
1. Engineering Physics by PK PalaniSamy, ScitechPublications.
2. Applied Physics for Engineers by Dr.P.MadhusudanaRao, Academic Publishing Company.
3. Solid State Physics by S.O.Pillai (Main edition) – New Age Publishers.

**REFERENCES:**
1. Fundamentals of Physics, David Halliday, Robert Resnick, Jearl Walker by John Wiley & Sons
2. Introduction to Solid State Physics – C. Kittel (Wiley Eastern).
3.Modern Physics by K. *Vijaya Kumar*, S. Chandralingam, *S*. Chand & Co.
4. Engineering Physics by R.K.Gaur and S.L.Gupta; DhanpatRai and Sons.

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**(A1016) ENGINEERING CHEMISTRY**

**UNIT I**
 **WATER TECHNOLOGY**
Sources of water – Impurities in water – Hardness of water – Temporary and Permanent Hardness – Units. Estimation of temporary and permanent hardness of water – EDTA method; Numerical problems; Potable Water treatment – Specifications; Steps involved in treatment - Sedimentation – Coagulation – Filtration – Sterilisation – Desalination of Brackish Water – Reverse Osmosis and Electro dialysis.
Industrial water treatment – Boiler Troubles – Scales and  Sludges ; Caustic Embrittlement; Boiler Corrosion; Priming and Foaming. Hot lime and Cold lime soda process ; Numerical Problems; Zeolite Process and Ion Exchange Process. Internal conditioning methods like – Phosphate, Carbonate ,Calgon, Colloidal, Radioactive, Electrical and Sodium aluminate conditioning.

**UNIT II**
**BATTERY TECHNOLOGY**
Electrode Potential – Determination of Single Electrode Potential;galvanic cells; Primary Cell – Dry or Leclanche Cell, Secondary Cell – Lead acid storage Cell ; Ni – Cd batteries, , Fuel Cell – Hydrogen Oxygen Fuel Cell. Methanol – Oxygen fuel cell.
Solar – Photoelectric cells – Applications of solar cells.

**UNIT III**
**CORROSION AND ITS CONTROL**
Causes and effects of corrosion. Theories of Corrosion – Chemical & Electrochemical corrosion; Types of corrosion (Galvanic, Waterline, Pitting and Inter granular ); Pilling bed-worth Rule. Factors affecting rate of corrosion – Nature of metal and Nature of Environment – Corrosion control methods – Cathodic protection (sacrificial anodic and Impressed current).

**UNIT IV**
**PROTECTIVE COATINGS**
Surface coatings: Metallic coatings & methods of application of metallic coating – Hot dipping (Galvanization & Tinning); Cementation, Metal Cladding; Electroplating (copper plating); Electroless plating (Ni Plating); Organic coatings – Paints – Constituents and their functions. Varnishes, Enamels & Lacquers.

**UNIT V**
 **PHASE RULE**
Definitions of terms - Phase, Component and Degree of Freedom. Phase Rule Equation. Phase diagrams – One Component System – Water System; Two Component System – Silver Lead System; Cooling Curves. Iron – Carbon Phase Diagram; Heat treatment of steel. Hardening. Annealing, and Normalizing.

Text Books;
1. Engineering chemistry by B.Rama Devi & Ch. Venkata Ramana Reddy; Cengage Learning, 2012
2.Engineering Chemistry P.C.Jain and M.Jain, Dhanapat Rai & Sons
3.Engineering chemistry by Dr.Bharathi kumari,Dr.Jyotsna
4.Engineering chemistry by Thirumala chary,E.Laxminyarana ,SCITECHPublicationa(India) p ltd

REFERENCES:
1.   A Textbook of Engineering Chemistry, S.S.Dara, S.Chand & Co.
2.    A Textbook of Engineering Chemistry, Sashi Chawla, Dhanapath Rai & Sons
3.   Engineering Chemistry, B.K.Sharma Et al

**Course Outcomes**

At the end of the course the students will able to:

1. Understand concepts of electrochemistry, Corrosion and corrosion protection methods.
2. Understand usage of appropriate engineering materials such as polymers, plastics, fibers, cement and Nano- materials for various Applications.
3. Understand of water purification and pure water for domestic and industrial utilization.
4. Understand suitable energy source for their applications in the economical growth of nation.
5. Apply the concepts of phase rule and surface chemistry.

# ENGINEERING MECHANICS-1

### UNIT-I

**Introduction to Mechanics** : Basic Concepts, system of Forces Coplanar Concurrent Forces -Components in Space -Resultant -Moment of Forces and its Application - Couples and Resultant of Force Systems. Equilibrium of system of Forces: Free body diagrams, Equations of Equilibrium of Coplanar Systems and Spatial Systems.

### UNIT-II

**Friction**: Types of friction -Limiting friction -Laws of Friction -static and Dynamic Frictions -Motion of Bodies -Wedge Screw, Screw-jack and differential screw –jack

### UNIT-III

**Centroid and Center of Gravity**: Introduction – Centroids of lines – Centroids of area - Centroids of Composite figures - Theorem of Pappus -Centre of Gravity of Bodies – Centroids of Volumes – Center of gravity of composite bodies.

### UNIT-IV

**Area moments of Inertia**: Introduction – Definition of Moment of Inertia -Polar Moment of Inertia – Radius of gyration - Transfer Theorem for moment of inertia – Moments of inertia by integration - Moments of Inertia of Composite Figures, Product of Inertia, Transfer Formula for Product of Inertia.

### UNIT-V

**Mass Moment of Inertia**: Introduction - Moment of Inertia of Masses – Radius of gyration - Transfer Formula for Mass Moments of Inertia – Mass moments of inertia by integration - Mass moment of inertia of composite bodies.

**TEXT BOOKS:**

1. Singer's Engineering Mechanics Statics and Dynamics , K. Vijaya Kumar Reddy, J. Suresh Kumar, BS Publications, 3rd Edition(SI Units)Fifth impression 2013
2. Engg. Mechanics / Timoshenko & Young

**REFERENCES:**
1. Engg. Mechanics/ Irving Shames, G. Krishna Mohan Rao, Prentice Hall
2. Engg. Mechanics Umesh Regl / Tayal.
3. A text of Engineering Mechanics /YVD Rao/ K. Govinda Rajulu/ M. Manzoor Hussain, Academic Publishing Company
4. Text Book in Applied Mechanics / Malhotra, Subramanian, Gahlot and Rathore / New Age.
5. Engg. Mechanics / KL Kumar / Tata McGraw Hill..
6. Engg. Mechanics / S.S. Bhavikati & K.G. Rajasekharappa

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**B.Tech. (CE)-Sem**                                                      **L T P  C**
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**(A1302) ENGINEERING GRAPHICS**
**(Common to MECH & CIVIL ENGG Branches)**

**Objective**:        The objective of this subject is to provide the basic concepts about Engineering Drawing. Detailed concepts are given in projections, technical drawing, dimensioning and specifications.

To inculcate the imagination and mental visualization capabilities for interpreting the

geometrical details of common engineering objects.

To impart knowledge about principles/methods related to projections of one, two and three dimensional objects. To inculcate the ability to translate geometric and topological information of common engineering object (two/three dimensional) into engineering drawing using standard graphical techniques.

To introduce universally accepted conventions and symbols for their usage in technical drawings.

To expose students to computer aided drafting tools.

**UNIT – I**
**INTRODUCTION TO ENGINEERING DRAWING :**
Principles of Engineering Graphics and their Significance, Conic Sections including the Rectangular Hyperbola – General method only. Cycloid, Epicycloid and Hypocycloid, involutes.

**UNIT-II**
Scales – Plain, Diagonal , Vernier and comparative scales.

**UNIT- III**
**ORTHOGRAPHIC PROJECTIONS:**
Principles of Orthographic Projections – Conventions – Projections of Points and Lines.

**UNIT-IV**
**PROJECTION OF PLANES**: regular geometric figures.—Auxiliary Planes.

**UNIT-V**
**PROJECTION OF SOLIDS:** Projection of regular solids, cube, prisms, pyramids, cone –use of Auxiliary Views.

**UNIT-VI**
**SECTIONS AND SECTIONAL VIEWS:** Right regular solids - prism, cylinder, pyramid, cone – use of Auxiliary views.

**TEXT BOOKS :**
1. Engineering Drawing N.D. Bhatt / Charotar
2. Engineering Drawing and Graphics Rane and Shah/ Pearson  Edu.

**REFERENCE BOOKS**:
1. A Text Book of Engineering Drawing / Dhawan R K / S. Chand
2. Engineering Graphics With Auto CAD / James D Bethune / Pearson Edu.
3. Engineering Graphics / K R Mohan / Dhanpat Rai.
4. Text book on Engineering Drawing / KL Narayana/ P Kannaih / Scitech

**B.Tech.CE. I-Sem**                                                            **L  T  P  C**
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## (A1303) ENGINEERING WORKSHOP
(COMMON TO ALL BRANCHES)

I  TRADE FOR EXERCISE:
  (Two experiments each from any six trades of the following)
   1. Carpentry
   2. Fitting
   3. Tin-smithy
   4. House-wiring
   5. Foundry
   6. Plumbing
   7. Welding
   8. Black smithy

II    TRADES FOR DEMONSTRATION AND EXPOSURE:

   1. Power tools
   2. Machine  tools

**Text Book:**

**1.** Workshop Manual, Second edition/ P Kannaiah and K L Narayana/ Scitech publishers

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**( A1003) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB**

**Introduction**

The introduction of the English Language Lab is considered essential at 3rd year level. At this stage the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalised context.

**Objectives**:
This Lab focuses on using computer-aided multimedia instruction for language development to meet the following targets:

➢ To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.

➢ Further, they would be required to communicate their ideas relevantly and coherently in writing.

**LEARNING OUTCOMES**

➢ Gather ideas and information, to organise ideas relevantly and coherently.
➢ Engage in debates.
➢ Participate in group discussions.
➢ Face interviews.
➢ Write project/research reports/technical reports.
➢ Make oral presentations.
➢ Write formal letters.
➢ Transfer information from non-verbal to verbal texts and vice versa.

➢ To take part in social and professional communication.

**Syllabus**:
The following course content is prescribed for the Advanced Communication Skills Lab:

1. **Functional English** –

- Starting a conversation
- responding appropriately and relevantly
- using the right body language
- roleplay in different situations.

2. **Vocabulary building**

- synonyms and antonyms,
- word roots,
- one-word substitutes,
- prefixes and suffixes,
- study of word origin,
- analogy,
- idioms and phrases verbs

3. **Group Discussion** –

- dynamics of group discussion,
- intervention,
- summarizing,
- modulation of voice,
- body language,
- relevance, f

- fluency and coherence.

4. **Interview Skills** –

- concept and process,
- pre-interview planning,
- opening strategies,
- answering strategies,
- Interview through tele and video-conferencing.

5. **Resume and Technical Report writing** –

- structure and presentation,
- planning,
- defining the career objective,
- projecting ones strengths and skill-sets,
- summary, formats and styles,
-  Letter-writing.
- **Reading comprehension** – reading for facts, guessing meanings from context, scanning, skimming, inferring meaning and critical reading.

**Minimum Requirement:**

**The English Language Lab shall have:**

- The Computer aided Language Lab for 60 students with 60 systems,

- One master console, LAN facility and English language software for self- study by learners.

- The Communication Skills Lab with movable chairs and audio-visual aids with a P.A System, a T. V., a digital stereo –audio & video system and camcorder etc.

- System Requirement (Hardware component):

- Computer network with Lan with minimum 60 multimedia systems with the following specifications:
  P – IV Processor
  d) Speed – 2.8 GHZ
  e) RAM – 512 MB Minimum
  f) Hard Disk – 80 GB
  Headphones of High quality

**Suggested Software**:
The software consisting of the prescribed topics elaborated above should be procured and used.

Suggested Software:

- Clarity Pronunciation Power – part II

- Oxford Advanced Learner's Compass, 7th Edition

- DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.

- Lingua TOEFL CBT Insider, by Dreamtech

- TOEFL & GRE( KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)

- The following software from 'train2success.com'

  - ✓ Preparing for being Interviewed,

  - ✓ Positive Thinking,

- ✓ Interviewing Skills,
- ✓ Telephone Skills,
- ✓ Time Management
- ✓ Team Building,
- ✓ Decision making

DISTRIBUTION AND WEIGHTAGE OF MARKS English Language Laboratory Practical Examination:

1. The practical examinations for the English Language Laboratory shall be conducted as per the University norms prescribed for the core engineering practical sessions.

2. For the Language lab sessions, there shall be a continuous evaluation during the year for **25** sessional marks and **50** year-end Examination marks. Of the **25** marks, **15** marks shall be awarded for day-to-day work and **10** marks to be awarded by conducting Internal Lab Test(s). The year- end Examination shall be conducted by the teacher concerned with the help of another member of the staff of the same department of the same institution.

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## (A1002) ENGLISH-II

The fundamental aim of this course is to help the student to become a confident and competent communicator in written and spoken English. The methodology in teaching and evaluation shall be oriented towards this end, rather than rote memorization.

**Prerequisite**: Acquaintance with basic High School Grammar and Composition

**Objectives**

➢ Take part in a discussion about the business
➢ Listen to an explanation and respond
➢ Write a formal letter
➢ Read company literature

**SYLLABUS:**
**TEXT BOOK PRESCRIBED**

In order to improve the language skills needed for professional students, the following text and course content has been prescribed to expose the students to a variety of genres, themes and language styles.
A text book entitled, **"Epitome of Wisdom",** Published by Maruthi Publications, Hyderabad.
The course content and study material is divided into five Units.

**UNIT I**
➢ Chapter entitled 'Mokshagundam Visvesvaraya' from "Epitome of Wisdom", Published by Maruthi Publications, Hyderabad.
- L-Conversations – Introducing each other, Talking about a course.
- S- Opinion based questions
- R- Reading for Subject/ Theme - The Palm island
- W- Writing Paragraphs
- G- Joining ideas by conjunctions, Adverbs
- V- Prefixes and suffixes

**UNIT –II**
➢ Chapter entitled 'Three days To See' from "Epitome of Wisdom", Published by Maruthi Publications, Hyderabad.
- L – Conversations – Planning for an outing
- S – Debate
- R- 'Physically challenged athletes
- W- Report writing
- G- Expressing yourself with modal auxiliary verbs
- V- Collective nouns – Synonyms, Prefixes

**UNIT –III**
➢ Chapter entitled 'Leela's Friend' by R.K. Narayan from "Epitome of Wisdom", Published by Maruthi Publications, Hyderabad
- L – for main points and sub-points for note taking
- S – Presentations
- R – reading for details
- W – note-making, information transfer, punctuation

- V – Guessing the words, using an appropriate word, Phrasal verbs

## UNIT –IV

➢ Chapter entitled 'The Last Leaf' from "Epitome of Wisdom", Published by Maruthi Publications, Hyderabad
- L -Listening for specific details - 'Speech on Environmental conservation'
- S- Group Discussions - narrating, expressing opinions
- R –Choose how to start your day
- W- Writing a Precis
- G- Relating objects by using preposions, Ergative verbs
- V- Vocabulary - idioms

## UNIT –V

➢ Chapter entitled 'The Convocation Speech' by N.R. Narayanmurthy' from "Epitome of Wisdom", Published by Maruthi Publications, Hyderabad
- L- Speech on 'How do you make a teacher great?'
- S- Role play – Interviewing famous personalities
- R- Critical reading, reading for reference – 'What is meant by Entrepreneurship?'
- W-Essay writing
- G- Focussing with passive voice
- V- One word substitutes

**REFERENCES:**

20. Contemporary English Grammar Structures and Composition by David Green, MacMillan Publishers, New Delhi. 2010.
21. Innovate with English: A Course in English for Engineering Students, edited by T Samson, Foundation Books.
22. English Grammar Practice, Raj N Bakshi, Orient Longman.
23. Technical Communication by Daniel Riordan. 2011. Cengage Publications. New Delhi.
24. Effective English, edited by E Suresh Kumar, A RamaKrishna Rao, P Sreehari, Published by Pearson
25. Handbook of English Grammar& Usage, Mark Lester and Larry Beason, Tata Mc Graw –Hill.
26. Spoken English, R.K. Bansal & JB Harrison, Orient Longman.
27. Technical Communication, Meenakshi Raman, Oxford University Press
28. Objective English Edgar Thorpe & Showick Thorpe, Pearson Education
29. Grammar Games, Renuvolcuri Mario, Cambridge University Press.
30. Murphy's English Grammar with CD, Murphy, Cambridge University Press.
31. Everyday Dialogues in English, Robert J. Dixson, Prentice Hall India Pvt Ltd.,
32. ABC of Common Errors Nigel D Turton, Mac Millan Publishers.
33. Basic Vocabulary Edgar Thorpe & Showick Thorpe, Pearson Education
34. Effective Technical Communication, M Ashraf Rizvi, Tata Mc Graw –Hill.
35. An Interactive Grammar of Modern English, Shivendra K. Verma and Hemlatha Nagarajan , Frank Bros & CO
36. A Communicative Grammar of English, Geoffrey Leech, Jan Svartvik, Pearson Education
37. Enrich your English, Thakur K B P Sinha, Vijay Nicole Imprints Pvt Ltd.,
38. A Grammar Book for You And I, C. Edward Good, MacMillan Publisher

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## (A1007) ADVANCED CALCULUS

<u>Unit-I</u>: Differential equations of first order and their applications
Over view of Differential equations – exact, Linear and Bernoulli's. Applications to Newton's Law of cooling, Law of Natural growth and decay, Orthogonal trajectories.

<u>Unit-II</u>: Higher order Linear differential equations and their applications
Linear differential equations of second and higher order with constant coefficients.RHS term of the type $f(x) = e^{ax}, \sin ax, \cos ax$ and $x^n, e^{ax}V(x), x^nV(x)$, method of variation of parameters. Applications to bending of beams, Electrical circuits, Simple harmonic motion.

<u>Unit-III</u>: Laplace Transform and its applications to Ordinary Differential Equations
Laplace transform of standard functions – Inverse transform- First Shifting theorem, Transforms of derivatives and integrals – Unit step function – Second Shifting theorem – Dirac's delta function- Convolution theorem – Periodic function – Differentiation and integration of transforms – Application of Laplace transforms to ordinary differential equations.

<u>Unit-IV</u>: Fourier Series
Determination of Fourier coefficients – Fourier Series – even and odd function – Fourier Series in an arbitrary interval – even and odd periodic continuation – Half-range Fourier sine and cosine expansions.

<u>Unit-V</u>: Vector Calculus
Vector Differential Calculus: Scalar & vector point functions, Gradient – Divergence – Curl with geometrical & Physical interpretation. Directional derivatives, Vector differential operators &their related properties.

Vector Integral Calculus: Line integral – Work done – scalar potential function, surface integrals – Flux of Vector valued function, Volume integrals.
Vector integral theorems: Gauss's Divergence theorem, Green's theorem, Stoke's Theorem (Statement and their verification).

Text Books :

1. Kreyszig's Engineering Mathematics – I by Dr. A. Ramakrishna Prasad, 2014yr Edition John Wiley Publications.

2. Advanced Engineering Mathematics by R.K. Jain &S.R.K. Iyengar, 3rd edition, Narosa Publishing House, Delhi.

References :

1. Kreyszig's Mathematical Methods by Dr. A. Ramakrishna Prasad, 1st Edition John Wiley Publications.

2. Advanced Engineering Mathematics by Kreyszig, 8th Edition, John Wiley & Sons Publishers

3. Higher Engineering Mathematics by B.S. Grewal, 36th Edition, Khanna Publishers.

4. Advanced Engineering Mathematics with MATLAB, Dean G. Duffy, 3rd Edi, CRC Press Taylor & Francis Group.

5. Mathematics for Engineering and Scientists. Alan Jeffrey, 6th Edi, 2013, Chapman & Hall / CRC

6. Engineering Mathematics – I by T.K.V. Iyengar, B. Krishna Gandhi & Others, 2012 Yr. Edition S.Chand.

7. Engineering Mathematics – I by D.S. Chandrasekhar, Prison Books Pvt. Ltd.

8.Engineering Mathematics – I by G. ShankerRao& Others I.K. International Publications

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## (A1014)ENGINEERING PHYSICS-II

### UNIT-I

**Lasers:** Characteristics of lasers, spontaneous and stimulated emission of radiation, Einstein's coefficients and relation between them, population inversion, lasing action in ruby laser, Helium-Neon laser, semiconductor diode laser, applications of lasers.

**Fiber Optics:** Principle of optical fiber, construction of fiber, acceptance angle and acceptance cone, numerical aperture, types of optical fibers: step index and graded index profiles, attenuation in optical fibers, optical fiber communication, optical fiber sensors.

### UNIT-II

**Dielectric Properties:** Electric dipole, dipole moment, dielectric constant, polarizability, electric susceptibility, displacement vector, electronic, ionic, orientation and space charge polarizations and derivation of polarizabilities, internal fields in solids, Clausius - Mossottiequation, piezo-electricity, ferro- electricity and pyro-electricity.

### UNIT-III

**Magnetic Properties & Superconducting Properties:** Permeability, field intensity, magnetic field induction, magnetization, magnetic susceptibility, origin of magnetic moment, Bohr Magneton, classification of dia, para and ferro, ferri and anti-ferro magnetic materials on the basis of magnetic moment, domain theory of ferro magnetism on the basis of hysteresis curve, soft and hard magnetic materials.

**superconductivity:**Introduction, critical field, Meissner effect, effect of magnetic field, type-I and type-II superconductors, BCS theory (qualitative), applications of superconductors.

### UNIT-IV
**Electromagnetic Theory**: Review of steady and varying fields – Conduction and displacement current – Maxwell's equations in integral and differential forms – Electromagnetic wave equations in free space, dielectric and conducting media – Poynting theorem.

### UNIT-V

**Nanotechnology:** Origin of nanotechnology, nano scale, surface to volume ratio, quantum confinement, bottom-up fabrication: sol-gel, precipitation, combustion methods; top-down fabrication: chemical vapour deposition, physical vapour deposition, pulsed laser vapour deposition methods, characterization by XRD & TEM; properties and applications.

**Acoustics:**Basic requirements of acoustically good hall,reverberation and time of reverberation, Sabine's formula for reverberation time, measurement of absorption coefficient of a material, factors affecting the architectural acoustics and their remedies.

**Ultrasonics**: Introduction, production of ultrasonics using piezoelectric method –magnetostriction method- applications.

**TEXT BOOKS:**
1. Engineering Physics by P K PalaniSamy, ScitechPublications.
2. Applied Physics for Engineers by Dr.P.MadhusudanaRao, Academic Publishing Company.
3. Solid State Physics by S.O.Pillai (Main edition) – New Age Publishers.

**REFERENCES:**
1. Fundamentals of Physics, David Halliday, Robert Resnick, Jearl Walker by John Wiley & Sons
2. Introduction to Solid State Physics – C. Kittel (Wiley Eastern).
3.Modern Physics by K. *Vijaya Kumar*, S. Chandralingam: *S*. *Chand* & Co.
4. Engineering Physics by R.K.Gaur and S.L.Gupta; DhanpatRai and Sons.

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## (A1018) CHEMISTRY OF ENGINEERING MATERIALS
### ( common to Civil & Mech)

**UNIT I :**
 **HIGH POLYMERS**
Types of polymerization (addition, condensation and copolymerization) .
**Plastics:** Thermoplastic and Thermosetting resins, Compounding and fabrication of plastics (compression and injection moulding). Preparation, properties, Engineering applications of PVC, Teflon and Bakelite.
**Fibers:** Characteristics of fibers – preparation, properties and uses of Nylon – 6,6 and Dacron – Fibre Reinforced Plastics (FRP) – applications.
**Rubbers:** Natural rubber and its vulcanization.
**Elastomers:** Buna – s, Butyl rubber and Thiokol rubber.
**Conducting Polymers:** Polyacetylene, Polyaniline, Mechanism of conduction doping, applications of conducting polymers.
**Bio-degradable polymers:** Preparation and applications of Polyvinyl acetate and Polylactic acid.
**UNIT II :**
 **MATERIAL CHEMISTRY(12)**
**Nanomaterials:** Introduction, preparation by sol-gel and chemical vapour deposition methods. Applications of nanomaterials.
Superconductors, Semiconductors, Insulators and its applications.
**Cement** – Chemical composition of cement, Manufacture of Portland cement, Setting and Hardening of cement, Various reactions involved.
**UNIT III**
**FUEL TECHNOLOGY**
**Gaseous Fuels**: Classification of fuels – characteristics of fuels-calorific value-units. Determination - Bomb calorimeter - Dulong's formula.
**Solid fuels**- Coal; Classification of coal by rank-Analysis of coal-Proximate and Ultimate analysis and its significance; Coke - Manufacture of Coke- Beehive Oven and Otto Hoffmann's by Product Oven process.
**Liquid fuels:** Refining of Petroleum-,Cracking-types,fixed bed catalytic cracking.Petroleum products used as Fuels- Gasoline-Knocking and Octane Number of Gasoline, Synthetic Petrol- Bergius and Fischer Tropsch method. Diesel – Cetane number ,High speed and Low speed diesel oils ; LPG and Natural gas.

**UNIT IV**
**LUBRICANTS**
Classification with examples – Characteristics of a good lubricant, Mechanism of lubrication (thick film, thin film and extreme pressure); Properties of lubricants; Viscosity – Cloud point & pour point; Flash point & Fire point, Saponification number-Carbon residue, Emulsification number, Precipitation number, Neutralisation number
**UNIT V : SURFACE CHEMISTRY**
Adsorption – Types of Adsorption, Isotherms – Freundlich and Langmuir adsorption isotherm, applications of adsorption.
Colloids: Classification of colloids; Mechanical – Brownian movement. Electrical – Electrophoresis, Electro-osmosis. Iso electric point. Optical – Tyndall effect. Micelles. Applications of colloids in industry.

Text Books;
1. Engineering chemistry by B.Rama Devi & Ch. Venkata Ramana Reddy; Cengage Learning, 2012
2.Engineering Chemistry P.C.Jain and M.Jain, Dhanapat Rai & Sons
3.Engineering chemistry by Dr.Bharathi kumari,Dr.Jyotsna
4.Engineering chemistry by Thirumala chary,E.Laxminyarana ,SCITECHPublicationa(India) p ltd
REFERENCES:
1. A Textbook of Engineering Chemistry, S.S.Dara, S.Chand & Co.
2.  A Textbook of Engineering Chemistry, Sashi Chawla, Dhanapath Rai & Sons
     Engineering Chemistry, B.K.Sharma Et al

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## (A1539) 'C' PROGRAMMING AND DATA STRUCTURES

**Objectives:**

1. Understand computer basic's, algorithms, flowcharts and write simple 'C' programs, data types and operators, Console I/O functions, Decision making statements and loops.
2. Understand the concepts of functions and pointers.
3. Understand the concepts of strings and various string handling functions and Arrays.
4. Understand the concepts related to structures and able to differentiate between structure and union, Storing of large data using files.
5. Understand and analyze various searching and sorting algorithms, data structures such as stacks and queues.

### UNIT – I

**Introduction to Computers**- Elements of computer processing, Hardware and software, Computing Environments, Computer Languages, SDLC , Problem solving-algorithms , Pseudo code, and flowcharts.

**Introduction to C Language**- History, Structure of a C program, Simple C Program, Compilation process (program development).Identifiers, Data Types, Variables, Constants, Console I/O (printf, scanf), Operators –(Arithmetic, Relational, Logical, Conditional, Increment/decrement etc), Expressions, Precedence and Associativity, Expression Evaluation, Type conversions, preprocessor directives, Comments. Library functions, Header files, Simple C Programming examples. Decision Statements and loops- Introduction, IF statement- Simple IF Statement, the IF ELSE Statement, Nesting of IF ELSE Statement, The ELSE IF Ladder. The Switch Statement, Repetition statements - for, While, do-while statements, Jump statements, Simple C Programming examples.

### UNIT-II

**Functions**-Designing Structured Programs, Functions, user defined functions, inter function communication, Standard functions, Scope, Storage classes-auto, register, static, extern, scope rules, type qualifiers, recursion- recursive functions, Limitations of recursion, example C programs, Command line arguments.

**Pointers** – Introduction (Basic Concepts), Pointers for inter function communication, pointers to pointers, compatibility, Dynamic Memory Allocation, programming applications.

### UNIT-III

**Arrays** – Concepts, using arrays in C, inter function communication, array applications, two – dimensional arrays, multidimensional arrays, C program examples.

**Strings** – Concepts, C Strings, String Input / Output functions, arrays of strings, string manipulation functions, string / data conversion, C program examples.

### UNIT-IV

**Structures and Union:** Declaring and initializing a structure, Accessing the members of a structure, Nested structures, self referential structures, Declaring and initializing a union. Enumerated types, typedef, bit fields.

**Files**- Concept of a file, streams, text files and binary files, Differences between text and binary files, State of a file, Opening and Closing files, file input / output functions (standard library input / output functions for files), file status functions (error handling), C program examples.

### UNIT-V

Searching and Sorting – Sorting- selection sort, bubble sort. Searching - linear and binary search methods.

Data Structures – Introduction to Data Structures, abstract data types, Stacks –Operations, array representations of stacks, stack applications, Queues – Operations, array representations of queues.

**Text Books:**

1. C programming A Problem-Solving Approach by Behrouz A.Forouzan,
   E.V.Prasad,Richard F.GilbergC How to Program Paul Deitel and Harvey Deitel,
   PH.
2. Computer Programming and Data Structures by E Balagurusamy, Tata McGraw
   Hill.
3. Yedidyah Langsam , Moshe J. Augenstein and Aaron M. Tenenbaum, Data Structures using C and C++. 2 ed, Pearson Education.
4. C Programming& Data Structures, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.

**Reference Books**

1. Kanetkar, Yashavant, Let Us C, BPB.
2. The C Programming Language by Brain W.Kernighan, Dennis M.Ritchie.
3. Programming in C, 2/e By Ashok Kamthane.
4. Absolute beginner's guide to C, Greg M. Perry, Edition 2,Publisher: Sams Pub., 1994.
5. C& Data structures – P. Padmanabham, Third Edition, B.S. Publications.
6. Mark Allen Weiss, *Data structure and Algorithm Analysis in C.* Addison Wesley Publication.

*Electronic Materials, Websites*

1. http://en.wikiversity.org/wiki/Topic:C
2. www.cprogramming.com
3. https://www.youtube.com/user/mycodeschool
4. http://freevideolectures.com/Course/2279/Data-Structures-And-Algorithms

## Outcomes:

1. Understand the algorithms, flowcharts implementation of simple 'C' programs, data types and operators and Console I/O functions. Implement the decision control statements, loop control statements and case control structures.
2. Declare and implement the pointers and functions.
3. Declare and implement the arrays and strings.
4. Understand the structures declaration, initialization and implementation, understand the file operations, Character I/O, String I/O, File pointers and importance of pre-processor directives.
5. Understand the searching and sorting algorithms, and to solve the problems using data structures such as stacks and queues using arrays.

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### (A1304) ENGINEERING MECHANICS-II
### (COMMON TO ME & CE)

**UNIT-I**

**Kinematics of a Particle**: Motion of a particle – Rectilinear motion – motion curves – Rectangular components of curvilinear motion– Kinematics of Rigid Body - Types of rigid body motion -Angular motion - Fixed Axis Rotation

**UNIT-II**

**Kinetics of particles**: Translation -Analysis as a Particle and Analysis as a Rigid Body in Translation – Equations of Plane motion - Angular motion - Fixed Axis Rotation – Rolling Bodies

**UNIT-III**

**Work Energy- Method**: Work Energy equations for translations. Work Energy    Applications to Particle Motions.

Work Energy applied to connected systems. Work Energy applied to fixed axis rotation and plane motions.

**UNIT-IV**

**Virtual Work and Impulse Momentum:** Introduction- Principle of Virtual work and uses of Principle of Virtual Work. Impulse and Momentum- Applications

**UNIT-V**

**Mechanical Vibrations**: Definitions and Concepts- Simple Harmonic Motion- Free Vibrations- Simple Pendulum, Compound Pendulum and Torsion Pendulum. Free Vibrations without Damping (General Cases).

**Text books:**

1.  Singer's Engineering Mechanics Statics and Dynamics , K. Vijaya Kumar Reddy, J. Suresh Kumar, BS Publications, 3$^{rd}$ Edition(SI Units)Fifth impression 2013
2.  Engg. Mechanics / Timoshenko & Young

**References:**

1.  Engg. Mechanics/ Irving Shames, G. Krishna Mohan Rao, Prentice Hall
2.  Engg. Mechanics Umesh Regl / Tayal.
3.  A text of Engineering Mechanics /YVD Rao/ K. Govinda Rajulu/ M. Manzoor Hussain, Academic Publishing Company
4.  Text Book in Applied Mechanics / Malhotra, Subramanian, Gahlot and Rathore / New Age.
5.  Engg. Mechanics / KL Kumar / Tata McGraw Hill.
6.  Engg. Mechanics / S.S. Bhavikati & K.G. Rajasekharappa

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### (A1305) ENGINEERING GRAPHICS & AutoCAD
### (Common to MECH & CIVIL Branches)

**Objective**:        The objective of this subject is to provide the basic concepts about Engineering Drawing. Detailed concepts are given in projections, technical drawing, dimensioning and specifications.

### UNIT – I

**DEVELOPMENT OF SURFACES :** Development of right, Regular solids – prisms, cylinder, pyramids, cone and their parts, frustum of solids.

### UNIT-II

**INTERSECTION OF SOLIDS :** Intersection of cylinder Vs cylinder, cylinder Vs prism, cylinder Vs cone.

### UNIT – III

**ISOMETRIC PROJECTIONS :**
Principles of Isometric Projection – Isometric Scale – Isometric Views – Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts.

### UNIT-IV

**TRANSFORMATION OF PROJECTIONS**: Conversion of Isometric Views to Orthographic Views and Vice-versa – Conventions

### UNIT-V

**PERSPECTIVE PROJECTIONS :** Perspective view : points, lines and plane figures, vanishing point methods( General Method only)

### UNIT-VI

**COMPUTER AIDED DRAWING:** Introduction, starting the software, types of coordinate systems, tool bars & menu bars, General Software commands, Orthographic & Isometric Projection -Simple drawings.
(Practice on AutoCAD; Examination on writing command sequence/ script files only)

**TEXT BOOKS :**
1. Engineering Drawing N.D. Bhatt / Charotar
2. Engineering Drawing and Graphics Rane and Shah/ Pearson  Edu.

**REFERENCE BOOKS**:
1. A Text Book of Engineering Drawing / Dhawan R K / S. Chand
2. Engineering Graphics With Auto CAD / James D Bethune / Pearson Edu.
3. Engineering Graphics / K R Mohan / Dhanpat Rai.
4. Text book on Engineering Drawing / KL Narayana/ P Kannaih / Scitech
5. Computer Aided Engineering Drawing / S.Tryumbaka Murthy/ I.K.Internatinal

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## (A1553) COMPUTER PROGRAMMING AND DATA STRUCTURES LAB

**Outcomes:**
1. To understand the various steps in program development.
2. To understand the basic concepts in C Programming Language.
3. To understand different modules that includes conditional and looping expressions.
4. To understand how to write modular and readable C Programs.
5. To write programs in C to solve problems using arrays, structures and files.
6. To understand the behavior of data structures such as stacks, queues.
7. To understand and analyze various searching and sorting algorithms.
8. To write programs in C to solve problems using data structures such as arrays.

| | WEEK WISE PROGRAMS |
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| **Week 1** | Basic DOS Commands |
| **Week 2** | a) Write a simple C program to Print "Hello World"<br>b) Write a simple C program Declaring Variable and Printing its Value<br>c) Write a simple C Program to Calculate Area and Circumference of Circle |
| **Week 3** | a) Write a simple C program to implement basic arithmetic operations - sum, difference, product, quotient and remainder of given numbers.<br>b) Write a C program using Assignment Operator.<br>c) Write a C program using Logical Operator. |
| **Week 4** | a) Write a C Program to Demonstrate the increment and decrement operators.<br>b) Write a C Program to multiply given number by 4 using bitwise operators<br>c) Write a C Program to demonstrate Ternary condition/conditional operator. |
| **week 5** | a) Write a C programs - to find the largest and smallest of 2 numbers(if – else), to find the largest and smallest of 3 numbers(Nestedif – else), roots of quadratic equation(else – if ladder).<br>b) The total distance traveled by vehicle in 't' seconds is given by distance=ut+1/2at$^2$ where 'u' and 'a' are the initial velocity and acceleration.<br>Write a c program to find the distance traveled at regular intervals of time given the values of'u' and 'a'.The program should provide the flexibility to the user to select his own time intervals and repeat the calculations for different values of 'u' and 'a'.<br>c) Write a c program ,which takes two integer operands and one operator from the user,performs the operation and the prints the result.(consider the operators +,-,*,/,% and use switch statement). |
| **week 6** | a) Write a C program to find the sum of individual digits of a positive integer<br>b) A Fibonacci Sequence is defined as follows: the first and second terms in the sequence are 0 and 1.Subsequent terms are found by adding the preceding two terms in the sequence .Write a c program to generate the first n terms of the sequence.<br>c) Write a c program to generate all the prime numbers between 1 and n ,where n is a value supplied by the user. |
| **week 7** | a) Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression:<br>1+x+x2+x3+… ........... +xn<br>b) Write a C program to generate Pascal's triangle.<br>c) Write a C program to construct a pyramid of numbers |
| **week 8** | a)Write a programs that use both recursive and non-recursive functions<br> i)To find the factorial of a given integer.(non- recursive)<br> ii)To find the GCD of two given integers.(Non-recursive) |
| **week 9** | a)Write a c program to find both the largest and smallest number in a list of integers. |

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| | b)write a c program that uses functions to perform the following:<br>   i)Addition of Two Matrices.<br>   ii)Multiplication of Two Matrices. |
| **week 10** | a) Write a c program that uses functions to perform the following operations:<br> i)To insert a sub-string in given main string from a given position.<br> ii) To delete n Characters from a given position in a given string.<br>b)Write a C program to determine if the given string is a palindrome or not |
| **week 11** | Write a C program that uses functions to perform the following operations:<br>        i) Reading a complex number<br>        ii) Writing a complex number<br>        iii) Addition of two complex numbers<br>        iv) Multiplication of two complex numbers<br>(Note: represent complex number using a structure.) |
| **week 12** | a)Write a C program which copies one file to another<br>b) Write a C program to reverse the first n characters in a file.<br>(Note: The file name and n are specified on the command line). |
| **week 13** | a)Write a C program that implements the following sorting methods to sort a given list of integers in ascending order<br>i) Bubble sort ii)Selection sort<br>b) Write C programs that use both recursive and non recursive functions to perform the following searching operation for a Key value in a given list of integers :<br>i)Linear search ii)Binary search |
| **week 14** | **a)** Write C programs that implement Stack (its operations) using Arrays<br>**b)** Write C programs that implement Queue (its operations) using Arrays |

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**(A1015) ENGINEERING PHYSICS LAB**
**(Any ten experiments compulsory)**

1. Determination of wavelength of a source – Diffraction Grating.
3. Newton's Rings - Radius of curvature of plano convex lens.
4. Melde's experiment – Transverse and longitudinal modes.
5. Time constant of an R-C circuit.
6. L-C-R circuit.
7. Magnetic field along the axis of current carrying coil – Stewart and Gees method.
8. Bending losses of fibres & Evaluation of numerical aperture of a given fibre.
9. Energy gap of a material of p-n junction.
10. Torsional pendulum.
11. Wavelength of light –Diffraction grating using laser.
12. Sonometer-AC power supply.
13. Characteristics of a LED.
14. Characteristics of a photodiode.
15. Characteristics of a solar cell.
16. Determination of velocity of ultrasonic waves.


**LABORATORY MANUAL:**
1. Laboratory Manual of Engineering Physics by Dr.Y.Aparna&Dr.K.VenkateswaraRao (V.G.S Publishers).

OBJECTIVES:
This course on Physics lab is designed with 13 experiments in an academic year. It is common to all branches of Engineering in B.TechIst year.
The objective of the course is that the student will have exposure to various experimental skills which is very essential for an Engineering student.
The experiments are selected from various area of Physics like Physical Optics, Lasers, Fiber Optics, Sound, Mechanics, Electricity & Magnetism and Basic Electronics.
Also the student is exposed to various tools like Screw gauge, Vernier Callipers, Physics Balance , Spectrometer and Microscope.

OUTCOME:
The student is expected to learn from this laboratory course the concept of error and its analysis. It also allows the student to develop experimental skills to design new experiments in Engineering.
With the exposure to these experiments the student can compare the theory and correlate with experiment.

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## (A1544) IT WORKSHOP LAB

**Objectives:**
- The IT Workshop for engineers is a training lab course spread over 42 hours. The modules include training on PC Hardware, Internet & World Wide Web and Productivity tools including Word, Excel and Power Point.

**Outcomes:**

**PC Hardware** introduces the students to a personal computer and its basic peripherals, the process of assembling a personal computer, installation of system software like MS Windows, Linux and the required device drivers. In addition hardware and software level troubleshooting process, tips and tricks would be covered. **The students should work on working PC to disassemble and assemble to working condition and install Windows and Linux on the same PC. Students are suggested to work similar tasks in the Laptop scenario wherever possible.**

**Internet & World Wide Web** module introduces the different ways of hooking the PC on to the internet from home and workplace and effectively usage of the internet. Usage of web browsers, email, newsgroups and discussion forums would be covered. In addition, awareness of cyber hygiene, i.e., protecting the personal computer from getting infected with the viruses, worms and other cyber attacks would be introduced.

**Productivity tools** module would enable the students in crafting professional word documents, excel spread sheets and power point presentations using the Microsoft suite of office tools and LaTeX. (**Recommended to use Microsoft office 2007 in place of MS Office 2003).**

**PC Hardware:**
**Week 1 – Task 1 :** Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

**Week 2 – Task 2 :** Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.

**Week 3 – Task 3 :** Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

**Week 4 – Task 4 :** Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

**Week 5 – Task 5: Hardware Troubleshooting:** Students have to be given a PC which does not boot due to improper assembly or defective peripherals. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva

**Internet & World Wide Web:**

**Week 6 - Task 1** : **Orientation & Connectivity Boot Camp :** Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.

**Task 2 : Web Browsers, Surfing the Web :** Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

**Week 7 -Task 3: Cyber Hygiene:** Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to first install antivirus software, configure their personal firewall and windows update on their computer. Then they need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms.

**Productivity tools**

**LaTeX and Word:**

**Week 8 – Word Orientation**: The mentor needs to give an overview of LaTeX and Microsoft (MS) office 2007/ equivalent (FOSS) tool word: Importance of LaTeX and MS office 2007/ equivalent (FOSS) tool Word as word Processors, Details of the three tasks and features that would be covered in each, using LaTeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter.

**Task 1 : Using LaTeX and Word** to create project certificate. Features to be covered:-Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.

**Week 9 - Task 2: Creating project** abstract Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

**Week 10 - Task 3 : Creating a Newsletter** : Features to be covered:- Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

**Excel:**

**Week 11 - Excel Orientation:** The mentor needs to tell the importance of MS office 2007/ equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the two tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.

**Task 1: Creating a Scheduler -** Features to be covered:- Gridlines, Format Cells, Summation, auto fill, Formatting Text

**Week 12 - Task 2 : Calculating GPA** - .Features to be covered:- Cell Referencing, Formulae in excel – average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function, LOOKUP/VLOOKUP, Sorting, Conditional formatting

**LaTeX and MS/equivalent (FOSS) tool Power Point:**

**Week 13 - Task1:** Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered during this week includes :- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in both LaTeX and Power point.Students will be given model power point presentation which needs to be replicated (exactly how it's asked).

**Week 14 - Task 2:** Second week helps students in making their presentations interactive. Topic covered during this week includes: Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts

**Task 3:** Concentrating on the in and out of Microsoft power point and presentations in LaTeX. Helps them learn best practices in designing and preparing power point presentation. Topic covered during this week includes: - Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), Inserting – Background, textures, Design Templates, Hidden slides.

**REFERENCE BOOKS:**
1. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.LaTeX Companion – Leslie Lamport, PHI/Pearson.
3.Introduction to Computers, Peter Norton, 6/e McGraw Hill Publishers.
4.Upgrading and Repairing, PC's 18th e, Scott Muller QUE, Pearson Education
5.Comdex Information Technology course tool kit Vikas Gupta, WILEY Dreamtech
6.IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson and Ken Quamme. – CISCO Press, Pearson Education.
7.PC Hardware and A+Handbook – Kate J. Chase PHI (Microsoft)

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**B.Tech.CE - III Sem**

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### (A1008) MATHEMATICAL METHODS

**UNIT – I**

**Solutions of Linear & Non-Linear equations :**Introduction to Algebraic and Transcendental Equations, Bisection Method, Method of False Position (Regula – False Method), Iteration Method, Newton – Raphson's Method, Errors in Polynomial.Gauss Jacobi's iterative method, Gauss-Seidel Method.

**Unit – II**

**Interpolation& Curve fitting:** Forward, Backward & Central Differences, Symbolic Relations, Newton's Forward & Backward Interpolation, Gauss's Forward & Backward Interpolation, Lagrange's Interpolation & Problems. Fitting straight line, Fitting Non-Linear curve, Curve fitting by sum of Exponentials, Non-Linear Weighted least squares approximation.

**UNIT –III**

**Numerical Differentiation, Integrations & Solutions of ODE :** Numerical Differentiation, Derivatives using forward & backward difference formula, Derivatives using central difference formula, Trapezoidal Rule, Simpson's 1/3 Rule,3/8 Rule.
Introduction to Numerical solutions of ODE, Taylor's series method, Picard's method of Successive Approximations, Euler's method, Euler's Modified method, Runga-Kutta method , Predictor and Corrector method, Milne's Predictor and Corrector method, Adams-Moulton method.

**UNIT – IV**

**Partial differential equations:**

Introduction and Formation of partial differential equation by elimination of arbitrary constants and arbitrary functions solutions of first order linear (Lagrange) equation and non-linear equations (Charpit's method).Method of separation of variables for second order equations – applications of Partial differential equations – Two dimensional wave equation.Heat equation.

**UNIT – V**

**Fourier transforms & Z-transforms**
Fourier integral theorem – Fourier sine and cosine integrals. Fourier transforms – Fourier sine and cosine transforms – properties – Inverse transforms – Finite Fourier transforms.

Z-transforms, inverse Z-transforms, properties, Damping rule, shifting rule, initial and final value theorems, convolution theorem, solution of difference equations by Z-transforms.

**TEXT BOOKS**

1. Kreyszig's Mathematical Methods by Dr. A. Ramakrishna Prasad, 2014 yr Edition John Wiley Publications.
2. Advanced Engineering Mathematics by R.K. Jain &S.R.K. Iyengar, $3^{rd}$ edition, Narosa Publishing House, Delhi.

**REFERENCES**

1. Advanced Engineering Mathematics by Kreyszig, $8^{th}$ Edition, John Wiley & Sons Publishers
2. Higher Engineering Mathematics by B.S. Grewal, $36^{th}$ Edition, Khanna Publishers.
3. Advanced Engineering Mathematics with MATLAB, Dean G. Duffy, $3^{rd}$ Edi, CRC Press Taylor & Francis Group.
4. Mathematics for Engineering and Scientists. Alan Jeffrey, $6^{th}$ Edi, 2013, Chapman & Hall / CRC
5. Introductory Methods of Numerical Analysis , S.S.Sastry, 4h Edition, Prentce Hall of India Pvt. Ltd.
6. Mathematical Methods by T.K.V. Iyengar, B. Krishna Gandhi & Others, 2013 Yr. Edition S.Chand.
7. Mathematical Methodsby D.S. Chandrasekhar, Prison Books Pvt. Ltd.
8. Mathematical Methods by G. ShankerRao& Others I.K. International Publications.

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## (A1101) STRENGTH OF MATERIALS – I

**Course objectives:**
Students will be able to demonstrate basic knowledge of
1) Various elastic constants and their relationships to evaluate stresses and strains in the material.
2) Behavior of structural members under various types of external loadings and calculation of their strength in tension, compression, shear, bending and torsion.
3) Behavior of composite members under axial loading.
4) Strain energy stored by body in axial loading, bending, shear and torsion

## UNIT - I

**SIMPLE STRESSES AND STRAINS:**
Elasticity and plasticity Types of stresses and strains Hooke's law stress - strain diagram for mild steel Working stress Factor of safety Lateral strain, Poisson's ratio and volumetric strain Elastic moduli and the relationship between them Bars of varying section composite bars Temperature stresses.
**STRAIN ENERGY** - Resilience Gradual, sudden, impact and shock loadings simple applications.

## UNIT - II

**SHEAR FORCE AND BENDING MOMENT:**
Definition of beam Types of beams Concept of shear force and bending moment S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, u.d.l., uniformly varying loads and combination of these loads Point of contra flexure Relation between S.F., B.M and rate of loading at a section of a beam

## UNIT - III

**FLEXURAL STRESSES & SHEAR STRESSES**
**Flexural stresses:**
Theory of simple bending Assumptions Derivation of bending equation: $M/I = f/y = E/R$ Neutral axis Determination of bending stresses section modulus of rectangular and circular sections (Solid and Hollow), I,T, Angle and Channel sections Design of simple beam sections.
**Shear Stresses:** Derivation of formula Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T, angle sections.

## UNIT - IV

**DEFLECTION OF BEAMS:**
Bending into a circular arc slope, deflection and radius of curvature Differential equation for the elastic line of a beam Double integration and Macaulay's methods.
Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, U.D.L. uniformly varying load.-Mohr's theorems Moment area method application to simple cases including overhanging beams.
**CONJUGATE BEAM METHOD:**
**Introduction -** Concept of conjugate beam method. Difference between a real beam and conjugate beam.
Deflections of determinate beams with constant and different moments of inertia.

**UNIT V**

**PRINCIPAL STRESSES AND STRAINS:**
Introduction: Stresses on an inclined section of a Bar under axial loading compound stresses- normal and tangential stresses on an inclined plane for biaxial stresses. Two perpendicular normal stresses accompanied by a state of simple shear Mohr's circle of stresses- Principle stresses and strains- analytical and graphical solutions-Various theories of failures: Introduction, Various Theories of failures like Maximum Principal Stress theory Maximum Principal strain theory Maximum shear stress theory Maximum strain energy theory Maximum shear strain energy theory.

**TEXT BOOKS:**

1. Introduction to text book of Strength of materials by R.K.Bansal _ Laxmi publications
Pvt. Ltd., New Delhi.
2. Introduction to text book of Strength of Material by U.C. Jindal, Galgotia publications.

**REFERENCES:**

1. Mechanics of Solid, by Ferdinand P Beer and others Tata MCGrawhill Publications
2000.
2. Strength of Materials by Schaum's out line series Mc. Grawhill International Editions.
3. Strength of Materials by S. Ramakrishna and R.Narayan _ Dhanpat Rai publications.
4. Strength of materials by R.K.Rajput, S.Chand & Co, New Delhi.
5. Strength of Materials by A.R.Basu, Dhanpat Rai & Co, Nai Sarah, New Delhi.
6. Strength of Materials by L.S.Srinath et al., Macmillan India Ltd., Delhi.
7. Strength of materials by R. Subramanian, Oxford university press, New Delhi

**Course Outcomes**
Students completing the course will have:-
1) Ability to employ the knowledge of mechanics to understand the behavior of structures.
2) Ability to analyze determinate structural members subjected to different types of loadings.

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## (A1102) FLUID MECHANICS

To understand the fundamentals of fluid mechanics; pressure exerted by fluids; and measurement of pressure, Forces on submerged bodies?
To learn about different types of fluid flows; different methods applied for describing fluid in motion
To learn about different types of energies associated with Fluid in motion
To learn about the measurement of flow in pipes and flow in open channels
To understand concept of equivalent pipe; Energy losses in flow in pipe
To understand the dimensional analysis: Methods of dimensional analysis, Model studies
To learn about types and working of turbines and pumps

### UNIT I

**INTRODUCTION:** Dimensions and units - Physical properties of fluids specific gravity, viscosity, surface tension, vapor pressure and their influences on fluid motion-pressure at a point, Pascal's law, Hydrostatic law - atmospheric, gauge and vacuum pressure measurement of pressure. Pressure gauges, Manometers: differential and Micro Manometers.
**Hydrostatic forces**: Hydrostatic forces on submerged plane, Horizontal, Vertical, inclined and curved surfaces-Center of pressure. Derivations and problems.

### UNIT - II

**FLUID KINEMATICS:** Description of fluid flow, Stream line, path line and streak lines and stream tube. Classification of flows : Steady, unsteady, uniform, non uniform, laminar, turbulent, rotational and irrotational flows _ Equation of continuity for one, two , three dimensional flows _ stream and velocity potential functions, flownet analysis.

### UNIT - III

**FLUID DYNAMICS:** Surface and body forces - Euler's and Bernoulli's equations for flow along a stream line for 3-D flow, (Navier - stokes equations (Explanatory) Momentum equation and its application - forces on pipe bend. Pitot tube, Venturi meter and orifice meter - classification of orifices, flow over rectangular, triangular and trapezoidal and Stepped notches -Broad crested weirs.

### UNIT - IV

**Boundary layer Theory:**
Approximate Solutions of Navier Stoke's Equations - Boundary layer - concepts, Prandtl contribution, Characteristics of boundary layer along a thin flat plate, Vonkarmen momentum integral equation, laminar and turbulent Boundary layers -no deviations BL in transition, separation of BL, control of BL, flow around submerged objects-Drag and Lift- Magnus effect.

### UNIT - V

**CLOSED CONDUIT FLOW:** Reynold's experiment - Characteristics of Laminar & Turbulent flows. Flow between parallel plates, Flow through long tubes, flow through inclined tubes. Laws of Fluid friction - Darcy's

equation, Minor losses - pipes in series- pipes in parallel -Total energy line and hydraulic gradient line. Pipe network problems, variation of friction factor with Reynold_s number _ Moody's Chart.

**TEXT BOOKS:**

1. Fluid Mechanics by Modi and Seth, Standard book house.
2. Introduction to Fluid Machines by S.K.Som & G.Biswas (Tata Mc.Grawhill publishers Pvt. Ltd.)
3. Introduction to Fluid Machines by Edward J. Shaughnessy, Jr, Ira M. Katz and James P. Schaffer , Oxford University Press, New Delhi

**REFERENCES:**

1. Fluid Mechanics by J.F.Douglas, J.M. Gaserek and J.A.Swaffirld (Longman)
2. Fluid Mechanics by Frank.M. White (Tata Mc.Grawhill Pvt. Ltd.)
3. Fluid Mehanics by A.K. Mohanty, Prentice Hall of India Pvt. Ltd., New Delhi
4. A text of Fluid mechanics and hydraulic machines by Dr. R.K. Bansal - Laxmi Publications (P) ltd., New Delhi

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| Fluid Mechanics | 1. Ability to understand the various physical properties of fluid, characteristics of various fluid flows, computation of displacement, velocity and acceleration of a fluid in motion. <br> 2. Study and understand laws of conservation of mass, energy and momentum. Computation of discharge, velocity across weirs and notches. <br> 3. Study and understand Laminar and turbulent flows, significance of Reynold's experiment, computation of velocity and discharge for laminar and turbulent flows across pipes. <br> 4. Study and understand various losses in pipe flows. Computation of losses in pipe flow in series and parallel. |

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### (A1103) SURVEYING – I

## Course Objectives
The students will learn:
1) Theory of measurement errors, accuracies, magnitude of errors and error propagation
2) Level instrument setup, theory, field procedures and computations, for vertical control survey accuracy.
3) Distances, angles, azimuths and bearing measurements
4) Traversing and traverse computations, for horizontal control survey accuracy.
5) Total Station instrument setup, field procedures and computations, including instrument technical specifications and expected survey precision using the instrument.
6) Topographic surveying and terrain modeling using AutoCAD and Land Development

**UNIT–I**

**Introduction**: surveying-objectives of surveying-Classification of surveys-Principles of Surveying

**Chain Surveying:** - Linear measurements - Direct measurement – Ranging - offsets- errors in chaining - cross staff and optical square -obstacles in chaining –Problems – Traversing - plotting

**UNIT – II**

**Compass Surveying:** Introduction to compass survey -Types of compasses–Designation of Bearings – Calculation of included angles from bearings -Magnetic Declination- Magnetic dip –Traversing -Local attraction- Problems- Errors in compass survey.

**UNIT- III**

**Plane table surveying:** Introduction- accessories- Methods of plane tabling- Two point problem -Three point problem – Errors in plane tabling.

**Study of Minor Instruments:** Planimeter - Sextant - Pentograph - Ceylon Ghat Tracer.

**UNIT- IV**

**Levelling:**
Principles - Levels and Staves –Types of levelling - Bench Marks - Temporary and permanent adjustments – Booking – Reduction and Arithmetic checks - Fly levelling – Reciprocal levelling – check levelling - longitudinal and cross sectioning – Plotting - Errors in levelling- Introduction to Auto Level.

**UNIT-V**

**Contouring:** Contours and contouring - Characteristics and uses – methods - Interpolation of contours -Contour gradient.

**Areas and Volumes:** Calculation of areas and volumes - field notes and plans - Earth work - Capacity of reservoirs - alignment of hill roads.

**TEXT BOOKS:**

1.Dr. K.R. Arora, Surveying Vo.I, Standard Book House, 6th edition, 2000
2. Punmia, Surveying Vol.I, Standard Book House, 9th edition, 1985

**REFERENCE BOOKS:**

1. S.K.Duggal, Surveying Vol.I, Tata Mcgraw Hill, 2nd edition
2. Surveying and levelling by R.subramanian,second Edition,Oxford University press-2012
3. Surveying and levelling by R. Agor. Khanna Publishers

**At the end of the course the student will be able to –**
1. know the principles and calculations to prepare the map of field utilizing field data obtained by using various surveying methods.
2. know the principles and calculations to find the elevation of field points for the preparation of contour map
3. know the principles and calculations to find the horizontal distances, heights and elevations by theodolite / tachometric /total station surveying
4. know the principles and calculations to set out the simple circular curves in the field for roads and railway lines

**Course Outcomes:**
Students completing the course will have:
1) Awareness of instrumental, natural and personal errors in measuring and surveying, field procedures for assessing errors, and standards to determine quality of measurements and surveys.
2) Professional and ethical responsibilities to record accurate field notes and to recognize and report poor survey results.
3) Practice with measuring and surveying procedures for a variety of engineering tasks such as horizontal and vertical control surveys, underground pipe alignment, and strategic topographic point selection for terrain modeling.
4) Experience with creating a representative electronic terrain model using a computer program and developing a scaled topographic map of a proposed project site, including selecting appropriate engineering scales and including typical drawing information.

## CMR COLLEGE OF ENGINEERING & TECHNOLOGY
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## (A1020) ENVIRONMENTAL STUDIES

**Objectives:**

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1. Understanding the importance of ecological balance for sustainable development.
2. Understanding the impacts of developmental activities and mitigation measures.
3. Understanding the environmental policies and regulations

### UNIT-I

**Ecosystems:** Definition, Scope and Importance of ecosystem. Classification, structure and function of an ecosystem, Food chains, food webs and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity, Field visits.

### UNIT-II

**Natural Resources: Classification of Resources:** Living and Non-Living resources, **water resources:** use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. **Mineral resources:** use and exploitation, environmental effects of extracting and using mineral resources, **Land resources:** Forest resources, **Energy resources:** growing energy needs, renewable and non renewable energy sources, use of alternate energy source, case studies

### UNIT-III

**Biodiversity And Biotic Resources:** Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

### UNIT-IV

**Environmental Pollution and Control Technologies: Environmental Pollution:** Classification of pollution, **Air Pollution:** Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. **Water pollution:** Sources and types of pollution, drinking water quality standards. **Soil Pollution:** Sources and types, Impacts of modern agriculture, degradation of soil. **Noise Pollution:** Sources and Health hazards, standards, **Solid waste:** Municipal Solid Waste management, composition and characteristics of e-Waste and its management. **Pollution control technologies:** Wastewater Treatment methods: Primary, secondary and Tertiary. Overview of air pollution control technologies, Concepts of bioremediation.
**Global Environmental Problems and Global Efforts: C**limate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol and Montreal Protocol.

### UNIT-V:

**Environmental Policy, Legislation & EIA:** Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP). **Towards Sustainable Future:** Concept of Sustainable Development, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot

Print, Life Cycle assessment (LCA), Low carbon life style.

**TEXT BOOKS:**

1  Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University GrantsCommission.
2 Environmental Studies by R. Rajagopalan, Oxford University Press.

**REFERENCE BOOKS:**
1. Environmental Science: towards a sustainable future by Richard T.Wright. 2008 PHL Learning PrivateLtd. New Delhi.
2. Environmental Engineering and science by Gilbert M.Masters and Wendell P. Ela .2008 PHI LearningPvt. Ltd.
3. Environmental Science by Daniel B.Botkin & Edward A.Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications

## Course outcomes:

1. Ability to understand various scientific disciplines with respect to environmental science.
2. Ability to understand primary environmental problems Invasive species, climate change, populations, water pollution. and the science behind those problems and potential solutions.
3. Ability to apply values, ethics and concepts of justice to environmental concerns.
4. Students will learn skills required to analyze environmental issues scientifically and learn how to use those skills in applied situations such as careers that may involve environmental problems and/or issues.

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## (A1215) BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

**Objective:**
This course introduces the concepts of electrical DC and AC circuits, basic law's of electricity, instruments to measure the electrical quantities, different methods to solve the electrical networks, construction operational features of energy conversion devices i.e. DC and AC machines, transformers. It also emphasis on basics of electronics, semiconductor devices and their characteristics and operational features.

### UNIT-I

**Electrical Circuits:** Basic definitions, Types of elements, Ohm's Law, Resistive networks, Kirchhoff's Laws, Inductive networks, capacitive networks, Series, Parallel circuits and Star-delta and delta-star transformations.
**Instruments:** Basic Principle of indicating instruments – permanent magnet moving coil and moving iron instruments.

### UNIT-II

**DC Machines:** Principle of operation of DC Generator & motor – EMF equation - types – DC motor types –torque equation – applications – three point starter.

### UNIT-III

**Transformers:** Principle of operation of single phase transformers –EMF equation – losses – efficiency and regulation.
**AC Machines:** Principle of operation of induction motor – slip – torque characteristics – applications. Principle of operation of alternators – regulation by synchronous impedance method

### UNIT–IV

**Diodes:** P-n junction diode, symbol, V-I Characteristics, Diode Applications, and Rectifiers – Half wave, Full wave and Bridge rectifiers (simple Problems).
**Transistors:** PNP and NPN Junction transistor, Transistor as an amplifier, SCR characteristics and applications.

### UNIT-V

**Cathode Ray Oscilloscope:** Principles of CRT (Cathode Ray Tube), Deflection, Sensitivity, Electrostatic and Magnetic deflection, Applications of CRO - Voltage, Current and frequency measurements.

### TEXT BOOKS:

1. Basic concepts of Electrical Engineering, PS Subramanyam, BS Publications.
2. Basic Electrical Engineering, S.N. Singh, PHI.
3. Electronic Devices and Circuits, S.Salivahanan, N.Suresh Kumar, A.Vallavaraj,Tata McGraw-Hill Companies
4. Electronic Devices and Circuits, K. Lal Kishore,BS Publications

**REFERENCE BOOKS:**

1. Basic Electrical Engineering, Abhijit Chakrabarthi, Sudipta nath, Chandrakumar Chanda, Tata-McGraw-Hill.
2. Principles of Electrical Engineering, V.K Mehta, Rohit Mehta, S.Chand Publications.
3. Basic Electrical Engineering, T.K.Nagasarkar and M.S. Sukhija, Oxford University Press.
4. Fundamentals of Electrical Engineering, RajendraPrasad, PHI. Basic Electrical Engineering by D.P.Kothari , I.J. Nagrath, McGraw-Hill.
5. Millman's Electronic Devices and Circuits,J. Millman, C.C.Halkias, and Satyabrata Jit, Tata McGraw-Hill companies.
6. Electronic Devices and Circuits, R.L. Boylestad and Louis Nashelsky,PEI/PHI.
7. Introduction to Electronic Devices and Circuits, Rober T. Paynter,PE.
8. Integrated Electronics, J. Millman and Christos C. Halkias, Tata McGraw-Hill companies.
9. Electronic Devices and Circuits, Anil K. Maini, Varsha Agarwal,Wiley India Pvt. Ltd.

**Course Outcomes:**

1. Able to understand the basic electrical circuits, parameters, measuring instruments
2. Acquire the knowledge on the operation of the transformers in the energy conversion process,
3. Able to understand the construction, operation, characteristics of DC and AC machines
4. Able to understand different semiconductor devices, their voltage-current characteristics, realization of various electronic circuits with the various semiconductor devices, and cathode ray oscilloscope,

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**(A1104) STRENGTH OF MATERIALS LAB**

## Course Objective
1. To introduce soil mechanics laboratory techniques to civil engineering undergraduate students.
2. To familiarize students with common geotechnical test methods, test standards and technology.
3. To understand, interpret and properly apply laboratory results obtained using standardized method for construction of structures.
4. To understand the analytical techniques for understanding (a) Darcy's law for permeability and seepage
(b) Stoke's law for hydrometer analysis of particle size distribution of cohesive soils (c) Mohr-Coulomb's
analysis for shear strength parameters of soils.
5. Enable students to prepare professional reports for design projects and data presentation skill and to use

computers and some computer graphics


1. Tension test

2. Bending test on (Steel / Wood) Cantilever beam.

3. Bending test on simple support beam.

4. Torsion test

5. Hardness test

6. Spring test

7. Compression test on wood or concrete

8. Impact test

9. Shear test

10. Verification of Maxwell's Reciprocal theorem on beams.

11. Use of electrical resistance strain gauges

12. Continuous beam - deflection test.


**LIST OF MAJOR EQUIPMENT:**

1. UTM for conducting tension test on rods

2. Steel beam for flexure test

3. Wooden beam for flexure test

4. Torsion testing machine

5. Brinnell's / Rock well's hardness testing machine

6. Setup for spring tests

7. Compression testing machine

8. Izod Impact machine

9. Shear testing machine

10. Beam setup for Maxwell's theorem verification.

11. Continuous beam setup

12. Electrical Resistance gauges.

**Course Outcomes**

1. The ability to identify the structural behavior of steel with respect to torsion, torsion, hard new, impact and shear.
2. Ability to identify the structural behavior of wood & steel members with respect to bending for cantilever and simply suppliers and conditions.
3. Ability to identify the structural behavior of wood and steel under compression.
4. Ability to identify the defection/elastic behavior of continuous beam and to verify the Maxwell's reciprocal theorem on beams and utility of the electrical strain gauges.

Upon successful completion of this course, it is expected that students will be able to:
1. Classify the soils and predict its behavior in terms of mechanical properties i.e. strength, compressibility
and permeability.
2. Predict behavior of soil under field loading for safe design of structures over or under the soil.
3. Quantify the mechanical properties of soil based on standardized laboratory tests.
4. Analyse and Design a variety of geotechnical engineering structures including foundations, piles,
retaining walls, slopes and interpret data for different laboratory/field conditions

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## (A1105) SURVEYING LAB - I

**LIST OF EXERCISES:**

1. Survey of an area by chain survey (closed traverse) & Plotting

2. Chaining across obstacles

3. Determination of distance between two inaccessible points with compass.

4. Surveying of a given area by prismatic compass (closed traverse) and plotting after adjustment.

5. Radiation method, intersection methods by plane Table survey

6. Two point and three point problems in plane table survey

7. Traversing by plane table survey

8. Fly leveling (differential leveling)

9. An exercise of L.S and C.S and plotting

10. Two exercises on contouring.

**List of Major Equipment:**

1. Chains, tapes, Ranging rods, cross staff, arrows

2. Compasses and Tripods, Optical square.

3. Plane tables, Alidade, Plumbing fork, trough compasses

4. Leveling instruments and leveling staves

5. Box sextants, planimeter.

## Course Outcomes:

**At the end of the course the student will be able to –**
1. Prepare the map of field details and find the area of field by conducting chain surveying.
2. Prepare the map of field details and find the area of field by conducting compass surveying.
3. Prepare the map of field details and find the area of field by conducting table surveying.
4. Find the elevation of field points for the preparation of contour map by conducting leveling.

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### (A1010) PROBABILTY AND STATISTICS

#### UNIT - I

**Single Random variables and probability distributions:** Random variables - Discrete and continuous. Probability distributions, mass function/ density function of probability distributions. Mathematical Expectation, Moment about origin, Central moments Moment generating function of Probability distribution. Binominal, Poisson & normal distributions and their propertites. Moment generating functions of the above three distributions. And hence finding the mean and variance.

#### UNIT - II

**Multiple Random variables, Correlation & Regression:** Joint probability distributions - Joint Probability mass / density function, Marginal Probability mass / density functions, Convariance of two random variables, Correlation - Coefficient of correlation, the rank correlation. Regression - Regression Coefficient, The lines of regression and multiple correlations & regressions.

#### UNIT -III

**Sampling Distribution and Testing of Hypothesis: Sampling:** Definitions of population, sampling, statistic, and parameter. Types of sampling, Expected values of sample mean and variance, sampling distribution, Standard error, Sampling distribution of means and sampling distribution of variance.
**Parameter estimations:** - likelihood estimated interval estimations.
**Testing of hypothesis:** Null hypothesis, Alternate hypothesis, type I, & type II errors - Critical region, confidence interval, Level of significance. One sided test, two sided test,
**Large sample tests:**

(i) Test of Equality of means of two samples equality of sample, mean and population mean ( cases of known variance & unknown variance, equal and unequal variances)
(ii) Tests of significance of difference between sample S.D and population S.D.
(iii) Tests of significance difference between sample proportion and population proportion & difference between two sample proportions.

**Small sample tests:** Student t-distribution, its properties; Test of significance difference between sample mean and population mean; difference between means of two small samples
Snedecor's F-distribution and its properties. Test of equality of two population variances
Chi-square distribution, its properties, Chi-square test of goodness of fit

#### UNIT - IV

**Queuing Theory:** Structure of queuing system, Operating Characteristics of queuing system, Transient and steady states, Terminology of Queuing systems, Arrival and service processes- pure birth-death process Deterministic queuing models- M/M/1 model of infinite queue.

#### UNIT -V

**Stochastic processes:** Introduction to Stochastic Processes - Classification of Random processes, Methods of description of random processes, Stationary and non - Stationary random process, Average values of single random process and two or more random processes. Markov Process, Markov chain, Classification of states - Examples of Markov Chains, Stochastic Matrix.

**TEXT BOOKS:**

1. Higher Engineering Mathematics by Dr. B.S. Grewal, Khanna Publishers.
2. Probability and Statistics for Engineers and Scientists by Sheldom M.Ross, Academic Press.
3. Operations Research by S.D. Sarma.

**REFERENCES:**

1. Mathematics for Engineers by K.B.Datta and M.A.S.Srinivas, Cengage Publications
2. Probability and Statistics by T.K.V.Iyengar & B.Krishna Gandhi Et
3. Fundamentals of Mathematical Statistics by S C Guptha and V.K.Kapoor.
4. Probability and Statistics for Engineers and Scientists b Jay I. Devore.
5. Probability Theory & Stochastic Processes by P.Sri Hari, Hi-Tech Publishers.
6. Probability & Statistics by Ahmed Waheedullah, M.Ahmed Mohiuddin, Sultan Ali, HI-TECH Publishers.

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| Probability and Statistics | 1. Ability to define probability & interpret probability by modeling sample spaces. <br> 2. Ability to define descriptive statistics and statistical inference <br> 3. Students draw inferences about the hypothesis statement. <br> 4. Able to know two sets of variable having relation by using correlation methods and usage of queuing techniques in the field of engineering. |

**B.Tech CE - IV Sem**

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## (A1106) STRENGTH OF MATERIALS – II

### Course Objectives
Students will be able to demonstrate basic knowledge of
1) Determination of combined direct and bending stresses.
2) Identification of principle planes and computation of principle stresses and strains due to combination of axial forces, bending moments and shear.
3) Calculation of slope and deflection of beams under different loading conditions.
4) Evaluation of strength of short and long columns.
5) Influence line diagrams for shear force, bending moment on a girder due to rolling loads.
6) Various theories of elastic failure.

### UNIT I

**TORSION OF CIRCULAR SHAFTS:**
Theory of pure torsion Derivation of Torsion equations: $T/J = q/r = N/L$, Assumptions made in the theory of pure torsion, Torsional moment of resistance Polar section modulus Power transmitted by shafts Combined bending and torsion and end thrust Design of shafts according to theories of failure.

**SPRINGS**
Introduction ; Types of springs, deflection of close and open coiled helical springs under axial pull and axial couple, springs in series and parallel, Carriage or leaf springs.

### UNIT - II

**COLUMNS AND STRUTS:**
Introduction, Types of columns- Short, medium and long columns, Axially loaded compression members, Crushing load, Euler's theorem for long columns assumptions- derivation of Euler's critical load formulae for various end conditions, Equivalent length of a column slenderness ratio, Euler's critical stress, Limitations of Euler's theory, Rankine Gordon formula Long columns subjected to eccentric loading, Secant formula, Empirical formulae, Straight line formula Prof. Perrys Formula. Beam columns; laterally loaded struts, subjected to uniformly distributed and concentrated loads Maximum B.M. and stress due to transverse and lateral loading.
**Beam columns**: Laterally loaded struts-subjected to uniformly distributed and concentrated loads--maximum B.M. and stress due to transverse and lateral loading.

### UNIT -III

**DIRECT AND BENDING STRESSES**
Stresses under the combined action of direct loading and B.M, Core of a section determination of stresses in the case of chimneys, retaining walls and dams conditions for stability stresses due to direct loading and B.M. about both axis.

**BEAMS CURVED IN PLAN:**
Introduction, circular beams loaded uniformly and supported on symmetrically placed Columns, Semi-circular beam simply-supported on three equally spaced supports.

### UNIT - IV

Unsymmetrical bending: Introduction- Centroidal principal Axis of section- Graphical Method for locating Principal axis – Moment of Inertia referred to any set of rectangular axis- Stresses in beams subjected to Unsymmetrical bending- Principal Axis-Resolution of bending movements in to two rectangular axis through the Centriod – Location of N.A –Deflection of Beams under Unsymmetrical bending.
Shear centre :Introduction –Shear centre for symmetrical and Unsymmetrical(Channel, I,T and L ) sections

## UNIT- V

Thin Cylinders: Thin seamless cylindrical shells- Derivation of the formula for longitudinal and circumferential stress-hoop, longitudinal and volumetric strains- change in diameter and volume of thin cylinders- Thin spherical shells
Thick Cylinders: Introduction, Lame's theory for thick cylinders- Derivation lame's formula- Distribution of hoop and radial Stresses across thickness-design of thick cylinders- Compound cylinders-Necessary difference of radii for shrinkage- Thick spherical shells.
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**TEXT BOOKS**

1. A Text book of Strength of materials by R.K.Bansal �Laxmi Publications (P) ltd., New Delhi
2. Introduction to Strength of Materials by U.C. Jindal, Galgotia publications.
3. Strength of Materials by B.C. Punmia

**REFERENCES:**

1. Mechanics of Solid, by Ferdinand P Beer and others �Tata Mc.Graw-Hill Publications 2000.
2. Strength of Materials by Schaum�s out line series �Mc. Graw Hill International Editions.

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| Strength of Materials – II | 1. Ability to design the circular shaft either in solid or hollow subjected to pure torsion or combination of bending and torsion<br>2. Ability to design the section of column or strut with given end conditions.<br>3. Ability to analyze the stresses developed in each member and should be able to design the cross section for the allowable stresses.<br>4. Ability to draw SFD/BMD of propped cantilevers, Fixed beams and continuous beams under various conditions of loading and with direct moment etc. |

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## (A1107) HYDRAULICS AND HYRAULIC MACHINERY

To introduce concepts of laminar, turbulent flow and boundary layer formation.

To analyze, and solve problems related to water flow in a conduit and in open channel and forces in bodies emerged in fluid.

To undertake design problems related to water surface profiles, soffit level of stilling basin etc. on the basis of total energy and hydraulic jump formation concepts.

To undertake experiments for evaluation of hydraulic principle

### UNIT - I

**OPEN CHANNEL FLOW:** Types of flows - Type of channels �Velocity distribution - Energy and momentum correction factors - Chezy's, Manning's; and Bazin formulae for uniform flow - Most Economical sections. Critical flow: Specific energy-critical depth - critical sub-critical and super critical flows.
Non uniform flow-Dynamic equation for G.V.F., Mild, Critical, Steep, horizontal and adverse slopes-surface profiles-direct step method- Rapidly varied flow, hydraulic jump, energy dissipation.

### UNIT - II

**Dimensional Analysis and Similitude:** Dimensional analysis-Rayleigh's method and Buckingham's pi theorem-study of Hydraulic models - Geometric, kinematic and dynamic similarities-dimensionless numbers - model and prototype relations.

### UNIT - III

**Hydrodynamic force of jets**: Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes, jet striking centrally and at tip, velocity triangles at inlet and outlet, expressions for work done and efficiency-Angular momentum principle, Applications to radial flow turbines. : Layout of a typical Hydropower installation �
Heads and efficiencies

### UNIT - IV

**HYDRAULIC TURBINES** -classification of turbines-pelton wheel-Francis turbine-Kaplan turbine-working, working proportions, velocity diagram, work done and efficiency, hydraulic design, draft tube - theory and function efficiency.
Governing of turbines-surge tanks-unit and specific turbines-unit speed-unit quantity-unit power-specific speed performance characteristics geometric similarity-cavitation.

### UNIT - V

**CENTRAIFUGAL-PUMPS:** Pump installation details-classification-work done- Manometric head-minimum starting speed-losses and efficiencies-specific speedmultistage pumps-pumps in parallel- performance of pumps-characteristic curves- NPSH-cavitation.

Classification of Hydropower plants - Definition of terms - load factor, utilization factor, capacity factor, estimation of hydropower potential.

**TEXT BOOKS:**

1. Open Channel flow by K,Subramanya . Tata Mc.Grawhill Publishers
2. A text of Fluid mechanics and hydraulic machines by Dr. R.K. Bansal - Laxmi Publications (P) ltd., New Delhi
3. Fluid Mechanics & Fluid Power Engineering by D.S. Kumar Kataria & Sons.

**REFERENCES:**

1. Fluid Mechanics, Hydraulic and Hydraulic Machines by Modi & Seth, Standard book house.
2. Elements of Open channel flow by Ranga Raju, Tata Mc.Graw Hill, Publications.
3. Fluid mechanics and fluid machines by Rajput, S.Chand &Co.
4. Open Channel flow by V.T.Chow, Mc.Graw Hill book company.
5. Hydraulic Machines by Banga & Sharma Khanna Publishers

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| Hydraulics and Hydraulic Machinery | **At the end of the course the student will be able to –**<br>1. Understand the principles and calculations required to design open channel sections and to find parameters of hydraulic jump and back water curve.<br>2. Ability to understand the principles and calculations required to utilize the dimensional analysis as a tool in solving problems in the field of fluid mechanics.<br>3. Ability to understand the principles and calculations required to design impulse and reaction turbines, and conduct model studies for turbines and pumps.<br>4. Ability to understand the principles and calculations required to assess hydro electric potential, know functions of components of power house and find the factors governing the operation of power station. |

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## (A1108) STRUCTURAL ANALYSIS – I

## Course Objective
1. To develop an understanding of various types of structures and their built to facilitate the performance of
various activities connected with residence, transportation, storage, healthcare etc. in the field of civil
engineering.
2. To develop an understanding of the behavior of structure under serviceability load.
3. To understand the mechanics of the material behavior of different types of structures.
4. To make student aware of various procedure of analysis like Mohr's theorem, method of consistent
deformation, reciprocal theorem, Betti's theorem, energy theorem etc. for statically indeterminate
structures.
5. To develop good technical reporting and data presentation skills

### UNIT - I

**Analysis of Perfect Frames:** Types of frames - Perfect. Imperfect and redundant pin jointed frames. - Analysis of determinate pin jointed frames - Analysis of determinate pin jointed frames using method of joints, method of sections and tension coefficient method for vertical loads, horizontal loads and inclined loads

### UNIT - II

**Energy Theorems:** Introduction - Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear forces - Castigliano's first theorem - Unit load Method. Definitions of simple beams and pin- jointed plane trusses. Definitions of statically determinate bent frames.
**Three Hinged Arches -** Introduction- Types of Arches - Comparison between three hinged and two hinged arches. Normal Thrust and radial shear in an arch. Geometrical properties of parabolic and circular arch. Three hinged circular arch at different levels. Absolute maximum bending moment diagram for a three hinged arch.

### UNIT - III

**Propped Cantilever and Fixed Beams:** Analysis of propped cantilever and fixed beams, including the beams with varying moments of inertia, subjected to uniformly distributed load, central point load, eccentric point load, number of point loads, uniformly varying load, couple and combination of loads - Shear force and Bending moment diagrams for propped Cantilever and Fixed Beams - Deflection of propped cantilever and fixed beams; effect of rotation of a support.

### UNIT -IV

**Slope - Deflection Method and moment Distribution Method:** Introduction - Continuous beams. Clapeyron's theorem of three moments- Analysis of continuous beams with constant and variable moments of inertia with one or both ends fixed - continuous beams with overhang. Effects of sinking of supports. Derivation of slope- deflection equation, application to continuous beams with and without settlement of supports using Moment Distribution Method. Shear force and bending moment diagrams, Elastic curve.

### UNIT - V

**Moving Loads and Influence Lines:** Introduction maximum SF and BM at a given section and absolute maximum SF and B.M due to single concentrated load U.D load longer than the span, U.D load shorter than the span, two point loads with fixed distance between and them and several point loads - Equivalent uniformly distributed load - Focal length. Definition of influence line for SF, Influence line for BM- load position for maximum SF at a section- Load position for maximum BM at a section - point loads, UDL longer than the span, UDL shorter than the span- influence lines for forces in members of pratt and Warren trusses.

**TEXT BOOKS:**

1. Structural Analysis Vol - I and II by Vazarani and Ratwani, Khanna Publishers.
2. Structural Analysis Vol I & II by Pundit and Guptha., Tata McGraw Hill Publishers.

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| Structural Analysis – I | At the end of the course the student will be able to : <br> 1. Analyses three and two hinged arches under static loads - determine horizontal thrust at supports, radial shear, normal thrust and BM. At any given section including effects of settlement of support, temperature effects, lack of fit. <br> 2. Determine the static and kinematic indeterminacies of structural systems and analyses indeterminate beams using slope deflection, moment distribution and Matrix methods. <br> 3. Analyses simple beam and pin jointed trusses using strain energy principles- Castigliano's theorems. <br> 4. Analyses beams and trusses under moving loads with and without the aid of Influence line Diagrams. |

**REFERENCES:**

1. Basic Structural Analysis by K.U.Muthu et al., I.K.International Publishing House Pvt.Ltd.
2. Structural Analysis by Hibbeler, pearson Education Ltd
3. Basic Structural Analysis by C.S.Reddy., Tata McGraw Hill Publishers.
4. Fundamentals of structural Analysis by M.L.Gamhir, PHI.

Upon successful completion of this course, it is expected that students will be able to:
1. Apply fundamental concepts of mathematics, statics, mechanics of deformable bodies, and principle of
dynamics to the solution of fundamental civil engineering structural analysis problems.
2. Apply structural codes and standards such as IS 1875 (part-2&3) and IS: 1893 (Part-I) to model dead, live,
snow, wind, and earthquake loads on structures.
3. Understand the significance of the basic mechanical properties of structural materials.
4. Understand how to represent real structures by idealized structural systems.
5. Understand the deformations of structures under loading and be able to apply various methods to
determine the deformations.
6. Develop the ability to analyze cable and arch structures.
7. Solve statically indeterminate structures using classical methods.
8. Familiarise with professional and ethical issues and the importance of lifelong learning in structural
engineering.
9. Familiarise with contemporary issues in structural engineering

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## (A1109) BUILDING MATERIALS, CONSTRUCTION AND PLANNING

### UNIT - I

**Stones and Bricks, Tiles:** Building stones - Classifications and quarrying - properties - structural requirements - dressing bricks - composition of brick earth - manufacture and structural requirements.

**Wood, Aluminum, Glass and Plants:** Wood - Structure - Types and Properties - seasoning - defects; alternate materials for wood - GI/ Fibre - reinforced glass bricks, steel & aluminum.

### UNIT - II

**Cement & Admixtures:** Ingredients of cement - manufacture - chemical composition- Hydration - field & lab tests admixtures - mineral & chemical admixtures - uses.

### UNIT - III

**Building Components:** Lintels, Arches, walls, vaults - Stair cases - Types of floors, types of roofs - flat, curved, trussed; foundations - types ; Damp Proof Course ; Joinery - doors - windows - materials - types.

**Building Services:** Plumbing Services: Water Distribution, Sanitary - Lines & Fitting; Ventilations: Functional requirements systems of ventilations. Air-conditioning - Essentials and Types; Acoustics - characteristic - absorption - Acoustic design ; Fire protection - Fire Hazards - Classification of fire resistance materials and constructions.

### UNIT - IV

**Masonry and Finishing's:** Brick masonry - types - bonds ; Stone masonry - types; Composite masonry - Brick - Stone Composite; Concrete, Reinforced brick.

Finishers: Plastering, Pointing , Painting, Claddings - Types - Tiles - ACP

**Form work:** Requirements - Standards - Scaffolding - Design; Shoring, Underpinning.

### UNIT - V

**Building Planning:** Principles of building planning, Classification of buildings and building by laws.

**TEXT BOOKS:**

1. Building Materials and Construction - Arora & Bindra, Dhanpat Roy Publications.
2. Building Construction by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi

**REFERENCES:**

1. Building Materials by Duggal, New Age Internations.
2. Building Construction by PC Verghese PHI.
3. Construction Technology - Vol - I & II by R.Chuddy, Longman UK.
4. Basics of Civil Engg by Subhash Chander; Jain Brothers.
5. Alternate Building materials and Technology, K.S.Jagadish, Venkatarama Reddy and others; New Age Publications.

| Building Materials | 1. Understand the types of shelter construction of such buildings. |
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| and Construction | 2. Understand changing functions of buildings and rooms within buildings. Demonstrate a familiarity with materials used in modern construction. |
| | 3. Understand the various types of building processes and site selection for residential and commercial projects. Develop an understanding of the design criteria |
| | 4. the guideline to be followed in construction and layouts planning and execution and by-laws governing. |

On completion of the course, the students will be:

• Able to identify the various building materials with symbols.

• Able to identify the properties of building materials.

• Made acquainted with the manufacturing process of basic construction materials.

• Made acquainted with the masonry construction and finishes

• Aware of building services, acoustics, DPC, etc.

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**(A1110) SURVEYING – II**

**Course Objectives: -** The students learn the advanced surveying techniques including tacheometry, triangulation, remote sensing and Geographic Information Systems.
The Students will learn to:
1. Use survey instruments like the Tacheometer.
2. Record the data in field book and plot the collected data.
3. Find out horizontal and vertical distances with a tachometer
4. Set out simple curves and building layout using Theodolite.
5. Set out alignments for roads, railways, canals, pipelines, tunnels etc.
6. Use Modern Survey equipments, software and techniques

**UNIT-I**

**Theodolite:** - Types - Uses - Temporary Adjustments-Measurement of horizontal and vertical angles - Repetition and Reiteration - Theodolite traversing - Closing error, balancing the error - Omitted measurements - Gales traverse table – Errors in theodolite work
**Setting Out Works**: Introduction-Control points-Laying Out buildings-Setting out Culverts-Bridges-Sewer lines

**UNIT-II**

**Tachometer**: – Principle of tachometry - Methods – Heights and distances -different systems – subtense bar
**Trigonometric Levelling**: Basic principles-calculation of heights and distances - Determining difference in Elevation - problems.

**UNIT-III**

**Curves**: – Types of curves – Elements of simple curve – Degree of curve -Methods of setting simple curves – Rankine's method – Two theodolite method – Compound curves – Elements of compound curves. – Problems

**UNIT-IV**

Reverse curve - Elements of Reverse curve -Transition curve –Types - Vertical curves- Types - Setting out vertical curves - problems

**UNIT-V**

 **Introduction to Advanced Surveying**: Electromagnetic Spectrum – Radar -Electromagnetic Distance Measurement - EDM Equipment –Corrections – Electronic theodolite - Total stations
Remote sensing-basic concepts-applications - Introduction to Global Positioning system (GPS ) - Introduction to Geographic Information System (GIS )

**TEXT BOOKS:**

1. Surveying and levelling by R.subramanian,second Edition,Oxford University     press-2012.
2. Dr. B.C. Punmia, Surveying, Vol. II, Laxmi Publications Pvt. Ltd, Twenth edition 1994.

**REFERENCE BOOKS:**

1. Dr. A.M.Chandra, Higher Surveying, New Age International Publishers.

2. Dr. K.R. Arora, Surveying, Vol. II, Standard Book House, Fifth edition, 2001

3. "Advanced Surveying Total station GIS and Remote sensing" by Satheesh Gopi. Sathi Kumar and N. Madhu.

## Course Outcomes

On completion of the course the students will be able to,
1. Plan project survey for bridges tunnels, building, dam , culvert etc.
2. Prepare contour maps and other surveying maps such as longitudinal profile and cross sections for various civil engineering projects.
3. Work on various application software related to surveying

**B.Tech .CE - IV Sem**

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### (A1111) COMPUTER AIDED DRAFTING OF BUILDINGS

1. Introduction to computer aided drafting

2. Software for CAD - Introduction to different software's

3. Practice exercises on CAD software.

4.  Drawing of plans of buildings using software'

   (a) Single storied buildings (b) multi storied buildings.

5. Developing sections and elevations for

   (a) Single storied buildings (b) multi storied buildings.

6. Detailing of building components like Doors, Windows, Roof Trusses etc. using

   CAD software.

7. Exercises on development of working of buildings.

### TEXT BOOKS:

1. Computer Aided Design Laboratory by M.N.Sesha Praksh & Dr. G. S. Servesh - Laxmi Publications.

2. Engineering Graphics by P. J. Sha - S.Chand & Co

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| CAD Lab | 1. Drafting section and elevations for single and multi storied buildings.<br>2. Drafting plan of single and multi storied buildings with detailing of building components like doors windows roof trusses using cads software. |

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## (A1112) SURVEYING LAB - II

**LIST OF EXERCISES:**

1. Study of theodolite in detail - practice for measurement of horizontal and vertical angles.

2. Measurement of horizontal angles by method of repetition and reiteration.

3. Trigonometric Leveling - Heights and distance problem (Two Exercises)

4. Heights and distance using Principles of tacheometric surveying (Two Exercises)

5. Curve setting �different methods. (Two Exercises)

6. Setting out works for buildings & pipe lines.

7. Determine of area using total station

8. Traversing using total station

9. contouring using total station

10. Det of remote height using total station

11. State-out using total station

12. Distance, gradient, Diff, height between tow inaccessible points using total stations

**LIST OF EQUIPMENT:**

1. Theodolite and leveling staffs.

2. Tachometers.

3. Total station.

| | At the end of the course the student will be able to – |
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| Surveying Lab – II | 1. •find the horizontal distances, heights and elevations by conducting theodolite surveying.<br>2. •find the horizontal distances, heights and elevations by conducting tachometric surveying.<br>3. •Set out the simple circular curves in the field for roads and railway lines by linear and angular instruments.<br>4. •find the horizontal distances, heights and elevations by conducting total station surveying. |

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**B.Tech .CE - IV Sem**

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### (AUTONOMOUS)

### (A1005) SOFT SKILLS & PROFESSIONAL ETHICS

**MODULE   1.    BUSINESS COMMUNICATION SKILLS**
- **English Language Enhancement**
- **The Art of Communication**

**OBJECTIVE**
- The student will gain a functional understanding of basic English Grammar
- Practice language skills to eliminate errors in pronunciation and    sentence construction
- Understand and enhance interpersonal communication process

**MODULE   2.    INTRAPERSONAL & INTERPERSONAL RELATIONSHIP SKILLS**
- **Intrapersonal Relationships**
- **Interpersonal Relationships – To be an Effective Team Player**

**OBJECTIVE**
- The student will understand the importance of and the various skills involved in developing enriching interpersonal relationships

- Be more aware of his/her own self – confidence, values

- Understand and handle emotions of self and others.

- Understand the necessity and importance of working together as a team

- Learn how to go about being a good team player and form an effective team

- Have put their team building skills to test in the various activities to understand where they stand and improve themselves with each succeeding activity.

**MODULE 3. CAMPUS TO COMPANY**
- **Corporate Dressing**
- **Corporate Grooming**
- **Business Etiquette**
- **Communication Media Etiquette**

**OBJECTIVE**
- The student will understand what constitutes proper grooming and etiquette in a professional environment.

- Have some practical tips to handle him/her in a given professional setting.
- Have practiced the skills necessary to demonstrate a comfort level in executing the same.

**MODULE   4.    GROUP DISCUSSIONS, INTERVIEWS AND PRESENTATIONS**
- **Group Discussions**

- **Interviews**

- **Presentations**

**OBJECTIVE**
- The student will be able to appreciate the nuances of the Group Decision-making process.
- Understand the skills tested and participate effectively in Group Discussions.
- Learn the basics of how to make an effective presentation and have numerous practice presentations in small groups and larger audiences.
- Attend any type of interview with the confidence borne out of knowledge gained and practice sessions.

**MODULE 5. ENTREPRENEURIAL SKILLS DEVELOPMENT**
- **Goal Setting**

- **Entrepreneurial Skills – Awareness and Development**

**OBJECTIVE**
- The student will be able to set specific measurable goals for themselves in their personal and/or professional life.

- Understand the skills and the intricacies involved in starting an entrepreneurial venture.

**REFERENCES**

1. UNLEASH the power within….Soft Skills – Training Manual (Infosys Campus Connect)

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## (AUTONOMOUS)

### (A1113) CONCRETE TECHNOLOGY

**B.Tech .CE -V Sem**

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## Course Objectives
1) Students will learn properties of various ingredients of concrete.
2) Students will learn properties of fresh and hardened concrete.
3) Students will learn various methods of concrete mix design.

**UNIT-I**

**CEMENT:** Portland cement- chemical composition- Hydration of cement-Structure of Hydrate cement- Test on physical properties- Different grades of cement.
**Admixtures**: Types of admixtures- mineral and chemical admixtures- properties-dosages- effects- usage.
**Aggregates**: classification of aggregate- Particle shape & texture – Bond, Strength & other mechanical properties of aggregate- Specific gravity, Bulk Density, porosity, adsorption & moisture content of aggregate – Bulking of sand- Deleterious substance in aggregate- Soundness of aggregate- Alkali aggregate reaction –Thermal properties – Sieve analysis – Fineness modulus –Grading curves – Grading of fine & coarse aggregates- Gap graded aggregate- Maximum aggregate size

**UNIT- II**

**Fresh concrete**; Workability- Factors affecting workability –Measurement of workability by different tests- Setting times of concrete- Effect of time and temperature on workability- Segregation &bleeding- Mixing and vibration of concrete- steps in manufacture of concrete- Quality of mixing water.

**UNIT- III**

**Hardened concrete**-: water/cement ratio- Abram's law- Gelspaoe ration- Nature of strength of concrete- Maturity concept- Strength in tension& compression- Factors affecting strength- Relation between compression & tensile strength- Curing
**Testing of Hardened concrete**: Compression tests- Tension tests- Factors affecting strength- flexure tests- Splitting tests- Pull-out test, Non destructive testing methods-codal provisions for NDT.
Elasticity, Creep& Shrinkage-Modulus of elasticity- Dynamic modulus of elasticity- Posisson's ratio-Creep of concrete- Factors influencing creep- Relation between creep& time- Effects of creep- Shrinkage- types of shrinkage.

**UNIT- IV**

**Mixed Design**: Factors I the choice of mix proportions- Durability of concrete-Quality Control of concrete- Statistical Quality Control- Acceptance criteria- Proportioning of concrete mix by normal and pump able concretes by BIS method of mix design.

**UNIT-V**

Special Concretes: Light weight concrete-Light weight aggregate concrete- Cellular concrete- No-fines Concrete- Fibre reinforced concrete- Polymer concrete- Types of polymer concrete- Self compacting concrete.

**EXT BOOKS:**

1. Properties of Concrete by A.M Neville- low priced Edition- 4th edition
2. Concrete Technology by M.S.Shetty.- S. Chand& Co

**REFERENCES:**

1. Concrete Technology by Job Thomas, Cengage Learning
 2. Concrete Technology by M.L.Gamghir.- Tata McGraw Hill publishers, New          Delhi .
3   Concrete Technology by A.R.Santakumar, Oxford University Press, New Delhi
4. Concrete Micro structure, Properties and Materials-P.K. Mehta and J.M.Monterio, McGraw Hill publishers

| Concrete Technology | 1. The student should be able to understand ingredients of cement and chemical process involved in manufacturing of cement. <br> 2. Ability to understand the process of admixtures i.e.., add the chemical compound to the cement. <br> 3. Ability to understand differentiate the classification of the aggregate. <br> 4. understand the durability of concrete and mix design. |
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Students will be able to
1) Select appropriate type of concrete for specific requirements.
2) Design a concrete mix of required strength and durability using suitable ingredients.

**B.Tech .CE- V Sem**

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### (A1114) DESIGN OF RC STRUCTURES & DRAWING

**UNIT - I**
Concepts of RC Design - Limit State method - Material Stress - Strain Curves - Safety factors - Characteristic values. Stress Block parameters - IS - 456 - 2000 - Working Stress Method.
Beams: Limit state analysis and design of singly reinforced, doubly reinforced, T and L beam sections.
**UNIT - II**
Shear, Torsion and Bond: Limit state analysis and design of section for shear and torsion - concept of bond, anchorage and development length. I.S. code provisions. Design examples in simply supported and continuous beams, detailing Limit state design for serviceability for deflection, Cracking and codal provision.
**UNIT - III**
Design of Two- way slabs, one way slab, continuous slab Using I S Coefficients, Cantilever slab / Canopy slab.
**UNIT - IV**
Short and Long columns - axial loads, uni axial and biaxial bending I S Code provisions.
**UNIT - V**
Design of Footings- isolated (square, rectangular) and combined footings. Design of stair case.
**TEXT BOOKS:**
1. Limit state designed of reinforced concrete - P.C.Varghese, Prentice Hall of India, New Delhi.
2. Reinforced concrete design by N.Krishna Raju and R.N. Pranesh. New age International Publishers, New Delhi
3. Reinforced concrete design by S.Unnikrishna Pillai & Devadas Menon, Tata Mc.Graw Hill, New Delhi.
4. Fundamentals of reinforced concrete by N.C.Sinha and S.K.Roy, S.Chand publishers.

**REFERENCES:**

1. Fundamentals of Reinforced concrete design by M.L.Gambhir, Printice Hallo of India Ltd., NewDelhi.
2. Reinforced concrete structural elements - behaviour, Analysis and design by P.Purushotham. Tata Mc.Graw - Hill , 1994
3. Plasticity in Reinforced Concrete by Chen - Cengage Learning Pvt.Ltd

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| Design of Reinforced Concrete Structures | 1. Ability to understand comprehend the concept of limit states design method for collapse and serviceability, material properties and behaviour. <br><br> 2. Ability to understand and design Reinforced Concrete Flexural members - Beams, Slabs, Footings under bending, Shear and torsion. <br><br> 3. Ability to understand Design Reinforced concrete compression numbers - Columns under combined action of axial load and bending. <br><br> 4. Ability to understand Compute crack width and long term reflections as per limit state of serviceability. |

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## Course Objectives

1) To provide the students with a basic understanding of hydrologic data and hydrologic processes
2) To enable the student to predict the storm hydrograph for a given watershed resulting from a given rainfall event.
3) To provide the student with a basic introduction of groundwater flow processes.
4) To provide students the basic introduction of Watershed management practices.
5) To enable students to select appropriate method of irrigation depending upon availability of water, crop water requirements

**UNIT – I**

INTRODUCTION: Origin- Soil formation – soil structure and clay mineralogy – Adsorbed water – Mass- volume relationship –Relative density.
INDEX PROPERTIES OF SOILS: Grain size analysis – Sieve and Hydrometer methods – consistency limits and indices –I.S. Classification of soils

**UNIT –II**

PERMEABILITY: Soil water – capillary rise – flow of water through soils – Darcy's law- permeability – Factors affecting –laboratory determination of coefficient of permeability –Permeability of layered systems. In-situ permeability tests (pumping-in and pumping-out tests)
SEEPAGE THROUGH SOILS: Total, neutral and effective stresses –quick sand condition – Seepage through soils –Flownets: Characteristics and Uses.

**UNIT – III**

STRESS DISTRIBUTION IN SOILS: Boussinesq's and Wester gaard's theories for point loads and areas of different shapes – Newmark's influence chart.
COMPACTION: Mechanism of compaction – factors affecting – effects of compaction on soil properties. – Field compaction Equipment – compaction quality control.

**UNIT – IV**

CONSOLIDATION : Spring analogy-Void ratio and effective stress (e vs log p relationship- Tergaghi's theory of one dimensional consolidation – Assumptions and derivation of Governing Differential Equation (GDE)-Computation of magnitude of settlement and time rate of settlement

**UNIT – V**

SHEAR STRENGTH OF SOILS : Importance of shear strength-Mohr's – Coulomb's Failure theories – Shear Parameters-Laboratory tests for determination of strength tests –Direct shear test, Tri-axial compression test(UU,CU and CD) and unconfined compression tests- Vane shear test. Factors affecting shear strength of cohesion less and cohesive soils- Determination of elastic moduli.

**TEXT BOOKS:**

1 Basic and Applied Soil Mechanics by Gopal Ranjan & ASR Rao, New age International Pvt . Ltd, New Delhi
2. Soil Mechanics and Foundation Engineering . By K.R. Arora, Standard Publishers and Distributors,Delhi. Ltd., New Delhi
3. Geotechnical Engineering by C. Venkataramiah, New age International Pvt . Ltd, ( 2002).
4. Soil Mechanics and Foundation Engineering. By V.N.S.Murthy, CBS Publishers and Distributors.
5. Principles of geotechnical Engineering by B.M.Das, Cingage learning publishers

**REFERENCES:**

1. Soil Mechanics and Foundation by by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt.
2. Soil Mechanics – T.W. Lambe and Whitman, Mc-Graw Hill Publishing Company, Newyork.
3. Geotechnical Engineering by Purushotham Raj
4. Geotechnical Engineering by Manoj Dutta & Gulati S.K – Tata Mc.Grawhill Publishers New Delhi.

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| Geotechnical Engineering –I | 1. Ability to developed competence in the principles of soil mechanics and application in engineering practice. |
| | 2. Ability to list the relevant engineering properties of soils and their characteristics and describe the factors which control these properties. |
| | 3. Apply laboratory methods of determining the properties of soils. |
| | 4. Ability to identify common situations when the soilbecomes a factor in an engineering or environmental problem and apply basic analytical procedures to obtain the engineering quantity desired and understand their limitations. |

**Course Outcomes:**
1) The students will be able to assess stream flow, rainfall, and geographic data.
2) The students will be able to construct and apply models of hydrologic processes
3) Construct a rainfall hyetograph for a given storm duration and frequency
4) The students will be able to understand the component of ground water flow and aquifers in a hydrologic system.
5) The students will be able to calculate flows based on properties of soil, pumping tests, permeability estimation.

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**(A1116) STRUCTURAL ANALYSIS – II**

## Course Objective

1. To develop an understanding of theory and application of the various advanced methods of structural
analysis.
2. To understand the analytical procedure related to the analysis of building frame by some classical methods
viz. Kani's methods and approximate methods of analysis.
3. To understand matrix method and its application for computer based analysis of structure.
4. To develop the skill to deals with the problems of moving loads in the structures and their analysis
techniques.

**UNIT - I**
**Moment Distribution Method -** Analysis of single Bay Single Story Portal Frames including side sway. Analysis of inclined frames.
**Kani's Method:** Analysis of continuous beams including settlement of supports. Analysis of single bay single storey and single bay two storey Frames by Kani's Method Including Side sway. Shear force and bending moment diagrams. Elastic curve.

**UNIT - II**
**Slope Deflection Method:** Analysis of single Bay - Single storey Portal Frames by Slope Deflection Method Including Side Sway. Shear force and bending moment diagrams. Elastic curve.
**Two Hinged Arches:** Introduction - Classification of Two hinged Arches - Analysis of Two Hinged Parabolic arches - Secondary stresses in two hinged arches due to temperature and elastic shortening of rib.

**UNIT - III**
**Approximate Methods of Analysis:** Introduction - Analysis of multi- storey frames for lateral loads: Portal Method, Cantilever method and Factor method. Analysis of multi- storey frames for gravity (vertical) loads. Substitute Frame method. Analysis of Mill bents.

**UNIT - IV**
**Matrix Methods of Analysis:** Introduction - Static and Kinematic Indeterminacy - Analysis of continuous beams including settlement of supports, using stiffness method. Analysis of pin-jointed determinate plane frames using stiffness method - Analysis of single bay single storey frames including side sway, using stiffness method. Analysis of continuous beams upto three degree of indeterminacy using flexible method. Shear force and bending moment diagrams. Elastic curve.

**UNIT - V**
**Influence Lines for Indeterminate Beams:** Introduction - ILD for two span continuous beam with constant and variable moments of inertia. ILD for propped cantilever beams.

**Indeterminate Trusses:** Determination of static and kinematic indeterminacies - Analysis of trusses having single and two degree of internal and external indeterminacies - Castigliano's second theorem.

**TEXT BOOKS:**
1. Structural Analysis Vol - I & II by Vizarani and Ratwani, Khanna Publishers.
2. Structural Analysis Vol - I and II by Pundit and Guptha., Tata McGrew Hill Publishers.
3. Structural Analysis SI edition by Aslam Kassimali, Cengage Learning.

**REFFERENCES:**
1. Matrix Analysis of Structures by Singh, Cengage Learning Pvt.Ltd.
2. Structural Analysis by Hibbeler.
3. Basic Structural Analysis by C.S.Reddy., Tata McGrew Hill Publishers.
4. Matrix Analysis of Structures by Pundit and Gupta., Tata McGrew Hill Publishers.
5. Advanced Structural Analysis by A.K.Jain, Nem Chand Bros.

## Course Outcomes

Upon successful completion of this course, it is expected that students will be able to:

1. Apply fundamental concept of mathematics, statics and mechanics to understand the essentials of the
advanced method of structural analysis.
2. Understand the structural actions viz. rotations and displacements, especially in building frames subjected
to vertical and lateral loadings.
3. Generate mathematical expressions involving all possible structural actions.
4. Analyze building framing system and its components under the action of gravity and lateral loads and
thereby developing database for the design of the structure.
5. Identify, formulate and solve engineering problems and to effectively use and apply the computer friendly
structural analysis techniques viz. stiffness and flexibility methods to the field problems.
6. Deal with the problems of moving loads in the structures and their analysis techniques such as influence

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### (A1117) ENGINEERING GEOLOGY

## Course Objectives

1) The students will be introduced to the scope and relation of geology with civil engineering.
2) The students will learn physical geology, mineralogy, petrology, structural geology, and hydrology.
3) The students will be able to identify types of stones and minerals.
4) The students will be introduced to Geological aspects of earthquakes, landslides.
5) They will learn site investigation for dams, reservoir, bridges and various other civil engineering structures

**UNIT – I**

**INTRODUCTION:** Importance of geology from Civil Engineering point of view. Brief study of case histories of failure of some Civil Engineering constructions due to geological draw backs. Importance of Physical geology, Petrology and Structural geology.

**WEATHERING OF ROCKS:** Its effect over the properties of rocks importance of weathering with REFERENCE to dams, reservoirs and tunnels weathering of common rock like "Granite"

**UNIT – II**

**MINERALOGY:** Definition of mineral, Importance of study of minerals, Different methods of study of minerals. Advantages of study of minerals by physical properties. Role of study of physical properties of minerals in the identification of minerals. Study of physical properties of following common rock forming minerals: Feldspar, Quartz, Flint, Jasper, Olivine, Augite, Hornblende, Muscovite, Biotite, Asbestos, Chlorite, Kyanite, Garnet, Talc , Calcite. Study of other common economics minerals such as Pyrite, Hematite, Magnetite, Chlorite, Galena, Pyrolusite, Graphite, Magnesite, and Bauxite.

**PETROLOGY:** Definition of rock: Geological classification of rocks into igneous, Sedimentary and metamorphic rocks. Dykes and sills, common structures and textures of igneous. Sedimentary and metamorphic rocks. Their distinguishing features, Megascopic study of Granite, Dolerite, Basalt, Pegmatite, Laterite, Conglomerate, Sand Stone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble and Slate.

**UNIT –III**

**STRUCTURAL GEOLOGY: Out** crop, strike and dip study of common geological structures associating with the rocks such as folds, faults unconformities, and joints - their important types. Their importance In-situ and drift soils, common types of soils, their origin and occurrence in India. Stabilization of soils. Ground water, Water table, common types of ground water, springs, cone of depression, geological controls of ground water movement, ground water exploration.

Earth quakes, their causes and effects, shield areas and seismic belts. Seismic waves, Richter scale, precautions to be taken for building construction in seismic areas. Land slides, their causes and effect; measures to be taken to prevent their occurrence. Importance of study of ground water, earth quakes and land slides.

**UNIT –IV**

**GEOLOGY OF DAMS RESERVOIRS:** Types of dams and bearing of Geology of site in their selection, Geological Considerations in the selection of a dam site. Analysis of dam failures of the past. Factor's Contributing to the success of a reservoir. Geological factors influencing water Lightness and life of reservoirs. Importance of Geophysical studies Principles of geophysical study by Gravity methods. Magnetic methods, Electrical methods. Seismic methods, Radio metric methods and Geothermal method. Special importance of Electrical resistivity methods, and seismic refraction methods. Improvement of competence of sites by grouting etc. Fundamental aspects of Rock mechanics and Environmental Geology.

**UNIT – V**

**TUNNELS:** Purposes of tunneling, Effects of Tunneling on the ground Role of Geological Considerations (.lithological, structural and ground water) in tunneling over break and lining in tunnels. Tunnels in rock ,subsidence over old mines, minining substances

**TEXT BOOKS:**

1. Engineering Geology by N. Chennkesavulu, McMillan, India Ltd. 2nd addition
2. Principals of Engineering Geology by K.V.G.K. Gokhale – B.S publications

3. Engineering Geology by Subinoy Gangopadhyay.Oxward University press

**REFERENCES:**

**1.** Engineering Geology for Civil Engineering, P.C.Varghese, PHI Learning& private Limited

**2.** Geology of Engineering by Aurele Parriaux, CRCpress

3 F.G. Bell, Fundamental of Engineering Geology Butterworths, Publications, New Delhi, 1992.

4 Krynine & Judd, Principles of Engineering Geology & Geotechnics, CBS Publishers & Distribution,

**Course Outcomes:**

At the end of this course:

1) Students will be able to identify different type of rocks and minerals.

2) Students will be able to draw geological maps.

3) This course will help them for preliminary geological investigation of site related to civil engineering projects

**B.Tech .CE-V Sem**

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## (A1118) WATER RESOURCES ENGINEERING – I

**UNIT-I**

Introduction to engineering hydrology and it's applications, Hydrologic cycle, types and forms of precipitation, rainfall measurement, types of rain gauges, computation of average rainfall over a basin, processing of rainfall data – Adjustment of record – Rainfall Double Mass Curve. Runoff – Factors affecting Runoff- Runoff over a Catchment – Empirical and Rational Formulae.

Abstraction from rainfall – evaporation, factors affecting evaporation, measurement of evaporation – Evapotranspiration – penman and Blaney & Criddle Methods – Infiltration, factors affecting infiltration, measurement of infiltration, infiltration indices.

**UNIT – II**

Distribution of Runoff – Hydrograph Analysis Flood Hydrograph – Effective Rainfall – Base Flow – Base Flow Separation – Direct Runoff Hydrograph – Unit Hydrograph, definition, and limitations of applications of Unit hydrograph , derivation of Unit Hydrograph from Direct Runoff Hydrograph and versa – S – hydrograph, synthetic Unit Hydrograph.

**UNIT – III**

Ground water Occurrence, types of aquifers, aquifer parameters, porosity, specific yield, permeability, Transmissivity and storage coefficient, Darcy's law, radical flow to wells in confined and unconfined aquifers. Types of wells – well Construction – well Development.

**UNIT – IV**

Necessity and Importance of Irrigation, advantages and ill effects of Irrigation, types of Irrigation, methods of application of Irrigation water, Indian agricultural soils, methods of improving soil fertility – Crop Roation, preparation of land for Irrigation, standards of quality for Irrigation water.

Soil – water – plant relationship, vertical distribution of soil moisture, soil moisture constants, soil moisture tension , consumptive use, Duty and delta factors affecting duty – Design discharge for a water course. Depth and frequency of Irrigation, irrigation efficiencies – Water Logging.

**UNIT – V**

Classification of canals, Design of Irrigation canal by Kennedy's and Lacey's theories, balancing depth of cutting , IS standards for a canal design canal lining

Design Discharge over a catchment, computation of design discharge – rational formula, SCS curve number method, flood frequency analysis – Introductory part only. Stream Gauging – measurement and estimation of stream flow.

**TEXT BOOKS:**
1. Engineering Hydrology by Jayaram Reddy, Laxmi publication pvt.Ltd., New Delhi
2. Irrigation and water power engineering by punmia & Lal, Laxmi publications pvt. Ltd., New Delhi

**REFERENCES:**
1. Elementary hydrology by V.P. Singh, PHI publications.
2. Irrigation and water Reasources & Water power by P.N.Modi, Standard Book House.
3. Irrigation water Management by D.K. Majundar, Printice Hall of India.
4. Irrigation and Hydraulic structures by S.K. Grag.
5. Applied hydrology by Vent te chow, David R. maidment larry W.Mays Tata MC. Graw Hill
6. Introduction to hydrology by Warren Viessvann, Jr. Garryl. Lewis, PHI

Course Outcomes

1. Understand the water resources importance, occurrence, forms and availability India.
2. Ability to understand Plan, develop and management of water resource in Indian context
3. Ability to understand Different forms water availability and its exploration methods for different uses
4. Ability to understand Storage and conservation of water by planning and constructing the different types of dams, canals etc
5. Ability to understand Prepare reports on a water resource project with the knowledge acquired in completion of the course with other subjects.

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## (A1119) HYDRAULICS & HYDRAULIC MECHINERY LAB.

## Course Objective
The main objective of this lab course is to make the students in better understanding of fluid mechanics
phenomena such as variation of velocity and pressure, measuring head loss in terms of differential head,
liquid jet forces acting on various type of vanes and measurement of flow rate by various devices such as
orifice meter, weir etc.

**SYLLABUS**
**LIST OF EXERCISES:**

1. alibration of Venturimeter & Orifice Meter

2. Determination of Coefficient of discharge for a small orifice/mouth piece by constant head method

3. Calibration of contracted Rectangular Notch and / Triangular Notch

4. Determination of friction factor of a pipe

5. Determination of Coefficient for minor losses

6. Verification of Bernoulli Equation

7. Impact of Jet on Vanes

8. Performance test on Pelton wheel turbine

9. Performance test on Francis turbine

10. Performance characteristics of a single stage centrifugal pump

11. Performance characteristics of a multi-stage centrifugal pump

12. Performance characteristics of a reciprocating pump

## Course Outcomes
Upon successful completion of this course, it is expected that students will be able to:
1. Design intricacies of hydraulic structures such as dams, spillways, weirs, sluice gate etc.
2. Design water and waste water disposal system.
3. Design and select appropriate rotodynamic system.
4. Use appropriate type of flow measuring devices

**B.Tech .CE-V Sem**

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**(A1120) ENGINEERING GEOLOGY LAB**

## Course Objective

1 .Study of physical properties and identification of minerals referred under theory.

2.Megascopic and microscopic description and identification of rocks referred under Theory.

3 .Megascopic identification of rocks& Minerals

4.Interpretation and drawing of sections for geological maps showing tilted beds, faults, unconformities

5.Simple Structural Geology problems

**LAB EXAMINATION PATTERN:**

1.Description and Identification of Six minerals

2.Description and identification of six(Including igneous, sedimentary and metamorphic rocks)

3.Interpretation of a Geological map along with a geological section.

4.Simple strike and Dip problems.

## Course Outcomes

Upon successful completion of this course, it is expected that students will be able to:

1. Learn about the ground surface features based on map patterns of contour within the framework of fundamental concepts of basic sciences with emphasis on practical application in civil engineering.

2. Know about different earth materials, their physical properties and their application in day to day use.

3. Identify physical and mechanical properties of rock and its application in civil engineering uses.

4. Produce lab and technical reports for effective communication amongst stakeholders to comprehend complex problems and accordingly employ state of the art technologies.

**B.Tech .CE- V Sem**                                      **L    T    P    C**

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**(A1011) ANALYTICAL SKILLS-1**

**Quantitative Aptitude**
- ➢ Number System

- ➢ LCM and HCF

- ➢ Averages

- ➢ Simple Equations

- ➢ Ratios & Proportions

- ➢ Partnerships

- ➢ Percentages

- ➢ Profit & Loss

- ➢ Time & Work

- ➢ Time & Distance

- ➢ Simple and compound interest

- ➢ Permutations & Combinations

- ➢ Probability

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### (A1121) DESIGN OF STEEL STRUCTURES & DRAWING

❖ To perform structural stability analysis.

❖ To perform plate girders and steel structures such as roof trusses and building frames for industrial buildings.

❖ To perform analysis and design of tubular structures.

❖ To analyze and design various types of steel bridges.

❖ To introduce analysis and design of steel transmission line towers and tower foundations.

❖ To analyze and design aluminum and light weight structures.

**UNIT - I**
Materials - Making of iron and steel - Types of structural steel - mechanical properties of steel - Concepts of plasticity - yield strength. Loads - and combinations loading wind loads on roof trusses, behaviour of steel, local buckling. Concept of limit State Design - Different Limit States as per IS 800 - 2007 - Design Strengths - deflection limits - serviceabiolity - Bolted connections - Welded connections - Design Strength - Efficiency of joint - Prying action Types of Welded joints - Design of Tension members - Design Strength of members.

**UNIT -II**
Design of compression members - Buckling class - slenderness ration / strength design - laced - battened columns - column splice - column base - slab base.

**UNIT -III**
Design of beams - Plastic moment - Bending and shear strength laterally / supported beams design - Built up sections - large plates Web Buckling Crippling and Deflection of Beams, Design of Purlin.

**UNIT -IV**
Design of eccentric connections with brackets, Beam end connections - Web angle - Un-stiffened seated connections (bolted and Welded types) Design of truss joints

**UNIT - V**
Design of welded plate girders - optimum depth Design of main section - Design of end bearing stiffness and intermediate stiffness
Connection between web and flange and Design splice and web splices.

**TEXT BOOKS:**
1. Design of steel structures - N.Subramanian, Oxford University Press - 2009
2. Limit State Design of steel structures, S.K.Duggal, Tata McGraw- Hill,2010

**REFERENCE BOOKS:**
1. Design of steel structures by K.S.Sai Ram, Person Education.
2. Design of Steel Structures Edwin H.Gaylord, Jr.Charles N.Gaylord and James Stallmeyer Tata McGraw-Hill Education pvt.Ltd.
3. Design of steel structures Vol. 1& 2 - Ramchandra, Standard Publications.

Course outcomes
1. Ability to understand the concept of limit state method of design of steel structures,         Material properties and types of steel and behaviour.
2. Ability to understand Design simple Bolted, Riveted and Welded Connections as well as eccentric and moment connections.
3. Ability to understand Design Tension and compression Members including splice connections and column bases, Beams and plate girder.

4. Ability to understand the forces in roof trusses and design the various structural elements there in.

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## (A1122) GEOTECHNICAL ENGINEERING-II

### Course Objective

1. To develop an understanding to perform site investigations and to determine the soil parameters needed to carry out foundation design.
2. To learn the subsurface exploration techniques and apply them to design the foundations and retaining walls.
3. To understand and be able to apply the modeling and analysis techniques used in design of foundation: (a) Coulomb's and Rankine's theory for earth retaining structure; (b) Terzaghi's and Skempton's analysis for bearing capacity; (c) Engineering News and Hiley's formula for load carrying capacity of pile.
4. To apply the principles of soil mechanics to design of shallow and deep foundations including bearing capacity, stability analysis of slopes and settlement calculations
5. To compute the lateral earth pressure, select size of retaining walls and ensure safety against external forces and moments.
6. To enable students to prepare professional reports for design projects and data presentation skill and to use computers and some computer graphics.

**UNIT – I**

**SOIL EXPLORATION**: Need – Methods of soil exploration – Boring and Sampling methods – Field tests – Penetration Tests
– Plate load test – Pressure meter – planning of Programme and preparation of soil investigation report.
**UNIT – II**

**EARTH SLOPE STABILITY**: Infinite and finite earth slopes – types of failures – factor of safety of infinite slopes – stability analysis by Swedish arc method, standard method of slices, Bishop's Simplified method – Taylor's Stability Number-Stability of slopes of earth dams under different conditions.

**UNIT – III**

**EARTH PRESSURE THEORIES**: States of earth pressures-Active, Passive and at rest conditions-Rankine's theory-Computation of Active and Passive Earth Pressures in Cohesion less and Cohesive soils, Coloumb's wedge theory– Culmann's graphical method
**RETAINING WALLS**: Types of retaining walls – stability of retaining walls against overturning, Sliding, bearing capacity and drainage from backfill.

**UNIT – IV**

**SHALLOW FOUNDATIONS**- STREANGTH CRITERION: Types-Choice of foundation-Location of depth- safe bearing capacity-Terzaghi and Meyrhoff, Skempton and IS methods.
**SHALLOW FOUNDATIONS** – settlement criteria – Safe bearing pressure based on N value-Allowable bearing pressure: Safe bearing capacity- Allowable settlement of structures

**UNIT-V**

**PILE FOUNDATION**: Types of piles – Load carrying capacity of piles based on static pile formulae in different soils – Dynamic pile formulae – Pile load tests - Load carrying capacity of pile groups in sands and clays – Settlement of pile groups.

**WELL FOUNDATIONS**: Types – Different shapes of wells – Components of wells – functions
 and design Criteria – Sinking of wells – Tilts and shifts.

**TEXT BOOKS:**

1.  Basic and Applied Soil Mechanics by Gopal Ranjan & ASR Rao, New Age International Pvt. Ltd, (2004).
2.  Soil Mechanics and Foundation Engineering . By V.N.S.Murthy, CBS Publishers and Distributors.
3.  Bowles, J.E., (1988) Foundation Analysis and Design – 4th Edition, McGraw-Hill Publishing company, Newyork.
4.  Soil Mechanics and Foundation Engineering . By K.R. Arora, Standard Publishers and Distributors, Delhi

**REFERENCES:**

1.  Geotechnical Engineering by C. Venkataramiah, New age International Pvt . Ltd, ( 2002).
2.  Das, B.M., - (1999) Principles of Foundation Engineering –6th edition (Indian edition) Thomson Engineering

3.  Analysis and Design of Substructures – Swami Saran, Oxford and IBH Publishing company Pvt Ltd ( 1998 ).
4.  Geotechnical Engineering by S. K.Gulhati & Manoj Datta – Tata Mc.Graw Hill Publishing company New Delhi. 2005.
5.  Soil Mechanics and Foundations by - by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi
6.  Foundation Engineering by Varghese,P.C., Prentice Hall of India., New Delhi.

Course Outcomes
1.  Ability to understand important geotechnical features in the design and construction of underground opening s in soils.
2.  Ability to understand plan and design a surface exploration programme based on anticipated geotechnical logic conditions and potential construction problems.
3.  Ability to understand bore log of soil samples and prepare boring logs for civil engineering projects.
4 Ability to understand recognize ground behavior and identify important geotechnical parameters in soil exposure.

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## (A1123) WATER RESOURCES ENGINEERING – II

**UNIT - I**
Storage Works – Reservoirs – Types of reservoirs, selection of site for reservoir, zones of storage of a reservoir , reservoir yield , estimation of capacity of reservoir using mass curve – Reservoir Sedimentation – Life of Reservoir. Types of dams, factors affecting selection of type of dam, factors governing selection of site for a dam.

**UNIT - II**
Gravity dams : Forces acting on a gravity dam, causes of failure of a gravity dam, elementary profile and practical profile of a gravity dam, limiting height of a low gravity dam, Factors of safety – stability analysis, Foundation for a Gravity Dam, drainage and inspection galleries.

**UNIT- III**
Earth dam: types of Earth dams, causes of failure of earth dam, criteria for safe design of earth dam, seepage through earth dam – graphical method, measures for control of seepage.
Spill ways: types of spillway, Design principles of Ogee spillways – spillway gates. Energy Dissipaters and stilling basins singnificance of Jump Height Curve and tail water Rating curve – USBR and Indain types of stilling Basins.

**UNIT – IV**
Diversion Head works: Types of Diversion head works – weirs and barrages, layout of diversion head work – components. Causes and failure of weirs and Barrages on permaeable foundations – silt Ejectors and silt Excluders Weirs on permeable Foundations – Creep Theories – Bligh's Lane's and Khosla's theories, Determination of uplit pressure – various Correction Factors – Design principales of weirs on permeable foundations using Creep theories – exit gradient, U/S and D/S Sheet piles- Launching Apron.

**UNIT – V**
Canal Falls – types of falls and their location, Design principles of Notch fall and sarada type Fall.
Canal regulation works, principles of design of distributory and head regulators, Canal Cross Regulators – Canal outlets, types of canal modules, proportionality, sensitivity and flexibility.
Cross Drainage works: Types, selection of site, Design principles of aqueduct, siphon aqueduct and super passage.

**TEXT BOOKS**
1. Irrigation engineering and hydraulic structures by S.K. Garge, Khanna publications pvt.Ltd., New Delhi
2. Irrigation and water power engineering by punmia & Lal, Laxmi publications pvt.Ltd., New Delhi

**REFERENCES:**
1. Irrigation and resources engineering by G.L.Asawa, New Age International publishers
2. Theory and Design of Hydraulic structures by Varshney, Gupta & Gupta
3. Irrigation engineering by K.R.Arora
4. Irrigation Engineering by R.K.Sharma and T.K.Sharma, S. Chand publishers
5. Introduction to hydrology by warrenViessvann, Jr.Gary. Lewis, PHI
6. Engineering Hydrology by CS Pojha, R.Berndtsson and P.Bhunya, Oxford University press

Course Outcomes
1. Ability to understand water resources importance, occurrence, forms and availability in India
2. Ability to plan, develop and management of water resources in the context of India
3. Ability to understand different forms, water availability and its exploration methods for different uses
4. Ability to understand storage and conservation of water by planning and constructing different types of dams, canals etc

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## (AUTONOMOUS)

**B.Tech .CE- VI Sem**

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## (A1124) TRANSPORTATION ENGINEERING-I

**UNIT I**

**HIGHWAY DEVELOPMENT AND PLANNING**: Highway development in India – Necessity for Highway Planning- Different Road Development Plans- Classification of Roads- Road Network Patterns – Highway Alignment- Factors affecting Alignment- Engineering Surveys – Drawings and Reports

**UNIT – II**

**HIGHWAY GEOMETIC DESIGN:** Importance of Geometric Design- Design controls and Criteria- Highway Cross Section Elements- Sight Distance Elements- Stopping sight Distance, Overtaking Sight Distance and intermediate Sight Distance- Design of Horizontal Alignment-Design of Super elevation and Extra widening-Design of Transition Curves-Design of Vertical alignment-Gradients- Vertical curves.

**UNIT – III**

**TRAFFIC ENGINEERING & REGULATIONS**: Basic Parameters of Traffic-Volume, Speed and Density-Traffic Volume Studies- Data Collection and Presentation- speed studies- Data Collection and Presentation-Origin & Destination Studies, Parking Studies – On Streets & Off-street Parking- Road Accidents- Causes and Preventive Measures- Accident Data Recording – Condition Diagram and Collision Diagrams-Traffic Signs – Types and Specifications – Road Markings- Need for Road Markings- Types of Road Markings- Design of Traffic Signals-Webster Method.

**UNIT – IV**

**INTERSECTION DESIGN:** Types of Intersections – Conflicts at Intersections- Requirements of At-Grade Intersections- Types of At-Grade Intersections- Channelized and Unchannelized Intersections-–TrafficIslands - Types of Grade Separated Intersections- Rotary Intersection – Concept of Rotary – Design Factors of Rotary-Advantages and Limitations of Rotary Intersections

**UNIT: V**

**HIGHWAY MATERIAL, CONSTRUCTION AND MAINTENANCE:** Highway Materil Characterization: Subgrade Soil, Stone Aggregates, Bitumen Materials,Construction of Gravel Roads- Construction of water Bound Macadam Roads- Construction of Bituminious Pavements:Surface Dressing, Bitumen Bound Macadam, Bituminious Concrete- Construction of Cement Concrete Pavements- Construction of joints on cement Cxoncrete Pavements-joint Filler and Seal- Pavement Failures- Maintenance of Highways- Highway Drainage.

**TEXT BOOKS:**
1. Highway Engineering – S.K.Khanna & C.E.G.Justo, Nemchand & Bros., 7th edition (2000).
2. Railway Engineering – A text book of Transportation Engineering – S.P.chadula – S.Chand & Co. Ltd. – (2001).
3. Highway Engineering Design – L.R.Kadiyali and Lal- Khanna Publications.
4.Airport Planning and Design- S.K.Khanna and Arora,Nemchand Bros.

**REFERENCES:**
1. Highway Engineering – S.P.Bindra , Dhanpat Rai & Sons. – 4th Edition (1981)
2. Traffic Engineering & Transportation Planning – Dr.L.R.Kadyali, Khanna publications – 6th Edition – 1997.
3. Railway Engineering – August – Prabha & Co., 15th Edition – 1994.
4. Air Transportation Planning & design – Virendhra Kumar & Statish Chandhra – Gal Gotia Publishers (1999).

Course Outcomes

1. Ability to understand history of transportation and development roads.
2. Ability to know about geometric design of roads, traffic Engineering & Traffic regulation, Management studies & Intersection design using various methods.
3. Ability to understand basics of railway engineering & its component of railway track & its Geometric designs
4. Ability to understand basic requirement for airport & its geometric design.

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### (A1125) ENVIRONMENTAL ENGINEERING

## Course Objective

1. To make the students conversant about the environmental pollution problems related to land, air and
water.
2. To make the students conversant about the principles of water treatment processes including the problems
involved in handling the different sources of water supply.
3. To impart basic knowhow of the process of collection and distribution of domestic wastewater and to
make them learn about the different techniques of onsite treatment of sewage.
4.  To impart a comprehensive knowledge of the different wastewater treatment processes including the latest
state of the art technologies.
5. To get a brief idea of solid waste collection, its sources and characteristics and the different
methods of disposal of solid waste

### UNIT-I

Introduction: Water supply Schemes- Protected water supply- Population forecasts, design period- water demand- Types of demand – factors affecting-fluctuations- fire demand –Sources of Water- intakes- infiltration galleries, confined and unconfined aquifers- water quality parameters and testing- drinking water standards

### UNIT-II

Layout and general outline of water treatment units- sedimentation, uniform setting velocity- principles- design factors- surface loading- jar test –optimum dosage of coagulant- coagulation- flocculation, clarifier design- coagulants –feeding arrangements. Filtration- theory- working of slow and rapid gravity filters- multimedia filters- design of filters-troubles in operation comparison of filters –disinfection- types of disinfection – theory of chlorination –chlorine demand- other disinfection treatment methods. Distribution systems- Types of layouts of Distribution systems – design of distribution systems- Hardy Cross and equivalent pipe methods-service reservoirs- Determination of Storage Capacity.

### UNIT-III

Conservancy and water carriage systems- sewage and storm water estimation- time of concentration- storm water overflows combined flow- characteristics of sewage – examination of sewage-B.O.D.- C.O.D .equations .Design of sewers
Shapes and materials- Sewer appurtenances manholes- inverted siphon- catch basins-flushing tanks- ejectors, pumps and pumping houses- house drainage- components requirements – sanitary fittings- traps-one pipe and two pipe systems of plumbing.

**UNIT-IV**

Layout and general outline of various units in a waste water treatment plant-primary treatement design of screens-grit chambers- skimming tanks- sdementation tanks- principle and design of biological treatement- trickling filters-standard and high rat- Filters-ASP- Asp modification- Areation.

**UNIT-V**

Construction and design of oxidation ponds- Oxidation ditches- Sludge Treatment- Sludge digestion tanks-design of digestion tank- Factors affecting sludge digestion- sludge disposal by drying- septic tanks- working principles and design- soak pits. Ultimate disposal of waste water- self purification of rivers- Sewage farming.

**TEXT BOOKS:**

1. Water supply& Sanitary Engineering by G.S.Bindie.
2. Water supply Engineering, Vol. I waste water Engineering. Vol. II
 B.C.Punmia, Ashok jain& Arun Jain, Laxmi Publications Pvt.ltd New Delhi
3. Water Supply Engineering Vol.I& waste water Engineering Vol. II .P.N.Modi, Standard Book Publishers, New Delhi.

**REFERENCES**

1. Waste Water Technology By Mark J Hammer and Mark J Hammer Jr
2. Water and Waste Water Technology by Steel
3. Waste Water Engineering by Fair Geyer and Okun.
4. . Waste Water Engineering by Metcalf and Eddy
5. Theory & practice of water & waste water Treatement by Ronald L Drose,Wiley India Publishers

Course Outcomes
  ❖ Ability to understand water borne diseases and how protected water supply is made.
  ❖ Ability to understand to differentiate quality and quantity of water.
  ❖ Ability to understand layout and general outline of water treatment units.
  ❖ Ability to understand to analyse the design of slow sand and rapid sand filters.

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**(AUTONOMOUS)**
**(A1126) CONSTRUCTION TECHNOLOGY AND PROJECT MANAGEMENT**
**(ELECTIVE-I)**

**Objectives:**

❖ To explain the main responsibilities of a project manager and how to carry out these.
❖ To equip the students with modern project approaches and project management techniques including the project crashing and resource allocation techniques.
❖ To provide tools for project control and evaluation.
❖ To explain the benefits of undertaking effective contract management.
❖ To provide the various methods for estimating the cost of the construction project.
❖ To explain the details of the accounts procedure of the PWD works.
❖ Apply computer skills to project management and evaluation.

**UNIT-I**

Management process- Roles, management theories, Social responsibilities, planning and strategic management, strategic implementation, Decision making tools and techniques-Organizational structure, Human resource management- motivation performance- leadership.

**UNIT-II**

Classification of construction projects, Construction Stages, Resources-Functions of Construction Management and its Applications, Preliminary planning –Collection of Data-Contract planning –Scientific Methods of Management; Network Techniques in construction management- Bar Chart-Grant Chart, CPM- PERT-Cost & Time optimization .

**UNIT-III**

Resource planning – planning for manpower, materials, Cost, equipment, Labour, Scheduling, Forms of , Scheduling-Resource allocation, budget and budgetary control methods.

**UNIT-IV**

Contract-types of contract, contract document, specification, important conditions of contract- tender and tender document- Deposits by contractor –Arbitration, negotiation – M- Book –Muster rolls- stores

**UNIT-V**

Management information systems- Labour Regulations: Social security-welfare Legislation-laws relating to wages , Bonus and industrial disputes, Labour administration – insurance and safety Regulations- Workmen's compensation Act – other labour laws- safety in construction : legal and financial aspects of accidents in construction , occupational and safety hazard assessment , human factors in safety , legal and financial aspects of accidents , occupational and safety hazard assessment.

**TEXT BOOKS**
1) Ghalot,P.S., Dhir,D.M., Construction planning and Management ,Wiley Eastern limited,1992
2) Chikara,K.K., Construction Project Management, Tata McGraw Hill publishing Co,Ltd New Delhi,1998
3) Punima,B.C., Project planning and Control with PERT and CPM, Laxmi Publications New Delhi 1987

**REFERENCE:**
1. Construction Management and Planning by Sengupta,B. Guha,H., Tata McGraw Hill publictions

## Course Outcomes

1. Ability to choose and adopt suitable mechanised equipment at various stages of major construction project life cycle.

2. Ability to understand significance and benefits of quality control (QC) and quality assurance (QA) in a major construction project.

3. Ability to understand and differentiate various estimates, phases involved in bidding process for a huge complex project.

4. Ability to understand various activities involved in project planning and apply them suitably for various types of construction projects.

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## (A1127) FINITE ELENENT METHODS
### (ELECTIVE-I)

**Course Objectives**

- ❖ Understand the fundamental ideas of FEM.
- ❖ Know the behavior and usage of different elements.
- ❖ Prepare a FEM model for structures.
- ❖ Analyze structure using a software.
- ❖ Interpret and evaluate the results

**UNIT – I**

Introduction to Finite Element Method – Basic Equations in Elasticity – stress strain equations – concept of plane stress – plane strain – advantages and disadvantages of FEM.
Element shapes – nodes – nodal degree of freedom – strain displacement relations.

**UNIT – II**

Finite Element Analysis (FEA) of – one dimensional problems – Bar element – Shape functions stiffness matrix.
FEA Beam elements – stress strain relation – shape functions- stiffness matrix – continuous beams.

**UNIT - III**

FEA Two dimensional problem – CST – LST element – shape function – stress – strain.
Lagrangian – Serendipity elements – Hermite polynomials – regular, Irregular2 D & 3 D – Element – shape functions.

**UNIT – IV**

Isoparametric formulation – Concepts of isoparametric elements for 2D analysis – formulation of CST element, 4-noded and 8-noded iso-parametric quadrilateral elements.

**UNIT – V**

Solution Techniques: Numerical Integration, Static condensation, assembly of elements and solution techniques for static loads.

**TEXT BOOKS:**

1. Introduction to Finite elements in engineering by Chandrupatla, Belegundu, Prentice Hall.
2. Finite element method by Daryl L.Logan, CENGAGE Learning.

**REFERENCES:**

1. Finite element analysis by S.S.Bhavikatti – New age International publishers.
2. Finite element analysis by P.Seshu, PHI.

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## (A1128) ADVANCED STRUCTURAL DESIGN
### (ELECTIVE-I)

**UNIT-I**
Design and detailing of cantilever type of retaining walls- stability Check.-Principles of Counterfort. Retaining walls and shelf type retaining walls.

**UNIT-II**
Design of circular and Rectangular Water tanks at Ground level and elevated with staging.

**UNIT-III**
Design of Flat slabs- Design of Raft and pile foundations.

**UNIT-IV**
Design of Concrete Bridges- IRC loading Design of Slab bridge, T- beam gider bridge.

**UNIT-V**
Design of RCC Chimneys Bunkers& Silos

**TEXT BOOKS**
1. Advanced reinforced Concrte Structures by Varghese, Pranties Hall of India Pvt.Ltd.

2. Bridge Engineering By S.Ponnuswamy. Mc Graw Hill Co

3. Reinforced Concrete Design by S.A. Pillai and D.Menon, Tata Mc Graw Hill Publishing Company.

4. Advanced reinforced Concrete Structures by Krishna Raju

**REFERENCES:**
1. Reinforced Concrete Structures Vol. 2 by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, Publications Pvt.Ltd. New Delhi

2. Essentials of Bridge Engineering By D.John Son Victor, Oxford and IBM Publication Co. Pvt. Ltd.

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## (A1129)GEOTECHNICAL ENGINEERING LAB

**LIST OF EXPERIMENTS**
1. Atterberg's Limits (LL & PL)
2. Field density-core and sand replacement method
3. Grain size analysis
4. Permeability of soil, constant and variable head test
5. Compaction Test
6. CBR Test
7. Consolidation Test
8. Unconfined Test
9. Tri-axial Compression test
10. Direct shear test
11. Vane shear test

**Note:** Any eight experiments may be completed.

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## (A1004) ADVANCED ENGLISH COMMUNICATION SKILLS LAB

**Introduction**

The introduction of the English Language Lab is considered essential at 3rd year level. At this stage the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalised context.

**Objectives**:
This Lab focuses on using computer-aided multimedia instruction for language development to meet the following targets:

➢ To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.

➢ Further, they would be required to communicate their ideas relevantly and coherently in writing.

**LEARNING OUTCOMES**

➢ Gather ideas and information, to organise ideas relevantly and coherently.
➢ Engage in debates.
➢ Participate in group discussions.
➢ Face interviews.
➢ Write project/research reports/technical reports.
➢ Make oral presentations.
➢ Write formal letters.
➢ Transfer information from non-verbal to verbal texts and vice versa.

➢ To take part in social and professional communication.

**Syllabus**:
The following course content is prescribed for the Advanced Communication Skills Lab:

1. **Functional English** –

- Starting a conversation
- responding appropriately and relevantly
- using the right body language
- roleplay                         in                    different                    situations.

2. **Vocabulary building**

- synonyms and antonyms,
- word roots,
- one-word substitutes,
- prefixes and suffixes,
- study of word origin,
- analogy,
- idioms and phrases verbs

### 3. Group Discussion –

- dynamics of group discussion,
- intervention,
- summarizing,
- modulation of voice,
- body language,
- relevance, f
- fluency and coherence.

### 4. Interview Skills –

- concept and process,
- pre-interview planning,
- opening strategies,
- answering strategies,
- Interview through tele and video-conferencing.

### 5. Resume and Technical Report writing –

- structure and presentation,
- planning,
- defining the career objective,
- projecting ones strengths and skill-sets,
- summary, formats and styles,
- Letter-writing.
- **Reading comprehension** – reading for facts, guessing meanings from context, scanning, skimming, inferring meaning and critical reading.

**Minimum Requirement:**

**The English Language Lab shall have:**

- The Computer aided Language Lab for 60 students with 60 systems,

- One master console, LAN facility and English language software for self- study by learners.

- The Communication Skills Lab with movable chairs and audio-visual aids with a P.A System, a T. V., a digital stereo –audio & video system and camcorder etc.

- System Requirement (Hardware component):

- Computer network with Lan with minimum 60 multimedia systems with the following specifications:
  P – IV Processor
  d) Speed – 2.8 GHZ
  e) RAM – 512 MB Minimum
  f) Hard Disk – 80 GB
  Headphones of High quality

**Suggested Software**:
The software consisting of the prescribed topics elaborated above should be procured and used.

Suggested Software:

- Clarity Pronunciation Power – part II

- Oxford Advanced Learner's Compass, 7th Edition

- DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.

- Lingua TOEFL CBT Insider, by Dreamtech

- TOEFL & GRE( KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)

- The following software from 'train2success.com'

  - ✓ Preparing for being Interviewed,

  - ✓ Positive Thinking,

  - ✓ Interviewing Skills,

  - ✓ Telephone Skills,

  - ✓ Time Management

  - ✓ Team Building,

  - ✓ Decision making

DISTRIBUTION AND WEIGHTAGE OF MARKS English Language Laboratory Practical Examination:
1. The practical examinations for the English Language Laboratory shall be conducted as per the University norms prescribed for the core engineering practical sessions.
2. For the Language lab sessions, there shall be a continuous evaluation during the year for **25** sessional marks and **50** year-end Examination marks. Of the **25** marks, **15** marks shall be awarded for day-to-day work and **10** marks to be awarded by conducting Internal Lab Test(s). The year- end Examination shall be conducted by the teacher concerned with the help of another member of the staff of the same department of the same institution.

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**(A1012) Analytical Skills-II**

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**Logical Reasoning**
➢ Analogy

➢ Classification

- ➢ Series & Sequence

- ➢ Coding & Decoding

- ➢ Directions

- ➢ Blood Relations

- ➢ Seating Arrangements

- ➢ Clocks and Calendars

**Analytical Ability & Reasoning**
- ➢ Cubes

- ➢ Logical Deductions

- ➢ Figure Analysis

- ➢ General Puzzles

- ➢ Data Sufficiency

- ➢ Data Interpretation

**Business English**
- ➢ Basics of Communication Skills
- ➢ Articles
- ➢ Tenses
- ➢ S+ V agreement
- ➢ Model Verbs
- ➢ Be/do/has/have forms
- ➢ Question forms

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### (A1130 ) GROUND WATER DEVELOPMENT AND MANAGEMENT

**(ELECTIVE-II)**
**UNIT-I**
Ground Water occurrence, Ground water hydrologic cycle, origin of ground water, rock properties effecting ground water, vertical distribution of ground water, zone of aeration and zone of saturation, geologic formation as aquifers ,porosity , Specific yield and Specific retention.
**UNIT-II**

Ground Water Movement: Permeability, Darcy's law, storage coefficient, Transmissivity, differential equation governing ground water flow in three dimensions derivation, ground water flow contours their applications.

**UNIT-III**

Steady ground water flow towards a well in confined and unconfined aquifers- Dupuit's and Theim's equations, Assumptions, Formation constants, yield of an open well, Well interface and well tests- Recuperation Test.

Unsteady flow towards a well- Non equilibrium equations - Theis solution-Jocob and Chow's simplifications, Leaky aquifers- Well interference.

**UNIT- IV**

Surface and Subsurface Investigation: Surface methods of exploration- Electrical resistively and Seismic refraction methods. Subsurface methods- Geophysical logging and resistively logging. Aerial Photogrammetry applications along with case studies in Subsurface Investigation.

Artificial recharge of Ground Water: Concept of artificial recharge - recharge methods, relative metrics, Applications of GIS and Remote Sensing in Artificial Recharge of Ground water along with Case studies.

**UNIT - V**

Well Construction - Drilling Equipment used for Well Equipment used for well construction - Bore log - Interpretation of Log Data.

Saline Water Intrusion in aquifer: Occurrence of saline water intrusions, Ghyben - Herzberg relation, Shape of interface, control of seawater intrusion. Ground water Basin Management: Concepts of conjunction use, Case studies.

**TEXT BOOKS:**
1. Ground water Hydrology by David Keith Todd, Jhon Wiley & Son, New York.
2. Groundwater by H.M.Raghunath, Weley Eastern Ltd.

**REFERENCES:**
1. Groundwater Hydrology by BOWER, John Wiley & Sons.
2. Groundwater System Planning & Management - R.Willes & W.W.G.Yeh, Printice Hall.
3. Applied Hydrology by C.W.Fetta, CBS Publishers & Distributers.

## Course Outcomes
1. Ability to understand the ground water occurrence, ground water movement.
2. Ability to understand the analysis of pumping test, surface and subsurface Investigation.
3. Ability to understand the artificial recharge of ground water, saline water intrusion in aquifer and groundwater basin management.
4. Ability to understand the types of floe and their importance and well construction.

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## (A1141) ADVANCED FOUNDATION ENGINEERING
### (ELLECTIVE - II)

**Course Objectives**

1. The course offers the eccentric loads on shallow foundations, settlement in layered soils, sheet piles, anchor bulk heads, pile foundations, single pile, group piles, settlement in pile foundation, well foundations and expensive soils.
2. Thumb rules are adapted for the design of foundation in the earlier periods now that the subject of geotechnical engineering has come up with the pouch technologies and the methods of soil testing are now prevalent engineers are able to understand the type of soil and its engineering properties through laboratory and field expirations
3. After going to the subject a student will be able to understand through the soil expiration and the type and magnitudes of loads coming over the foundation will be able to deicide on type of foundation to be used.
4. And later design the details of the foundation keeping in mind the factors of settlements lateral pressure in the foundation soil and also to consider the foundation in problematic soils like black cotton soils and expansive soils etc.,
5. The student should be able to understand about the lateral earth pressures their theories the magnitudes of the earth pressures both active and massive types and will be able to design a proper earth retaining structure

**UNIT - I**

Introduction - Bearing capacity of Footings subjected to Eccentric and inclined loading - Meyerhoff's, Hansen's, Vesic theories - Foundations on layered soils - Elastic settlement of Footings embedded in sands and clays of infinite thickness - Footings on soils of Finite thickness - Schmertamaunn';s method, Janbu method

**UNIT - II**

Pile Foundation - Pile groups - settlement of pile groups resting in sands and clays - negative skin friction - under reamed piles - laterally loaded piles - ultimate lateral capacity - Broms Method - Reese and Matlock Approach.

**UNIT - III**

Lateral earth pressures theories - Rankine's and coulomb's theories - Graphical Methods, Culmann's, Trial Wedge methods - Stability checks of cantilever and gravity retaining walls. Reinforced earth retaining walls.

**UNIT - IV**

Cantilever and anchored sheet piles - earth pressure diagram - determination of depth of embedment in sands and clays - braced cuts - earth pressure diagrams - forces in struts.

**UNIT -V**

Foundations in Expansive Soils - problems in expansive soils - mechanism of swelling - swell pressure and swelling potential - heave - foundation practices - sand cushion - CNS technique - under - reamed pile foundations - granular pile anchor technique, stabilization of expansive soils.

**TEXT BOOKS:**

1. Das, B.M./., - 1999 Principles of Foundation Engineering - 4th edition PWS Publishing , Singapore.
2. Bowles, J.E., - 1988 Foundation Analysis and Design - 4th edition, McGrew - Hill International.
3. Soil Mechanics and Foundation Engineering by V N S Murthy , CBS Publishers and Distributors.

**REFERENCES:**

1. Geotechnical Engineering Principles and Practices by Cuduto, PHI International.
2. Geotechnical Engineering by C. Venkataramah, New age International Pvt.Ltd., Publishers 2002.
3. Analysis and design of structuctures - Swami Saran, Oxford & IBH Publishing Company Pvt.Ltd.

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## (A1132) SOLID WASTE MANAGEMENT

**(ELECTIVE - II)**

The course shows how to manage and treat waste in the sense of sustainability. At the beginning waste and the responsibilities for waste will be defined and the general conditions as well as the specific waste amounts discussed. Then waste management techniques and processes like collection, transportation, sorting, treatment, recycling and disposal are shown. With regard to process engineering mechanical, biological treatment (composting, digestion), the combination (MBT, MBSt) and thermal waste treatment (wte, combustion, gasification, etc.) as well as reuse and disposal of the output are exposed in particular and related to each other. Besides of process description, design data and conditions, legal emission criteria as well as output quality are debated. Furthermore control, principles and requirements of landfill´s construction and emissions plus the handling of abandoned polluted areas are taught. Modern recycling techniques for glass, paper, plastics, wood, metal and construction waste are also part of this course as the evaluation (e.g. ecobalancing) and elaboration of administrative waste management concepts. The lecture orientates on contemporary practical examples and will be consolidated in tutorials in form of calculation examples

course, designed to provide students with a comprehensive background in waste management and an awareness of pollution control.

 the student will study six functional elements of solid waste management such solid waste generation, storage, collection, transfer, transformation and final disposal. In part two, the student will study on wastewater management, and in part three the student will be learn how to manage hazardous waste

**UNIT - I**

Solid Waste and their Handling: Definition of solid wastes - Types of solid wastes - Sources - Industrial, Mining, agricultural and domestic - Characteristics. Solid Waste Problems - impact on environmental health.

**UNIT - II**

Collection, Segregation and Transport AND Management of Municipal Solid Wastes: Handling and segregation, Collection and Storage of municipal solid wastes; analysis of collection systems. Transfer stations - labeling and handling of hazardous wastes. Solid waste processing technologies. Mechanical and thermal volume reduction. Biological and chemical techniques for energy and other resource recovery; Composting - types, vermicomposting, termigradation, fermentation. Incineration of solid wastes. Disposal in landfills: site selection, design, and operation of sanitary landfills; Leachate and landfill gas management; landfill closure and post-closure environmental monitoring; landfill remediation. Regulatory aspects of mincipal solid waste management.

**UNIT - III**

Hazardous Waste and Management: Hazardous waste definition. Physical and biological routes of transport of hazardous substances - sources and characterization. Sampling and analysis handling, collection, storage and transport. Hazardous waste treatment technologies TSDF concept - Physical, Chemical and thermal treatment of hazardous waste: solidification, chemical fixation, encapsulation, pyrolysis and incineration. Hazardous waste landfills - Site selections, design and operation. HW reduction, recycling and reuse, Regulatory aspects of HWM/HWM rules.

**UNIT - IV**

Biomedical Waste Management: Classification, collection, segregation Treatment and disposal. Radioactive waste: Definition, Low level and high level radioactive wastes and their management, Radition standards.

**UNIT - V**

E- Waste Management: Waste characteristics, generation, collection, transport and disposal, regulatory aspects of e-waste, global strategy, recycling.

**TEXT BOOKS:**

1. Hazardous waste management Charles A. Wentz. Second edition 1995. McGraw Hill International.
2. Integrated solid waste management George Tchobanoglous, Hillary Theisen & Sammuel A. Vigil.

**REFERENCES:**
1. Hazardous waste management by Prof. Anjaneyulu.
2. Criteria for hazardous waste landfills - CPCB guildlines 2000.
3. Standard handbook of Hazardous waste treatment and disposal by Harry M. Freeman, McGraw Hill 1997.
4. Management of Solid waste in developeing countries by FrankFlintoff,
5. WHO regional publications 1976.

## LEARNING OUTCOME

After completion of the course, students are expected to be able to:
- Identify the major components of wastes (solid and liquid),
- Analyze some alternatives of waste management.
- Evaluate various options for hazardous waste management.

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## (A1133) PRESTRESSED CONCRETE STRUCTURES

### Course Objective:
- ❖ Be able to learn analysis and design of prestressed concrete members and connections.

- ❖ To identify and interpret the appropriate relevant industry design codes.

- ❖ To become familiar with professional and contemporary issues in the design and fabrication of prestressed concrete members.

**UNIT - I**
Introduction: Historic development- General Principles of prestressing pretensioning and post tensioning - Advantages and limitations of Prestressed concrete - General principles of PSC - Classification and types of prestressing Materials - high strength concrete and high tensile steel their characteristics.
Methods and Systems of prestressing: Pretensioning and Posttensioning methods and systems of prestressing like Hoyer system, Magnel Blaton system, Freyssinet system and Gifford - Udall System - Lee McCall system.

**UNIT - II**
Losses of Prestress: Loss of prestress in pretension and post- tensioned members due to various causes like elastic shortage of concrete, shrinkage of concrete, creep of concrete, relaxation of stress in steel, slip in anchorage, frictional losses.

**UNIT -III**
Flexure: Analysis of sections for flexure- beams Prestressed with straight, concentric , eccentric, bent and parabolic tendons - stress diagrams- Elastic design of PSC beams of rectangular and I sections - Kern line - Cable profile and cable layout.
Shear: General considerations - Principal tension and compression - Improving shear resistance of concrete by horizontal and vertical prestressing and by using inclined or parabolic cables- Analysis of rectangular and I beams for shear - Design of shear reinforcements - Bureau of Indian Standards (BIS) Code provisions.

**UNIT - IV**
Transfer of Prestress in Pretensioned Members: Transmission of prestressing force by bond - Transmission length - Flexural bond stresses - IS code provisions - Anchorage zone stresses inpost tensioned members - stress distribution in End block - Analysis by Guyon, Magnel, Zielinski and Rowe's Methods - Anchorage zone reinforcement - BIS Provisions.

**UNIT - V**
Composite Beams: Different Types - Propped and Unpropped - stress distribution - Differential shrinkage - Analysis of composite beams - General design considerations.
Deflections: Importance of control of deflections - Factors influenceing deflections - Short term deflections of uncracked beams - prediction of longtime deflections - BIS code requirements.

**TEXT BOOK:**
 1. Prestressed concrete by N.Krishna Raju, 5th Edition, Tata McGraw Hill Book Education Pvt.Ltd.

**REFERENCES:**
1. Design of prestress concrete structures by T.Y.Lin and Burn, Jhon Wiley, New York.
2. Prestressed concrete by S.Ramamrutham, Dhanpat Rai & Sons, Delhi.
3. Prestressed Concrete by N.Rajagopalan, Narosa Publishing House.

## Course Outcomes:
- ❖ Students will understand the general mechanical behavior of prestressed concrete.

- ❖ Able to analyze and design prestressed concrete flexural members.

- ❖ Able to analyze and design for vertical and horizontal shear in prestressed concrete.

- ❖ Able to analyze transfer and development length as well as prestress losses.

- ❖ Able to analyze and design for deflection and crack control of prestressed concrete members.

- ❖ Concrete members and become familiar with fabrication and construction process.

- ❖ Able to perform an industry relevant design project in a team setting

**B.Tech.CE - VII Sem**

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## (A1134) TRANSPORTATION ENGINEERING-II

- ❖ To discuss the concepts of Runway Orientation and the Geometric Design of the Runway and the Taxiway.
- ❖ To identify, analyze, and solve problems related to structural design of the flexible and the rigid runway and taxiway pavements.
- ❖ To undertake problems related to the layout of the Terminal Building, Hangar and Apron.
- ❖ To discuss the concepts of the Permanent way section of the Indian Railway.
- ❖ To undertake the problems regarding the geometric design of the railway track.
- ❖ To discuss the concepts of the various signalling systems, the safety aspects and the modernization of the Indian Railway.

**UNIT – I**

**Introduction To Railway Engineering:** Permanent way components – Cross Section of Permanent Way - Functions of various Components like Rails, Sleepers and Ballast, Gauge — Creep of Rails- Theories related to creep –Sleeper density.

**UNIT – II**

**Geometric Design Of Railway Track:** Gradients- Grade Compensation- Cant and Negative Super elevation- Cant Deficiency – Degree of Curve –Points and Crossings , Rail Joints, Railway Stations & Yards, Signalizing & Interlocking.

**UNIT – III**

**Airport engineering:** Air Port Site selection- Runway Orientation- Basic Runway Length – Corrections for Elevation, Temperature – Air Port Classification- Runway Geometric design- Factors Controlling Taxiway Layout – Terminal Area- Apron – Hanger – Blast Considerations, Typical Airport Layouts- Windrose Diagram- Run way Lightening system & Marking.

**UNIT- IV**

**Port and Harbour Engineering:** Requirements of Port and Harbour, Classifications of Port & Harbour, Features of a Harbour, Planning of Harbour,
Breakwater, Dry docks, Jetties, Aprons, Transit shed and warehouses, Navigational aids, Maintenance of Port and Harbours, Inland water Transport

**UNIT- V**

**Intelligent Transport Systems:** ITS Definitions, Benefits of ITS, user services, Detectors, Automatic Vehicle Location (AVL), Automatic Vehicle Identification (AVI), Introduction to ITS applications; Advanced Traffic Management Systems ( ATIMS), Advanced Public Transportation System(APTS), ITS architecture components and standards, Over view of ITS implementations in developed countries.

**TEXT BOOKS:**

1. Railway Engineering – A text book of Transportation Engineering – S.P.chadula – S.Chand & Co. Ltd. – (2001).
2. Highway Engineering Design – L.R.Kadiyali and Lal- Khanna Publications.

3.Airport Planning and Design- S.K.Khanna and Arora,Nemchand Bros.
4. Transportation Engineering and Planning – C.S. Papacostas, P.D. Prevedours.

**REFERENCES:**

1. Railway Engineering – August – Prabha & Co., 15th Edition – 1994.
2. Air Transportation Planning & design – Virendhra Kumar & Statish Chandhra – Gal Gotia Publishers (1999).
3. Harbour, Dock and Tunnel Engineering – R. Srinivasan.
4. Dock and Harbour Engineering – Hasmukh P Oza, Gutam H Oza.

Course Outcomes
1.  Ability to understand history of transportation and development roads.
2. Ability to know about geometric design of roads, traffic Engineering & Traffic regulation, Management studies & Intersection design using various methods.
3. Ability to understand basics of railway engineering & its component of railway track & its Geometric designs
4. Ability to understand basic requirement for airport & its geometric design.

**B.Tech.CE - VII Sem**

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## (A1021) MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

**UNIT I**
**Introduction and Demand Analysis:**
Definition, Nature and Scope of Managerial Economics-Demand Analysis: Demand Determinants, Law of Demand and its exceptions. Elasticity of Demand:
Definition, Types, Measurement and Significance of Elasticity of Demand. Demand
Forecasting, Factors governing demand forecasting, methods of demand forecasting

**UNIT II**
**Production and Cost Analysis:**
Production Function - Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Cobb-Douglas Production function, Laws of Returns, Internal and External Economies of Scale. Cost Analysis: Cost concepts, Opportunity cost, Fixed vs. Variable costs, Explicit costs Vs. Implicit costs, Out of pocket costs vs. Imputed costs. Break-even Analysis (BEA)- Determination of Break-Even Point (simple problems)- Managerial Significance

**UNIT III**
**Markets & New Economic Environment:**
Types of competition and Markets, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly. Pricing - Objectives and Policies of Pricing- Methods of Pricing. Business: Features and evaluation of different forms of business Organisation: Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types New Economic Environment: Changing Business Environment in Post-liberalization scenario.

**UNIT IV**
**Capital Budgeting:**
Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements, Methods and sources of raising capital- Trading Forecast, Capital Budget, Cash Budget, Capital Budgeting: features of capital budgeting proposals, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value Method (simple problems)

**UNIT V**
**Introduction to Financial Accounting and Financial Analysis:**
Accounting concepts and conventions- Introduction IFRS- Double-Entry Book Keeping, Journal, Ledger, Trial Balance-Final Accounts(Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments ). Financial Analysis: Analysis and Interpretation of Liquidity Ratios, Activity Ratios, Capital structure Ratios and Profitability ratios. Du Pont Chart.

**TEXT BOOKS:**
1. Aryasri: Managerial Economics and Financial Analysis, 2/e, TMH, 2005.
2. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2003.

**REFERENCES:**
1. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi.
2. H. Craig Peterson & W. Cris Lewis, Managerial Economics, PHI, 4th Ed.
3. Suma Damodaran, Managerial Economics, Oxford University Press.
4. Lipsey & Chrystel, Economics, Oxford University Press.
5. S. A. Siddiqui & A. S. Siddiqui, Managerial Economics & Financial Analysis, New age
International Space Publications.
6. Domnick Salvatore: Managerial Economics In a Global Economy, 4th Edition, Thomson.
7. Narayanaswamy: Financial Accounting_A Managerial Perspective, PHI.
8. Raghunatha Reddy & Narasimhachary: Managerial Economics& Financial Analysis,
Scitech.
9. S.N.Maheswari & S.K. Maheswari, Financial Accounting, Vikas.
10. Truet and Truet: Managerial Economics:Analysis, Problems and Cases, Wiley.

Course Outcomes

1. Ability to understand components of the general economic principles and learning role of Managerial economist in estimating demand forecasting.
2. Ability to learning how to analyse production concepts, calculating the BEP and Analyze types of competition, and Pricing Strategies.
3. Ability to developing a business idea in changes in economic environment.
4. Ability to Estimating the various capitals required for the company and preparation of Final accounts and interpretation of Ratio analysis.

**CMR COLLEGE OF ENGINEERING & TECHNOLOGY**
**(AUTONOMOUS)**

| B.Tech.CE - VII Sem | L | T | P | C |
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### (A1135) ESTIMATION QUANTITY SURVEY AND VALUATION

**Objective:**

❖ To learn the ethics of civil engineering profession and implement them. To produce civil engineering students who have strong foundation in estimation of quantities required for roads and buildings.

❖ To familiarize with the knowledge of preparing bar bending schedules and valuation of buildings.

**UNIT - I**
General items of work in building - Standard Units Principles of working out quantities for detailed and abstract estimates - Approximate method of Estimating. Detailed Estimates of Buildings.

**UNIT - II**
Earthwork for roads and canals.

**UNIT -III**
Rate Analysis - Working out data for various items of work over head and contingent charges.

**UNIT - IV**
Reinforcement bar bending and bar requirement schedules. Contracts - Types of Contracts - Contract Documents - Conditions of contract.

**UNIT - V**
Valuation of Buildings. Standard specifications for different items of building construction.

**TEXT BOOKS:**
1. Estimation and Costing by B.N.Dutta, USB publishers,2000
2. Estimation and costing by G.S.Birdie.

**REFERENCES:**
1. Standard Schedule of rates and standard data book by public works department.
2. I.S.1200 (Parts I to XXV - 1974/method of measurement of building and Civil Engineering works - B.I.S).
3. Estimating, costing and specifications by M.Chakraborthi; Laxmi publications.
4. National Building Code.

**B.Tech.CE - VII Sem**

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### (A1136) DISASTER MANAGEMENT
### (OPEN ELECTIVE)

## Course Objective

1. To create awareness amongst students to basic issues of natural and manmade disasters.
2. To ensure the understanding of the disaster management cycle and relationship amongst vulnerability, preparedness, prevention and mitigation.
3. To invoke minimum ability and sensitivity amongst students to respond to disasters in their area of living and working.
4. To develop technical prowess and to mitigate the effects of disasters by capacity building amongst

engineering fraternity towards formulation and implementation of disaster management strategies.
5. To relate amongst the basic approaches adopted in disaster risk reduction and institutional mechanism adopted in country towards creating resilient society.

**UNIT - I**

Environmental Hazards & Disasters: Meaning of Environmental hazards, Environmental Disasters and Environmental stress. Concept of Environmental Hazards, Environmental stress & Environmental Disasters. Different approaches & relation eith human Ecology - Landscape Approach - Ecosystem Approach - Perception approach - Human ecology & its application in geographical researches.

**UNIT - II**

Types of Environmental hazards & Disasters: Natural hazards and Disasters - Man induced hazards & Disasters - Natural Hazards - Planetary Hazards / Disasters - Extra Planetary Hazards/ Disasters - Planetary Hazards - Endogenous Hazards - Exogenous Hazards -

**UNIT - III**

Endogenous Hazards - Volcanic Eruption - Earthquakes - Landslides - Volcanic Hazards/ Disasters - Causes and distribution of Volcanoes - Hazardous effects of Volcanic eruptions - Environmental impacts of volcanic eruptions - Earthquake Hazards/ disasters - Causes of Earthquakes- Distribution of earthquakes - Hazardous effects of - earthquakes - Earthquake Hazards in India -- Human adjustment, perception & Mitigation of earthquake.

**UNIT - IV**

Exogenous hazards/ disasters - infrequent events - Cumulative atmospheric hazards / disasters.

Infrequent events: Cyclones - Lighting - Hailstorms.

Cyclones: Tropical cyclones & local storms - Destruction by tropical cyclones & local stromes (causes, distribution human adjustment, perception & mitigation) Droughts:- Impacts of droughts - Drought hazards in India - Drought control measures - Extra planetary Hazards/ Disasters - Man induced Hazards / Disasters - Physical hazards / Disasters - Soil Erosion.

Soil Erosion:- Mechanics forms of soil Erosion - Factors & Causes of Soil Erotion - Conversation measures of soil Erosion.

Chemical hazards/ disasters:- Release of toxic chemicals, nuclear explosion - Sedimentation processes Sedimentation processes :- Global Sedimentation problems - Regional Sedimentation problems - Sedimentation problems - Sedimentation & environmental problems - Corrective measures of Erosion & Sedimentation

Biological hazards / Disasters: - Population Explosion.

**UNIT - V**

Emerging approaches in Disaster Management - Three Stages
1. Pre - Disaster stage (Preparedness)
2. Emergency Stage
3. Post Disaster stage - Rehabilitation

**TEXT BOOKS:**
1. Disaster Mitigation: Experience And Reflections by Pardeep Sahni.
2. Natural Hazards & Disasters by Donald Hyndman & David Hyndman - Cengage Learning.

**REFERENCES:**
1. R.B/Singh (Ed) Environmental Geography, Heritage Publishers New Delhi, 1990.
2. Savinder Sign Environmental Geography, Prayag Pustak Bhawan, 1997
3. Kates,B.I & White, G.F The Environment as Hazards, oxford, New York, 1978.
4. R.B.Singh (Ed) Disaster Management, Rawat Publication, New Delhi, 2000.

## Course Outcomes

Upon successful completion of this course, it is expected that students will be able to:

1. Understand genesis and causes of natural and manmade disaster within the framework of fundamental
concepts of basic sciences and engineering.

2. Perceive the vulnerability of their living and working places and level of preparedness within the
existing setup of disaster management.

3. Analyze and critically examine the vulnerability of a region and to employ adequate strategy and tools
of intervention.

4. Build capacity to use specialized problem solving skills, methodologies and technology.

5. Setup priorities to develop coherent and adaptable disaster management plan.

**B.Tech.CE - VII Sem**

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### (A1355) PRINCIPLES OF ENTREPRENEURSHIP
### (OPEN ELECTIVE)

**UNIT-I: INTRODUCTION TO ENTREPRENERSHIP**

Definition of Entrepreneur, Entrepreneurial traits, Entrepreneur vs Manager, Entrepreneur vs intrapreneur, the entrepreneurial decision process. Role of Entrepreneurship in economic development, ethics and social responsibility of Entrepreneurs, opportunities for Entrepreneurs in India and Abroad. Woman as Entrepreneur.

**UNIT-II: CREATING AND STARTING THE VENTURE**

Sources of new ideas, methods of generating ideas, creating problem solving, product planning and development process.

**THE BUSINESS PLAN**

Nature and scope of business plan, writing business plan, evaluating business plans, using and implementing business plans. Marketing plan, financial plan and the organizational plan, launching formalities.

**UNIT-III: FINANCING AND MANAGING THE NEW VENTURE**

Sources of capital, record keeping, recruitment, motivating and leading teams, financial controls. Marketing and sales controls. E-commerce and Entrepreneurship, internet advertising.

**NEW VENTURE EXPANSION STRATAGIES AND ISSUES**

Features and evaluation of joint ventures, acquisitions, merges, franchising. Public issues, rights issues, bonus issues and stock splits.

**UNIT-IV: INSTITUTIONAL SUPPORT TO ENTREPRENEURSHIP**

Role of directorate of industries, district industries, centres(DICs), industrial development corporation(IDC), state financial corporation(SFCs), small scale industries development corporations(SSIDCs), khadi and village industries commission(KVIC), technical consultancy organization(TCO), small industries service institute(SISI), national small industries corporation(NSIC), small industries development bank of india(SIDBI).

**UNIT-V: PRODUCTION AND MARKETING MANAGEMENT**

Thrust of production management, selection of production techniques, plant utilization and maintenance, designing the work place, inventory control, material handling and quality control. Marketing functions, market segmentation, market research and channels of distribution, sales promotion and product pricing.

Labour logioslation, salient provision under Indian factories act, industrial disputes act, and employees state insurance act, workmen's compensation act and payment of bonus act. This course replaces the course offered in earlier years as Entrepreneurship and Management.

**Text books:**

1. Robert Hisrich, & Michael Peters: Entrepreneurship, TMH, 5<sup>th</sup> Edition
2. Dollinger Entrepreneurship, 4/e, Pearson, 2004

**References:**

1. Vasant desal : Dynamics of entrepreneurial development and management, Himalaya publishing house, 2004
2. Harward business review of Entrepreneurship. HBR paper back,1999
3. Robert J.Calvin: Entrepreneurial Management, TMH,2004
4. Gurmeet Naroola: The Entrepreneurial connection, TMH,2001
5. Bolton & Thomson: Entrepeneurs- Talent, Temperament, Technique, Butterworth Heinemann,2001

**B.Tech.CE - VII Sem**

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## (A1510) OBJECT ORIENTED PROGRAMMING THROUGH JAVA
### (OPEN ELECTIVE)

**Objectives:**

- To understand object oriented programming concepts and applications in problem solving.
- Learn the Java programming language: its syntax, idioms, patterns, and styles.
- Become comfortable with object oriented programming: Learn to think in objects.
- Learn the essentials of the Java class library, and learn how to learn about other parts of the library when you need them.
- To learn the basics of java console and GUI based programs.
- Introduce event driven Graphical User Interface (GUI) programming.

**Unit I:**
**Java Programming:** History of java, comments, data types, variables, constants, scope and life time of variables, operators, hierarchy expressions, type conversions and casting, enumerated types, control for block scope, conditional statements, loops, break and continue statements, simple java stand alone programs, arrays, console input and output, formatting output, constructors, methods, parameter passing, static fields and methods, access controls, his reference, overloading methods and constructors, recursions, garbage collections, building strings, exploring strings class.

**Unit II:**
**Inheritance:** Inheritance hierarchies super and sub classes, member access rules, super keyword, and preventing inheritance: final classes and methods, the object class and its methods.
**Polymorphism:** dynamic binding, method overloading, abstract classes and methods. **Interface:** interface vs. Abstract classes, defining an interface, implementing interfaces, accessing implementations through interfaces references, extending interface.
**Packages:** Defining, creating and accessing a package, understanding CLASSPATH, importing packages

**Unit III:**
**Exception Handling:** Dealing with errors, benefits of exception handling, the classification of exceptions, exception hierarchy, checked exceptions and unchecked exception, usage of try , catch, throw, throws, and finally, re-throwing exceptions, exception specification, built in exceptions, creating own exception sub classes.
**Multithreading-** difference between multiple processes and multiple threads, thread states, creating threads, interrupting threads, thread priorities, synchronizing threads, inter-thread communication, producer consumer pattern.

**Unit IV:**
**Event Handling:** Events, Event sources, Event classes, Event Listeners, Relationship between Event sources and Listeners, Delegation event model, examples: handling a button click, handling mouse events, Adapter classes.
The AWT class hierarchy, Userinterface components-labels, button, canvas, scrollbars, text components, check box, checkbox groups, choices, list panels-scrollpane, dialogs, menubar, graphics, layoutmanager-layout manager types-border, grid, flow, card and grid bag.

**Unit V:**

introduction to Swing, Swing vs. AWT, Hierarchy for Swing components, Containers-JFrame, JApplet, JDialog, JPanel, Overview of some swing components, JButton, JLabel, JTextField, JTextArea, simple Swing applications, Layout management- Layout manager types- border grid and flow.

**Applets:** Inheritance hierarchy for applets, differences between applets and applications, life cycle of an Applet, is passing parameters to applets, applet security issues.

**Textbooks:**

1. Java the complete reference ,7th edition,Herbert schildt,TMH
2. Understanding oop with Java,updated edition,T.Budd,pearson education

**References:**
1. Java for programming, P.J.Dietel Pearson education (OR) Java: How to Program P.J.Dietel and H.M.Dietel, PHI
2. Object Oriented Programming through java, P.Radha Krishna, Universities Press.
3. Thinking in Java, Bruce Eckel, Pearson Education
4. Programming in Java, S.Malhotra and S.Choudhary, Oxford University Press.
5. Java Fundamentals- A Comprehensive introduction, Herbert schildtand Dale skrien, TMH

**Outcomes:**
- Understanding of OOP concepts and basics of java programming (Console and GUI Based)
- Understand the format and use of objects.
- Understand basic input/output methods and their use.
- The skills to apply OOP and java Programming in problem solving.
- Should have the ability to extend his/her knowledge of java programming future on his/her own.
- Understand object inheritance and its use.
- Understand development of JAVA applets vs. JAVA applications.
- Understand the use of various system libraries.

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**(A1138) HIGHWAY MATERIALS AND CONCRETE TECHNOLOGY LAB**

# Course Objective

1. To carry out tests on construction materials for their suitability and economic utilization.

2. To identify and classify the pavement materials into different groups according to their characteristics.

3. To make aware the students about the classification, suitability, strength and stability of pavement materials

### I. ROAD AGGREGATES:
1. Aggregate Crushing value.
2. Aggregate Impact Test
3. Specific Gravity and Water Absorption.
4. Attrition Test.
5. Abrasion Test.
6. Shape tests.

### II. BITUMINOUS MATERIALS:
1. Penetration Test.
2. Ductility Test.
3. Softening Point Test.
4. Flash and fire point tests.

### III. CEMENT AND CONCRETES:

### TEST ON CEMENTS:
1. Normal Consistency of fineness of cement.
2. Initial setting time and final setting time of cement.
3. Specific gravity and soundness of cement.
4. Compressive strength of cement.
5. Workability test on concrete by compaction factor, Slump and Vee-bee.
6. Young's modulus and compressive strength of concrete.
7. Bulking of sand.
8. Non- Destructive testing on concrete (for demonstration).

**B.Tech.CE - VII Sem**

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**(A1139) ENVIRONMENTAL ENGINEERING LAB**

# Course Objective

1. To learn the handling of different equipments related to water and wastewater analysis

2. To learn about the preparations of stock and standard solutions, their handling, storage, etc.

3. To understand the different experiments involved in water and wastewater analysis.

4. To learn more about the titration techniques of chemical analysis

5. To develop skills related to report writing.

**LIST OF EXPERIMENTS:**

1. Determination of pH and Turbidity.
2. Determination of Conductivity and Total dissolved solids (Organic and Inorganic)
3. Determination of Alkalinity/Acidity.
4. Determination of Chlorides.
5. Determination of iron.
6. Determination of Dissolved Oxygen.
7. Determination of Nitrates.
8. Determination of Optimum dose of coagulant.
9. Determination of Chlorine demand.
10. Determination of total Phosphorous.
11. Determination of B.O.D
12. Determination of C.O.D
13. Determination of Optimum coagulant dose.
14. Determination of Chlorine demand.
15. Presumptive coliform test.

Note: At least 8 of the above experiments are to be conducted.

**B.Tech.CE - VII Sem**

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### (A1139) ENVIRONMENTAL ENGINEERING LAB

## Course Objective

1. To learn the handling of different equipments related to water and wastewater analysis
2. To learn about the preparations of stock and standard solutions, their handling, storage, etc.
3. To understand the different experiments involved in water and wastewater analysis.
4. To learn more about the titration techniques of chemical analysis
5. To develop skills related to report writing.

**LIST OF EXPERIMENTS:**

16. Determination of pH and Turbidity.
17. Determination of Conductivity and Total dissolved solids (Organic and Inorganic)
18. Determination of Alkalinity/Acidity.
19. Determination of Chlorides.
20. Determination of iron.
21. Determination of Dissolved Oxygen.
22. Determination of Nitrates.
23. Determination of Optimum dose of coagulant.
24. Determination of Chlorine demand.
25. Determination of total Phosphorous.
26. Determination of B.O.D
27. Determination of C.O.D
28. Determination of Optimum coagulant dose.
29. Determination of Chlorine demand.
30. Presumptive coliform test.

Note: At least 8 of the above experiments are to be conducted.

## Course Outcomes

1. Ability to understand the method of calibration of pH of solution(water)
2. Ability to understand method of turbidity, Alkalinity/Acidity, Chlorides tests in solution.
3. Ability to understand estimation of total solids, organic solids and inorganic solids.
4. Ability to understand Determination of iron, Dissolved Oxygen, Nitrogen, Phosphorous, B.O.D, C.O.D, Optimum coagulant dose, Chlorine

**B.Tech-CE-VIII Sem**

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### (A1141) GROUND IMPROVEMENT TECHNIQUES
### (ELECTIVE - III)

**OBJECTIVES:**

To discuss necessity and introduce various ground improvement methods.
To discuss ground improvement techniques based on drainage and electrical conductivity.
To discuss ground improvement techniques based on compaction and consolidation.

To understand concept of soil reinforcement and its suitability as ground improvement method.
To understand ground improvement methods based on grouting and exclusion techniques.
To introduce design of earth retaining structures, diaphragm walls and stone columns

**UNIT-I**
**Introduction to Ground Improvement Modification**: Need and objectives, Identification of soil types, In situ and laboratory tests to characterize problematic soils, Mechanical, Hydraulic, Physico-chemical, Electrical, Thermal methods and their applications.
**UNIT-II**
**Mechanical Modification**: Deep compaction Techniques- Blasting Vibrocompaction, Dynamic Tamping and compaction piles
**UNIT-III**
**Hydraulic Modification-** Objectives and techniques, traditional dewatering methods and their choice, Design of dewatering system, Electro-osmosis, Electro-Kinetic dewatering, Filtration, Drainage and seepage control with Geo synthetics, preloading and vertical drains
**UNIT-IV**
**Physical and Chemical Modification**- Modification by admixtures, Shotcreating and Guinting Technology, Modification at depth by grouting, Crack Grouting and compaction grouting ,Jet grouting, Thermal modification, Ground freezing.
**UNIT-V**
**Modification by inclusions and confinement**: Soil reinforcement, reinforcement wit strip, and grid reinforced soil. In-situ ground reinforcement ground anchors, rock bolting and soil nailing.
TEXTBOOKS:
1 .HAUSMANN,M.R .(1990) – Engineering Principles of Ground Modifications, McGraw Hill publications

**REFERENCES:**
1. Koerner,R.M (1994)- Designing with Geosynthesis –Prentice Hall New Jersey
2. Jones C.J.F.P(1985)- Earth Reinforcement and Soil structures – Butterworths, London
3. Xianthakos, Abreimson and Bruce- Ground control and Improvement
4. Mosley- Ground Improvement

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### (A1142) DESIGN AND DRAWING OF IRRIGATION STRUCTURES
### (ELECTIVE-III)

## Course Objectives:

❑The purpose of this course is to impart the knowledge about the design of irrigation structures
❑To get hand-on experience in drawing of irrigation structures


Design and drawing of the following hydraulic structures.
**GROUP A**

1.  Surplus Weir.

2.  Syphon Well Drop

3.  Trapezoidal notch fall

4.  Tank sluice with tower head

**GROUP B**
1 . Sloping glacis weir
2.  Canal regulator
3.  Under Tunnel
4.Type III Syphon aqueduct

Final Examination pattern:
The question paper is divided into two parts with two parts with two questions in each part.
The student has to answer ONE question from each part. .Part I should cover the designs and
Drawing from Group A for 45 marks and part II should cover only designs from Group B carrying 30 marks.
The duration of the examination will be Three hours.
However, the students are supposed to practice the drawing for Group B structures also for internal evaluation.

**TEXT BOOKS:**

1.  Water Resources Engineering – Principles and Practice by Challa Satyanarayana Murthy,
    New Age International Publishers.
2.  Irrigation Engineering and Hydraulic structures by S.K. Garg, Standard Book House.

| B.Tech .CE-VIII Sem | L | T | P | C |
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### (A1143) REMOTE SENSING & GIS

**Objective:** This course provides students with an introduction to the principles of geographic information systems (GIS) and remote sensing and the application of these techniques to Civil Engineering. The first part of the course focuses on GIS, where the structure and format of GIS data, data input and transformation, database compilation,

and the use of search criteria and spatial modeling to carry out suitability mapping are examined. In Photogrammetry and remote sensing, the focus is on **Principles & types of aerial photograph** the capture and processing of satellite images, and how data from various satellite platforms are used in the. Civil Engineering.

**UNIT -I**

**Introduction to Photogrammetry:** Principles & types of aerial photograph, geometry of vertical aerial photograph, Scale & Height measurement on single vertical aerial photograph, Height measurement based on relief displacement, Fundamentals of stereoscopy, fiducial points, parallax measurement using fidcial line.

**UNIT - II**

**Remote Sensing: -** Basic concept of Remote sensing, Data and Information, Remote Sensing data collection, Remote sensing advantages & Limitations, Remote sensing process.

Electro-magnetic Spectrum, Energy interactions with atmosphere and with earth surface features (Soil, Water, Vegetation), Indian Satellites and Sensors characteristics, Resolution, Map and Image and False color composite, introduction to digital data, elements of visual interpretation techniques.

**UNIT -III**

**Geographical Information Systems:** Introduction to GIS; Components of a GIS; Geospatial Data: Spatial Data - Attribute data - joining Spatial and Attribute data; GIS operations: Spatial Data input- Attribute data Management - Data display - data exploration - Data Analysis. COORDINATE SYSTEMS: Geographic Coordinate System: Approximation of Earth, Datum; Map Projections; Types of Map Projection parameters - Commonly used Map Projections - Projected coordinate Systems.

**UNIT- IV**

**Vector Data Model:** Representation of simple features - Topology and its importance; coverage and its data structure, Shape file; Data Models for composite features Object Based Vector Data Model; Classes and Their Relationship; The geobase data model; Geometric representation of spatial Feature and Data Structure, Topology rules.

**UNIT -V**

**Raster Data Model:** Elements of Raster data Model, Types of Raster Data, Raster Data Structure, Data Conversion, Integration of Raster and Vector data.

**Data Input:** Metadata, Conversion of Existing data, creating new data; Remote Sensing data, Field data, Text data, Digitizing, Scanning, on Screen digitizing, importance of source map, Data Editing.

**TEXT BOOKS:**

1. Remote Sensing and its applications by LRA Narayana University Press 1999.
2. Principals of Geo physical Information Systems – Peter A Burragh and Rachael A. Mc Donnell, Oxford Publishers 2004.

**REFERENCES:**

1. Concepts & Techniques of GIS by C.P.Lo Albert, K.W. Yonng, Prentice Hall (India)
   Publications.
2. Remote Sensing and Geographical Information systems by M.Anji Reddy JNTU
   Hyderabad 2001, B.S.Publications.
3. GIS by Kang – tsung chang, TMH Publications & Co.,
4. Basics of Remote sensing & GIS by S.Kumar, Laxmi Publications.
5. Fundamental of GIS by Mechanical designs John Wiley & Sons.

## Course Outcomes

1. Ability to understand, Remote Sensing, Geographic Information Systems, calibration and interpretation in Analysis and Water Resources Applications.
2. Ability to understand GIS principles acquision, pre-processing and analysis.
3. Ability to understand GIS spatial data management and importance of database.
4. Ability to understand role of infrastructural development, disaster management, environmental monitoring in rural and urban planning.

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## MANAGEMENT SCIENCE

**UNIT I:**

**Introduction to Management &Organization:**Introduction to Management : Concepts of Management and organization- nature, importance and Functions of Management, Taylor's Scientific Management Theory, Fayol's Principles of Management, Mayo's Hawthorne Experiments, Maslow's Theory of Human Needs, Douglas McGregor's Theory X and Theory Y, Herzberg's Two-Factor Theory of Motivation, Systems Approach to Management, Leadership Styles, Social responsibilities of Management.

**UNIT II:**

**Operations& Marketing Management:**Principles and types of plant layout-Methods of Production, Work study Basic procedure involved in method study and Work Measurment-Business process reengineering Statistical Quality Control:control charts for variables and Attributes and Acceptance sampling, Total Quality Management (TQM), Six sigma, Deming's contribution to quality, objectives of inventory control EOQ, ABC Analysis, Functions of marketing, marketing mix, marketing Strategies based on product life cycle, channels of distribution.

**UNIT III:**

**Human Resource Management:**Human Resources Management (HRM) : Concepts of HRM, HRD and Personnel Management and Industrial Relations (PMIR), HRMvs.PMIR, Basic functions of HR Manager: Manpower planning, Recruitment, Selection, Training and Development, Placement, Wage and Salary Administration, Promotion, Transfer, Separation, Performance Appraisal, Grievance Handling and Welfare Administration, Job Evaluation andMeritRating.

**UNIT IV:**

**Project Management:**Project Management (PERT/CPM) : Network Analysis, Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), Identifying critical path, Probability of Completing the project within given time, Project Cost Analysis, Project Crashing. (simple problems)

**UNIT V:**

**Strategic Management and Contemporary Strategic Issues:**Strategic Management : Mission, Goals, Objectives, Policy, Strategy, Programmes, Elements of Corporate Planning Process, Environmental Scanning, Value Chain Analysis, SWOT Analysis, Steps in Strategy Formulation and Implementation, Generic Strategy alternatives. Bench Marking and Balance Score Card as contemporary Business Strategies

**TEXT BOOKS:**

1. Aryasri: Management Science, McGraw Hill,2012.
2. Vijay kumar and Apparao Management Science, Cenage,2012.

**REFERENCES:**

1. Kotler Philip & Keller Kevin Lane: Marketing Mangement,pearson,2012
2. Koontz &Weihrich: Essentials of Management, McGraw Hill,2012.
3. Thomas N.Duening& John M.Ivancevich Management—Principles and Guidelines, Biztantra,2012.
4. KanishkaBedi, Production and Operations Management, Oxford University Press, 2012.
5. Schermerhorn, Capling, Poole &Wiesner: Management, Wiley, 2012.
6. Parnell: Strategic Management, Cengage2012.
7. Lawrence R Jauch, R.Gupta&William F.Glueck:Business Policy and Strategic Management, Frank Bros.2012.

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## INDUSTRY ORIENTED MINI PROJECT

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**B.Tech .CE-VIII Sem**                               **L    T    P    C**
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## SEMINAR

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## PROJECT WORK

| B.Tech .CE-VIII Sem | L | T | P | C |
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## COMPREHENSIVE VIVA