

**ACADEMIC REGULATIONS  
COURSE STRUCTURE  
AND  
DETAILED SYLLABUS**

**CIVIL ENGINEERING**

*For*

**B.TECH. FOUR YEAR DEGREE COURSE**  
*(Applicable for the batches admitted from 2014-2015)*

**I, II, III & IV Year**



**VAAGDEVI COLLEGE OF ENGINEERING**  
**(Autonomous)**

Bollikunta, Warangal – 506 005  
Telangana State, India

**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

Bollikunta, Warangal – 506 005. T.S.

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**Academic Regulations for B.Tech. (Regular)**

(Effective for the students admitted into I-Year 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 fulfills the following academic regulations:

- i. Pursued a course of study for not less than four academic years and not more than eight academic years.
  - ii. Register for all credits and secure all credits with the exemption of 8 credits in elective subjects.
2. Students, who fail to fulfill all the academic requirements for the award of the degree within eight academic years from the year of their admission, shall forfeit their seat in B.Tech. course unless extension is granted by Academic Council to complete the course for a further period.

**3. Courses of Study**

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

| <b>Branch Code</b> | <b>Branch</b>                           |
|--------------------|---|
| 01                 | Civil Engineering                       |
| 02                 | Electrical & Electronics Engineering    |
| 03                 | Mechanical Engineering                  |
| 04                 | Electronics & Communication Engineering |
| 05                 | Computer Science & Engineering          |

And any other course as approved by the authorities of the college from time to time.

**4. Credits**

|                         | <b>For I-Year-I/II Semester</b> |                | <b>II,III,IV Years per Semester</b> |                |
|-------------------------|---------------------------------|----------------|-------------------------------------|----------------|
|                         | <b>Periods/Week</b>             | <b>Credits</b> | <b>Periods/Week</b>                 | <b>Credits</b> |
| Theory                  | 04                              | 04             | 03                                  | 04             |
|                         | 02                              | 02             | 04                                  | 04             |
| Practical               | 03                              | 02             | 03                                  | 02             |
| Drawing                 | 03T/03D                         | 04             | 03                                  | 02             |
| Mini Project            | -                               | -              | -                                   | 02             |
| Comprehensive Viva Voce | -                               | -              | -                                   | 02             |
| Seminar                 | -                               | -              | 02                                  | 02             |
| Project                 | -                               | -              | 15                                  | 12             |

## 5. Distribution and Weightage of Marks /Credits:

- i. 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 subject. In addition, Industry oriented mini-project, seminar, comprehensive viva-voce and project work shall be evaluated for 50, 50, 100 and 200 marks respectively.
- ii. For theory subjects the distribution shall be 25 marks for Internal Evaluation and 75 marks for the End-Examination.
- iii. For theory subjects, during the semester there shall be 2 mid term examinations. Each mid term examination consists of Part-A (Objective Type) for 5 marks and Part-B (subjective paper) for 15 marks with duration of 90 minutes and two assignments carrying 5 marks.

Subjective paper shall contain 5 questions of which student have to answer 3 questions of each 5 marks. First mid term examination shall be conducted for 2.5 units of syllabus and second mid term examination shall be conducted for 2.5 units. First Assignment should be submitted before the conduct of the first mid term examination, and the second Assignment should be submitted before the conduct of the second mid term examination.

The total marks secured by the student in each mid term examination for 25 marks are considered and the average of the two mid term examinations shall be taken as the final marks secured by each candidate. If he is absent for any test/assignment, he is awarded zero marks for that test/assignment. However a candidate may permitted on medical grounds/extreme conditions provided he applied for makeup examinations within a week. A subcommittee will be constituted by the Academic Council to look in to such cases.

- iv. For practical subjects there shall be a continuous evaluation during the semester for 25 sessional marks and 50 end examination marks. Out of the 25 sessional marks, day-today work in the laboratory shall be evaluated for 15 marks and internal examination for practical shall be evaluated for 10 marks conducted by the concerned laboratory teacher. The end examination shall be conducted with one external examiner and one internal examiner. The external examiner shall be appointed from the panel of examiners as recommended by the Chairman, Board of Studies in respective Branches.
- v. For the subject having design and/or drawing, (such as Engineering Graphics Engineering Drawing, Machine Drawing) and estimation, the distribution shall be 25 marks for internal evaluation (15 marks for day-to-day work and 10 marks for internal tests) and 75 marks for end examination. There shall be two internal tests in a semester and the average of the two shall be considered for the award of marks for internal test.
- vi. There shall be an industry-oriented mini project, in collaboration with an industry of their specialization, to be taken up during the vacation after III-year II-Semester examination. However, the mini project and its report shall be evaluated in IV Year I-Semester. The industry oriented mini project shall

be submitted in a report form and should be presented before the committee, which shall be evaluated for 50 marks. The committee consists of an external examiner, head of the department, the supervisor of mini project and a senior faculty member of the department. There shall be no internal marks for industry oriented mini project.

- vii. There shall be a seminar presentation in IV Year II-Semester. For the seminar, the student shall collect the information on a specialized topic and prepare a technical report, showing his understanding over the topic, and submit to the department, which shall be evaluated by the departmental committee consisting of Head of the Department, seminar supervisor and a senior faculty member. The seminar report and presentation shall be evaluated for 50 marks. There shall be no external examination for seminar.
- viii. There shall be comprehensive Viva-Voce in IV-Year II-Semester. The Comprehensive Viva-Voce will be conducted by a Committee consisting of (i) Head of the Department (ii) two Senior Faculty Members of the Department. The Comprehensive Viva-Voce is aimed to assess the student's understanding in various subjects he/she studied during the B.Tech. course of study. The Comprehensive Viva-Voce is evaluated for 100 marks by the Committee. There are no internal marks for the Comprehensive Viva-Voce.
- ix. Out of a total of 200 marks for the project work, 50 marks shall be for internal evaluation and 150 marks for the end semester examination. The end semester examination (Viva-Voce) shall be conducted by a committee. The committee consists of an external examiner, head of the department, and the supervisor of the project and a senior faculty member of the department. The topics for industry oriented mini project, seminar and project work shall be different from each other. The internal evaluation shall be on the basis of two seminars given by each student on the topic of his project.

#### **6. Attendance Requirements:**

- i. A student shall be eligible to appear for the end examinations if he acquires a minimum of 75% of attendance in all the subjects (in each subject).
- ii. Condonation of shortage of attendance in each subject up to 10% (On genuine medical grounds) in each semester may be granted by the College Academic Council on the basis of recommendation by the Principal.
- iii. Shortage of attendance below 65% in each subject shall in no case be condoned.
- iv. Student falling short of attendance as specified above will be detained.
- v. A student will not be promoted to the next semester unless he satisfies the attendance requirement of the present semester. They may seek-re-admission for that semester when offered next.
- vi. Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examination of that class and their registration shall stand cancelled.
- vii. A stipulated fee decided by the Academic Council shall be payable towards condonation of shortage of attendance.

## **7. Minimum Academic Requirements:**

The following academic requirements have to be fulfilled in addition to the attendance requirements mentioned in item no.6.

- i. A student shall be deemed to have fulfilled the minimum academic requirements and earned the credits allotted to each theory or practical design or drawing subject or project if he secures not less than 35% of marks in the end examination and a minimum of 40% of marks in the sum total of the internal evaluation and end examination taken together.
- ii. A student shall be promoted from II to III year only if he fulfills the academic requirement of 32 credits (out of 80 credits) secured from all the examinations (both regular and supplementary) conducted up to end of II-Year, excluding the performance in II-B.Tech-II-Semester examination.
- iii. A student shall be promoted from third year to fourth year only if he fulfills the academic requirements of 54 credits (out of 134 credits) secured from all the examinations (both regular and supplementary) conducted up to end of III-Year, excluding the performance in III-B.Tech.-II-Semester examination.
- iv. A student should earn all credits with an exemption of 8 credits in elective subjects. The marks obtained in the subjects excluding the subjects exempted shall be considered for the calculation of percentage of marks.
- v. Student who fails to earn credits with an exemption of eight credits as indicated in the course structure within eight academic years from the year of admission shall forfeit his seat in B.Tech. course unless an extension is given by College Academic Council to complete the course for a further period.

## **8. Course Pattern:**

- i. The entire course of study is of four academic years. All years shall be on semester pattern.
- ii. A student is eligible to appear for the end examination in a subject, but absent at it or has failed in the end examination may appear for that subject at the supplementary examination.
- iii. When a student is detained due to lack of credits/shortage of attendance he may be re-admitted when the semester is offered after fulfillment of academic regulations.

## **9. Award of Class:**

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

| <b>Class Awarded</b>         | <b>percentage of marks to be secured</b> | From the aggregate marks secured in the subjects excluding the subjects exempted. |
|------------------------------|--|---|
| 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%          |   |

(The Marks in internal evaluation and end examination shall be shown separately in the marks memorandum)

#### **10. Minimum Instruction Days:**

For each semester there shall be a minimum of 90 clear instruction days.

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

#### **12. 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 case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Academic Council is final.
- iv. The College 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.

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## ***Academic Regulations for B.Tech. (Lateral Entry Scheme)***

(Effective for the students getting admitted into II-Year from the academic year 2015-2016 and on wards)

1. The students have to acquire all credits from II to IV year of B.Tech. Program (Regular) for the award of the degree. Register all credits and secure all credits with the exemption of 8 credits in elective subjects.
2. Student, who fails to fulfill the requirements for the award of the degree in six consecutive academic years from the year of admission, shall forfeit his seat unless extension is granted by Academic Council to complete the course for a further period.
3. The same attendance regulations are to be adopted as that of B.Tech. (Regular).

#### **4. Promotion Rule:**

A student shall be promoted from third year to fourth year only if he fulfills the academic requirements of 32 credits from the following examinations.

- a. Two regular and one supplementary examinations of II-Year I-Semester.
- b. One regular one supplementary examinations of II-Year II-Semester.
- c. One regular examination of III-Year I-Semester.

#### **5. Award of Class:**

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

|                              |                                 |  |
|------------------------------|---------------------------------|--|
| First Class with Distinction | 70% and above                   | From the aggregate marks secured in subjects.(i.e., II-Year to IV-Year) excluding the subjects exempted. |
| 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% |  |

(The Marks in internal evaluation and end examination shall be shown separately in the marks memorandum)

6. All other regulations as applicable for B.Tech. IV-Year degree course (Regular) will hold good for B.Tech. (Lateral Entry Scheme)

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## MALPRACTICES RULES

### DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS

|        | <b>Nature of Malpractices/Improper Conduct</b>   | <b>Punishment</b>   |
|--------|--|---|
|        | <i>If the candidate:</i>   |   |
| 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.<br>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 University 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 in 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 University 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 examination hall or organizes a walk out or instigates others to 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-incharge, or any person on duty in or outside the examination hall or | 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 also are 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.  |

|    |   |  |
|----|---|--|
|    | 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. |  |
| 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.   | Student of the colleges 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.<br>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 the remaining examinations of the subjects of that semester. |
| 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 examinations.   |
| 12. | If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the University for further action to award suitable punishment. |   |

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**VAAGDEVI COLLEGE OF ENGINEERING**  
(AUTONOMOUS)

**CIVIL ENGINEERING**

**COURSE STRUCTURE**

(Applicable for the batches admitted from A.Y. 2014-15 onwards)

**I YEAR**

**I SEMESTER**

| S.No. | Code   | Subject                                     | L         | T        | P        | Credits   |
|-------|--------|---|-----------|----------|----------|-----------|
| 1     | A91001 | Mathematics-I                               | 4         | 1        | 0        | 4         |
| 2     | A91002 | English                                     | 4         | 0        | 0        | 4         |
| 3     | A91004 | Engineering Chemistry                       | 4         | 1        | 0        | 4         |
| 4     | A91302 | Engineering Mechanics-I                     | 4         | 1        | 0        | 4         |
| 5     | A91502 | Computer Programming & Data Structures      | 4         | 1        | 0        | 4         |
| 6     | A91007 | Engineering Chemistry Lab                   | 0         | 0        | 3        | 2         |
| 7     | A91303 | Engineering Workshop                        | 0         | 0        | 3        | 2         |
| 8     | A91504 | Computer Programming & Data Structures Lab. | 0         | 0        | 3        | 2         |
|       |        | <b>Total</b>                                | <b>20</b> | <b>4</b> | <b>9</b> | <b>26</b> |

**I YEAR**

**II SEMESTER**

| S.No. | Code   | Subject  | L         | T        | P         | Credits   |
|-------|--------|--|-----------|----------|-----------|-----------|
| 1     | A92001 | Mathematics-II                                 | 4         | 1        | 0         | 4         |
| 2     | A92002 | Engineering Physics                            | 4         | 1        | 0         | 4         |
| 3     | A92006 | Human Values and Professional Ethics           | 2         | 0        | 0         | 2         |
| 4     | A92203 | Basic Electrical & Electronics Engineering     | 4         | 1        | 0         | 4         |
| 5     | A92301 | Engineering Graphics                           | 2         | 0        | 4         | 4         |
| 6     | A92302 | Engineering Mechanics-II                       | 4         | 1        | 0         | 4         |
| 7     | A92007 | English Language Communication Skills Lab      | 0         | 0        | 3         | 2         |
| 8     | A92008 | Engineering Physics Lab                        | 0         | 0        | 3         | 2         |
| 9     | A92205 | Basic Electrical & Electronics Engineering Lab | 0         | 0        | 3         | 2         |
|       |        | <b>Total</b>                                   | <b>20</b> | <b>4</b> | <b>13</b> | <b>28</b> |

**VAAGDEVI COLLEGE OF ENGINEERING**  
(AUTONOMOUS)

**CIVIL ENGINEERING**

**COURSE STRUCTURE**

**II YEAR**

**I SEMESTER**

| S.No. | Code   | Subject                                     | L         | T        | P        | Credits   |
|-------|--------|---|-----------|----------|----------|-----------|
| 1     | A93002 | Probability & Statistics                    | 4         | 1        | 0        | 4         |
| 2     | A93101 | Strength of Materials - I                   | 4         | 1        | 0        | 4         |
| 3     | A93102 | Building Materials, Construction & Planning | 4         | 1        | 0        | 4         |
| 4     | A93103 | Surveying                                   | 4         | 1        | 0        | 4         |
| 5     | A93104 | Fluid Mechanics                             | 4         | 1        | 0        | 4         |
| 6     | A93105 | Computer Aided Drafting Lab                 | 0         | 0        | 3        | 2         |
| 7     | A93106 | Strength of Materials Lab                   | 0         | 0        | 3        | 2         |
| 8     | A93107 | Surveying Lab                               | 0         | 0        | 3        | 2         |
|       |        | <b>Total</b>                                | <b>20</b> | <b>5</b> | <b>9</b> | <b>26</b> |

**II YEAR**

**II SEMESTER**

| S.No. | Code   | Subject                                   | L         | T        | P        | Credits   |
|-------|--------|---|-----------|----------|----------|-----------|
| 1     | A94005 | Computational Mathematics                 | 2         | 0        | 0        | 2         |
| 2     | A94101 | Strength of Materials - II                | 4         | 1        | 0        | 4         |
| 3     | A94102 | Structural Analysis-I                     | 4         | 1        | 0        | 4         |
| 4     | A94103 | Engineering Geology                       | 4         | 0        | 0        | 4         |
| 5     | A94003 | Environmental Studies                     | 4         | 0        | 0        | 4         |
| 6     | A94301 | Hydraulics & Hydraulic Machinery          | 4         | 1        | 0        | 4         |
| 7     | A94104 | Engineering Geology Lab                   | 0         | 0        | 3        | 2         |
| 8     | A94105 | Structural Analysis Lab                   | 0         | 0        | 3        | 2         |
| 9     | A94306 | Fluid Mechanics & Hydraulic Machinery Lab | 0         | 0        | 3        | 2         |
| 10    | A94006 | Gender Sensitization                      | 2         | 0        | 0        | 0         |
|       |        | <b>Total</b>                              | <b>24</b> | <b>3</b> | <b>9</b> | <b>28</b> |

**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**CIVIL ENGINEERING**

**COURSE STRUCTURE**

| III YEAR     |        |   | I SEMESTER |          |          |           |
|--------------|--------|---|------------|----------|----------|-----------|
| S.No.        | Code   | Subject                                     | L          | T        | P        | Credits   |
| 1            | A95101 | Design of RC Structures                     | 4          | 1        | 0        | 4         |
| 2            | A95621 | Managerial Economics and Financial Analysis | 4          | 0        | 0        | 4         |
| 3            | A95102 | Estimating & Costing                        | 4          | 1        | 0        | 4         |
| 4            | A95103 | Concrete Technology                         | 4          | 1        | 0        | 4         |
| 5            | A95104 | Engineering Hydrology                       | 4          | 1        | 0        | 4         |
| 6            | A95001 | Technical Communications Skills Lab         | 0          | 0        | 3        | 2         |
| 7            | A95105 | Concrete Technology Lab                     | 0          | 0        | 3        | 2         |
| 8            | A95106 | Surveying Lab – II                          | 0          | 0        | 3        | 2         |
| <b>Total</b> |        |   | <b>20</b>  | <b>4</b> | <b>9</b> | <b>26</b> |

| III YEAR     |  |   | II SEMESTER |          |          |           |
|--------------|--|---|-------------|----------|----------|-----------|
| S.No.        | Code   | Subject   | L           | T        | P        | Credits   |
| 1            | A96101   | Design of Steel Structures                              | 4           | 1        | 0        | 4         |
| 2            | A96102   | Highway Engineering                                     | 4           | 0        | 0        | 4         |
| 3            | A96103   | Geotechnical Engineering-I                              | 4           | 1        | 0        | 4         |
| 4            | A96104   | Structural Analysis-II                                  | 4           | 0        | 0        | 4         |
| 5            | A96105<br>A96106<br>A96203<br>A96204<br>A96307<br>A96413<br>A96414<br>A96512<br>A96513 | <b>Open Elective</b>                                    | 4           | 0        | 0        | 4         |
|              |  | Disaster Management                                     |             |          |          |           |
|              |  | Air Pollution & Control                                 |             |          |          |           |
|              |  | Renewable Energy Sources                                |             |          |          |           |
|              |  | Energy Storage Systems                                  |             |          |          |           |
|              |  | Nanotechnology  |             |          |          |           |
|              |  | Embedded Systems & Microprocessors                      |             |          |          |           |
|              |  | Principles of Communication Systems                     |             |          |          |           |
| A96512       | Database Management Systems  |   |             |          |          |           |
| A96513       | Java Programming   |   |             |          |          |           |
| 6            | A96107<br>A96108<br>A96109   | <b>Department Elective-I</b>                            | 4           | 1        | 0        | 4         |
|              |  | Elements of Earthquake Engineering Watershed Management |             |          |          |           |
|              |  | Environmental Impact Assessment and Management          |             |          |          |           |
| 7            | A96110   | Transportation Engineering Lab                          | 0           | 0        | 3        | 2         |
| 8            | A96111   | Geo Technical Engineering Lab                           | 0           | 0        | 3        | 2         |
| <b>Total</b> |  |   | <b>24</b>   | <b>3</b> | <b>6</b> | <b>28</b> |

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**VAAGDEVI COLLEGE OF ENGINEERING**  
(AUTONOMOUS)

**CIVIL ENGINEERING**

**COURSE STRUCTURE**

**IV YEAR**

**I SEMESTER**

| S.No. | Code                       | Subject  | L         | T        | P        | Credits   |
|-------|----------------------------|--|-----------|----------|----------|-----------|
| 1     | A97101                     | Geotechnical Engineering-II  | 4         | 1        | 0        | 4         |
| 2     | A97102                     | Irrigation Engineering   | 4         | 1        | 0        | 4         |
| 3     | A97103                     | Environmental Engineering-I  | 4         | 0        | 0        | 4         |
| 4     | A97104<br>A97105<br>A97106 | <b>Department Elective-II</b><br>Pre stressed Concrete<br>Transportation Engineering<br>Solid Waste Management | 4         | 1        | 0        | 4         |
| 5     | A97107<br>A97108<br>A97109 | <b>Department Elective-III</b><br>Finite Element Method<br>Pavement Design<br>Ground Improvement Techniques    | 4         | 1        | 0        | 4         |
| 6     | A97110                     | Environmental Engineering Lab  | 0         | 0        | 3        | 2         |
| 7     | A97111                     | Structural Drafting Lab  | 0         | 0        | 3        | 2         |
| 8     | A97112                     | Seminar  | 0         | 0        | 3        | 2         |
| 9     | A97113                     | Industry Oriented Mini Project   | 0         | 0        | 0        | 2         |
|       |                            | <b>Total</b>   | <b>20</b> | <b>4</b> | <b>9</b> | <b>28</b> |

**IV YEAR**

**II SEMESTER**

| S.No. | Code                       | Subject   | L        | T        | P         | Credits   |
|-------|----------------------------|---|----------|----------|-----------|-----------|
| 1     | A98101<br>A98102<br>A98103 | <b>Department Elective-IV</b><br>RS & GIS<br>Earth and rock fill dams<br>Advanced topics in Environmental Engineering | 4        | 0        | 0         | 4         |
| 2     | A98104                     | Construction Technology and Project Management  | 4        | 0        | 0         | 4         |
| 3     | A98105                     | Comprehensive Viva  | 0        | 0        | 0         | 2         |
| 4     | A98106                     | Project   | 0        | 0        | 15        | 12        |
|       |                            | <b>Total</b>  | <b>8</b> | <b>0</b> | <b>15</b> | <b>22</b> |

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**(A91001) MATHEMATICS-I  
(Common for all Branches)**

**I Year I-Sem**

|          |          |          |          |
|----------|----------|----------|----------|
| <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b> |
| <b>4</b> | <b>1</b> | <b>0</b> | <b>4</b> |

**Course Objective:**

The main aim of teaching Engineering Mathematics-I is to emphasize the relevance of fundamentals and applications of Mathematics in Engineering field. Mathematics is the basic of all branches of modern business and science and technology. It deals with using the constructive results of mathematics to solve a problem in applied science or Engineering field.

It helps the students in choosing a technique that improve the quality and efficiency of actual computation.

**Unit-I:**

**Differential calculus:**

Rolle's Mean Value theorem, Lagrange's Mean Value Theorem, Cauchy's Mean Value Theorem, Taylor's Theorem with geometrical and algebraic interpretation (without proof). Functions of several variables-Chain Rule. Jacobian, Functional dependence, maxima and minima of functions of two variables, with constraints and without constraints-Method of Lagrange's multipliers.

**Unit-II:**

**Ordinary differential equations of first order:**

Formation of differential equations, solution of differential equations of First order and First degree. Exact differential equations, Linear Differential equations. Bernoulli's Differential equations, Orthogonal Trajectories, Newton's law of cooling and Natural law of growth and Decay.

**Unit-III:**

**Ordinary linear differential equations of higher order:**

Homogenous linear differential equations of higher order with constant coefficients, Non Homogenous linear differential equations of higher order of the form  $e^{ax}$ ,  $\sin ax$ ,  $\cos ax$ , Polynomials in  $x$ ,  $e^{ax} v(x)$ ,  $x^k v(x)$ , Cauchy-Euler equation and Lagrange's equation, Method of variation of parameters.

**Unit-IV:**

**Improper integration and multiple integrals:**

Beta and Gamma functions, properties and Relation between them Evaluation of improper integration using Beta, Gamma functions. Multiple integrals- double & triple integrals. Change of variables and change of order of integration. Finding area and volume of region.



## **Unit-V:**

### **Laplace Transformation:**

Laplace transform - Inverse Laplace transform - properties of Laplace transforms - Laplace transforms of unit step function, impulse function and periodic function - convolution theorem - Solution of ordinary differential equations with constant coefficients and system of linear differential equations with constant coefficients using Laplace transform.

### **Recommended Text Books:**

1. R. K. Jain and S. R. K. Iyengar: Advanced Engineering Mathematics, Narosa Publishing House, 2008
2. B. S. Grewal: Higher Engineering Mathematics, Khanna Publications, 2009.

### **Reference Book:**

1. Erwyn Kreyszig : Advanced Engineering Mathematics, John Wiley and Sons, 8th Edition.
2. T. K. V. Iyengar: Engineering Mathematics-I, S. Chand and Company.
3. A textbook of Engineering Mathematics Vol-I by P.B.Bhaskara Rao, S.K.V.S. Rama Chary.
4. A textbook of Engineering Mathematics Vol-I by C. Shankaraiah, VGS Book Link.

### **Learning Outcomes:**

By studying Mathematics-I students understanding the method of solving first order & higher order differential equations and they convert the trigonometric functions into algebraic function by studying mean value theorems. They understand how to find area, volume by using applications of integration. They understand how to find the solution of initial value problem without finding general solution by Laplace Technique.

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**(A91002) ENGLISH  
(Common for all Branches)**

**I Year I-Sem**

**L T P C  
4 0 0 4**

**1. INTRODUCTION:**

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training students to acquire communicative competence, the syllabus has been designed to develop linguistic and communicative competencies of Engineering students. The prescribed books and the exercises are meant to serve broadly as students' handbooks.

In the English classes, the focus should be on the skills of reading, writing, listening and speaking and for this the teachers should use the text prescribed for detailed study. For example, the students should be encouraged to read the texts/selected paragraphs silently. The teachers can ask comprehension questions to stimulate discussion and based on the discussions students can be made to write short paragraphs/essays etc.

The text for non-detailed study is for extensive reading/reading for pleasure. Hence, it is suggested that they read it on their own the topics selected for discussion in the class. The time should be utilized for working out the exercises given after each section, as also for supplementing the exercises with authentic materials of a similar kind for example, from newspaper articles, advertisements, promotional material etc.. *However, the stress in this syllabus is on skill development, fostering ideas and practice of language skills.*

**2. 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.

**Learning Outcomes**

- Usage of correct English Language, written and spoken
- Enrichment of comprehension and fluency
- Gaining confidence in using language in varied 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

*Students should be given practice in listening to the sounds of the language to be able to recognise them, to distinguish between them to mark stress and recognise and use the right intonation in sentences.*

- Listening for general content
- Listening to fill up information
- Intensive listening
- Listening for specific information

### **Speaking Skills:**

#### **Objectives**

1. To make students aware of the role of speaking in English and its contribution to their success.
2. To enable students to express themselves fluently and appropriately in social and professional contexts.
  - Oral practice
  - Describing objects/situations/people
  - Role play – Individual/Group activities (Using exercises from all the **six** units of the prescribed text: ***Skills Annexe: Functional English for Success.***)
  - Just A Minute(JAM) Sessions.

### **Reading Skills:**

#### **Objectives**

To develop an awareness in the students about the significance of silent reading and comprehension.

1. 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.
  - Skimming the text
  - Understanding the gist of an argument
  - Identifying the topic sentence
  - Inferring lexical and contextual meaning
  - Understanding discourse features
  - Scanning
  - Recognizing coherence/sequencing of sentences

**NOTE :** *The students will be trained in reading skills using the prescribed text for detailed study. They will be examined in reading and answering questions using „unseen“ passages which may be taken from authentic texts, such as magazines/newspaper articles.*

## 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.

### Writing sentences

- Use of appropriate vocabulary
- Paragraph writing
- Coherence and cohesiveness
- Narration / description
- Note Making
- Formal and informal letter writing
- Describing graphs using expressions of comparison

## 4. TEXTBOOKS PRESCRIBED:

### For Detailed study

- First Textbook entitled “*Skills Annexe -Functional English for Success*”, Published by Orient Black Swan, Hyderabad
- The Second Textbook entitled “*Epitome of Wisdom*”, published by Maruthi Publications, Hyderabad.

The course content and study material is divided into **Five Units**.

### Unit – I:

Importance of communication in English-Globalisation-changing trends-barriers to communication

### Unit –II:

- Chapter entitled „*Wit and Humour*” from „Skills Annexe” -Functional English to Success Published by Orient Black Swan, Hyderabad
- Chapter entitled „*Mokshagundam Visvesvaraya*” from “*Epitome of Wisdom*”, Published by Maruthi Publications, Hyderabad.

**and**

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 –III

- Chapter entitled “*Advances in Science and Technology*” from “*Skills Annexe - Functional English for Success*” Published by Orient Black Swan, Hyderabad.
- Chapter entitled „*Three days To See*” from “*Epitome of Wisdom*”, Published by Maruthi Publications, Hyderabad.

and

- 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 „*Risk Management*” from “*Skills Annexe -Functional English for Success*” Published by Orient Black Swan, Hyderabad.
- Chapter entitled „*Leela”s Friend*” by R.K. Narayan from “*Epitome of Wisdom*”, Published by Maruthi Publications, Hyderabad.

and

- 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 –V

- Chapter entitled „*Human Values and Professional Ethics*” from “*Skills Annexe - Functional English for Success*” Published by Orient Black Swan, Hyderabad.
- Chapter entitled „*The Last Leaf*” from “*Epitome of Wisdom*”, Published by Maruthi Publications, Hyderabad.

and

- 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
- \* Exercises from the texts not prescribed shall also be used for classroom tasks.

## SUGGESTED READING:

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 for Employability-K. Purushotham, Orient Blackswan (with CD).
4. Listening & Speaking Skills **Book I and Book II**, Cambridge Publishers (with CD's).
5. English Grammar Practice, **Raj N Bakshi, Orient Longman.**
6. **Technical Communication** by Daniel Riordan. 2011. **Cengage Publications. New Delhi.**
7. **Effective English**, edited by E Suresh Kumar, A RamaKrishna Rao, P Sreehari, Published by **Pearson**
8. Handbook of English Grammar and Usage, **Mark Lester and Larry Beason, Tata Mc Graw –Hill.**
9. Spoken English, **R.K. Bansal & JB Harrison, Orient Longman.**
10. Technical Communication, **Meenakshi Raman, Oxford University Press**
11. Objective English **Edgar Thorpe & Showick Thorpe, Pearson Education**
12. Grammar Games, **Renuvolcuri Mario, Cambridge University Press.**
13. Everyday Dialogues in English, **Robert J. Dixon, Prentice Hall India Pvt Ltd.,**
14. ABC of Common Errors **Nigel D Turton, Mac Millan Publishers.**
15. Basic Vocabulary **Edgar Thorpe & Showick Thorpe, Pearson Education**
16. Effective Technical Communication, **M Ashraf Rizvi, Tata Mc Graw –Hill.**
17. An Interactive Grammar of Modern English, **Shivendra K. Verma and Hemlatha Nagarajan , Frank Bros & CO**
18. A Communicative Grammar of English, **Geoffrey Leech, Jan Svartvik, Pearson Education**
19. Enrich your English, **Thakur K B P Sinha, Vijay Nicole Imprints Pvt Ltd.,**
20. A Grammar Book for You And I, **C. Edward Good, MacMillan Publishers.**
21. Practical English Usage (ELBS) **Michael Swan.**
22. Examine Your English – **Margaret Maison.**
23. The Parts of Speech: **P. Satyanarayana, P.C. Ray Publications, Warangal, 2003.**
24. The Tense: **P. Satyanarayana, P.C. Ray Publications, Warangal 2003.**

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**ENGINEERING CHEMISTRY**

**I year B.Tech. I-SEM CIVIL, MECH. & EEE(A91004)  
II-SEM ECE & CSE (A92003)**

**L T P C  
4 1 0 4**

**Objectives:**

The purpose of these courses is to emphasize the relevance of fundamentals and applications of chemical sciences in the field of engineering. Thus, the courses have been conceived in such a way that they take into account appropriate combinations of old and new emerging concepts in the chemical sciences area and their current and potential uses in engineering. The Courses attempt to address the principles of general chemistry and specific topics relevant to various engineering disciplines, wherein the students can apply this learning in their respective areas of expertise.

The syllabus has sought to fulfill the objective of making the student of engineering and technology realize that chemistry like other subjects is the real base of their profession and that therefore they must have a good understanding of chemistry before they can use it in their profession.

**Unit – 1:**

***Electro Chemistry***

Conductors, Non-conductors, Faraday's laws, Ohm's law, conductance, specific, equivalent and molar conductance, units and their relation. Numerical Problems. Applications of conductance – conductometric titrations.

EMF: Electrochemical and Electrolytic cells, Galvanic cell, Electro chemical series, measurement of emf and single electrode potential, Nernst's equation and its applications,

**Unit – 2:**

***Electrodes and Battery Chemistry***

Introduction, Types of electrodes: Reference electrodes (SHE, SCE and QH), Ion-selective electrode-Glass electrode, applications of electrode potentials- Determination of PH and Potentiometric Titrations. Numerical Problems. Concentration cells-Electrode concentration cells and Electrolyte concentration cells. Batteries: Primary cells-Dry cell, Secondary cells - Pb-Acid storage cell, Fuel cells- Hydrogen-Oxygen fuel cell. Solar Batteries, Relation between electrical and heat energy.

### **Unit –3:**

#### ***Corrosion and Its control***

Introduction, Causes of corrosion, Types of corrosion- Dry and Wet corrosion. Factors affecting on corrosion, Corrosion controlling methods- Cathodic protection and Surface coatings (anodic and Cathodic), Methods of applications of metal coatings- Hot dipping and electroplating.

### **Unit – 4:**

#### ***Polymer Chemistry***

Introduction, Functionality of Monomers, classification of polymers, Types of polymerization, Mechanism of polymerization: Chain and step. Plastics: Chemistry of Thermoplastic resins (PE, PVC, PS & Nylon) and thermosetting resins (Bakelite). Conducting Polymers- Poly acetylene, Poly aniline & Poly pyrrole. Fibers- Poly ester, Nylon-6, 6 & Nylon 6, 10.

### **Unit – 5:**

#### ***Water Chemistry***

Introduction, Types of hardness, units and Numerical problems, Estimation of hardness of water-EDTA method and Numerical problems, Boiler Troubles- Scale and sludge, caustic embrittlement & Boiler corrosion. Treatment of Boiler feed water- Lime-soda, Zeolite and Ion-exchange process. Numerical problems, Desalination of brackish water- Reverse Osmosis and Electro dialysis.

#### **Text Books:**

1. Text Book of Engineering Chemistry by C. Parameshwara Murthy. B.S. Publications
2. Text Book of Engineering Chemistry by Y. Bharathi kumara and Jyotsna Cherikuri, VGS Buplications.
3. Text Book of Engineering Chemistry by Shashi Chawla
4. Text Book of Engineering Chemistry by B. Ramadevi & Ch. Venkata Ramana Reddy, CENGAGE Learning 2012.

#### **Reference Books:**

1. Elementary principles of Physical Chemistry by P.W. Atkins, Oxford University Press.
2. Physical Chemistry by Puri & Sharma
3. Engineering Chemistry by Jain & Jain
4. Engineering Chemistry by Shashi Chawla.
5. Polymer Chemistry by Gourikar.
6. Physical Chemistry Glastone.



### **Learning Outcomes:**

1. Applications of electrochemistry understanding different types of cells, their representation, knowledge of electrode potentials, utilization of electrical energy and conversion into different energies.
2. Applicability of electrodes in different fields of analysis.
3. Understanding the utility of batteries as a source of energy in many electronic gadgets & their types.
4. Enhancement of power generation by making of fuel cells. Knowledge of need for alternate source of energy.
5. Deterioration of metal under the influence of environment, mechanism of corrosion, factors affecting corrosion, prevention of corrosion using various methods & a basic knowledge of surface coatings.
6. Improving the properties of plastics by various additives, integral role of various polymers in our life style & applicability of plastic in automobile and textile industry.
7. Knowledge of hardness of water and its effect, industrial utility of water especially for steam generation, removal methodologies of hardness & treatment of brackish or salty water.

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**(A91302) ENGINEERING MECHANICS-I**

**I Year I Sem, Mech & Civil**

|          |          |          |          |
|----------|----------|----------|----------|
| <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b> |
| <b>4</b> | <b>1</b> | <b>0</b> | <b>4</b> |

**COURSE OBJECTIVES:**

1. Understand the basic principles of static's applicable to rigid bodies in equilibrium
2. Apply static principles to the solution of a variety of practical problems.
3. Determine the component of force in space.
4. Determine the centre of gravity of Simple figures, composite figures and its applications
5. Determine the Moment of inertia of Simple figures, composite figures and its applications
6. Determine mass moment of inertia of simple objects, composite bodies.
7. Determine the Frictional Forces when the bodies are under motion.

**UNIT – I**

**Introduction to Engineering Mechanics** – Basic Concepts.

**Resultants of Force System:** Parallelogram law –Forces and components- Resultant of coplanar Concurrent Forces – Components of forces in Space – Moment of Force -principle of moments – Coplanar Applications – Couples -Resultant of any Force System.

**UNIT – II**

**Equilibrium of Force Systems** : Free Body Diagrams, Equations of Equilibrium - Equilibrium of planar Systems -Equilibrium of Spatial Systems.

**UNIT – III**

**FRICTION:** Introduction – Theory of Friction – Angle of friction - Laws of Friction – Static and Dynamic Frictions –Motion of Bodies: Wedge, Screw, Screw-jack and Differential Screw-jack.

**Transmission of Power:** Flat Belt Drives - Types of Flat Belt Drives – Length of Belt, tensions, Tight side, Slack Side, Initial and Centrifugal – Power Transmitted and Condition for Max. Power.

**UNIT – IV**

**CENTROIDS AND CENTERS OF GRAVITY:** Introduction – Centroids and Centre of gravity of simple figures (from basic principles) – Centroids of Composite Figures - Theorem of Pappus – Center of gravity of bodies and centroids of volumes.

**UNIT – V**

**Moments of Inertia** : Definition – Polar Moment of Inertia –Radius of gyration - Transfer formula for moment of inertia - Moments of Inertia for Composite areas - Products of Inertia, Transfer Formula for Product of Inertia.

**Mass Moment of Inertia** : Moment of Inertia of Masses- Transfer Formula for Mass Moments of Inertia - mass moment of inertia of composite bodies.

**TEXT BOOKS:**

1. Engg. Mechanics / S.S. Bhavikatti & K.G. Rajasekharappa / Third edition /New age International Publishers
2. Engineering Mechanics - Statics and Dynamics by Ferdinand.L. Singer / Harper International Edition.
3. Engineering Mechanics/ S. Timoshenko and D.H. Young / Mc Graw Hill Book Company.

**REFERENCES:**

1. Engineering Mechanics / Irving Shames / Prentice Hall
2. Engg. Mechanics / M.V. Seshagiri Rao & D Rama Durgaiyah/ Universities Press
3. Engineering Mechanics, Umesh Regl / Tayal.
4. Engg. Mechanics / KL Kumar / Tata McGraw Hill.

**COURSE OUTCOMES:**

The students will be able to

1. Apply engineering science principles to develop algebraic relationships among key physical parameters and variables based on analysis of a specified system
2. Apply the principles of mechanics for solving practical problems related to equilibrium of rigid bodies and particle in motion.
3. Use references that provide tabulated physical data that are useful for mechanical engineers.
4. Deal the subjects like Mechanics of Solids, Mechanics of Fluids and Design of machines etc. in higher classes with an ease.

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**VAAGDEVI COLLEGE OF ENGINEERING**  
(AUTONOMOUS)

**(A91502) COMPUTER PROGRAMMING & DATA STRUCTURES**

**I Year I-Sem Mech & Civil**

**L/T/P    C**  
**4/1/0    4**

**Objectives:**

To provide the necessary knowledge and training for step by step computer program development and to present the basic concepts in C programming language and to prepare the students to write modular and readable C Programs. Also the Course introduces the foundation concepts like abstract data types, linear data structures, to analyze the performance of algorithms and how to use stacks, queues, searching and sorting and aims to train the students to write working programs to solve problems using data structures such as arrays, linked lists etc.

**Syllabus Content**

**UNIT-1**

**Introduction to Computers:** Computer Systems, Computing Environments, Computer Languages, Creating and running programs, Software Development Method, Algorithms, Pseudo code, flow charts, applying the software development method.

**Introduction to C Language:** Background, Simple C programs, Identifiers, Basic data types, Variables, Constants, Input / Output, Operators. Expressions, Precedence and Associativity, Expression Evaluation, Type conversions, Bit wise operators, Statements, Simple C Programming examples.

**Selection Statements:** if and switch statements, Repetition statements – while, for, do-while statements, Loop examples, other statements related to looping – break, continue, go to, Simple C Programming examples.

**UNIT-2**

**Designing Structured Programs:** Functions, basics, user defined functions, inter function communication,

**Standard functions:** Scope, Storage classes-auto, register, static, extern, scope rules, type qualifiers, recursion- recursive functions, Preprocessor commands, example C programs

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

**UNIT-3**

**Pointers:** Introduction (Basic Concepts), Pointers for inter function communication, pointers to pointers, compatibility, memory allocation functions, array of pointers, programming applications, pointers to void, pointers to functions, command –line arguments.

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

## UNIT-4

**Derived types:** Structures – Declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typedef, bit fields, enumerated types, C programming examples.

**Input and Output:** Concept of a file, streams, standard input / output functions, formatted input / output functions, text files and binary files, file input / output operations, file status functions (error handling), C program examples.

## UNIT-5

**Sorting:** Selection sort, Bubble sort, Insertion sort,

**Searching:** Linear and Binary search methods.

**Data Structures:** Introduction to Data Structures, abstract data types, Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, Stacks-Operations, array and linked representations of stacks, stack applications, Queues-operations, array and linked representations.

### Text Books:

1. *C Programming & Data Structures*, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.
2. *C Programming & Data Structures*, P. Dey, M Ghosh R Thereja, Oxford University Press
3. *Problem Solving and Program Design in C*, J.R. Hanly and E.B. Koffman, Fifth Edition, Pearson Education.

### References:

1. *C& Data structures* – P. Padmanabham, Third Edition, B.S. Publications.
2. *C& Data structures* – E V Prasad and N B Venkateswarlu, S.Chand&Co.
3. *C Programming & Data Structures*,E.Balagurusamy,TMH.
4. *C Programming with problem solving*, J.A. Jones & K. Harrow, dreamtech Press
5. *Programming in C* – Stephen G. Kochan, III Edition, Pearson Eductaion.
6. *C for Engineers and Scientists*, H.Cheng, Mc.Graw-Hill International Edition
7. *Data Structures using C* – A.M.Tanenbaum, Y.Langsam, and M.J. Augenstein, Pearson Education / PHI
8. *The C Programming Language*, B.W. Kernighan and Dennis M.Ritchie, PHI/Pearson Education

### Course Outcomes:

- CO-1: A strong foundation in core Computer Science and Engineering, both theoretical and applied concepts.
- CO-2: An ability to apply knowledge of mathematics, science, and engineering to real-world problems.
- CO-3: Ability to model, understand, and develop complex software for System Software as well as Application Software.
- CO-8: A recognition of the need for, and an ability to engage in life-long learning.

**Learning Outcomes:**

1. Understanding the fundamentals of C programming.
2. Learning of sequencing, branching, looping and decision making statements to solve scientific and engineering problems.
3. Implementing different operations on arrays and creating and using of functions to solve problems.
4. Designing of linear data structures stacks, queues and linked lists. Learning of different searching and sorting techniques and ability to compare differences in performances.

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**(A91007) ENGINEERING CHEMISTRY LAB**

**I Year I-Sem: CIVIL & MECH**

**L T P C  
0 0 3 2**

**Objectives**

1. To impart fundamental knowledge in handling the equipment/glassware and chemicals in the chemistry laboratory.
2. To offer hands on experience on the basic equipment related to engineering chemistry.
3. For practical understanding of the theoretical concepts of chemistry.

***Titrimetry:***

1. Estimation of ferrous iron by dichrometry.
2. Estimation of hardness of water by EDTA method.

***Instrumental methods:***

***Colorimetry***

3. Determination of ferrous iron by colorimetric method
4. Estimation of copper by colorimetry.

***Conductometry:***

5. Determination of strength of given strong Acid using strong base by Conductometric method
6. Determination of strength of given strong Acid and weak acid present in given mixture of acids using strong base by Conductometric method

***Potentiometry:***

7. Determination of strength of given strong Acid using strong base by Potentiometric method
8. Determination of strength of given weak Acid using strong base by Potentiometric method

***Physical properties:***

9. Measurement of Viscosity of liquids
10. Measurement of Surface Tension of liquids

***Chemical Kinetics:***

11. Determination of rate constant of by hydrolysis of methyl acetate catalyzed by an acid.

***Preparations:***

12. Preparation of Aspirin tablet.

Laboratory Manual: 1. Engineering Chemistry Lab manual by Mukkanti, BS Publications.  
2. Engineering Chemistry Lab manual by Bharathi Kumari, VGS Publications

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**ENGINEERING WORKSHOP**

**I Year I-Sem Civil, EEE, ECE (A91303)  
II-Sem CSE & Mech (A92303)**

**L T P C  
0 0 3 2**

**COURSE OBJECTIVES:**

1. Know the usage of various tools and their application in carpentry, tin smithy.
2. Know the usage of various tools and their application in black smithy, foundry, welding and house wiring.
3. Make lap joint and dove tail joint in carpentry.
4. Make scoop, funnel and tray like items in tin smithy.
5. Use one-way, two-way switches, parallel and series connections in house wiring.
6. Know the basics of welding.

**I. TRADES FOR EXERCISES:**

(Any **six** trades from the following for Mechanical Engineering Branch & Any four trades for all other Branches with minimum of **two** exercises in each trade)

1. Carpentry
2. Fitting
3. Tin-Smithy
4. Black Smithy
5. House-wiring
6. Foundry
7. Plumbing

**II. Trades for Demonstration & Exposure**

1. Demonstration of power tools & wiring
2. Welding
3. Machine Shop

**III. IT Workshop I:** Computer hardware, identification of parts, Disassembly, Assembly of computer to working condition, simple diagnostic exercises.

**IT Workshop II:** Installation of operating system windows and linux simple diagnostic exercises.

**TEXTBOOKS:**

1. Workshop Manual – P.Kannaiah / K.L.Narayana / Scitech Publishers.
2. Workshop Manual- Venkat Reddy /BS Publications / 6<sup>th</sup> Edition.



## **COURSE OUTCOMES:**

The students will be able to

1. Know the fundamental knowledge of various trades and their usage in real time applications
2. Gain knowledge of Foundry, Welding, Black smithy, Fitting, Machine shop and house wiring
3. Understand the basis for analyzing power tools in construction and wood working, electrical engineering and mechanical engineering.
4. Use basic concepts of computer hardware for assembly and disassembly.

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**VAAGDEVI COLLEGE OF ENGINEERING**  
(AUTONOMOUS)

**(A91504) COMPUTER PROGRAMMING AND DATA STRUCTURES LAB**

**I Year I-Sem Civil & Mech**

|              |          |
|--------------|----------|
| <b>L/T/P</b> | <b>C</b> |
| <b>0/0/3</b> | <b>2</b> |

**Objectives:**

To provide the necessary knowledge and practical training for step by step computer program development and to apply the basic concepts in C programming language and to train the students to write modular and readable C Programs. Also the Lab Course makes use of foundation concepts like abstract data types, linear data structures, to analyze the performance of algorithms and uses stacks, queues, searching and sorting and trains the students to write working programs to solve problems using data structures.

**Syllabus Content**

Write a C program to find the sum of individual digits of a positive integer.

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.

Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

Write a C program to find the roots of a quadratic equation.

Write a C program to find the factorial of a given integer.

Write a C program to find the GCD (greatest common divisor) of two given integers.

Write a C program to solve Towers of Hanoi problem.

Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +, -, \*, /, % and use Switch Statement)

Write a C program to find both the largest and smallest number in a list of integers.

4. Write a C program that uses functions to perform all of the following:

- i. Reading of a matrix.
- ii. Printing a matrix in a formatted form.
- iii. Adding two compatible matrices to produce a result matrix
- iv. Multiplying two compatible matrices to produce a result matrix.

5. Write a C program that uses functions to perform the following operations:

- i. To insert a sub-string in to a given main string from a given position.
- ii. To delete n Characters from a given position in a given string.

- iii. Write a C program to determine if the given string is a palindrome or not.
- Write a C program using pointer to create a two dimensional matrix, to input values in to the matrix and to display the matrix and its transpose. Free the memory properly.
- Write a C program to demonstrate calling of a function (like add,subtract,multiply) using a function pointer.
- Write a C program that displays the position or index in the string S where the string T begins, or – 1 if S doesn't contain T.
- Write a C program to count the lines, words and characters in a given text.
- Write a C program to generate Pascal's triangle.
- Write a C program to construct a pyramid of numbers.
9. Write a menu driven C program that uses functions to perform the following operations on complex numbers stored in a structure:
- i. Reading a complex number
  - ii. Writing a complex number
  - iii. Addition of two complex numbers
  - iv. Multiplication of two complex numbers
- Write a C program which copies one text file to another text file and verify the correctness.
- Write a C program which copies one binary file to another binary file and verify the correctness.
- Write a command-line C program to reverse the first n characters in a file. (Note: The file name and n are specified on the command line.)
- Write a C program to display the contents of a file.
- Write a C program to produce reverse of the content of a text file into another text file and verify the result.
- Write a C program to merge two text files into a third text file ( i.e., the contents of the first file followed by those of the second are put in the third file) and verify the correctness.
12. Write a C program that uses functions to perform the following operations on singly linked list.:
- i) Creation      ii) Insertion      iii) Deletion      iv) Traversal
13. Write C programs that implement stack (its operations) using
- i) Arrays ii) Pointers
14. Write C programs that implement Queue (its operations) using
- i) Arrays ii) Pointers
15. Write a C program that implements the following sorting methods to sort a given list of integers in ascending order
- i) Bubble sort    ii) Selection sort

16. Write C programs that use both recursive and non recursive functions to perform the following searching operations for a Key value in a given list of integers:
- i) Linear search ii) Binary search

**Text Books:**

1. *C Programming & Data Structures*, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.
2. *C Programming & Data Structures*, P. Dey, M Ghosh R Thereja, Oxford University Press
3. *Problem Solving and Program Design in C*, J.R. Hanly and E.B. Koffman, Fifth Edition, Pearson Education.

**References:**

1. *C& Data structures* – P. Padmanabham, Third Edition, B.S. Publications.
2. *C& Data structures* – E V Prasad and N B Venkateswarlu, S.Chand&Co.
3. *C Programming & Data Structures*,E.Balagurusamy, TMH.
4. *C Programming with problem solving*, J.A. Jones & K. Harrow, dreamtech Press
5. *Programming in C* – Stephen G. Kochan, III Edition, Pearson Eductaion.
6. *C for Engineers and Scientists*, H.Cheng, Mc.Graw-Hill International Edition
7. *Data Structures using C* – A.M.Tanenbaum, Y.Langsam, and M.J. Augenstein, Pearson Education / PHI
8. *The C Programming Language*, B.W. Kernighan and Dennis M.Ritchie, PHI/Pearson Education

**Course Outcomes:**

- CO-1: A strong foundation in core Computer Science and Engineering, both theoretical and applied concepts.
- CO-2: An ability to apply knowledge of mathematics, science, and engineering to real-world problems.
- CO-3: Ability to model, understand, and develop complex software for System Software as well as Application Software.
- CO-4: A recognition of the need for, and an ability to engage in life-long learning.

**Learning Outcomes:**

1. Understanding the fundamentals of C programming.
2. Learning of sequencing, branching, looping and decision making statements to solve scientific and engineering problems.
3. Implementing different operations on arrays and creating and using of functions to solve problems.
4. Designing of linear data structures stacks, queues and linked lists. Learning of different searching and sorting techniques and ability to compare differences in performances.

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**(A92001) MATHEMATICS – II  
(Common for all Branches)**

**I Year II-Sem**

|          |          |          |          |
|----------|----------|----------|----------|
| <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b> |
| <b>4</b> | <b>1</b> | <b>0</b> | <b>4</b> |

**Course Objective:**

The main aim of this subject is to improve the mathematical knowledge of the student. When the student study the mathematics-II he should get the impression that mathematics is a systematic science of practical importance, resting on a relatively small number of basic concepts and involving powerful unifying methods. He should soon convince himself of the necessity for applying mathematical procedures to engineering problem.

By studying the mathematics the students translating the given physical information into mathematical model. This model may be a differential equation, a system of equation or some other mathematical expression.

**Unit-I :**

**Solution of Linear System:**

Matrix and types of matrices Elementary row and column operations on a matrix, Rank of matrix –Echelon and Normal form – Inverse of a matrix using elementary operations, linear dependence and independence of vectors, solutions of systems of linear equations using elementary operations, and direct methods-Gauss elimination, LU-decomposition.

**Unit-II:**

**Eigen values and Eigen vectors:**

Eigen values and Eigen vectors of a matrix and their properties, Cayley-Hamilton theorem and its applications, Diagonalization of a matrix, Quadratic forms - Reduction of a quadratic form to canonical form by linear transformation and orthogonal transformation and nature, signature index of a quadratic form, Complex matrices-Hermitian, skew-hermitian and Unitary matrices.

**Unit-III:**

**Fourier series:**

Determination of Fourier Coefficients, Even and Odd functions, Half Range Fourier sine and cosine expansions Fourier series in an arbitrary interval.

**Fourier transforms:** Fourier integrals, Fourier sine and cosine integrals. Fourier transforms Fourier sine and cosine transforms- Properties- Inverse transforms- Finite Fourier transforms

#### **Unit-IV:**

##### **Vector Calculus:**

Scalar and Vector fields; Vector Differentiation, Level surfaces - directional derivative - Gradient of scalar field, Divergence and Curl of a vector field - Laplacian - Line and surface integrals; Green's theorem, Gauss Divergence theorem, Stoke's theorem (without proof).

#### **Unit-V:**

##### **Partial differential equation:**

Formation of partial differential Equation by elimination of arbitrary constants and arbitrary functions, solutions of first order linear and non-linear Equations. Method of separation of variables, for 2<sup>nd</sup> order Equations. Applications of partial differential Equations.

#### **Recommended Text Books:**

1. R.K.Jain and S.R.K.Iyengar : Advanced Engineering Mathematics, Narosa Publishing House, 2008
2. B. S. Grewal : Higher Engineering Mathematics, Khanna Publications, 2009.

#### **Reference Book:**

1. T.K.V.Iyengar:Mathematical Methods, S.Chand and Company.
2. Erwyn Kreyszig : Advanced Engineering Mathematics, John Wiley and Sons, 8th Edition.
3. A textbook of Engineering Mathematics Vol-I by P.B.Bhaskara Rao, S.K.V.S. Rama Chary
4. A textbook of Engineering Mathematics Vol-I by C. Shankaraiah, VGS Book Link

#### **Course Outcomes:**

By studying Mathematics-II students are able to find the rank of matrix and they can find eigen values & eigen vectors of different engineering fields. They use concept of matrices in the development of programming languages and by studying the fourier series & fourier transforms students are able to solve the problems related to theory of circuits and many applications in electronic engineering and communications engineering.

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**(A92002) ENGINEERING PHYSICS**

**I Year II-Sem: CIVIL & MECH**

**L T P C  
4 1 0 4**

**OBJECTIVES:**

- Physics is the mother of engineering and technology. Without the applications of concepts of physics there can be no technological developments. Hence physics is the foundation on which stands the elaborate structure of technology. The main purpose of teaching physics to engineering under graduates is to acquaint the budding engineers with a thread of development. The aim of Physics is to provide an adequate exposure and develop insight about the basic principles of physics along with the engineering applications. The acquaintance of basic physics principles would help the engineers to understand the tools and techniques used in the industry and provide the necessary foundations for inculcating innovative approaches.

**Unit-I:**

**CRYSTALLOGRAPHY, CRYSTAL STRUCTURES & BAND THEORY OF SOLIDS:**

**Crystallography & Crystal Structures:** Space lattice, Unit cell, Lattice parameters, Crystal systems, Bravais lattice, Crystal planes & crystal directions, Miller indices, Inter-planar spacing of orthogonal crystal systems. Atomic radius, Co-ordination number and packing fraction of S.C.C., B.C.C & F.C.C., Crystal structures of diamond & NaCl.

**Band theory of solids:** Schrodinger time independent wave equation and significance of wave function. Electrons in a periodic potential, Bloch theorem, Kronig-Penny model (Qualitative treatment), E-k curve, Concept of effective mass of electron and hole. Origin of band formation in solids, Classification of materials into conductors, semi conductors and insulators.

**UNIT-II:**

**SEMI-CONDUCTOR PHYSICS & SEMI-CONDUCTOR DEVICES.**

**Semi-conductor Physics:** Introduction, Calculation of carrier concentration in intrinsic semiconductors and extrinsic semi conductors (N-type), Direct and Indirect band gap semi conductors, Hall effect & its applications.

**Semi-conductor devices:** Energy diagram of P-N diode, Diode equation, I-V characteristics of P-N junction diode, LED, LCD, Photo diode & Solar cell.

**UNIT-III:**

**DIELECTRICS & MAGNETIC MATERIALS**

**Dielectrics:** Introduction, Electric dipoles, Dipole moment, Dielectric constant, Polarizability, Electric susceptibility, Displacement vector, Electronic, Ionic and Orientational polarizations and calculations of electronic and ionic polarizabilities, Internal

fields in solids, Clausius - Mosotti equation, Piezo-electricity, Ferro electricity, Pyro electricity.

**Magnetics:** Origin of magnetic moment, Bohr magneton, Classification of dia, para and 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, Properties of anti-ferro and ferri magnetic materials and their applications.

#### **UNIT-IV:**

##### **LASERS & FIBRE OPTICS**

**Lasers:** Characteristics of lasers, Spontaneous and stimulated emission of radiation, Einstein's coefficients and relation between them (qualitative treatment), Population inversion, Lasing action, Ruby laser. Semi conductor diode laser, Applications of lasers in engineering and medicine.

**Fibre Optics:** Acceptance angle and acceptance cone, Numerical aperture, Step index and graded index fibres, Attenuation in optical fibres, Applications of optical fibres in communication systems.

#### **UNIT-V:**

##### **SUPER-CONDUCTIVITY & NANO SCIENCE**

**Super-conductivity:** Introduction, Zero resistance, Critical temperature, Perfect dia magnetism, Meissner effect, Critical field ( $H_c$ ), Type-I & Type -II super conductors, Applications of super conducting magnets.

**Nano Science:** Nano scale, Surface to volume ratio, Quantum confinement, Top-down method: Bottom-up fabrication, sol-gel method, chemical vapour deposition method, Characterization by XRD (Braggs Law) and SEM (Principles) applications.

#### **RECOMMENDED TEXT BOOKS:**

1. Engineering Physics, P.K Palanisamy, Scitech Publications
2. Engineering Physics, V. Rajandran, Tat Mc. Graw Hill Book Publishers.
3. A Text Book of Engg Physics – M. N. Avadhanulu & P. G. Khsirsagar, S. Chand & Co. (for acoustics).
4. Applied Physics for Engineers – P. Madhusudana Rao, Academic Publishing Company, 2013.

#### **REFERENCE BOOKS:**

1. Solid State Physics – M.Armugam, Anuradha Publications.
2. Modern Physics – R. Murugesan & K. Siva Prasath, S. Chand & Co. (for Statistical Mechnaics).
3. Introduction to Solid State Physics, C. Kittel (Wiley Eastern).
4. Solid State Physics, A.J. Dekker (Macmillan).
5. Applied Physics, Mani Naidu Pearson Edition.



**Learning Outcomes:**

1. The students will come to know about the various crystal structures and also about their mechanical and electrical properties.
2. The student will learn about the different semi-conduction devices along with the necessary basic theory.
3. The students will learn about various magnetic materials and dielectric materials which find many industrial applications.
4. The students learn about different types of emission of radiation and advanced applications of lasers in different fields.
5. They learn about different types of optical fibres and their applications in different fields.
6. The students will learn about the various methods of fabrication of nano materials and different methods of their characterization.

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**(A92006) HUMAN VALUES AND PROFESSIONAL ETHICS**

**I Year II-Sem: Civil, EEE & Mech**

**L T P C  
2 0 0 2**

**Unit 1 Human Values:** Morals, values, ethics – integrity – work ethics –service learning – civic virtue – respect for others- living peacefully - Caring –sharing –honesty – courage – valuing time – cooperation – commitment –empathy – self-confidence –spirituality – character- Mini-Cases

**Unit II Professional Ethics:** Profession- and professionalism - Two models of professionalism –Professional etiquette -Three types of Ethics or morality Responsibility in Engineering – Engineering standards –Engineering Ethics – Positive and Negative Faces. Professional Codes and Code of conduct (as given by ASME, ASCE, IEEE, IETE, Institute of Engineers as Guidelines for ethical conduct). Mini-cases.

**Unit III Professional Responsibilities:** Ethical standards Vs Professional Conduct – Zero Tolerance for Culpable Mistakes – Hazards and Risks- Risk benefit analysis– congeniality, collegiality and loyalty. Respect for authority – conflicts of interest – occupational crime — Mini-Cases.

**Unit IV Professional Rights:** professional rights and employee rights communicating risk and public policy – Whistle blowing - collective bargaining. Professionals /engineers as managers, advisors, experts, witnesses and consultants – moral leadership- Regulatory compliances, Monitoring and control- Mini-Cases

**Unit V Ethics in global context:** Global issues in MNCs- Problems of bribery, extortion, and grease payments – Problem of nepotism, excessive gifts – paternalism – different business practices – negotiating taxes. Mini-Cases.

**Mini-projects**

**Project 1:** The student of this course should invariably attend (or watch on internet/any TV channel/youtube/social media) two speeches of 30 minutes duration each dealing with spiritual discourse and submit a report on the contents of the lecture proceedings.

**Project 2:** Visit any organization (including shops/ hotels or shopping malls in your region) of your choice and observe how the professionals perform the given job with a focus on professional ethics and human values.

## References

1. Aryasri, *Human Values and Professional Ethics*, Maruthi Publications.
2. S B George, *Human Values and Professional Ethics*, Vikas Publishing.
3. KR Govindan & Saenthil Kumar: *Professional Ethics and Human Values*, Anuradha Publications.
4. S K Chakraborty & D.Chakraborty: *Human Values and Ethics*, Himalaya.
5. M. Govindarajan, S. Natarajan, & V.S. Senthilkumar: *Engineering Ethics (Includes Human Values)*, HI Learning Pvt. Ltd., New Delhi – 110001

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**(A92203)BASIC ELECTRICAL & ELECTRONICS ENGINEERING**

**I Year II-Sem CIVIL, MECH & CSE**

**L T/P/D C**  
**4 1/-/ 4**

**Course Objective**

This course introduces the concepts of basis electrical engineering parameters, quantities, analysis of AC and DC circuits, the construction operation and analysis of transformers, DC and AC machines. It also gives knowledge about operation of diode and transistor, characteristics and its applications.

**UNIT- I**

**Electrical Circuits:** Circuits concept, R-L-C Parameters, Voltage and Current sources, Source Transformation, V–I relationship for Passive elements, Kirchoff’s Laws, Network reduction techniques – series, parallel, series parallel, star/delta transformations, Nodal Analysis, Mesh analysis with DC excitations.

**Network Theorems** - Thevenin’s, Norton’s, Maximum Power Transfer, Superposition, Reciprocity Theorems with DC excitation.

**UNIT- II**

**Single Phase AC Circuits** - R.M.S. and Average values, Form Factor, steady state analysis of series, Parallel and Series parallel Combinations of R, L and C with Sinusoidal excitation, concept of reactance, Impedance, Susceptance and Admittance – phase and phase difference, Concept of Power Factor, j-notation, complex and Polar forms of representation.

**Three Phase AC Circuits:** Production of 3 - $\phi$  Voltages, Voltage & Current relationships of Line and Phase values for Star and Delta connections.

**UNIT- III**

**D.C.Machines:** Constructional features, Methods of Excitation, E.M.F. Equation and Applications, Torque development in D.C motor, Characteristics of DC motors, losses, Efficiency, Swinburne’s test, Speed control of DC Shunt motors

**Single Phase Transformers:** Construction and principle of operation, Development of No Load & On Load Phasor diagrams (elementary treatment only)

**3-Phase Induction Motor:** Constructional features, Principle of Operation (elementary treatment only)

**UNIT- IV**

**P-N Junction Diode** - Diode equation, Energy Band diagram, V-I characteristic, Temperature dependence, Ideal versus practical, Static and dynamic resistances, Equivalent circuit.

**Rectifiers and Filters** - The P-N junction as a rectifier - A Half Wave Rectifier, Ripple Factor, Full Wave Rectifier, Bridge Rectifier, Filters – Inductor Filters, Capacitor Filters, L-section Filters,  $\pi$ - section Filters.

#### **UNIT- V**

**Bipolar Junction Transistor (BJT)** - Construction, Principle of Operation, CB, CE and CC configurations.

**Junction Field Effect Transistor** - Construction, Principle of Operation, V-I Characteristic, Comparison of BJT and FET,

**Zener Diode and SCR Devices**- Zener diode characteristics, Use of Zener diode as simple regulator, Breakdown Mechanisms in Zener diode, Principle of Operation of SCR.(elementary treatment only)

#### **TEXT BOOKS:**

1. Electronic Devices and Circuits – R.L. Boyleston and Louis Nashelsky, PEI/PHI, 9<sup>th</sup> Ed, 2006.
2. Engineering circuit analysis- by William Hayt and Jack E. Kemmerly, Mc Graw Hill Company, 6<sup>th</sup> edition.
3. Electrical Machines – by P.S.Bimbra

#### **REFERENCES:**

1. Introduction to Electronic Devices and Circuits-Rober T. Paynter, Pearson Education.
2. Electronic Devices and Circuits - K. Lal Kishore, B.S. Publications, 2<sup>nd</sup> Edition, 2005.
3. Electrical Machines – by J.B.Gupta.
4. Network Theory by N.C.Jagan & C.Lakshminarayana, B.S. Publications.
5. Network Theory by Sudhakar, Shyam Mohan Palli, TMH.

#### **Course outcomes:**

After going through this course the student gets a thorough knowledge on basic electrical circuits, parameters, and operation of the transformers in the energy conversion process, electromechanical energy conversion, construction operation characteristics of DC machines and the constructional features and also fundamental and characteristics of diode and transistor. With which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**ENGINEERING GRAPHICS**

**I Year I-Sem: EEE, ECE, CSE (A91301)  
II-Sem: Civil, Mech (A92301)**

| <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b> |
|----------|----------|----------|----------|
| <b>2</b> | <b>0</b> | <b>4</b> | <b>4</b> |

**COURSE OBJECTIVES:**

1. Use various engineering drawing instruments.
2. Learn the basic conventions of drawings, dimensioning, scales and conic sections like ellipse, parabola and hyperbola.
3. Learn projections of points, lines viewed in different positions
4. Learn projections of plane surfaces and solids viewed in different positions.
5. Gain knowledge of sections of solids and their usage in real time applications.
6. Attain the concepts of isometric, orthographic projections.

**UNIT – I**

**INTRODUCTION TO ENGINEERING DRAWING:** Principles of Engineering Drawing and their significance- Drawing Instruments and their use. Principle of Dimensioning.

Geometrical Constructions of regular polygons.

**Conic Sections:** Ellipse, Parabola & Hyperbola ( General Method only).

**Cycloidal Curves:** Cycloid, epi-cycloid & hypo-cycloid.

**Involutes:** Circle, square, pentagon & hexagon.

**Scales:** Plain scale, Diagonal scale & Vernier scale.

**UNIT – II**

**ORTHOGRAPHIC PROJECTIONS IN FIRST ANGLE PROJECTION:** Principles of Orthographic Projections – Conventions – First and Third Angle projections.

**PROJECTIONS OF PLANES :** Surface inclined to both the Principal Planes.

**PROJECTIONS OF RIGHT REGULAR SOLIDS:** Axis inclined to both the Principal planes.

**UNIT – III**

**SECTIONS AND SECTIONAL VIEWS:** Right Regular Solids – Prism, Cylinder, Pyramid, Cone & Auxiliary views.

**DEVELOPMENT OF SURFACES:** Right Regular Solids – Prism, Cylinder, Pyramid, Cone and their parts.

**UNIT – IV**

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

**TRANSFORMATION OF PROJECTIONS :** Conversion of Isometric Views to Orthographic Views& Vice versa.

## **UNIT – V**

Introduction to Computer aided Drafting and generation of simple figures by using circle, line, Rectangle & Arc, etc.,

### **TEXT BOOKS**

1. Engineering Drawing, N.D. Bhatt
2. Engineering Drawing – Basant, Agrawal, TMH

### **REFERENCES:**

1. Engineering Graphics. P I Varghese Tata McGraw Hill Education Pvt. Ltd.
2. Engineering drawing – P.J. Shah .S.Chand Publishers.
3. Engineering Drawing- Johle/Tata Macgraw Hill Book Publishers.
4. Engineering Drawing – M.B. Shah and B.C. Rana, Pearson.
5. Engineering Drawing by K.Venu Gopal& V.Prabu Raja New Age Publications.
6. Engineering Drawing By John. PHI Learning Publisher.

### **COURSE OUTCOMES:**

The students will be able to

1. Understand and draw the different types of conic sections.
2. Analyze the projections of points, straight lines, plane surfaces, solids at different positions and angles.
3. Convert orthographic views into isometric views and vice versa.
4. Perform sections of solids, development of surfaces and their applications in human life.

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**(A92302) ENGINEERING MECHANICS-II**

**I Year II Sem: Civil, Mech**

| <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b> |
|----------|----------|----------|----------|
| <b>4</b> | <b>1</b> | <b>0</b> | <b>4</b> |

**COURSE OBJECTIVES:**

1. Determine the internal forces in plane trusses.
2. Know the applications of trusses to cantilever and simply supported trusses.
3. Describe the motion of a particle in terms of its position, velocity and acceleration in different frames of references.
4. Apply work, energy, relationships for a particle in motion.
5. Apply impulse and momentum relationships for a particle in motion.
6. Describe the motion of a rigid body in different frames of reference.

**UNIT-I**

**ANALYSIS OF PERFECT FRAMES:** Analytical Method-Types of frames-Assumption for forces in members of a perfect frame. Method of Joints, Method of sections, Force Table, Cantilever Trusses, Structure with one end hinged & other freely supported on rollers carrying Horizontal & inclined loads.

**UNIT-II**

**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-III**

**KINETICS OF A 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-IV**

**WORK – ENERGY METHOD:** Work energy Equations for Translation - Work-Energy Applications to Particle Motion – Work energy applied to Connected Systems - Work energy applied to Fixed Axis Rotation and Plane Motion. Impulse and momentum.

**UNIT-V**

**Mechanical Vibrations :** Definitions and Concepts – Simple Harmonic Motion – Free vibrations, simple and Compound Pendulums – Torsion Pendulum – Free vibrations without damping: General cases.



**TEXT BOOKS:**

1. Engg. Mechanics / S.S. Bhavikatti & K.G. Rajasekharappa / Third edition /New age International Publishers
2. Engineering Mechanics - Statics and Dynamics by Ferdinand.L. Singer / Harper International Edition.
3. Engineering Mechanics/ S. Timoshenko and D.H. Young / Mc Graw Hill Book Company.

**REFERENCES:**

1. Engineering Mechanics / Irving Shames / Prentice Hall
2. Engg. Mechanics / M.V. Seshagiri Rao & D Rama Durgaiyah/ Universities Press
3. Engineering Mechanics, Umesh Regl / Tayal.
4. Engg. Mechanics / KL Kumar / Tata McGraw Hill.

**COURSE OUTCOMES:**

The students will be able to

1. Apply engineering science principles to develop algebraic relationships among key physical parameters and variables based on analysis of a specified system
2. Apply the principles of mechanics for solving practical problems related to equilibrium of rigid bodies and particle in motion.
3. Use references that provide tabulated physical data that are useful for mechanical engineers.
4. Deal the subjects like Mechanics of Solids, Mechanics of Fluids and Design of machines etc. in higher classes with an ease.

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**ENGLISH LANGUAGE COMMUNICATIONS SKILLS LAB**

|   |          |          |          |          |
|---|----------|----------|----------|----------|
| <b>I Year I-Sem: MECH. &amp; EEE (A91005)</b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b> |
| <b>II-Sem: CIVIL, CSE &amp; ECE (A92007)</b>  | <b>0</b> | <b>0</b> | <b>3</b> | <b>2</b> |

The **Language Lab** focuses on the production and practice of sounds of language and familiarises the students with the use of English in everyday situations and contexts.

**Objectives:**

- To facilitate computer-aided multi-media instruction enabling individualized and independent language learning
- To sensitise the students to the nuances of English speech sounds, word accent, intonation and rhythm
- To bring about a consistent accent and intelligibility in their pronunciation of English by providing an opportunity for practice in speaking
- To improve the fluency in spoken English and neutralize mother tongue influence
- To train students to use language appropriately for interviews, group discussion and public speaking

**Learning Outcomes:**

- Better Understanding of nuances of language through audio- visual experience and group activities
- Neutralization of accent for intelligibility
- Speaking with clarity and confidence thereby enhancing employability skills of the students

**Syllabus:**

**English Language Communication Skills Lab shall have two parts:**

- a. Computer Assisted Language Learning (CALL) Lab**
- b. Interactive Communication Skills (ICS) Lab**

The following course content is prescribed for the **English Language Communication Skills Lab**

**Exercise – I**

**CALL Lab:** Introduction to Phonetics – Speech Sounds – Vowels and Consonants

**ICS Lab:** Ice-Breaking Activity and JAM Sessions

Intensive Practice in Articles, Prepositions, Word Formation- Prefixes & Suffixes, Synonyms & Antonyms with Software/Handouts

**Exercise – II**

**CALL Lab:** Structure of Syllables - Past Tense Marker and Plural Marker – Weak Forms and Strong Forms - Consonant Clusters.

**ICS Lab:** Situational Dialogues – Role-Play- Expressions in Various Situations – Self-introduction and Introducing Others – Greetings – Apologies – Requests – Social and Professional Etiquette - Telephone Etiquette.

Concord (Subject in agreement with verb) and Words Often Misspelt- Confused/Misused

### Exercise - III

**CALL Lab:** Minimal Pairs- Word Accent and Stress Shifts- Listening Comprehension.

**ICS Lab:** Descriptions- Narrations- Giving Directions and Guidelines.

Sequence of Tenses, Question Tags and One Word Substitutes.

### Exercise – IV

**CALL Lab:** Intonation and Common Errors in Pronunciation.

**ICS Lab:** Extempore- Public Speaking

Active and Passive Voice, –Common Errors in English, Idioms and Phrases

### Exercise – V

**CALL Lab:** Neutralization of Mother Tongue Influence and Conversation Practice

**ICS Lab:** Information Transfer- Oral Presentation Skills

Reading Comprehension and Job Application with Resume Preparation.

### Minimum Requirement of Infrastructural Facilities for ELCS Lab:

#### 1. Computer Assisted Language Learning (CALL) Lab:

**The Computer Aided Language Lab** for 40 students with 40 systems, one master console, LAN facility and English language software for self- study by learners.

#### System Requirement (Hardware Component):

*Computer network with LAN with minimum 60 multimedia systems with the following specifications:*

- i) P – IV Processor
  - a) Speed – 2.8 GHZ
  - b) RAM – 512 MB Minimum
  - c) Hard Disk – 80 GB
- ii) Headphones of High Quality

#### 2. Interactive Communication Skills (ICS) Lab :

**The Interactive Communication Skills Lab:** A spacious room with movable chairs and audio-visual aids with a Public Address System, a T. V., a digital stereo –audio & video system, camcorder etc.

**Prescribed Lab Manual:** A Manual entitled “*English Language Communication Skills (ELCS) Lab Manual- cum- Work Book*”, published by Cengage Learning India Pvt. Ltd, New Delhi. 2013.

- In addition to the prescribed lab manual, all the listening and speaking activities mentioned in Text-1 and Text-2 can be conducted in the English Language Communication Skills Lab.*

#### Suggested Software:

- Macmilan Dictionary Modern English (with CD).
- Oxford Advanced Learners' Dictionary (with CD).
- Cambridge Advanced Learners' English Dictionary with CD.
- Grammar Made Easy by Darling Kindersley
- Punctuation Made Easy by Darling Kindersley
- Clarity Pronunciation Power – Part I
- Clarity Pronunciation Power – part II

- **Oxford Advanced Learner's Compass, 8<sup>th</sup> 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)
- **English in Mind (Series 1-4), Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge**
- **English Pronunciation in Use (Elementary, Intermediate, Advanced) Cambridge University Press**
- Raman, M & Sharma, S. 2011. Technical Communication, OUP
- Sanjay Kumar & Pushp Lata. 2011. Communication Skills, OUP

#### **SUGGESTED READING:**

1. Situational English, Prof. Damodar 33 situations BIE Publications (with CD)
2. Radio lessons, Prof. G. Damodar.
3. Rama Krishna Rao, A. *et al. English Language Communication Skills – A Reader cum Lab Manual Course Content and Practice.* Chennai: Anuradha Publishers
4. Suresh Kumar, E. & Sreehari, P. 2009. *A Handbook for English Language Laboratories.* New Delhi: Foundation
5. *Speaking English Effectively* 2<sup>nd</sup> Edition by Krishna Mohan and N. P. Singh, 2011. Macmillan Publishers India Ltd. Delhi.
6. Sasi Kumar, V & Dhamija, P.V. *How to Prepare for Group Discussion and Interviews.* Tata McGraw Hill
7. Hancock, M. 2009. *English Pronunciation in Use. Intermediate.* Cambridge: CUP
8. Spoken English: A Manual of Speech and Phonetics by R. K. Bansal & J. B. Harrison. 2013. Orient Blackswan. Hyderabad.
9. Hewings, M. 2009. *English Pronunciation in Use. Advanced.* Cambridge: CUP
10. Marks, J. 2009. *English Pronunciation in Use. Elementary.* Cambridge: CUP
11. Nambiar, K.C. 2011. *Speaking Accurately. A Course in International Communication.* New Delhi : Foundation
12. Soundararaj, Francis. 2012. *Basics of Communication in English.* New Delhi: Macmillan
13. *Spoken English (CIEFL)* in 3 volumes with 6 cassettes, OUP.
14. *English Pronouncing Dictionary* Daniel Jones Current Edition with CD.
15. *A Textbook of English Phonetics for Indian Students* by T.Balasubramanian (Macmillan)
16. *Topical Thoughts – (A Textbook of Reading and Writing Skills)* Dr.P. Satyanarayana, Vaagdevi College of Engineering, Warangal Publications, 2013.

#### **DISTRIBUTION AND WEIGHTAGE OF MARKS**

##### **English Language Laboratory Practical Examination:**

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

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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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**(A92008) ENGINEERING PHYSICS LAB**

**I Year II-Sem: CIVIL & MECH**

**L T P C**  
**0 0 3 2**

**Objectives:**

The purpose of doing the experiments in laboratory is not simply to verify a principle but also to explore the other related phenomena and to find their applicability. The students are suggested to work in this direction and get benefit out of it.

1. To get practical knowledge which is related to the engineering course in the development of new technologies.
2. To impart fundamental knowledge in handling the equipment in Physics laboratory.
3. To offer practical experience on the basic equipment related to engineering Physics.
4. For practical understanding of the theoretical concepts of Physics.
5. To develop inquisitiveness in handling physics equipment leading to new technologies.

**S. No. Name of the Experiment**

1. Study of LED and LASER diode characteristics.
2. Torsional Pendulum-determination of rigidity modulus of material of a wire.
3. Determination of energy gap of material of p-n junction.
4. Bending losses of optical fibres and evaluation of numerical aperture of a given optical fibre.
5. Study of Decay of charge & determination of time constant of an RC circuit.
6. Determination of resonant frequency and quality factor of LCR circuit.
7. Study of Characteristics of solar cell.
8. Determination of wavelength of Laser source – Diffraction grating.
9. Determination of frequency of AC supply-sonometer.
10. Determination of wavelength of monochromatic source using diffraction grating.

**Laboratory Manual:**

The Laboratory manual of Engineering Physics by Dr. Y. Aparna & Dr. K. Venkateshwar Rao, VGS Publications.

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**(A92205) BASIC ELECTRICAL & ELECTRONICS ENGINEERING LAB**

Class: I Year II Semester.

Branch: Civil/Mech/CSE

Duration of University Examination: 3 Hrs

Practicals: 3

Tutorials: 0

University Examination: 50 Marks

Sessionals: 25 Marks

**List of Experiments:**

1. Verification of Kirchhoff's Laws.
2. Verification of superposition and Reciprocity Theorems.
3. Verification of Maximum Power transfer theorem.
4. Experimental Determination of Thevenin's theorem.
5. Magnetization characteristics of DC Shunt Generator.
6. Swinburne's Test on DC shunt machine.
7. Brake test on DC shunt motor.
8. OC & SC tests on single phase transformer.
9. PN Junction Diode characteristics (Forward bias, Reverse bias).
10. Zener Diode Characteristics.
11. Transistor CE Characteristics (Input and Output)
12. Rectifier without filters (Full wave & Half wave)
13. Rectifier with filters (Full wave & Half wave)

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**(A93002) PROBABILITY & STATISTICS**

**II Year B.Tech. Civil, Mech Engg. I-Sem**

**L T P C  
4 1 0 4**

**Course Objective:**

The main purpose of teaching Probability and Statistics is to develop the knowledge of the student. In the syllabus we concentrate on a few carefully selected basic ideas of general practical importance which are especially suitable for teaching the students probability and statistics to think and develop his own creative ability to solve engineering problem.

**UNIT-I: Probability**

Sample space and events – Probability – The axioms of probability – Some Elementary theorems – Conditional probability – Baye,s theorem, Random variables – Discrete and continuous.

**UNIT-II: Single Random variables and probability distributions.**

Random variables – Discrete and continuous, Probability distributions, mass function/ density function of a probability distribution. Mathematical Expectation, Moment about origin, Central moments, Moment generating function of probability distribution. Binomial, Poisson & normal distributions and their properties.

**UNIT-III: Correlation & Regression**

Covariance of two random variables, Correlation -Coefficient of correlation, The rank correlation. Regression- Regression Coefficient, The lines of regression and multiple correlation & regression.

**UNIT-IV: Sampling Distributions and Testing of Hypothesis**

**Sampling:** Definitions of population, sampling, statistic, 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 estimate, 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- V: Queuing Theory :**

Queuing Theory: Notation and Assumption, Queuing Models With Poisson Input - Exponential Service, Infinite Queue-Infinite Source, Single Server Model, Infinite Queue-Infinite Source, Arrival Theorem – Pure Birth process and Death process M/M/1 Model, Finite Queue-Infinite Source, Single Server Model.

**Text Books:**

- 1) Fundamentals of Mathematical Statistics by S C Gupta and V.K.Kapoor (Chapters IV&V)
- 2) Probability and Statistics for Engineers and Scientists by SHELDON M.Ross, Academic Press
- 3) Probability and Statistics for Engineering and the Sciences by Jay L. Devore.

**References:**

- 1) Mathematics for Engineers Series–Probability Statistics and Stochastic Process by K.B.Datta and M.A S.Srinivas, Cengage Publications.
- 2) Probability, Statistics and Stochastic Process by Prof. A R K Prasad., Wiley India
- 3) Probability and Statistics by T.K.V.Iyengar & B.Krishna Gandhi
- 4) A Text Book of Probability and Statistics, Shahnaz Bathul, Cengage Learning

**Course Outcomes:**

By studying the Probability & Statistics students are able to describe randomness or an uncertainty in certain realistic situations it can be of either discrete or continuous functions and the study of binomial, and the Poisson and normal random variables for the continuous case predominantly describe important probability distributions. Important statistical properties for this random variables provide very good insight and essential for Industrial applications. By studying the queuing theory students are able to solve the real world problems of queuing systems.

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**(A93101) STRENGTH OF MATERIALS-I**

**II Year B.Tech. Civil Engg. I-Sem**

**L T P C  
4 1 0 4**

**Course Objectives:**

**Student will be able to**

- Determine the stress strain behavior of different materials
- Understand the flexure and shear behavior of beams
- Predict the deflections due to various loads and load combinations.
- Apply the concept of pure torsion and different types of springs.

**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. Elastic constants.

**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 cantilver, simply supported and overhanging beams subjected to point loads, uniformly distributed load, uniformly varying loads and combination of these loads-Point of contraflexure-Relation between S.F., B.M and rate of loading at a section of a beam.

**UNIT – III**

**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- flitched beams.

**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 a conjugate beam. Deflections of determinate beams with constant and different moments of inertia.

## **UNIT – V**

### **TORSION OF CIRCULAR SHAFTS :**

Theory of pure torsion – Derivation of Torsion equations :  $T/J = q/r = N\theta/L$  – 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.

#### **Text Books:**

- 1) Mechanics of Materials by Timoshenko and Gere, CBS Publishers, New Delhi, 1996.
- 2) Strength of Materials by R.K Rajput, S.Chand & Company Ltd.
- 3) Strength of Materials by R.Subramanian, Oxford University Press.
- 4) Mechanics of Materials by Beer and Johnston, McGraw Hill International Edition, 1995

#### **References:**

- 1) Strength of Materials by S.S.Bhavikatti, Vikas Publishing House Pvt. Ltd.
- 2) Mechanics of Structures Vol –I by H.J.Shah and S.B.Junnarkar, Charotar Publishing House Pvt. Ltd.
- 3) Strength of Materials by D.S Prakash Rao, Universities Press Pvt. Ltd.
- 4) Strength of Materials by S.S.Rattan, Tata McGraw Hill Education Pvt. Ltd.
- 5) Fundamentals of Solid Mechancis by M.L.Gambhir, PHI Learning Pvt. Ltd
- 6) Strength of Materials and Structures by John Case *et al.*, Butterworth-Heinemann.

#### **Course Outcomes:**

##### **After completion of this course, student should be able to:**

- Analyze the stress-strain behavior and other mechanical properties of different materials.
- Know the important characteristic strengths of various materials used in construction, fabrication of various members.
- Know what type of straining actions will occur due to different type of Loadings.
- Predicting the displacements of a given member under given conditions.

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**(A93102) BUILDING MATERIALS CONSTRUCTION & PLANNING**

**II Year B.Tech. Civil Engg. I-Sem**

**L T P C  
4 1 0 4**

**Course Objectives:**

**Student will be able to**

- List the construction material.
- Know about the construction techniques
- Understands the building bye-laws
- Know insights in to smart building materials

**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 Paints**

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 & Fittings ; Ventilations : Functional requirements systems of ventilations. Air-conditioning - Essentials and Types ; Acoustics – characteristic – absorption – Acoustic design ; Fire protection – Fire Harzards – Classification of fire resistant 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 bye-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
3. NBC of India and Building Bye-laws.

**References:**

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

**Course Outcomes:**

**After completion of this course, student should be able to:**

- Identify and characterize building materials
- Understand the Basic terminology that is used in the industry
- Understand the manufacturing process of bricks and cement
- Identify the methods for preservation of timber and metals
- Understands the properties of building materials and services

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**(A93103) SURVEYING**

**II Year B.Tech. Civil Engg. I-Sem**

**L T P C  
4 1 0 4**

**Course Objective**

**Student will be able to**

- Learn and understand the various basic concept and principles used in surveying like Chain Surveying, Compass Surveying, Plane Table Surveying, and Levelling Surveying.
- Learn and understand various instrument used in surveying.
- Understand how to calculate Area of plot and Ground.
- Learn and understand about Horizontal Angle, Vertical Angle, Horizontal distance and Vertical distance to study the ground profile and its topography.

**Unit-I:**

**Introduction and Basic Concepts**

Introduction, Objectives, classification and principles of surveying, Scales, Shrinkage of Map, Conventional symbols and Code of Signals, Surveying accessories, phases of surveying.

**Measurement of Distances and Directions**

**Linear distances-** Approximate methods, Direct Methods- Chains- Tapes, ranging, Tape corrections, Indirect methods- optical methods- E.D.M. method.

**Prismatic Compass-** Bearings, included angles, Local Attraction, Magnetic Declination and dip

**Unit-II**

**Levelling and Contouring**

**Leveling-** Basics definitions, types of levels and levelling staves, temporary adjustments, methods of levelling, booking and Determination of levels- HI Method-Rise and Fall method, Effect of Curvature of Earth and Refraction.

**Contouring-** Characteristics and uses of Contours, Direct & Indirect methods of contour surveying, interpolation and sketching of Contours.

**Computation of Areas and Volumes**

**Areas-** Determination of areas consisting of irregular boundary and regular boundary (coordinates, MDM, DMD methods), Planimeter.

**Volumes-** Computation of areas for level section and two level sections with and without transverse slopes, determination of volume of earth work in cutting and embankments, volume of borrow pits, capacity of reservoirs.

### **Unit-III**

#### **Theodolite Surveying**

Types of Theodolites, Fundamental Lines, temporary adjustments, measurement of horizontal angle by repetition method and reiteration method, measurement of vertical Angle, Trigonometrical levelling when base is accessible and inaccessible.

### **Unit-IV**

#### **Traversing**

Methods of traversing, traverse computations and adjustments, Gale's traverse table, Omitted measurements.

#### **Tacheometric Surveying**

Principles of Tacheometry, stadia and tangential methods of Tacheometry.

### **Unit-V**

#### **Curves**

Types of curves and their necessity, elements of simple curve, setting out of simple Curves.

#### **Modern Surveying Methods**

Total Station and Global Positioning System.

### **TEXT BOOKS:**

1. Chandra A M, "Plane Surveying", New age International Pvt. Ltd., Publishers, New Delhi, 2002.
2. Chandra A M, "Higher Surveying", New age International Pvt. Ltd., Publishers, New Delhi, 2002.
3. Duggal S K, "Surveying (Vol – 1 & 2)", Tata Mc.Graw Hill Publishing Co. Ltd. New Delhi, 2004.

### **REFERENCES:**

1. Arthur R Benton and Philip J Taety, Elements of Plane Surveying, McGraw Hill – 2000
2. Arora K R "Surveying Vol 1, 2 & 3), Standard Book House, Delhi, 2004
3. Surveying (Vol – 1, 2 & 3), by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi
4. Surveying and levelling by R. Subramanian, Oxford university press, New Delhi
5. Surveying by BHAVIKATTI; Vikas publishing house ltd.

## Course Outcome

### **After completion of this course, student should be able to:**

- Prepare Map and Plan for required site with suitable scale.
- Prepare contour Map and Estimate the Quantity of earthwork required for formation level for Road and Railway Alignment.
- Judge which type of instrument to be used for carrying out survey for a particular area and estimate the area.
- Identify data collection methods and prepare field notes
- Judge the profile of ground by observing the available existing contour map.

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**(A93104) FLUID MECHANICS**

**II Year B.Tech. Civil Engg. I-Sem**

**L T P C  
4 1 0 4**

**Course Objectives**

**Student will be able to**

- Identify and obtain values of fluid properties and relationship between them.
- Understand the principles of continuity, momentum, and energy as applied to fluid motions.
- Recognize these principles written in form of mathematical equations.
- Apply these equations to analyze problems by making good assumptions and learn systematic engineering method to solve practical fluid mechanics problems.

**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 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, nonuniform, 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 and Measurement of Flow:** 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**

**CLOSED CONDUIT FLOW:** Reynold's experiment – Characteristics of Laminar & Turbulent flows. Laws of Fluid friction – Darcy's equation, variation of friction factor with Reynold's number – Moody's Chart, Minor losses – pipes in series – pipes in parallel – Total energy line and hydraulic gradient line. Pipe network problems Flow between parallel plates, Flow through long tubes, flow through inclined tubes.



## **UNIT – V**

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 derivations) BL in transition, separation of BL, control of BL, flow around submerged objects-Drag and Lift- Magnus effect.

### **TEXT BOOKS:**

1. Fluid Mechanics by Modi and Seth, Standard book house.
2. Fluid Mechanics by F M White, Tata McGraw Hill Publication 2011.
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.Swaffird (Longman)
2. Introduction to Fluid Machines by S.K.Som & G.Biswas (Tata Mc.Grawhill publishers 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

### **Course Outcomes**

**After completion of this course, student should be able to:**

- Apply fundamental knowledge of mathematics to modeling and analysis of fluid flow problems in civil and environmental engineering.
- Conduct experiments (in teams) in pipe flows and open-channel flows and interpreting data from model studies to prototype cases, as well as documenting them in engineering reports.
- Understand or become aware of disasters caused by an incorrect analysis in hydraulic engineering system.
- Apply fundamental principles of fluid mechanics for the solution of practical civil engineering problems of water conveyance in pipes, orifices, mouth pieces, notches and weirs.

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**(A93105) COMPUTER AIDED DRAFTING LAB**

**II Year B.Tech. Civil Engg. I-Sem**

**L T P C  
0 0 3 2**

**Course Objectives:**

**Student will be able to**

- Use AutoCAD software.
- Use different commands to draw Building Drawings.
- Draw different components of Doors and Windows.
- Draw different types of Trusses.

1. Introduction to computer aided drafting
2. Software for CAD – Introduction to different softwares
3. Practice exercises on CAD software
4. Drawing of plans of buildings using software
  - a) single storeyed buildings
  - b) multi storeyed buildings
5. Developing sections and elevations for
  - a) single storeyed buildings
  - b) multi storeyed buildings
6. Detailing of building components like Doors, Windows, Roof Trusses etc. using CAD softwares
7. Exercises on development of working of buildings

**Text Books :**

1. Computer Aided Design Laboratory by M. N. Sesa Praksh & Dr. G. S. Servesh – Laxmi Publications.
2. Engineering Graphics by P. J. Sha – S. Chand & Co.

**Course Outcomes:**

**After completion of this course, student should be able to:**

- Use different Autocad Commands to develop Plan, Section and elevation of single Storied and Multi Storied Buildings.
- Draw and detailing of components of different types of doors and windows.
- Develop Working Drawings of Residential Buildings.
- Prepare drawing with details of roof trusses.

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**(A93106) STRENGTH OF MATERIALS LAB**

**II Year B.Tech. Civil Engg. I-Sem**

**L T P C  
0 0 3 2**

**Course Objectives:**

**Student will be able to**

- Study the uses of various types of testing machines and capacities.
- Test various materials against various types of straining actions for assessing the strength of materials.
- Understand various implements to apply specific forces using the machine or to augment the utility of the same machine.

**List of Experiments**

1. Tension test
2. Bending test on cantilever beam.
3. Bending test on simple support beam.
4. Torsion test
5. Rockwell Hardness test
6. Brinells Hardness test
7. Spring test
8. Compression test on wood or concrete
9. Impact test
10. Shear test

**Course Outcomes:**

**After completion of this course, student should be able to:**

- Clearly understands the concepts of deciding the shape or type of specimen for assessing different strengths against various straining actions.
- Design the specimens for assessing a particular property of the material with the available machines.
- Understand the procedure for making use of various techniques of load measuring or deformation measuring instruments.

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**(A93107) SURVEYING LAB**

**II Year B.Tech. Civil Engg. I-Sem**

**L T P C  
0 0 3 2**

**Course Objective**

**Student will be able to**

- Learn and understand the various basic concept and principles used in surveying like Chain Surveying, Compass Surveying, Plane Table Surveying, and Levelling.
- Learn and understand various instruments used in surveying.
- Learn and understand how to calculate Area of plot and Ground.
- Learn and understand about Horizontal Angle, Vertical Angle, Horizontal distance and Vertical distance to study the ground profile.

**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 of road works.
10. Two exercises on contouring.

**LIST OF 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**

**After completion of this course, student should be able to:**

- Prepare Map and Plan for required site with suitable scale.
- Prepare contour Map and Estimate the Quantity of earthwork required for formation level for Road and Railway Alignment.
- Judge which type of instrument to be used for carrying out survey for a Particular Area and estimate the area.
- Judge the profile of ground by observing the available existing contour map.

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**(A94005) COMPUTATIONAL MATHEMATICS**

**II Year B.Tech. Civil, Mech Engg. II-Sem**

**L T P C  
2 0 0 2**

**Course Objective:**

The main aim of the computational mathematics to examine the constructive abstract methods of mathematics when illustrated with suitable numerical techniques. Computational methods which were developed for purely theoretical reasons suddenly becomes of great importance in engineering mathematics. It follows that the most important objective and purpose in engineering mathematics seems to be that the student become familiar with mathematical thinkings.

**Unit-I: Solutions of algebraic and transcendental equations:** Introduction, Numerical solution of algebraic and transcendental equations by Bisection Method, Regular-Falsi method

Iteration method, Newton-Raphson's method.

**Unit-II: Interpolation:** Interpolation Introduction-Errors in polynomial Interpolation, Finite differences-Forward Differences-Backward differences-central differences Symbolic relations and separation of symbols, Newton's formulae for interpolation. Gauss central Difference Formulae, Interpolation with un-equally spaced points-Lagrange's Interpolation formula.

**Unit-III: Curve Fitting:** Least square method- Fitting of a straight line-Second degree curve, Exponential curve-power curve.

**Unit-IV: Numerical Differentiation & Integrations:** Numerical differentiation of 1<sup>st</sup> & 2<sup>nd</sup> order. Numerical Integration with Trapezoidal rule, Simpson's 1/3<sup>rd</sup> rule, Simpson's ~~3~~ rule

**Unit-V: Numerical solutions of ordinary Differential Equations:** Solutions of first order ordinary differential equations by Taylor's series, Picard's Method, Euler's Method, Euler's - Modified Method, Runge-kutta methods.

**Recommended Text Books:**

- 1) STEVEN C CHAPRA AND RAYMOND P CANALE, NUMERICAL METHODS FOR ENGINEERS, TMH PUBLISHERS
- 2) B.S.GREWAL: HIGHER ENGINEERING MATHEMATICS, KHANNA PUBLICATIONS, 2009.

- 3) M.K. JAIN S.R.K. IYENGAR AND R.K.JAIN: NUMERICAL METHODS FOR SCIENTIFIC ANDENGINEERING COMPUTATION,WILEY EASTERN

**REFERENCE BOOK:**

- 1) ERWYN KREYSZIG: ADVANCED ENGINEERING MATHEMATICS, JOHN WILEY AND SONS, 8TH EDITION.
- 2) T.K.V.IYENGAR: MATHEMATICAL METHODS, S.CHAND AND COMPANY.
- 3) R.K.JAIN AND S.R.K.IYENGAR : ADVANCED ENGINEERING MATHEMATICS, NAROSA PUBLISHING HOUSE, 2008
- 4) MATHEMATICAL METHODS BY P.B. BHASKAR RAO, S.K.V.S.RAMA CHARY, M.BHUVANYA RAO, B.S.PUBLICATIONS
- 5) MATHEMATICAL METHODS BY K.V. SURYANARAYANA RAO, BY SCITECH PUBLICATIONS

**Course Outcomes:**

By studying Numerical Techniques students are able to solve transcendental equations and solving higher order difference and integrations and also to write the programmes on numerical techniques and matrices which are very useful for the Engineering students in real world applications and in Industrial research.

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**(A94101) STRENGTH OF MATERIALS-II**

**II Year B.Tech. Civil Engg. II-Sem**

**L T P C  
4 1 0 4**

**Course Objective**

**Student will be able to**

- Understand Principal Stresses and strains and different theories of failure.
- Understand Euler's formula, secant and straight line formula and their application to long and short columns.
- Analyze the stresses for the combined action of direct load and Bending Moment, determination of stresses for masonry structures.
- Analyze the stresses in beams subjected to unsymmetrical bending.

**UNIT-I**

**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 – Principal stresses and strains – Analytical and graphical solutions.

**THEORIES OF FAILURE:** Introduction – Various theories of failure - Maximum Principal Stress Theory, Maximum Principal Strain Theory, Maximum shear stress theory- Strain Energy and Shear Strain Energy Theory (Von Mises Theory).

**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. Perry's formula.

**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 bending moment, 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 bending moment 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

### THIN CYLINDERS:

Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and Volumetric strains – changes in diameter and volume of thin cylinders – Thin spherical shells – Wire wound thin cylinders.

### THICK CYLINDERS:

Introduction - Lamé's theory for thick cylinders – Derivation of Lamé's formulae – distribution of hoop and radial stresses across thickness – design of thick cylinders – compound cylinders – Necessary difference of radii for shrinkage – Thick spherical shells.

## UNIT- V

### UNSYMMETRICAL BENDING:

Introduction – Centroidal principal axes of section – Graphical method for locating principal axes – Moments of inertia referred to any set of rectangular axes – Stresses in beams subjected to unsymmetrical bending – Principal axes – Resolution of bending moment into two rectangular axes through the centroid – Location of neutral axis - Deflection of beams under unsymmetrical bending.

**SHEAR CENTRE:** Introduction - Shear centre for symmetrical and unsymmetrical (channel, I, T and L) sections

### Text Books:

- 1) Strength of Materials by R.Subramanian, Oxford University Press.
- 2) Strength of Materials by R.K Rajput, S.Chand & Company Ltd.

### References:

- 1) Fundamentals of Solid Mechancis by M.L.Gambhir, PHI Learning Pvt. Ltd
- 2) Introduction to Strength of Materials by U.C.Jindal, Galgotia Publications Pvt. Ltd.
- 3) Mechanics of Materials by R.C.Hibbeler, Pearson Education
- 4) Strength of Materials by D.S Prakash Rao, Universities Press Pvt. Ltd.
- 5) Strength of Materials by S.S.Rattan, Tata McGraw Hill Education Pvt. Ltd.
- 6) Mechanics of Materials by Ferdinand P. Beer *et al.*, Tata McGraw Hill Education Pvt. Ltd.

### Course Outcome

#### After completion of this course, student should be able to:

- Define Principal stresses and strains, Solve the problems on an inclined section of a bar under axial load, determine the Principal stresses by using the Mohr's stress circle method
- Define pure torsion, torsion equation & assumptions, polar section modulus, and they will be able to derive the Torsional moment of resistance for shafts and equations for open and close coiled helical springs
- Define Columns and struts, Analyze columns and struts with different end conditions by using different theories.
- Determine stresses for different masonry structures.

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**(A94102) STRUCTURAL ANALYSIS – I**

**II Year B.Tech. Civil Engg. II-Sem**

**L T P C  
4 1 0 4**

**Course Objectives:**

**Student will be able to**

- Learn how to analyze the indeterminate structure.
- Understands the difference between concepts of flexibility and stiffness methods.
- Learn the influence of moving loads on determinate structure.

**UNIT-I**

**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. Deflections of simple beams and pin-jointed plane trusses. Deflections of statically determinate bent frames.

**UNIT-II**

**THREE HINGED ARCHES** – Introduction – Types of Arches – Comparison between Three hinged and Two hinged Arches. Linear Arch. Eddy's theorem. Analysis of Three 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.

**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**

**PROPPED CANTILEVER and FIXED BEAMS:** Determination of static and kinematic indeterminacies for beams- Analysis of Propped cantilever and fixed beams, including the beams with different 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 sinking of support, effect of rotation of a support.

**UNIT-IV**

**CONTINUOUS BEAMS:** 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. Analysis of 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 S.F. 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 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. Equivalent uniformly distributed load. Focal length.

#### **Text Books:**

- 1) Structural Analysis Vol –I & II by V.N.Vazirani and M.M.Ratwani, Khanna Publishers.
- 2) Structural Analysis Vol I & II by G.S.Pandit and S.P.Gupta, Tata McGraw Hill Education Pvt. Ltd.

#### **References:**

- 1) Basic Structural Analysis by K.U.Muthu *et al.*, I.K.International Publishing House Pvt.Ltd.
- 2) Structural Analysis by R.C.Hibbeler, Pearson Education
- 3) Mechanics of Structures Vol –II by H.J.Shah and S.B.Junnarkar, Charotar Publishing House Pvt. Ltd.
- 4) Structural Analysis by Devdas Menon, Narosa Publishing House.
- 5) Basic Structural Analysis by C.S.Reddy., Tata McGraw Hill Education Pvt. Ltd.
- 6) Fundamentals of Structural Analysis by M.L.Gamhir, PHI Learning Pvt. Ltd
- 7) Structural Analysis -I by S.S.Bhavikatti, Vikas Publishing House Pvt. Ltd.

#### **Course Outcomes**

**After completion of this course, student should be able to:**

- Judge which type of support is suitable for given conditions of loading and spans.
- Understand the advantage of statically indeterminate structure over the statically determinate structure.
- Confidently analyze the indeterminate structure through computer oriented methods of analysis.
- Superimpose the effects of settlement or rotation of the supports over the regular analysis.

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**(A94103) ENGINEERING GEOLOGY**

**II Year B.Tech. Civil Engg. II-Sem**

**L T P C  
4 0 0 4**

**Course Objectives : Student will be able to**

- Know geology from Civil Engineering point of view
- Understand Mineral and rock properties
- Understands the significance of structural geology
- Understand the concepts of Geophysical methods

**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 drawbacks. 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 economic minerals such as Pyrite, Hematite , Magnetite, Chromite , 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 and microscopic and microscopic study of Granite, Dolerite, Basalt, Pegmatite, Laerite, 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 and case studies. Their importance Insitu and drift soils, common types of soils, their origin and occurrence in India, Stabilisation of soils. Ground water, Water table, common types of ground water, springs, cone of depression, geological controls of ground water movement, ground water exploration.

#### **UNIT - IV**

**EARTH QUAKES:** 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.

**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**

**GEOLOGY OF DAMS , RESERVOIRS AND TUNNELS:** 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 - Purposes of tunneling, Effects of Tunneling on the ground Role of Geological Considerations ( ie. Tithological, structural and ground water ) in tunneling over break and lining in tunnels.

#### **TEXT BOOKS:**

- 1) Engineering Geology by N.Chennakesavulu, Mc-Millan, India Ltd. 2005
- 2) Engineering Geology by Subinoy Gangopadhyay, Oxford university press.
- 3) Engineering Geology by Parbin Singh, S.K.Kataria & Sons.
- 4) Principles of Engineering Geology by K.V.G.K. Gokhale – B.S publications

#### **REFERENCES:**

1. F.G. Bell, Fundamental of Engineering Geology Butterworths, Publications, New Delhi, 1992.
2. Krynine & Judd, Principles of Engineering Geology & Geotechnics, CBS Publishers & Distribution
- 3) Engineering Geology for Civil Engineers – P.C. Varghese PHI

#### **Course Outcomes:**

**After completion of this course, student should be able to:**

- Define geology and its importance in Civil Engineering
- List different properties of Minerals
- Classify the rocks
- Aquire the knowledge of structural geology.

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**(A94003) ENVIRONMENTAL STUDIES**

**II Year B.Tech. Civil Engg. II-Sem**

**L T P C  
4 0 0 4**

**Course Objectives:**

**Student will be able to**

- Develop an understanding of the necessity of protection of environment
- Develop an understanding of Natural resources
- Develop an understanding of Biodiversity
- Develop an understanding of Global Environmental problems
- Develop an understanding of Environmental pollution

**UNIT - I**

**MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES:** Definition, Scope and Importance – Need for Public Awareness.

**NATURAL RESOURCES :** Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems - Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. - Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. - Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources. Case studies. Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

**UNIT - II**

**ECOSYSTEMS:** Concept of an ecosystem.-Structure and function of an ecosystem.- Producers, consumers and decomposers.-Energy flow in the ecosystem-Ecological succession-Food chains, food webs and ecological pyramids.-Introduction, types, characteristic features, structure and function of the following ecosystem:

- a. Forest ecosystem
- b. Grassland ecosystem
- c. Desert ecosystem
- d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

**UNIT - III**

**BIODIVERSITY AND ITS CONSERVATION :** Introduction - Definition: genetic, species and ecosystem diversity. - Bio-geographical classification of India - Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values - . Biodiversity at global, National and local levels. - . India as a mega-diversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife

conflicts. - Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

#### **UNIT - IV**

**ENVIRONMENTAL POLLUTION:** Definition, Cause, effects and control measures of:

- a. Air pollution, b. Water pollution, c. Soil pollution, d. Marine pollution,
- e. Noise pollution, f. Thermal pollution, g. Nuclear hazards

**SOLID WASTE MANAGEMENT:** Causes, effects and control measures of urban and industrial wastes. - Role of an individual in prevention of pollution. - Pollution case studies. - Disaster management: floods, earthquake, cyclone and landslides.

#### **UNIT - V**

**SOCIAL ISSUES AND THE ENVIRONMENT :** From Unsustainable to Sustainable development -Urban problems related to energy -Water conservation, rain water harvesting, watershed management -Resettlement and rehabilitation of people; its problems and concerns. Case Studies -Environmental ethics: Issues and possible solutions. - Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies. -Wasteland reclamation. –Consumerism and waste products. - Environment Protection Act. -Air (Prevention and Control of Pollution) Act. -Water (Prevention and control of Pollution) Act -Wildlife Protection Act -Forest Conservation Act - Issues involved in enforcement of environmental legislation. -Public awareness.

**HUMAN POPULATION AND THE ENVIRONMENT:** Population growth, variation among nations. Population explosion - Family Welfare Programme. -Environment and human health. -Human Rights. -Value Education. -HIV/AIDS. -Women and Child Welfare. -Role of information Technology in Environment and human health. –Case Studies.

#### **TEXT BOOK:**

- 1 Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.,Universities Press
- 2 Environmental Studies by R. Rajagopalan, Oxford University Press.

#### **REFERENCE:**

1. Environmental Studies by Benny Joseph, McGraw Hill Education (India) Private Limited.
2. Introduction to Environmental Engineering and Science (3rd Edition) by [Gilbert M. Masters](#), [Wendell P. Ela](#), PHI

#### **Course Outcomes:**

**After completion of this course, student should be able to:**

- Acquire the knowledge on environment
- Acquire the knowledge of various Natural Resources
- Develop skills in understanding of various environmental problems
- Develop skills to protect the Environment

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**(A94301) HYDRAULICS & HYDRAULIC MACHINERY**

**II Year B.Tech. Civil Engg. II-Sem**

**L T P C  
4 1 0 4**

**Course Objectives:**

**Student will be able to**

- Apply fundamental principles of fluid mechanics for the solution of practical Civil Engineering problems of water conveyance in open channels.
- Study, Analyze and Design of channels in uniform and Non-uniform flow conditions.
- Describe the operating characteristics of hydraulic machinery (pumps and turbines) and the factors affecting their operation and specifications, as well as their operation in a system.
- Study and Analyze different types and elements of Hydro Electric Power plants.

**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 – computation of 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**

**HYDRAULIC 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. Distorted and non-distorted models.

**UNIT – III**

**BASICS OF TURBO MACHINERY :** 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.

**UNIT - IV**

**HYDRAULIC TURBINES :** Layout of a typical Hydropower installation – Heads and efficiencies-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**

**CENTRIFUGAL PUMP** : installation details-classification-types 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. Fluid Mechanics, Hydraulic and Hydraulic Machines by Modi & Seth, Standard book house.
3. Fluid Mechanics & Fluid Power Engineering by D.S. Kumar Kataria & Sons.

#### **REFERENCES :**

1. Elements of Open channel flow by Ranga Raju, Tata Mc.Graw Hill, Publications.
2. Open Channel flow by V.T.Chow, Mc.Graw Hill book company.
3. Hydraulic Machines by Banga & Sharma Khanna Publishers.

#### **Course Outcomes:**

**After completion of this course, student should be able to:**

- Apply fundamental knowledge of fluid mechanics in solving problems and making design of open-channel hydraulics in Civil and Environmental Engineering.
- Describe and apply dimensional analysis and similarity to develop hydraulic models and testing.
- Understand the basics of hydraulic machinery and their operation design in water distribution systems.
- Select and design appropriate pumps, classification, identify and design of hydraulic turbines and their application in Hydro Electric Power plants.

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**(A94104) ENGINEERING GEOLOGY LAB**

**II Year B.Tech. Civil Engg. II-Sem**

**L T P C  
0 0 3 2**

**Course Objectives :**

**Student will be able to**

- Identify the mineral name by studying the properties
- Identify the rocks name by studying the properties
- Interpretation of geological maps

**List of Experiments**

1. Study of physical properties and identification of minerals referred under theory.
2. Megascopic description and identification of rocks referred under theory.
3. Microscopic study of rocks.
4. Interpretation and drawing of sections for geological maps showing tilted beds, faults, uniformities etc.
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. Microscopic identification of rocks.

**Course Outcomes:**

**After completion of this course, student should be able to:**

- Identify various Minerals
- Identify the rocks
- Interpret and draw the sections for geological maps showing horizontal beds, vertical beds, inclined beds, folds, faults, unconformities.

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**(A94105) STRUCTURAL ANALYSIS LAB**

**II Year B.Tech. Civil Engg. II-Sem**

**L T P C  
0 0 3 2**

**Course Objectives:**

**Student will be able to**

- Identify the behavior of two and three hinged arches.
- Verify the reciprocal and moment area theorem.
- Verify the behaviour of types of columns.

**LIST OF EXPERIMENTS**

1. Verification of reciprocal theorem of deflection using a simply supported beam
2. Verification of moment area theorem for slopes and deflections of the beam
3. Deflection of a truss
4. Elastic displacements of curved beams
5. Experimental and analytical study of three hinged arch
6. Experimental and analytical study of behavior of struts with various end conditions
7. To determine elastic properties of a beam
8. Experiment on two hinged arch for horizontal thrust
9. Experimental and analytical study of a three bar pin jointed truss
10. Experimental and analytical study of deflections for unsymmetrical bending of cantilever beam

**Course Outcomes:**

**After completion of this course, student should be able to:**

- Analyze the behavior of two and three hinged arches.
- Analyze the behavior of various types of columns
- Analyze the behavior of redundant frame

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**(A94306) FLUID MECHANICS & HYDRAULIC MACHINES LAB**

**II Year B.Tech. Civil Engg. II-Sem**

**L T P C  
0 0 3 2**

**Course Objectives:**

**Student will be able to**

- Compare the results of analytical models introduced in lecture to the actual behavior of real fluid flows.
- Discuss and practice standard measurement techniques of fluid mechanics and their applications.
- Familiarize the students with the components and working principles of the Hydraulic machines- different types of Turbines, Pumps, and other miscellaneous hydraulics machines.
- Learn and practice writing technical reports and to work on small design projects.

**List of Experiments**

1. Calibration of Venturimeter & Orifice meter
2. Determination of Coefficient of discharge for a small orifice / mouthpiece 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's equation.
7. Impact of jet on vanes
8. Study of Hydraulic jump.
9. Performance test on Pelton wheel turbine
10. Performance test on Francis turbine.
11. Performance characteristics of a single stage/ multi-stage centrifugal pump.
12. Performance characteristics of a reciprocating pump.

**Course Outcomes:**

**After completion of this course, student should be able to:**

- Utilize basic measurement techniques of fluid mechanics and able to differentiate among measurement techniques their relevance and applications.
- Demonstrate practical understanding of Minor and friction losses in pipe flows.
- Demonstrate practical working of Hydraulic machines- different types of Turbines, Pumps, and other miscellaneous hydraulics machines.
- Compare the results of analytical models introduced in lecture to the actual behavior of real fluid flows and draw correct and sustainable conclusions.

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**(A94006) GENDER SENSITIZATION**

**II Year B.Tech. II-Sem**

**L T P C**  
**2 0 0 0**

**Pre-Requisites: None**

**Course Objectives:**

- To develop students sensibility with regard to issue of gender in contemporary India.
- To provide a critical perspective on the socialization of men and women.
- To introduce students to information about some key biological aspects of genders.
- To expose the students to debates on the politics and economics of work.
- To help students reflect critically on gender violence.
- To expose students to more egalitarian interactions between men and women.

**Unit – 1**

**Gender: Why Should We Study It?**

**Unit – 2**

**Socialization: Making Women, Making Men**

Introduction  
Preparing for womanhood  
Growing up male  
First lessons in caste  
Different masculinities

**Unit – 3**

**Housework: The Invisible Labour**

“My mother does not work”  
“Share the load”

**Unit – 4**

**Missing Women: Sex Selection and Its consequences**

Declining sex ratio  
Demographic consequences

**Unit – 5**

**Knowledge: Through the Lens of Gender**

Point of view  
Gender and the structure of knowledge  
Further reading: Unacknowledged women artists of Telangana

## **Unit – 6**

### **Sexual Harassment: Say No!**

Sexual harassment, not eve-teasing  
Coping with everyday harassment  
Further reading: “Chupulu”

## **Unit – 7**

### **Women" Work: Its Politics and Economics**

Fact and fiction  
Unrecognized and unaccounted work  
Further reading: Wages and conditions of work

## **Unit – 8**

### **Domestic Violence: Speaking Out**

Is home a safe place?  
When women unite [Film]  
Rebuilding lives  
Further reading: New forums for justice

## **Unit – 9**

### **Whose History? Questions for Historians and Others**

Reclaiming a past  
Writing other histories  
Further reading: Missing pages from modern Telangana history

## **Unit – 10**

### **Gender Spectrum: Beyond the Binary**

Two or many?  
Struggles with discrimination

## **Unit – 11**

### **Thinking about Sexual Violence**

Blaming the victim  
“I fought for my life...”  
Further reading: The caste face of violence

## **Unit – 12**

### **Just Relationships: Being Together as Equals**

Mary Kom and Onler  
Love and acid just do not mix  
Love letters  
Mothers and fathers  
Further Reading: Rosa Parks – The braveheart

## **Unit – 13**

### **Additional Reading: Our Bodies, Our Health**

### **Course Outcomes:**

- Students will have developed a better understanding of important issues related to gender in contemporary India.
- Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
- Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
- Students will acquire insight into the gendered division of labor and its relation to politics and economics.
- Men and women students and professionals will be better equipped to work and live together as equals.
- Students will develop a sense of appreciation of women in all walks of life.
- Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**(A95101) DESIGN OF RC STRUCTURES**

**III Year B.Tech. Civil Engg. I-Sem**

**L T P C  
4 1 0 4**

**Course Objectives:**

**Student will be able to**

- Know the salient features of Limit State Method design of RC structures.
- Understand the various codal provisions given in IS. 456-2000.
- Know the behaviour of RC beams under flexure, shear and compression.
- Understand the concepts of limit state of collapse and limit state of serviceability.

**UNIT –I**

Concepts of RC. Design – Working Stress Method - Limit State method – Material Stress-Strain Curves – Safety factors – Characteristic values. Stress Block parameters – IS – 456 – 2000.

**Beams:** Limit state analysis and design of singly reinforced, doubly reinforced, T and L beam.

**UNIT –II**

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.

**UNIT - III**

Design of one way slab, two-way slab and continuous slab Using I S Coefficients - Limit state design for serviceability for deflection, cracking and codal provision.

**UNIT – IV**

Short and Long columns – under axial loads, uniaxial bending and biaxial bending – I S Code provisions.

**UNIT – V**

**Footings:** Different types of footings – Design of isolated, square, rectangular, circular footings and combined footings.

Design of dog-legged staircase.

**Text Books:**

1. Limit state designed of reinforced concrete – P.C.Varghese, Prentice Hall of India, New Delhi.
2. Reinforced concrete design by S.Unnikrishna Pillai & Devdas Menon, Tata Mc.Graw Hill, New Delhi.
3. Reinforced concrete design by N. Krishna Raju and R.N. Pranesh, New age International Publishers, New Delhi
4. IS 456 – 2000.

**References :**

1. Fundamentals of Reinforced concrete design by M.L. Gambhir, Prentice Hall of India Private Ltd., New Delhi.
2. Design of concrete structures by J.N.Bandhyopadhyay PHI Learning Private Limited.
3. Design of Reinforced Concrete Structures by I.C.Syal and A.K.Goel, S.Chand & company.
4. Fundamentals of reinforced concrete by N.C. Sinha and S.K Roy, S. Chand publishers
5. Design of Reinforced Concrete Foundations – P.C. Varghese Prentice Hall of India, New Delhi.
6. Reinforced concrete structures, Vol.1, by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi
7. Design of concrete structures – Arthus H.Nilson, David Darwin, and Chorles W. Dolar, Tata Mc.Graw-Hill, 3rd Edition, 2005.

**Course Outcomes:**

**After completion of this course, student should be able to**

- Design the singly reinforced, doubly reinforced and flanged sections.
- Design the axially loaded, uniaxial and biaxial bending columns.
- Design the isolated square, rectangular and circular footings
- Design the one-way slab, two-way slab and staircase.

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**(A95621) MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**

**III Year B.Tech. I-Sem**

**L T P C  
4 0 0 4**

**Course Objectives:**

To enable the student to understand and appreciate, with a practical insight, the importance of certain basic issues governing the business operations namely. Demand and supply, production function, cost analysis, markets forms of business organizations, capital budgeting and financial accounting and financial analysis by using ratios.

**UNIT – I**

**Introduction to Managerial Economics:** Definition, Nature and Scope of Managerial Economics Demand Analysis: Demand Determinants, Law of Demand and its exceptions, Definition, Types, Measurement and Significance of Elasticity of Demand. Demand Forecasting, Factors governing demand forecasting, methods of demand forecasting (survey methods, statistical methods, expert opinion method, test marketing, controlled experiments, judgmental approach to demand forecasting)

**UNIT – II**

**Production and Cost Analysis:** Production Function – Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, 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 and limitations of BEA.

**UNIT – III**

**Introduction to Markets & Pricing strategies:** Market structures: Types of competition, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly. Pricing Strategies, Business & New Economic Environment: Characteristic features of Business, Features and evaluation of Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types, Changing Business Environment in Post-liberalization scenario.

**UNIT – IV**

**Capital and Capital Budgeting:** Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements, Methods and sources of raising finance, Nature and scope of 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 & Financial Analysis:** Double-Entry Book Keeping, Journal, Ledger, Trial Balance – Final Account (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments.) Computation, Analysis and Interpretation of Liquidity Ratios (Current Ratio and quick ratio), Activity Ratios (Debt-Equity ratio, Interest

Coverage ratio), and Profitability ratios (Gross Profit Ratio, Net Profit ratio, Operating Ratio, P/E Ratio and EPS).

### **Text Books**

Aryasri: Managerial Economics and Financial Analysis, 2/e, TMH, 2005.

Varshney & Maheswari: Managerial Economics, Sultan Chand, 2003.

### **References**

- 1) Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi, 2004.
- 2) Shim & Siegel: Financial Accounting (Schaum's Outlines), 2/e TMH, 2004
- 3) Chary: Production and Operations Management, 3/e, TMH, 2004.
- 4) Domnick Salvatore: Managerial Economics In a Global Economy, 4<sup>th</sup> Edition, Thomson, 2003.
- 5) Narayanaswamy: Financial Accounting-A Managerial Perspective, PHI, 2005.
- 6) Peterson & Lewis: Managerial Economics, 4<sup>th</sup> Edition, Pearson Education, 2004.
- 7) Raghunatha Reddy & Narasimhachary: Managerial Economics & Financial Analysis, Scitech, 2005.
- 8) S.N.Maheswari & S.K. Maheswarial, Financial Accounting, Vikas, 2005.
- 9) Truet and Truet: Managerial Economics: Analysis, Problems and Cases, Wiley, 2004.
- 10) Dwivedi: Managerial Economics, 6<sup>th</sup> Ed., Vikas, 2002.
- 11) Yogesh Maheswari: Managerial Economics, 2<sup>nd</sup> Ed., PHI, 2005

### **Course Outcomes:**

- 1) To study fundamental concepts in managerial economics and financial analysis including certain basic issues governing the business operations.
- 2) To learn the concepts of demand, elasticity of demand and demand forecasting and methods of demand forecasting.
- 3) To learn various issues involved in production decision analysis.
- 4) To gain the knowledge of Break – Even Analysis and its importance in managerial decision making.
- 5) To learn different types of market environment under various types of competition.
- 6) To gain the knowledge of new economic environment in post – liberalization scenario.
- 7) To know the concepts of capital budgeting and various methods of capital budgeting and its application in business decision making.

### **Learning Outcomes:**

- 1) Have an ability to understand the market dynamics namely, demand, demand forecasting, elasticity of demand, pricing methods and pricing in different market structures.
- 2) Gain an insight into how production function is carried out to achieve least cost combination of inputs and cost analysis.
- 3) Have an ability to understand the application of BEA in business decision making.
- 4) Have an ability to understand how capital budging decisions are carried out in business organization.
- 5) Have an ability to record the business transactions and following accounting process.
- 6) Have an ability to analyse and interpret the financial statements through ratio analysis.

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**(A95102) ESTIMATING & COSTING**

**III Year B.Tech. Civil Engg. I-Sem**

**L T P C  
4 1 0 4**

**Course Objectives:**

**Student will be able to**

- Understands the terms of estimation.
- Calculate detailed estimate of buildings
- Do rate analysis of quantities
- Understand the types of valuating the property

**UNIT – I**

General items of work in Building – Standard Units Principles of working out quantities for detailed and abstract estimates – Approximate method of Estimating.

**UNIT – II**

Detailed Estimates of Buildings - Reinforcement bar bending and bar requirement schedules

**UNIT – III**

Earthwork for roads and canals.

**UNIT – IV**

Rate Analysis – Working out data for various items of work over head and contingent charges.

**UNIT-V**

Contracts – Types of contracts – Contract Documents – Conditions of contract, Valuation - Standard specifications for different items of building construction.

**NOTE : NUMBER OF EXERCISES PROPOSED :**

1. Three in flat Roof & one in Sloped Roof
2. Exercises on Data – three Nos.

**Text Books**

1. Estimating and Costing by B.N. Dutta, UBS publishers, 2000.
2. Estimating and Costing by G.S. Birdie

**Reference books :**

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. Estimation, Costing and Specifications by M. Chakraborti; Laxmi publications.

**Course Outcomes:**

**After completion of this course, student should be able to**

- Evaluate the detailed estimate of RC building
- Evaluate the detailed estimate of roads and irrigation works
- Understands the importance of valuation
- Understands what type of contract is used for a specific Work

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**(A95103) CONCRETE TECHNOLOGY**

**III Year B.Tech. Civil Engg. I-Sem**

**L T P C  
4 1 0 4**

**Course Objectives:**

**Student will be able to**

- Use different types of cement as per their properties for different field applications.
- Learn the methods of testing of aggregates.
- Design economic concrete mix proportion for different exposure conditions and intended purposes.
- Supervise various concreting operations.

**UNIT I**

**CEMENT:** Portland cement – chemical composition – Hydration, Setting of cement – Structure of hydrate cement – Test on physical properties – Different grades of cement. Admixtures : Types of admixtures – mineral and chemical admixtures – relevant IS codal provisions.

**UNIT - II**

**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– relevant IS codal provisions..

**UNIT – III**

**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– relevant IS codal provisions..

**UNIT - IV**

**HARDENED CONCRETE :** Water / Cement ratio – Abram’s Law – Gelspaoe ratio – Nature of strength of concrete – Maturity concept – Strength in tension & compression – Factors affecting strength – Relation between compression & tensile strength - Curing– relevant IS codal provisions..

**TESTING OF HARDENED CONCRETE:** Compression tests – Tension tests – Factors affecting strength – Flexure tests – Splitting tests – Pull-out test, Non-destructive testing methods – codal provisions.

**ELASTICITY, CREEP & SHRINKAGE** – Modulus of elasticity – Dynamic modulus of elasticity – Poisson's ratio – Creep of concrete – Factors influencing creep – Relation between creep & time – Nature of creep – Effects of creep – Shrinkage – types of shrinkage– relevant IS codal provisions..

#### **UNIT – V**

**MIX DESIGN :** Factors in the choice of mix proportions – Durability of concrete – Quality Control of concrete – Statistical methods – Acceptance criteria – Proportioning of concrete mixes by various methods – BIS method of mix design– relevant IS codal provisions..

**SPECIAL CONCRETES:** Introduction to Light weight concrete – Cellular concrete – No-fines concrete – High density concrete – Fibre reinforced concrete – Polymer concrete – High performance concrete – Self compacting concrete– relevant IS codal provisions..

#### **Text books:**

1. Properties of Concrete by A.M.Neville – Low priced Edition – 4th edition
2. Concrete Technology by M.S.Shetty. – S.Chand & Co. ; 2004
3. Relevant IS codes

#### **References:**

1. Concrete Technology by M.L. Gambhir. – Tata Mc. Graw Hill Publishers, New Delhi
2. Concrete Technology by A.R. Santha Kumar, Oxford university Press, New Delhi
3. Concrete: Micro structure, Properties and Materials – P.K.Mehta and J.M.Monteiro, Mc-Graw Hill Publishers

#### **Course Outcomes:**

**After completion of this course, student should be able to**

- Determine the properties of concrete ingredients i.e. cement, sand, coarse aggregate by conducting different tests.
- Recognize the effects of the rheology and early age properties of concrete on its long-term behavior.
- Develop an advanced knowledge of the mechanical performance of cement based materials and how it can be controlled
- Use various chemical admixtures and mineral additives to design cement based materials with tailor-made properties
- Use advanced laboratory techniques to characterize cement-based materials.
- Understand the mix design and engineering properties of special concretes such as high-performance concrete, self-compacting concrete, fibre reinforced concrete, etc.

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**(A95104) ENGINEERING HYDROLOGY**

**III Year B.Tech. Civil Engg. I-Sem**

**L T P C  
4 1 0 4**

**Course Objectives:**

The main Objectives of Engineering Hydrology is to make the students working in the design offices and the fields, conversant with principles and practice of Irrigation engineering. The study aimed at the occurrence, movement and augmentation of surface water and ground water. India being predominantly an agricultural country with increasing population, irrigation has attained great significance in achieving the goal of self sufficiency in food production. The Present syllabus includes the conventional methods of Irrigation, detailed treatment of the modern methods of Irrigation and design principles of various hydraulic structures.

**UNIT I**

Introduction to engineering hydrology and its 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**

Stream flow measurement- Introduction – Measurement of stage – Measurement of velocity – Area velocity method – Electromagnetic method – Ultrasonic method – Indirect methods – Hydrometry stations.

**UNIT-III**

Distribution of Runoff – Hydrograph Analysis Flood Hydrograph – Effective Rainfall – Base Flow- Base Flow Separation - Direct Runoff Hydrograph Unit pulse and Unit step function - Unit Hydrograph, definition, limitations and applications of Unit hydrograph, derivation of Unit Hydrograph from Direct Runoff Hydrograph and vice versa - S-hydrograph, Synthetic Unit Hydrograph.

**UNIT-IV**

Floods – Introduction – Rational method – Unit hydrograph method – Flood frequency studies – Design flood – Risk, Reliability and safety factor.

Flood Routing- Introduction – Basic equations – Hydrologic storage routing – Hydraulic method of flood routing – Nash's conceptual model – Flood forecasting.

## **UNIT-V**

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

### **Text books:**

1. Engineering Hydrology by [K. Subramanya](#), Tata McGraw-Hill Education
2. Engineering Hydrology by Jayaram Reddy, Laxmi publications pvt. Ltd., New Delhi

### **References:**

1. Engineering Hydrology by C.S.P. Ojha, P. Bhunya and R. Berndtsson, Oxford Higher Education.
2. Irrigation and Water Resources & Water Power by P.N.Modi, Standard Book House.
3. Irrigation Water Management by D.K. Majundar, Printice Hall of India.
4. Elementary hydrology by V.P.Singh, PHI publications.
5. Applied hydrology by Ven Te Chow, David R. Maidment larry W. Mays Tata MC. Graw Hill.

### **Course Outcomes:**

At the end of the course, the student understands the need and importance of irrigation and also knows the irrigation management practices of the past, present and future. Student familiarizes about the availability of the water resource with special reference to irrigation.

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**(A95001) TECHNICAL COMMUNICATION SKILLS LAB**

III Year B. Tech. I-SEM

**L T P C**  
**0 0 3 2**

**Introduction**

The introduction of the Technical Communication Skills Lab is considered essential at 3<sup>rd</sup> 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.

The proposed course should be a laboratory course to enable students to use „good“ English and perform the following:

- Gathering ideas and information to organize ideas relevantly and coherently.
- Engaging in debates.
- Participating in group discussions.
- Facing interviews.
- Writing project/research reports/technical reports.
- Making oral presentations.
- Writing formal letters.
- Transferring information from non-verbal to verbal texts and vice-versa.
- Taking part in social and professional communication.

**Objectives:**

This Lab focuses on using multi-media 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.
- To prepare all the students for their placements.

**Syllabus:**

The following course content to conduct the activities is prescribed for the Technical Communication Skills (TCS) Lab:

- I. **Fundamentals of Inter-personal Communication and Building Vocabulary** – Starting a conversation – responding appropriately and relevantly – using the right body language – Role Play in different situations & Discourse Skills- using visuals – Synonyms and antonyms, word roots, one-word substitutes, prefixes and

suffixes, study of word origin, business vocabulary, analogy, idioms and phrases, collocations & usage of vocabulary.

- II. **Reading Comprehension** –General Vs Local comprehension, reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading & effective googling.
- III. **Writing Skills** – Structure and presentation of different types of writing – *letter writing/Resume writing/ e-correspondence/ Technical report writing/ Portfolio writing* – planning for writing – improving one’s writing.
- IV. **Presentation Skills** – Oral presentations (individual and group) through JAM sessions/seminars/**PPTs** and written presentations through posters/projects/ reports/ e-mails/assignments etc.
- V. **Group Discussion and Interview Skills** – Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and organization of ideas and rubrics for evaluation- Concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele-conference & video-conference and Mock Interviews.

#### **Minimum Requirement:**

The Technical Communication Skills (TCS) Laboratory shall have the following infra-structural facilities to accommodate at least 35 students in the lab:

- Spacious room with appropriate acoustics
- Round Tables with movable chairs
- Audio-visual aids
- LCD Projector
- Public Address system
- P – IV Processor, Hard Disk – 80 GB, RAM–512 MB Minimum, Speed – 2.8 GHZ
- T. V, a digital stereo & Camcorder
- Headphones of High quality

**Prescribed Lab Manual:** A book titled *A Course Book of Advanced Communication Skills (ACS) Lab* published by Universities Press, Hyderabad.

#### **Suggested Software:**

The software consisting of the prescribed topics elaborated above should be procured and used.

- **Oxford Advanced Learner’s Compass**, 8<sup>th</sup> 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**
  - **Skillmate**
  - **Presentation skills, Cambridge (with VCD)**

#### **Books Prescribed:**

1. **Technical Communication** by Meenakshi Raman & Sangeeta Sharma, Oxford University Press 2009.
2. **English Language Communication : A Reader cum Lab Manual** Dr A Ramakrishna Rao, Dr G Natanam & Prof SA Sankaranarayanan, Anuradha Publications, Chennai 2008.
3. **Advanced Communication Skills Laboratory Manual** by Sudha Rani, D, Pearson Education 2011.
4. **Technical Communication** by Paul V. Anderson. 2007. Cengage Learning pvt. Ltd. New Delhi.
5. **Business and Professional Communication: Keys for Workplace Excellence.** Kelly M. Quintanilla & Shawn T. Wahl. Sage South Asia Edition. Sage Publications. 2011.

#### **Suggested Books:**

1. **The Basics of Communication: A Relational Perspective.** Steve Duck & David T. McMahan. Sage South Asia Edition. Sage Publications. 2012.
2. **English Vocabulary in Use** series, Cambridge University Press 2008.
3. **Management Shapers Series** by Universities Press(India)Pvt Ltd., Himayatnagar, Hyderabad 2008.
4. **Handbook for Technical Communication** by David A. McMurrey & Joanne Buckley. 2012. Cengage Learning.
5. **Communication Skills** by Leena Sen, PHI Learning Pvt Ltd., New Delhi, 2009.
6. **Handbook for Technical Writing** by David A McMurrey & Joanne Buckely CENGAGE Learning 2008.
7. **Job Hunting** by Colm Downes, Cambridge University Press 2008.
8. **Master Public Speaking** by Anne Nicholls, JAICO Publishing House, 2006.
9. **English for Technical Communication for Engineering Students, Aysha Vishwamohan, Tata Mc Graw-Hil 2009.**
10. Books on **TOEFL/GRE/GMAT/CAT/ IELTS** by Barron"s/DELTA/Cambridge University Press.

11. **International English for Call Centres** by Barry Tomalin and Suhashini Thomas, Macmillan Publishers, 2009.

**Course Outcomes**

**After completion of this course, student should be able to**

- Accomplishment of sound vocabulary and its proper use contextually.
- Flair for Writing and felicity in written expression.
- Enhanced job prospects.
- Effective speaking abilities

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**(A95105) CONCRETE TECHNOLOGY LAB**

**III Year B.Tech. Civil Engg. I-Sem**

**L T P C  
0 0 3 2**

**Course Objectives**

**Student will be able to**

- Understand the test procedures to find Physical properties of Cement
- Understand the test procedures to find Specific Gravity, Bulking of Aggregates.
- Understand the test procedures to find properties of Fresh Concrete
- Understand the test procedures to find properties of Hardened Concrete

**I. Test on Cement**

1. Normal Consistency, Initial setting time and final setting time of cement
2. Specific gravity of cement
3. Soundness of cement by Lechatlier's apparatus.
4. Compressive strength of cement.

**II. Test on Aggregate**

1. Specific gravity of fine and coarse aggregates.
2. Bulking of sand
3. Fineness modulus of fine and coarse aggregates.

**III. Test on Fresh Concrete – Workability tests**

1. Slump test
2. Compaction factor
3. Flow Table Test

**IV. Test on hardened concrete**

1. Compressive strength of concrete
2. Split Tensile strength of concrete

**V. Non Destructive test of concrete- Demonstration**

1. Rebound hammer

**TEXT BOOK:**

1. Concrete Technology by M.S. Shetty – S.Chand & Co.
2. Concrete Manual by M.L. Gambhir, Dhanpat Rai & Sons
3. Relevant IS codes

**Course Outcomes:**

**After completion of this course, student should be able to**

- Test Fineness, Specific Gravity, Setting Time, Soundness and Compressive Strength of Cement
- Test Specific Gravity of Coarse Aggregate, Fine Aggregate and Bulking of Fine Aggregate.
- Design Concrete Mix Proportioning by Using Indian Standard Method.
- Test Workability of Fresh Concrete and Compressive strength, Split Tensile Strength of Hardened Concrete.

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**(A95106) SURVEYING LAB – II**

**III Year B.Tech. Civil Engg. I-Sem**

**L T P C  
0 0 3 2**

**Course Objective**

**Student will be able to**

- Learn and understand the various basic concept of theodolite
- Learn and understand the measurement of horizontal angles and vertical angles.
- Learn the concepts of total station.
- Learn and understand how to calculate Area of plot and Ground.

**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 tachometric surveying ( Two Exercises)
5. Curve setting – ( Two Exercises)
6. Determine of area using total station
7. Traversing using total station
8. Contouring using total station
9. Determination of remote height using total station

**Course Outcomes**

**After completion of this course, student should be able to:**

- Measure the horizontal angles using theodolite
- Measure the area using total station
- Prepare contour Map and Estimate the Quantity of earthwork required for formation level for Road and Railway Alignment.

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**(A96101) DESIGN OF STEEL STRUCTURES**

**III Year B.Tech. Civil Engg. II-Sem**

**L T P C  
4 1 0 4**

**Course Objectives:**

**Student will be able to**

- Know about the manufacturing process of steel, types of steel and their properties
- Understand the salient features of Limit State Method of design of Steel structures.
- Understand the various codal provisions given in IS. 800.
- Know the behaviour of steel structures under tension, compression and flexure.

**UNIT – I**

Materials-types of structural steel-mechanical properties of steel-Concepts of plasticity-yield strength. Loads-and combinations local buckling behavior of steel. Concept of limit State Design-Limit States-Design Strengths-deflection limits-serviceability-stability check. Bolted connections-Riveted connections-IS-800-2007- specifications-Design strength-efficiency of joint-prying action. Welded connections-Types of welded joints-specifications-design requirements.

**UNIT – II**

Design of tension members- Design strength- Design procedure splice - lug angle.  
Design of compression members-Buckling class- slenderness ratio / strength design- laced – battened columns- splice- column base- slab base.

**UNIT – III**

Design of Beams-Plastic moment- Bending and shear strength/ buckling – Builtup sections – laterally / supported beams - Design of eccentric connections – Framed – stiffened / seat connection.

**UNIT – IV**

Design of plate girders – elements – economical depth – design of main section – connections between web and flange – design of stiffness bearing – intermediate stiffeners – Design of Web splice & Flange splice.

**UNIT – V**

Design of roof trusses – Types of roof trusses, loads on trusses – purlin design – truss design, Design of joints and end bearings.



**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.
4. Design of steel structures, Structures, S.S. Bhavikatti, IK int Publication House, New Delhi, 2010.
5. Structural Design and Drawing by N.Krishna Raju, Universities Press.

**Course Outcomes:**

**After completion of this course, student should be able to**

- Design the tension members and compression members.
- Design the slab and gusset type column bases.
- Design the welded plate girder and various stiffeners.
- Design the various components of roof trusses.

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**(A96102) HIGHWAY ENGINEERING**

**III Year B.Tech. Civil Engg. II-Sem**

**L T P C  
4 0 0 4**

**Course Objectives:**

**Student will be able to**

- Introduce the principles of highway design, road safety and highway construction materials.
- Start applying these skills to design roads and select material for road construction.

**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 – Highway Project.

**UNIT – II**

**HIGHWAY GEOMETRIC 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 – Onstreet & 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 – Traffic Islands - Types of Grade Separated Intersections - Rotary Intersection – Concept of Rotary – Design Factors of Rotary – Advantages and Limitations of Rotary Intersections.

## **UNIT - V**

### **PAVEMENT DESIGN**

Design of Pavements : Design of Flexible pavement by CBR method as per IRC 37-2012 and theory of empirical mechanistic method. Stresses in rigid pavement by westergards and IRC methods. Design of overlay by Benkelman beam method.

#### **Text books:**

1. Highway Engineering by S.K. Khanna, C.E.G. Justo and Veeraraghavan A, Nemchand & Bros., 10th edition (2013).
2. Traffic Engineering & Transportation Planning – Dr.L.R.Kadyali, Khanna Publications – 6th Edition – 1997.

#### **References:**

1. Principles of Traffic and Highway Engineering – Garber & Hoel, Cengage Learning.
2. Principles and Practices of Highway Engineering – Dr.L.R.Kadiyali and Dr.N.BLal - Khanna Publications.
3. Highway Engineering – S.P.Bindra , Dhanpat Rai & Sons. – 4th Edition (1981)
4. IRC 37-2012 : Tentative guidelines for design of flexible pavement
5. IRC 58-2011: Guidelines for design of plain jointed rigid pavements.
6. IRC 81-1997 : Guidelines for design of overlay using Benkalman Beam Deflection Technique

#### **Course Outcomes:**

##### **After completion of this course, student should be able to**

- Classify roads based on functional classification,
- Describe design element: sight distance, horizontal curvature, super elevation, grades, visibility on vertical curves, cross section elements
- Use fundamental physics and mathematical knowledge in deriving geometric design equations
- Plan surveys, preparation of survey forms and data collection from field for highway design
- Construct safety audit at different stage of road construction and Describe the structural elements of highway and causes for structural failures in pavement

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**(A96103) GEOTECHNICAL ENGINEERING-I**

**III Year B.Tech. Civil Engg. II-Sem**

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4 1 0 4**

**Course Objectives**

**Student will be able to**

- Apply knowledge of geotechnical engineering.
- Understanding of the basic principles of soil mechanics and its application to solve problems related to geotechnical engineering.
- Improve the basic understanding of the index and engineering properties of soils

**UNIT – I**

**INTRODUCTION:** Soil formation and structure – moisture content – Mass- volume relationship – Relative density.

**INDEX PROPERTIES OF SOILS:** Grain size analysis – Sieve– 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 permeability – laboratory determination of coefficient of permeability –Permeability of layered soils – In-situ permeability tests (Pumping in & Pumping out test).

**EFFECTIVE STRESS & SEEPAGE THROUGH SOILS:** Total, neutral and effective stress – principle of effective stress - quick sand condition – Seepage through soils – Flownets: Characteristics and Uses.

**UNIT –III**

**STRESS DISTRIBUTION IN SOILS:** Boussinesq's and Westergaard's theories for point load, uniformly loaded circular and rectangular areas, pressure bulb, variation of vertical stress under point load along the vertical and horizontal plane, and Newmark's influence chart for irregular areas.

**COMPACTION:** Mechanism of compaction – factors affecting compaction – effects of compaction on soil properties – Field compaction Equipment – compaction quality control.

**UNIT – IV**

**CONSOLIDATION:** Types of compressibility – Immediate Settlement, primary consolidation and secondary consolidation - stress history of clay; e-p and e-log(p) curves – normally consolidated soil, over consolidated soil and under consolidated soil - preconsolidation pressure and its determination - Terzaghi's 1-D consolidation theory –

coefficient of consolidation: square root time and logarithm of time fitting methods - computation of total settlement and time rate of settlement.

## **UNIT - V**

**SHEAR STRENGTH OF SOILS:** Importance of shear strength – Mohr's– Coulomb Failure theories – Types of laboratory tests for strength parameters – strength tests based on drainage conditions – strength envelopes – Shear strength of sands - dilatancy – critical void ratio.

### **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 Engg. By K.R. Arora, Standard Publishers and Distributors, Delhi.
3. Foundation Engineering by P.C.Varghese, PHI

### **References:**

1. Soil Mechanics and Foundation Engineering by VNS Murthy, CBS Publishers and Distributors.
2. Principals of Geotechnical Engineering by Braja M.Das, Cengage Learning Publishers.
3. Geotechnical Engineering by C. Venkataramiah, New age International Pvt . Ltd, (2002).
4. Geotechnical Engineering Principles and Practices by Cuduto, PHI International.
5. Geotechnical Engineering by Manoj Dutta & Gulati S.K – Tata Mc.Grawhill Publishers New Delhi.
6. Soil Mechanics and Foundation by by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi

### **Course Outcomes**

**After completion of this course, student should be able to**

- Identify, formulate and solve geotechnical engineering problems.
- Improve techniques, skills, and modern engineering tools necessary for understanding in geotechnical engineering practice.
- Know the complete awareness of the classical concept of soil mechanics and its necessity

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**(A96104) STRUCTURAL ANALYSIS – II**

**III Year B.Tech. Civil Engg. II-Sem**

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**Course Objectives:**

**Student will be able to**

- Idealize and analyze statically determinate and indeterminate structures
- Introduce Displacement methods of analysis for statically indeterminate structures.
- Introduce the approximate methods of analysis for both gravity and Lateral loads.
- Familiarity with professional and contemporary issues

**UNIT – I**

**SLOPE DEFLECTION METHOD:** Determination of static and kinematic indeterminacies for frames. Analysis of Single Bay – single storey Portal Frames by Slope Deflection Method Including Side Sway. Shear force and bending moment diagrams. Elastic curve.

**UNIT – II**

**MOMENT DISTRIBUTION METHOD** - Analysis of Single Bay Single Storey 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 – 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 to Flexibility and Stiffness matrix methods of analyses using „system approach“ upto three degree of indeterminacy– Analysis of continuous beams including settlement of supports using flexibility and stiffness methods. Analysis of pin-jointed determinate plane frames using flexibility and stiffness methods- Analysis of single bay single storey portal frames including side sway using only stiffness method. Shear force and bending moment diagrams. Elastic curve.

## **UNIT- V**

**INDETERMINATE TRUSSES:** Determination of static and kinematic indeterminacies – Analysis of trusses having single and two degrees of internal and external indeterminacies – Castigliano’s second theorem.

### **Text Books:**

- 1) Structural Analysis Vol –I &II by Vazarani and Ratwani, Khanna Publishers.
- 2) Structural Analysis Vol I & II by G.S. Pandit S.P.Gupta Tata McGraw Hill Education Pvt. Ltd.

### **References:**

- 1) Mechanics of Structures Vol –II by H.J.Shah and S.B.Junnarkar, Charotar Publishing House Pvt. Ltd.
- 2) Basic Structural Analysis by C.S.Reddy., Tata McGraw Hill Publishers.
- 3) Structural Analysis -II by S.S.Bhavikatti, Vikas Publishing House Pvt. Ltd.
- 4) Structural Analysis by Devdas Menon, Narosa Publishing House.
- 5) Advanced Structural Analysis by A.K.Jain, Nem Chand & Bros.
- 6) Structural Analysis Vol I & II by R.Vaidyanathan and P.Perumal, Lakshmi Publications House Pvt. Ltd.
- 7) Examples in structural Analysis by William M.C.McKenzie, Taylor & Francis.

### **Course outcomes:**

**After completion of this course, student should be able to**

- Determine deflections of beams using classical methods
- Solve statically indeterminate structures using classical methods
- Solve statically indeterminate structures using Approximate methods

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**(A96105) DISASTER MANAGEMENT  
(OPEN ELECTIVE)**

**III Year B.Tech. II-Sem**

**L T P C  
4 0 0 4**

**Course Objectives:**

**Student will be able to**

- Understand the difference between a hazard and disaster
- Know about various disasters and their impacts
- Understand different approaches of disaster risk reduction
- Understand disaster risks in India

**UNIT 1 : Understanding Disaster**

1. Concept of Disaster
2. Different approaches
3. Concept of Risk
4. Levels of Disasters
5. Disaster Phenomena and Events (Global, national and regional)

**Hazards and Vulnerability**

1. Natural and man-made hazards; response time, frequency and forewarning levels of different hazards.
2. Characteristics and damage potential of natural hazards; hazard assessment.
3. Dimensions of vulnerability factors; vulnerability assessment.
4. Vulnerability and disaster risk.
5. Vulnerabilities to flood and earthquake hazards.

**UNIT 2 : Disaster Management Mechanism**

1. Concepts of risk management and crisis managements.
2. Disaster Management Cycle.
3. Response and Recovery.
4. Development, Prevention, Mitigation and Preparedness.
5. Planning for Relief.

**UNIT 3: Capacity Building**

1. Capacity Building: Concept.
2. Structural and Nonstructural Measures.
3. Capacity Assessment; Strengthening Capacity for Reducing Risk.
4. Counter-Disaster Resources and their utility in Disaster Management.
5. Legislative Support at the state and national levels.

**UNIT 4: Coping with Disaster**

1. Coping Strategies; alternative adjustment processes.
2. Changing Concepts of disaster management.
3. Industrial Safety Plan; Safety norms and survival kits.
4. Mass media and disaster management.



## **UNIT 5: Planning for disaster management**

1. Strategies for disaster management planning.
2. Steps for formulating a disaster risk reduction plan.
3. Disaster management Act and Policy in India.
4. Organizational structure for disaster management in India.
5. Preparation of state and district disaster management plans.

### **Text Books**

1. Alexander, D. Natural Disasters, ULC press Ltd, London, 1993.
2. Carter, W.N. Disaster Management: A Disaster Management Handbook, Asian Development Bank, Bangkok, 1991.
3. Manual on Natural Disaster Management in India, NCDM, New Delhi, 2001.

### **References**

1. Abarquez I. & Murshed Z. Community Based Disaster Risk Management: Field Practitioner's Handbook, ADPC, Bangkok, 2004.
2. Goudie, A. Geomorphological Techniques, Unwin Hyman, London 1990.
3. Goswami, S.C Remote Sensing Application in North East India, Purbanchal Prakesh, Guwahati, 1997.
4. Chakrabarty, U.K. Industrial Disaster Management and Emergency Response, Asian Book Pvt. Ltd., New Delhi 2007.
5. Disaster Management in India, Ministry of Home Affairs, Government of India, New Delhi, 2011.
6. National Policy on Disaster Management, NDMA, New Delhi, 2009
7. Disaster Management Act. (2005), Ministry of Home Affairs, Government of India, New Delhi, 2005.
8. District Disaster Management Plan-Model Template, NIDM, New Delhi, 2005.
9. Disaster Management, Future challenge and opportunities, Edited by Jagbir singh, I.K. International publishing home Pvt, Ltd.

### **Course Outcomes:**

**After completion of this course, student should be able to**

- Acquire the knowledge of disaster Management
- Understand the vulnerability of ecosystem and infrastructure due to a disaster
- Acquire the knowledge of Disaster Management Phases
- Understand the hazard and vulnerability profile of India

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**(A96106) AIR POLLUTION AND CONTROL  
(OPEN ELECTIVE)**

**III B.Tech. II Sem**

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4 0 0 4**

**Course Objectives:**

**Student will be able to**

- Develop an understanding of Air pollution Concepts
- Develop an understanding of Effects of air pollution
- Develop an understanding of Air pollution Control devices
- Develop an understanding of Air quality monitoring devices

**UNIT – I**

Air Pollution-Definitions, Scope, Significance and Episodes, Air Pollutants-Classifications-Natural and Artificial-Primary and Secondary, point and Non-Point, Line and Areal Sources of air pollution- stationary and mobile sources.

**UNIT – II**

Effects of Airpollutants on man, material and vegetation; Global effects of air pollution – Green House effect, Heat Islands, Acid Rains, Ozone Holes etc.

**UNIT-III**

Thermodynamics and Kinetics of Air-pollution – Applications in the removal of gases like  $SO_x$ ;  $NO_x$ ; CO; HC etc., air-fuel ratio. Computation and Control of products of combustion. Meteorology and plume Dispersion; properties of atmosphere; Heat, Pressure, Wind forces, Moisture and relative Humidity; Influence of Meteorological phenomena on Air Quality-wind rose diagrams.

**UNIT-IV**

Lapse Rates, Pressure Systems, Winds and moisture plume behaviour and plume Rise Models; Gaussian Model for Plume Dispersion.

Control of particulates – Control at Sources, Process Changes, Equipment modifications, Design and operation of control.

Equipment's – Settling Chambers, Centrifugal separators, filters Dry and Wet scrubbers, Electrostatic precipitators.

**UNIT – V**

General Methods of Control of  $NO_x$  and  $SO_x$  emissions – In-plant Control Measures, process changes, dry and wet methods of removal and recycling.

Air Quality Management – Monitoring of SPM,  $SO_x$ ;  $NO_x$  and CO Emission Standards.

**Text books:**

1. Air pollution by M.N.Rao and H.V.N.Rao – Tata Mc.Graw Hill Company.
2. Air pollution by Wark and Warner.- Harper & Row, New York.

**Reference:**

1. Air Pollution and Control Engineering by Noel de Nevers, McGraw Hill, 2000.
2. Environmental Pollution Control Engineering by Rao C.S, Wiley Eastern Limited, India, 1993.
3. Air pollution and control By K.V.S.G. Murali Krishna, Kaushal Publishers. Kakinada.

**Course Outcomes:****After completion of this course, student should be able to**

- Acquire the knowledge of Air pollution Concepts
- Acquire the knowledge of Effects of air pollution
- Acquire the knowledge of Air pollution Control devices
- Acquire the knowledge of Air quality monitoring devices

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**(A96203) RENEWABLE ENERGY SOURCES  
(OPEN ELECTIVE)**

**III Year B.Tech. II-Sem**

**L T P C  
4 0 0 4**

**Course Objectives:**

To make the student

- Introduce to the technology of renewable sources of energy.
- Learn about the solar radiation, its applications and radiation measuring instruments.
- Learn about the various types of geothermal resources and its applications.
- Study the biomass energy resources, bio-mass systems.
- Learn the methods of energy extraction from the wind and oceans.
- Learn to the technology of direct energy conversion methods.

**UNIT – I**

**PRINCIPLES OF SOLAR RADIATION:** Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data for India.

**UNIT-II**

**SOLAR ENERGY COLLECTION:** Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors, tracking CPC and solar swing

**SOLAR ENERGY STORAGE AND APPLICATIONS:** Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications- solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion, applications of PV system-PV hybrid systems

**UNIT-III**

**WIND ENERGY:** Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria, analysis of aerodynamic forces acting on blade, applications.

**BIO-MASS:** Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C.Engine operation and economic aspects, biomass resource development in India.

**UNIT-IV**

**GEOHERMAL ENERGY:** Structure of earth's interior- geothermal sites- earthquakes & volcanoes- geothermal resources- hot springs-steam ejection- principle of working- types of geothermal station with schematic representation site selection for geothermal power plants-problems associated with geothermal conversion-applications-geothermal energy prospects in India.

**OCEAN ENERGY:** OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

## **UNIT-V**

**DIRECT ENERGY CONVERSION:** Need for DEC, Carnot cycle, limitations, principles of DEC. Thermo-electric generators, seebeck, peltier and joule Thomson effects, Figure of merit, materials, applications, MHD generators, principles, dissociation and ionization, hall effect, magnetic flux, MHD accelerator, MHD Engine, power generation systems, electron gas dynamic conversion, economic aspects. Fuel cells, principles, faraday's law's, thermodynamic aspects, selection of fuels and operating conditions.

### **Text Books:**

1. Non-Conventional Energy Sources by G.D. Rai, Khanna Publihers, fourth edition, 2008

### **Reference Books:**

1. Suhas.P.Sukhatma and Nayak.J.K., "solar Eenergy", TMH, New Delhi, 3<sup>rd</sup> edition, 2008
2. D.P.Kothari and Rakesh Ranjan and K.C. Singal., " Renewable energy resources and emerging technologies"Prentice Hall of India Pvt.Ltd., 2<sup>nd</sup> Edition, 2011
3. Non-Conventional Energy Systems / K Mittal /Wheeler

### **Course Outcomes:**

At the end of the course, the student will be able to

- Apply the technology to capture the energy from the renewable sources like sun, wind, ocean, biomass, geothermal.
- use different renewable energy sources to produce electrical power
- Minimize the use of conventional energy sources to produce electrical energy
- Identify the fact that the conventional energy resources are depleted

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**(A96204) ENERGY STORAGE SYSTEMS  
(OPEN ELECTIVE)**

**III Year B.Tech. II-Sem**

**L T P C  
4 0 0 4**

**Course Objectives:**

- Introduce to the technology of energy storage systems
- Learn about the characteristics of electricity and need of ESS in various applications
- Learn about the various types and features of ESS
- Learn about the practical applications of ESS

**UNIT-I: ELECTRICAL ENERGY STORAGE TECHNOLOGIES**

Characteristics of electricity, Electricity and the roles of EES, High generation cost during peak-demand periods, Need for continuous and flexible supply, Long distance between generation and consumption, Congestion in power grids, Transmission by cable.

**UNIT-II: NEEDS FOR ELECTRICAL ENERGY STORAGE**

Emerging needs for EES, More renewable energy, less fossil fuel, Smart Grid uses. The roles of electrical energy storage technologies, The roles from the viewpoint of a utility, The roles from the viewpoint of consumers, The roles from the viewpoint of generators of renewable energy.

**UNIT-III: FEATURES OF ENERGY STORAGE SYSTEMS**

Classification of EES systems , Mechanical storage systems, Pumped hydro storage (PHS), Compressed air energy storage (CAES), Flywheel energy storage (FES), Electrochemical storage systems , Secondary batteries , Flow batteries, Chemical energy storage , Hydrogen (H<sub>2</sub>), Synthetic natural gas (SNG).

**UNIT-IV: TYPES OF ELECTRICAL ENERGY STORAGE SYSTEMS**

Electrical storage systems, Double-layer capacitors (DLC) , Superconducting magnetic energy storage (SMES), Thermal storage systems , Standards for EES, Technical comparison of EES technologies.

**UNIT-V: APPLICATIONS**

Present status of applications, Utility use (conventional power generation, grid operation & service) , Consumer use (uninterruptable power supply for large consumers), New trends in applications , Renewable energy generation, Smart Grid, Smart Micro grid, Smart House, Electric vehicles, Management and control hierarchy of storage systems, Internal configuration of battery storage systems, External connection of EES systems , Aggregating EES systems and distributed generation (Virtual Power Plant), Battery SCADA– aggregation of many dispersed batteries.

**Course Outcomes:**

- Apply the technology to have energy storage system for any electrical Loads
- To save the electrical power in peak time loads using ESS
- To store energy and to avoid the environmental pollution

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**(A96307) NANO TECHNOLOGY  
(OPEN ELECTIVE)**

**III Year B.Tech. II-Sem**

**L T P C  
4 0 0 4**

**Course Objectives:**

1. Understand the fundamentals of Nano theory, necessary background for applications in various industries.
2. Learn the components of Nano materials in detail, and its working in different applications
3. Understand the general scientific concepts required for technology, Apply the concepts in solving engineering problems,
4. Explain scientifically the new developments in engineering and technology, and Get familiarized with the concepts, theories, and technological applications.

**Unit-I:**

**Introduction to nanotechnology:** Importance of nanoscale, Nanostructure types, electronic, magnetic, optical Properties of Nanomaterials, top-down and bottom – up approach to nanostructures.

**Unit-II:**

**Quantum Mechanical phenomenon in nanostructures:** Quantum confinement of electrons in semiconductor Nano structures, one dimensional confinement (Quantum Wires), two dimensional confinements (Quantum Wells), three dimensional confinements (Quantum dots).

**Carbon Nano Structures:** Carbon nanotubes (CNTs), Fullerenes, C60, C80 and C240 Nanostructures, properties (mechanical, optical and electrical) and applications.

**Unit-III:**

**Fabrication of Nanomaterials:** Physical Methods: Inert gas condensation, Arc discharge, RF plasma, plasma arc technique, Ion sputtering, Laser ablation, Laser pyrolysis, Molecular beam epitaxy, Chemical vapour deposition method.

**Unit-IV:**

**Nano Scale characterization techniques:** Scanning probe techniques (AFM, MFM, STM, SEM, TEM), XRD.

**Nanodevices and Nanomedicine:** Lab on chip for bioanalysis, Core/shell Nanoparticles in drug delivery systems (site specific and targeted drug delivery), cancer treatment, and bone tissue treatment.

**Unit-V:**

**Nano and molecular electronics:** Resonant-Tunneling Structures, single electron tunneling, Single Electron transistors, coulomb blockade, giant magneto resistance, tunneling magneto resistance.

**Nanolithography and nanomanipulation:** e-beam lithography and SEM based nanolithography and nanomanipulation, Ion beam lithography, oxidation and metallization Mask and its application. Deep UV lithography, x-ray based lithography.

**Text Books:**

1. Charies.P.pode, introduction to nanotechnology, springer publications.
2. Springer Handbook of Nanotechnology-Bharat Bhusan.
3. Phani Kumar, principles of nanotechnology, scitech publications.

**References Books:**

1. David Ferry “Transport in Nano structures” Cambridge University press 2000.
2. Nanobiotechnology; ed, C.M.Niemeyer, C.A. Mirkin.
3. Nanofabrication towards biomedical application: Techniques, tools, Application and impact-Ed. Challa S., S.R.Kumar, J.H.Carola.
4. Encyclopedia of Nanotechnology-Hari Singh Nalwa
5. Carbon Nanotubes: Properties and Applications- Michael J.O’Connell.
6. S.Dutta “Electron Transport in Mesoscopic systems” Cambridge University press.
7. H.Grabert and M.Devoret “Single charge Tunneling” Plenum press 1992.

**Course Outcomes:**

The students will be able to

1. Understand the fundamentals of Nanotechnology
2. Know the different classes of nano materials
3. Impart basic knowledge on various synthesis and characterization techniques involved in Nanotechnology
4. Make the learner familiarize with nanotechnology potentialities.

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**(A96413) EMBEDDED SYSTEMS & MICRO PROCESSORS  
(OPEN ELECTIVE)**

**III Year B.Tech. II-Sem**

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**Course Objectives:**

- Ability to understand comprehensively the technologies and techniques underlying in building an embedded solution to a wearable, mobile and portable system.

**Unit I: Introduction to Embedded System**

Embedded system processor, hardware unit, soft ware embedded into a system, Example of an embedded system, Embedded Design life cycle, Embedded System modeling [flow graphs, FSM, Petri nets], Layers of Embedded Systems.

**Unit II: Processor and Memory Organization**

Bus Organization, Memory Devices and their Characteristics, Instruction Set Architecture [RISC, CISC], Basic Embedded Processor/Microcontroller Architecture [8051, ARM, DSP, PIC], memory system architecture [cache, virtual, MMU and address translation], DMA, Co-processors and Hardware Accelerators, pipelining.

**Unit III: I/O Devices and Networks**

I/O Devices[Timers, Counters, Interrupt Controllers, DMA Controllers, A/D and D/A Converters, Displays, Keyboards, Infrared devices], Memory Interfacing, I/O Device Interfacing [GPIO, FIREWIRE, USB, IRDA], Networks for Embedded systems (CAN, I2C, SPI, USB, RS485, RS 232), Wireless Applications [Bluetooth, Zigbee].

**Unit IV: Operating Systems**

Basic Features of an Operating System, Kernel Features [polled loop system, interrupt driven system, multi rate system], Processes and Threads, Context Switching, Scheduling[RMA, EDF, fault tolerant scheduling], Inter-process Communication, real Time memory management [process stack management, dynamic allocation], I/O[synchronous and asynchronous I/O, Interrupts Handling, Device drivers], RTOS [ VxWorks, RT-LINUX].

**Unit V: Shell Programming & Kernel Module Programming**

Processes – giving more than one command at a time – prioritizing and killing processes – Scheduling Commands – pipes and redirection – regular expression – pattern matching – Scripting using for while, if and other commands. Compiling kernel -Configuring Kernel and compilation, Bootloader and boot process and booting kernel, Kernel code browsers.-Static linking ,dynamic linking of modules-User space - kernel space concepts-System calls - Writing simple modules -Writing Makefiles for modules.

**Reference Books:**

1. Wayne Wolf “Computers as components: Principles of Embedded Computing System Design” The Morgan Kaufmann Series in Computer Architecture and Design, 2008.
2. Jane W. S., Liu, “Real time systems”, Pearson Education, 2000.
3. Raj Kamal, “Embedded systems Architecture, Programming and Design”, Second Edition, 2008.
4. Steve Heath, “Embedded Systems Design”, EDN Series, 2003.

**Course Outcome:**

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

- Define an embedded system and compare with general purpose system.
- Appreciate the methods adapted for the development of a typical embedded system.
- Get introduced to RTOS and related mechanisms.

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**(A96414) PRINCIPLES OF COMMUNICATION SYSTEMS  
(OPEN ELECTIVE)**

**III Year B.Tech. II-Sem**

**L T P C  
4 0 0 4**

**Course Objectives**

- To have understanding about different types of AM Communication systems (Transmitters & Receivers)
- To study in detail the different types of FM transmitters & Receivers and PM Transmitters and Receivers
- To gain knowledge about different digital modulation techniques for digital transmission.
- To have knowledge about base band transmission ISI and distortion free base band transmission
- To know the spread spectrum modulation techniques and different multiple access methods.

**Unit 1:**

**Introduction:** Communication Systems and types, modulation and multiplexing, Electromagnetic spectrum, Gain, Attenuation and decibels.

**Unit 2:**

**Simple description on Modulation:** Analog Modulation-AM, FM, Pulse Modulation-PAM, PWM, PCM, Digital Modulation Techniques-ASK, FSK, PSK, QPSK modulation and demodulation schemes.

**Unit 3:**

**Telecommunication Systems:** Telephones Telephone system, Paging systems, Telephony.  
**Networking and Local Area Networks:** Network fundamentals, LAN hardware, Ethernet LANs, Token Ring LAN.

**Unit 4:**

**Satellite Communication:** Satellite Orbits, satellite communication systems, satellite subsystems, Ground Stations Satellite Applications, Global Positioning systems.  
**Optical Communication:** Optical Principles, Optical Communication Systems, Fiber –Optic Cables, Optical Transmitters & Receivers, Wavelength Division Multiplexing.

**Unit 5:**

**Multiple Access Techniques:** FDMA, TDMA, CDMA, Packet Radio techniques-ALOHA, slotted ALOHA.  
**Cellular and Mobile Communications:** Cellular telephone systems, AMPS, GSM, CDMA, WCDMA.  
**Wireless Technologies:** Wireless LAN, PANs and Bluetooth, ZigBee and Mesh Wireless networks, Wimax and MANs, Infrared wireless, RFID communication, UWB.

**TEXT BOOKS:**

1. Principles of Electronic Communication Systems, Louis E. Frenzel, 3e, McGraw Hill publications, 2008.
2. Wayne Tomasi, Introduction to data communications and networking, Pearson Education, 2005.

**REFERENCE BOOKS:**

1. Tarmo Anttalainen, Introduction to Telecommunications Network Engineering, Artech House Telecommunications Library.
2. Theodore Rappaport, Wireless Communications-Principles and practice, Printice Hall, 2002.
3. Roger L. Freeman, Fundamentals of Telecommunications, 2e, Wiley publications.
4. Kennady, Davis, Electronic Communications systems, 4e, TMH, 1999.

**Course Outcomes:**

- Identify various elements, processes, and parameters in telecommunications systems, and describe their functions, effects, and interrelationship
- Design procedure of AM transmission and reception, analyze, measure and evaluate the performance of a telecommunication systems and gains given criteria.
- Understand basic components of digital communication systems.
- Design optimum receivers for digital modulation techniques
- Know about deferent error detecting and error correcting codes like block codes, cyclic codes and convolution codes.

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**(A96512) DATABASE MANAGEMENT SYSTEMS  
(OPEN ELECTIVE)**

**III Year B.Tech. II Semester**

**L T P C  
4 0 0 4**

**Course Objectives:**

This Course provides an emphasis on how to organize, maintain and retrieve information efficiently and effectively from a Database and it presents an introduction to database management systems (DBMS) and relational data model. Also the course introduces the concepts of transactions and transaction processing and the issues and techniques relating to concurrency and recovery in multi-user database environments

**UNIT-I**

Introduction - Database system Applications - Database System versus File Systems - View of Data- Instances and schema - Data Models - Database Languages -DDL-DML - Database Users and Administrator –Transaction Management - Database System Structure-Application Architectures – History of Database Systems.(**Chapter 1:-Refer Pg.No 1-21**)

**UNIT-II**

Database Design and ER model – Basic concepts - Entity sets and Relationship Sets – Constraints - Keys - Design Issues - Entity-Relationship Diagram- Weak Entity Sets - Extended E-R Features - Designing of an E-R Database Schema-Reduction of an E-R Schema to Tables.

(**Chapter 2:-Refer Pg.No 27-68**)

**UNIT – III**

Introduction to the Relational Model – Structure of Relational Databases - Relational Algebra –Relational Calculus – Domain relational Calculus , Tuple Relational Calculus - Integrity and Security –Domain Constraints ,Referential Integrity Constraints-Triggers-security and Authorization – SQL- Basic Structure, Set operations ,Aggregate Operations –Null values-Nested Sub queries – Views –Modification of Database- Joined relations ,Data Definition Language, Embedded SQL ,Dynamic SQL. (**Chapter 3:-Refer Pg.No 79-122,Chapter 6:-Refer Pg.No 222-248, Chapter 4:-Refer Pg.No 135-180**)

**UNIT – IV**

First Normal Form ,Pitfalls in Relational Database Design-Functional Dependencies–Decomposition – Desirable properties of Decomposition – Boyce-Codd Normal Form — Third Normal Form- Fourth Normal Form. Transactions-Transaction Concept- Transaction state- Implementation of atomicity and Durability- Concurrent Executions – Serializability, Recoverability-Implementation of Isolation (**Chapter 7:-Refer Pg.No 257-293,Chapter 15:-Refer Pg.No 565-584**)

**UNIT-V**

Concurrency Control-Lock Based Protocols, Timestamp Based Protocols, Validation Based Protocols, Multiple Granularity, Dead Lock Handling-Recovery System – Failure

Classification, Storage Structure , Recovery and Atomicity,Log Based recovery ,Shadow Paging, Recovery with concurrent transactions.

Storage and File Structure - File Organization – Organization of records in file - Data Dictionary Storage – Indexing and Hashing – Basic Concepts , Ordered Indices,B+Tree Index files, B- tree index files – Static Hashing – Dynamic Hashing – Comparison of Indexing and Hashing.

**Chapter 16:-Refer Pg.No 591-620,Chapter 17:-Refer Pg.No 639-660, Chapter 11:-Refer Pg.No 415-428, Chapter 12:-Refer Pg.No 445-480)**

### **Text Books.**

1. Database System Concepts, Silberschatz, Korth , Fourth Edition, McGraw hill (Chapters 1,2 excluding 2.10,3,4 excluding 4.8,4.14,6 excluding 6.6, 6.7,7 excluding 7.9, 7.10,11 excluding 11.1 to 11.5,12 excluding 12.8, 12.9, 15 excluding 15.8, 15.9, 16 excluding 16.5, 16.7, 17 excluding 17.7 to 17.10).

### **References Books :**

1. Fundamentals of Database Systems, Elmasri Navrate Pearson Education
2. Database Management Systems, Raghuramakrishnan, Johannes Gehrke, TATA Mc Graw Hill
3. Data base Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.

### **Course Outcomes:**

- A strong foundation in core Computer Science and Engineering, both theoretical and applied concepts.
- An ability to apply knowledge of mathematics, science, and engineering to real-world problems.
- Ability to model, understand, and develop complex software for system software as well as application software.
- An ability to communicate effectively, both in writing and oral.
- The broad education necessary to understand the impact of computer science and engineering solutions in the scientific, societal and human contexts
- A recognition of the need for, and an ability to engage in life-long learning
- A knowledge of contemporary issues.

### **Learning Outcomes:**

1. Ability to understand the fundamental concepts of database management.
2. Ability to design and query databases, as well as understand the internals of databases.
3. Ability to define basic functions of DBMS & RDBMS.
4. Ability to describe database development process and to apply the Relational Database Model to understand the Logical and Physical aspects of the DBMS architecture.
5. Ability to analyze database models & entity relationship models and to draw the E-R diagram for the given case study.
6. Ability to use Structured Query Language (SQL) with complex queries.

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**(A96513) JAVA PROGRAMMING  
(OPEN ELECTIVE)**

**II Year B. Tech CSE I SEM**

**L T P C  
4 0 0 4**

**Course Objectives:**

Modern Computerization methods have matured in the problem solving aspects and presently use the concepts of object oriented treatment of issues. Data sets are used with more functional aspects using the concept of classes and objects with a distinct programming methodology which has become predominant. Many other important software development techniques are based upon the fundamental ideas employed in object-oriented programming. The CSE students are already exposed to preliminaries using C++. Now this course introduces Java and OOPs programming at a higher platform.

**UNIT-I**

**OOP Concepts:** Data Abstraction, Encapsulation, Inheritance, Benefits of inheritance, Polymorphism, Classes and Objects, Procedural and Object oriented Programming paradigms.

**Java Programming:** History of Java, Comments, Data Types, Variables, Constants, Scope and Life Time of Variable, Operators, Operator Hierarchy, Expressions, Type Conversion and Casting, Enumerated Types, Control Flow-Block Scope, Conditional Statements, loops, break, continue statements, simple java stand alone programs, arrays, console input and output, formatting output, constructors, methods, parameter passing, static fields and methods, access control, this reference, overloading methods and Constructors, recursion, garbage collection, Nested Classes, Inner Classes.

(Text Book-1, Page Number:3-159)

**UNIT-II**

**Inheritance:** Inheritance hierarchies super and sub classes, Member access rules, super keyword, and method over riding, preventing Inheritance: final classes and methods, the Object class and its methods.

**Interfaces-** Interfaces vs. Abstract classes, defining an interface, implementing interfaces, accessing implementations through interface references, extending interface.

**Packages-** Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing Packages.

(Text Book-1, Page Numbers:161-205).

**UNIT-III**

**Exception Handling-** Dealing with Errors, benefits of Exception Handling, the classification of exceptions-exception Hierarchy, checked exceptions and unchecked exceptions, Usage of try, catch, throw, throws and finally, re-throwing exceptions, exception specification, built in exceptions, creating own exception sub classes.(TextBook-1: PageNumber:207-225)

**Files-** streams-byte streams, character streams, text Input/output, binary input/output random access file operations, File management using File class, exploring String Class.

**UNIT-IV**

**Collection Framework in Java-** Introduction to Java Collections, Overview of Java Collection Framework, Generics, Commonly used Collection classes-Array List, Vector,

Hash Table, Stack, Enumeration, Iterator, String Tokenizer, Random, Scanner, calendar and Properties.(TextBook-1 PageNumbers: 453-492).

**Multi Threading-** Differences between multiple processes and multiple threads, thread states, creating threads, interrupting threads, thread priorities, synchronizing threads, inter-thread communication, producer consumer pattern. (TextBook-1 PageNumbers: 227-249).

## UNIT-V

**GUI Programming with Java-** The AWT class Hierarchy, Introduction to Swing, Swing vs. AWT. 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.

**Applets:** Inheritance hierarchy for applets, differences between applets and applications, Life Cycle of an applet, passing parameters to applets, applet security issues. (TextBook-1 PageNumbers: 687-706).

### Text Books:

1. Java The Complete Reference, 8<sup>th</sup> Edition. Hebert Schildt. Indian edition.

### Reference Books:

1. Java for Programmers, P.J. Dietel and H.M 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, University Press.
3. Thinking in Java, Bruce Ecel, Pearson Education
4. Programming in Java, S. Malhotra and S. Choudary, Oxford Univ. Press.

### Course Outcomes (COs):

Following are the course outcomes that we attain:

- A strong foundation in core computer science and engineering, both theoretical and applied concepts.
- An ability to apply knowledge of mathematics, science, and engineering to real-world problems.
- Ability to model, understand, and develop complex software for system software as well as application software.
- An ability to function effectively within teams
- An ability to communicate effectively, both in writing and oral.
- The broad education necessary to understand the impact of computer science and engineering solutions in the scientific, societal and human contexts

### Learning Outcomes (LOs):

Upon successful completion of this course, students would be able to learn:

1. **Knowledge:** They can describe the principles of object-oriented programming, apply the concepts of data encapsulation, inheritance, and polymorphism to large-scale software and also acquire the concepts of Graphical User Interfaces.
2. **Professional Skill:** They can Design and develop object-oriented computer programs apart from that they can develop programs with Graphical User Interfaces capabilities.
3. **Transferable Skill:** They can formulate problems as steps so as to be solved systematically.
4. **Attitude:** They can integrate robustness, reusability, and portability into large-scale software development with team-work in mind.

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**(A96107) ELEMENTS OF EARTHQUAKE ENGINEERING  
(DEPARTMENTAL ELECTIVE-I)**

**III Year B.Tech. Civil Engg. II-Sem**

**L T P C  
4 1 0 4**

**Course Objectives**

**Student will be able to**

- Estimate the lateral loads and to design the structures for lateral and gravity load combinations.
- Learn Earthquake Engineering concept and Design philosophies.

**UNIT-I**

**Engineering Seismology:** Earthquake phenomenon cause of earthquakes-Faults- Plate tectonics- Seismic waves- Terms associated with earthquakes-Magnitude/Intensity of an earthquake-scales-Energy released-Earthquake measuring instruments-Seismoscope, Seismograph, accelerograph-strong ground motions- Seismic zones of India.

**Theory of Vibrations:** Elements of a vibratory system- Degrees of Freedom-Continuous system-Lumped mass idealization-Oscillatory motion-Simple Harmonic Motion-Free vibration of single degree of freedom (SDOF) system- undamped and damped-critical damping-Logarithmic decrement-Forced vibrations-Harmonic excitation-Dynamic magnification factor-Excitation by rigid based translation for SDOF system-Earthquake ground motion.

**UNIT-II**

**Conceptual design:** Introduction-Functional planning-Continuous load path-Overall form-simplicity and symmetry-elongated shapes-stiffness and strength-Horizontal and Vertical members-Twisting of buildings-Ductility-definition-ductility relationships-flexible buildings-framing systems-choice of construction materials-unconfined concrete-confined concrete-masonry-reinforcing steel.

**Introduction to earthquake resistant design:** Seismic design requirements-regular and irregular configurations-basic assumptions-design earthquake loads-basic load combinations-permissible stresses-seismic methods of analysis-factors in seismic analysis-equivalent lateral force method.

**UNIT-III**

**Reinforced Concrete Buildings:** Principles of earthquake resistant design of RC members-Structural models for frame buildings- Seismic methods of analysis- Seismic design methods-IS code based methods for seismic design- Seismic evaluation and retrofitting- Vertical irregularities- Plan configuration problems- Lateral load resisting systems- Determination of design lateral forces- Equivalent lateral force procedure- Lateral distribution of base shear.

#### **UNIT-IV**

**Masonry Buildings:** Introduction- Elastic properties of masonry assemblage- Categories of masonry buildings- Behaviour of unreinforced and reinforced masonry walls- Behaviour of walls- Box action and bands- Behaviour of infill walls- Improving seismic behaviour of masonry buildings- Load combinations and permissible stresses- Seismic design requirements- Lateral load analysis of masonry buildings.

#### **UNIT- V**

**Structural Walls and Non-Structural Elements:** Strategies in the location of structural walls- sectional shapes- variations in elevation- cantilever walls without openings – Failure mechanism of non-structures- Effects of non-structural elements on structural system- Analysis of non-structural elements- Prevention of non-structural damage- Isolation of non-structures. Ductility Considerations in Earthquake Resistant Design of RC Buildings: Introduction- Impact of Ductility- Requirements for Ductility- Assessment of Ductility- Factors affecting Ductility- Ductile detailing considerations as per IS 13920. Behaviour of beams, columns and joints in RC buildings during earthquakes-Vulnerability of open ground storey and short columns during earthquakes.

#### **Text Books:**

1. Earthquake Resistant Design of structures – S. K. Duggal, Oxford University Press
2. Earthquake Resistant Design of structures – Pankaj Agarwal and Manish Shrikhande, Prentice Hall of India Pvt. Ltd.

#### **References:**

1. Seismic Design of Reinforced Concrete and Masonry Building – T. Paulay and M.J.N. Priestly, John Wiley & Sons.
2. Earthquake Resistant Design of Building structures by Vinod Hosur, Wiley India Pvt. Ltd.
3. Elements of Mechanical Vibration by R.N.Iyengar, I.K.International Publishing House Pvt. Ltd.
4. Masonry and Timber structures including earthquake Resistant Design –Anand S.Arya, Nem chand & Bros
5. Earthquake Tips – Learning Earthquake Design and Construction  
C.V.R. Murthy

**Reference Codes:**

1. IS: 1893 (Part-1) -2002. “Criteria for Earthquake Resistant – Design of structures.” B.I.S., New Delhi.
2. IS:4326-1993, “ Earthquake Resistant Design and Construction of Building”, Code of Practice B.I.S., New Delhi.
3. IS:13920-1993, “ Ductile detailing of concrete structures subjected to seismic force” – Guidelines, B.I.S., New Delhi.

**Course Outcomes:**

**After completion of this course, student should be able to**  
Estimate the lateral loads on structures and design the structures for gravity and lateral load combinations.

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**(A96108) WATERSHED MANAGEMENT  
(DEPARTMENTAL ELECTIVE-I)**

**III B.Tech. Civil Engg. II Sem**

**L T P C  
4 1 0 4**

**Course Objectives:**

**Student will be able to**

- Develop an understanding of the processes and fluxes of mass and energy within a watershed and how land use changes potentially affect these processes.
- Learn how science-based management principles may be applied to watershed systems.
- Develop/improve critical problem solving, quantitative and data analysis skills commonly used by natural resource managers.
- Understand potential environmental effects of various land and water uses and how these resources can benefit from integrated watershed management.

**UNIT-I**

**INTRODUCTION:** Concept of watershed development, objectives of watershed development, need for watershed development in India, Integrated and multidisciplinary approach for watershed management.

**CHARACTERISTICS OF WATERSHED:** size, shape, physiography, slope, climate, drainage, land use, vegetation, geology and soils, hydrology and hydrogeology, socio-economic characteristics, basic data on watersheds.

Watershed delineation – Runoff Computations from a watershed – Flood Frequency Analysis – Gumbell, Log Pearson and Weibull Methods of Analysis.

**UNIT-II**

**PRINCIPLES OF EROSION:** Types of erosion, factors affecting erosion, effects of erosion on land fertility and land capability, estimation of soil loss due to erosion, Universal soil loss equation.

**MEASURES TO CONTROL EROSION:** Contour techniques, ploughing, furrowing, trenching, bunding, terracing, gully control, rockfill dams, brushwood dam, Gabion.

**UNIT-III**

**WATER HARVESTING:** Rainwater Harvesting, catchment harvesting, harvesting structures, soil moisture conservation, check dams, artificial recharge, farm ponds, percolation tanks.

**UNIT-IV**

**FOREST AND GRASS LAND MANAGEMENT:** Interpretation of Satellite Imageries-Land use and Land Cover. Land capability classification, management of forest, agricultural, grassland and wild land. Reclamation of saline and alkaline soils.

## **UNIT-V**

**ECOSYSTEM MANAGEMENT:** Role of Ecosystem, crop husbandry, soil enrichment, inter, mixed and strip cropping, cropping pattern, sustainable agriculture, bio-mass management, dry land agriculture, Silvi pasture, horticulture, social forestry and afforestation.

Planning of watershed management activities, peoples participation, preparation of action plan, administrative requirements- Reservoir Routing..

### **Text books:**

1. Watershed Management by JVS Murthy, - New Age International Publishers.
2. Soil and Water Conservation Practices by Suresh Rao, Standard Publishers, 1998
3. Water Resource Engineering by R.Awurbs and WP James, - Prentice Hall Publishers.

### **References:**

1. Land and Water Management by VVN Murthy, - Kalyani Publications.
2. Irrigation and Water Management by D.K.Majumdar, Printice Hall of India
3. Water Resources Conservation and Management by Chatterjee, S. N. Atlantic Publishers, 2008.

### **Course Outcomes:**

**After completion of this course, student should be able to**

- Comprehend the physical, biological and environmental aspects and their interrelations within a watershed; choose and apply available system tools for system intervention.
- Comprehend the participatory decision making processes; comprehend the interdependencies between natural resources and management at different locations in land and water management.
- Formulate a vision and design a sustainable watershed management plan that shows an integrated approach towards multiple use of land- and water resources and social equity and economic viability.
- Work in multidisciplinary and multicultural groups (with respect for different views, expertise and culture); reflect on own contribution to group work and on group processes.

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**(A96109) ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT  
(DEPARTMENTAL ELECTIVE-I)**

**III B.Tech. Civil Engg. II Sem**

**L T P C  
4 1 0 4**

**Course Objectives:**

**Student will be able to**

- Understand Environmental Impacts and assessment
- Understand the EIA methodology
- Understand about environmental audits

**UNIT – I**

Basic concept of EIA : Initial environmental Examination, Elements of EIA, - factors affecting E-I-A Impact evaluation and analysis, preparation of Environmental Base map, Classification of environmental parameters.

E I A Methodologies: introduction, Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method, overlay methods, cost/benefit Analysis.

**UNIT-II**

Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation – Causes and effects of deforestation.

**UNIT-III**

Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures.

**UNIT – IV**

Environmental Audit & Environmental legislation objectives of Environmental Audit, Types of environmental Audit, Audit protocol, stages of Environmental Audit, onsite activities, evaluation of Audit data and preparation of Audit report, Post Audit activities.

**UNIT - V**

The Environmental Protection Act, The water Act, The Air (Prevention & Control of pollution Act.), Motor Act, Wild life Act. Case studies and preparation of Environmental Impact assessment statement for various Industries.

**Text Books:**

1. Environmental Impact Assessment Methodologies by Y. Anjaneyulu, Valli Manickam, CRC Press, 2011.
2. Larry Canter – Environmental Impact Assessment, McGraw-Hill Publications
3. Barthwal, R. R. B. – Environmental Impact Assessment, New Age International Publications

**References:**

1. Glynn, J. and Gary, W. H. K. - Environmental Science and Engineering, Prentice Hall Publishers
2. Suresh K. Dhaneja - Environmental Science and Engineering, S.K.,Katania & Sons Publication., New Delhi.
3. Bhatia, H. S. - Environmental Pollution and Control, Galgotia Publication(P) Ltd, Delhi.
4. Wathern, P. – Environmental Impact Assessment: Theory & Practice, Publishers-Routledge, London, 1992.

**Course Outcomes:****After completion of this course, student should be able to**

- Acquire the knowledge of Environmental examination
- Understand environmental clearances and guidelines
- Understands to prepare an audit report
- Understands environment laws and regulations

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**(A96110) TRANSPORTATION ENGINEERING LAB**

**III Year B.Tech. Civil Engg. II-Sem**

**L T P C**  
**0 0 3 2**

**Course Objectives:**

**Student will be able to**

- Learn pavement management systems at Network level and project level.
- Learn Functional and Structural Evaluation of pavement.
- Learn Alternate design strategies of pavement and Economic Evaluation.

**I. ROAD AGGREGATES:**

1. Aggregate Crushing value
2. Aggregate Impact Test.
3. Specific Gravity and Water Absorption.
4. Abrasion Test
5. Attrition Test
6. Flakiness and elongation Indices of coarse Aggregates.

**II. BITUMINOUS MATERIALS:**

1. Penetration Test
2. Ductility Test
3. Softening Point Test
4. Flash and fire point tests

**Text Book:**

1. Laboratory Manual in Highway Engineering by Ajay K.Duggal and Vijay P. Puri - Newage Publishers.
2. Highway Material Testing by Khanna S.K., Justo C.E.G, NemChand & Bros.
3. Principles and practice of Highway Engineering, L.R Kadiyali & N.B.Lal, Khanna, 2007.
4. Traffic Engineering and Transportation planning, L.R Kadiyali, Khanna publications, 2007.

**Course Outcomes:**

**After completion of this course, student should be able to**

- Identify the aggregate used and quality and design sizes of each layers used for construction of pavement.
- Identify and select the various Design strategies of pavement using Lab Equipment.
- Evaluate the pavement condition using Functional and Structural Evaluation pavement.

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**(A96111) GEOTECHNICAL ENGINEERING LAB**

**III Year B.Tech. Civil Engg. II-Sem**

**L T P C**  
**0 0 3 2**

**Course Objectives:**

**Student will be able to**

- Introduce traditional program consisting mostly of practical courses related to geotechnical engineering.
- Apply the knowledge of science, mathematics and engineering with the context of applications in geotechnical engineering.
- Design and conduct experiments, analyze and interpret data related to the various laboratory tests studied in geotechnical engineering.

**List of Experiments**

1. Atterberg Limits (Liquid Limit, Plastic Limit)
2. a) Field density by core cutter method and  
b) Field density by sand replacement method
3. Determination of Specific gravity of soil.
4. Grain size distribution by sieve analysis
5. Permeability of soil by constant and variable head test methods
6. Standard Proctor's Compaction Test
7. California Bearing Ratio Test (CBR Test)
8. Determination of Coefficient of consolidation
9. Unconfined compression test
10. Direct shear test
11. Vane shear test
12. Tri-axial compression test

*Note: Any eight experiments may be completed.*

**Reference Book**

Measurement of Engineering Properties of Soils by. E. Saibaba Reddy & K. Rama Sastri, New Age International.

**Course Outcomes:**

**After completion of this course, student should be able to**

- Use the techniques, skills, and modern engineering tools necessary for engineering practice.
- Develop an opportunity to work in groups
- Identify, formulate and practice the various soil identification and classification tests.

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**VAAGDEVI COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**IV B.Tech. Civil Engg. I Sem**

**L T P C  
4 1 0 4**

**(A97101) GEOTECHNICAL ENGINEERING-II**

**Course Objectives**

**Student will be able to**

- Create an ability to apply knowledge of geotechnical engineering.
- Understand basic principles of soil mechanics and its application to solve problems related to geotechnical engineering.
- Improve the basic understanding of the index and engineering properties of soils

**UNIT – I**

**SOIL EXPLORATION:** Need – methods of soil exploration – boring and sampling methods – penetration tests – plate load test – pressure meter – planning of soil exploration programme and preparation of soil investigation report.

**UNIT – II**

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

**UNIT – III**

**EARTH PRESSURE THEORIES:** Rankine's theory of earth pressure – earth pressures in layered soils – Coulomb's earth pressure theory – Culmann's graphical method.

**RETAINING WALLS:** Types of retaining walls – stability of retaining walls against overturning, sliding, bearing capacity and drainage from backfill, introduction to reinforced earth walls.

**UNIT –IV**

**SHALLOW FOUNDATIONS** - Types - choice of foundation – location and depth - safe bearing capacity – shear criteria – Terzaghi's, Meyerhof's, Skempton's and IS code methods settlement criteria – allowable bearing pressure based on SPT N value and plate load test – computation of immediate and consolidation settlement – allowable settlements of structures – presumptive bearing capacities from national building code.

**UNIT -V**

**PILE FOUNDATION:** Types of piles – load carrying capacity of piles based on static pile formulae – dynamic pile formulae – pile load tests - load carrying capacity of pile groups in

sands and clays – Settlement of pile groups – negative skin friction - introduction to laterally loaded piles.

**WELL FOUNDATIONS:** Types – different shapes of wells – forces on 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, New Delhi
2. Principals of Geotechnical Engineering by Braja M.Das, Cengage Learning Publishers.
3. Soil Mechanics and Foundation Engineering by VNS Murthy, CBS Publishers and Distributors.

**References:**

1. Geotechnical Engineering Principles and Practices by Cuduto, PHI International.
2. Analysis and Design of Substructures – Swami Saran, Oxford and IBH Publishing company Pvt Ltd ( 1998 ).
3. Geotechnical Engineering by S. K.Gulhati & Manoj Datta – Tata Mc.Graw Hill Publishing company New Delhi. 2005.
4. . Bowles, J.E., (1988) Foundation Analysis and Design – 4th Edition, McGraw-Hill Publishing company, Newyork.

**Course Objectives**

**After completion of this course, student should be able to**

- Identify, formulate and solve geotechnical engineering problems.
- Improve techniques, skills, and modern engineering tools necessary for understanding in geotechnical engineering practice.
- Acquire complete awareness of the classical concept of soil mechanics and its necessity

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**VAAGDEVI COLLEGE OF ENGINEERING  
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**IV B.Tech. Civil Engg. I Sem**

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**(A97102) IRRIGATION ENGINEERING**

**Course Objectives:**

**Student will be able to**

- Know the concepts of providing conveyance of water to the agricultural fields.
- Know the application of water to agricultural fields.
- Know the drainage and relieving the water logging.

**UNIT-I**

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 Rotation, 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-II**

Classification of canals, Design of Irrigation canals 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 formulae etc.

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-III**

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.

Earth dams: 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.

Spillways: types of spillways, Design principles of Ogee spillways - Spillway gates.

Energy Dissipaters and Stilling Basins Significance of Jump Height Curve and Tail Water Rating Curve - USBR and Indian 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 permeable foundations, -Silt Ejectors and Silt Excluders

Weirs on Permeable Foundations – Creep Theories - Bligh's, Lane's and Khosla's theories, Determination of uplift pressure- Various Correction Factors – Design principles 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,

#### **Text books:**

1. Irrigation engineering and hydraulic structures by S.K Garg, Khanna publishers.
2. Irrigation and water power engineering by Punmia & Lal, Laxmi publications pvt. Ltd., New Delhi

#### **References:**

1. Irrigation and water resources engineering by G.L. Asawa, New Age International Publishers
2. Theory and Design of Hydraulic structures by Varshney, Gupta & Gupta
3. Irrigation Water Resources Engineering by Arora K.L., Standard Book Publishing Co., Delhi, 1996.
4. Irrigation Engineering by R.K. Sharma and T.K. Sharma, S. Chand Publishers
5. Introduction to hydrology by Warren Viessvann, Jr, Garyl. Lewis, PHI

#### **Course Outcomes**

- At the end of the course, the student will understand the need and mode of irrigation and also knows the irrigation management practices of the past, present and future. The student will be able to handle and plan any type of irrigation project.

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**(A97103) ENVIRONMENTAL ENGINEERING**

**Course Objectives:**

**Student will be able to**

- Develop an understanding of sources of water and water supply
- Develop an understanding of water treatment process
- Develop an understanding of Distribution of water
- Develop an understanding of air pollution concepts

**UNIT – I**

Introduction : Waterborne diseases – protected water supply – Population forecasts, design period – types of water demand – factors affecting – fluctuations – fire demand – water quality and testing – drinking water standards: sources of water - Comparison from quality and quantity and other considerations – intakes – infiltration galleries .

**UNIT II**

Layout and general outline of water treatment units – sedimentation – principles – design factors – 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 – theory of chlorination, chlorine demand - other disinfection practices- Miscellaneous treatment methods.

**UNIT-III**

Distribution systems requirement –method and layouts -Design procedures- Hardy Cross and equivalent pipe methods pipe – joints, valves such as sluice valves, air valves, scour valves and check valves water meters – laying and testing of pipe lines – pump house - Conservancy and water carriage systems – sewage and storm water estimation – time of concentration – storm water overflows combined flow

**UNIT - IV**

characteristics of sewage – cycles of decay – decomposition of sewage, examination of sewage – B.O.D.Equation – C.O.D. Design of sewers – shapes and materials – sewer appurtenances manholes – inverted siphon – catch basins – flushing tanks – ejectors, pumps and pumphouses – house drainage – components requirements – sanitary fittings-traps – one pipe and two pipe systems of plumbing – ultimate disposal of sewage – sewage farming – dilution.

## **UNIT – V**

Waste water treatment plant – Flow diagram - primary treatment Design of screens – grit chambers – skimming tanks – sedimentation tanks – principles of design – Biological treatment – trickling filters – standard and high rate – Construction and design of oxidation ponds. Sludge digestion – factors effecting – design of Digestion tank – Sludge disposal by drying – septic tanks working principles and design – soak pits.

### **TEXT BOOKS :**

1. Water supply and sanitary Engineering by G.S. Birdi, Dhanpat Rai & Sons Publishers.
2. Water Supply & Environmental Engineering by A.K. Chatterjee.
3. Water and Waste Water Technology by Mark J Hammar and Mark J.Hammar Jr.

### **REFERENCE BOOK :**

1. Water and Waste Water Technology by Steel
2. Water and Waste Water Engineering by Fair Geyer and Okun
3. Text book of Environmental Engineering by P. Venugopal Rao (PHI)
4. Waste water Engineering by Metcalf and Eddy.
5. Unit operations in Environmental Engineering by R. Elangovan and M.K. Sasutharam (Newage)

### **Course Outcomes:**

**After completion of this course, student should be able to**

- Acquire the knowledge of the water borne diseases
- Acquire the knowledge of sources of water
- Develop skills in designing the water treatment plant.
- Develop skills in control of Air pollution

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**(A97104) PRESTRESSED CONCRETE  
(DEPARTMENT ELECTIVE-II)**

**Course Objectives:**

**Student will be able to**

- Develop an understanding of the necessity of prestressed concrete structures.
- Develop an understanding of various techniques of prestressing.
- Develop an understanding of various losses of prestress.
- Develop an understanding of the analysis 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.

**UNIT II:**

**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.**Losses of Prestress:** Loss of prestress in pretensioned and posttensioned 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 slabs and 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- IS 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 in post tensioned members – stress distribution in End block – Analysis by



Guyon, Magnel, Zienlinski and Rowe's methods – Anchorage zone reinforcement- IS 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 influencing deflections – Short term deflections of uncracked beams- prediction of long time deflections- IS code requirements.

### **TEXT BOOKS :**

1. Prestressed concrete by Krishna Raju, Tata Mc Graw Hill Book – Co. New Delhi.
2. Design of prestress concrete structures by T.Y. Lin and Burn, John Wiley, New York.
3. Prestressed concrete by S. Ramamrutham Dhanpat Rai & Sons, Delhi.
4. Prestressed Concrete by N. Rajagopalan Narosa Publishing House

### **Course Outcomes:**

**After completion of this course, student should be able to**

- Acquire the knowledge of evolution of process of prestressing.
- Acquire the knowledge of various prestressing techniques.
- Develop skills in analysis of prestressed concrete beams and slabs.
- Develop skills to satisfy the serviceability and strength provisions of the Indian Standards (IS: 1343-2012).

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**(A97105) TRANSPORTATION ENGINEERING  
(DEPARTMENTAL ELECTIVE-II)**

**Course Objectives**

**Student will be able to**

- Know about railway planning and design
- Study railway track construction maintenance and operation
- Study different modes of transport
- Know about the fundamentals of airways
- Know about the fundamentals of port and harbor
- Know the different components of harbor

**UNIT – I**

**INTRODUCTION TO RAILWAY**

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 Crossing, Rail Joints & Welding of Joints, Railway station& Yards, Signalizing & interlocking.

**UNIT – III**

**AIRPORT ENGINEERING:**

Airport Site selection – Runway Orientation – Basic Runway Length – Corrections for Elevation, Temperature – Airport Classification - Runway Geometric design – Factors Controlling Taxiway Layout - Terminal Area – Apron – Hangar – Blast Considerations, Typical Airport Layouts – Wind rose diagram - Runway Lightening system & Marking.

**UNIT – IV**

**PORT AND HARBOUR ENGINEERING:**

Requirements of Port and Harbour, Classification of Port & Harbour, Features of a Harbour, Planning of Harbour, Breakwaters, Dry docks, Jetties, Aprons, Transit shed and Warehouses, Navigational aids, Maintenance of Port and Harbours, Inland Water Transport

## **UNIT –V**

### **INTELLIGENT TRANSPORT SYSTEMS:**

ITS Definition, Benefits of ITS, user services, Detectors, Automatic Vehicle Location (AVL), Automatic Vehicle Identification (AVI), Introduction to ITS applications; Advanced Traffic Management systems (ATMS), Advanced Public Transportation systems (APTS), ITS architecture components and standards, Overview of ITS implementations in developed countries.

#### **Text books:**

1. Satish Chandra and Agarwal, M.M. (2007) “Railway Engineering” Oxford Higher Education, University Press New Delhi.
2. Airport Planning and Design- S.K. Khanna and M.G Arora, Nemchand Bros.
3. A Text book of Transportation Engineering – S.P.Chandola – S.Chand & Co. Ltd. – (2001).
4. Transportation Engineering and Planning – C.S. Papacostas, P.D.Prevedouros

#### **References:**

1. A Text Book of Railway Engineering-S.C.Saxena and S.Arora, Dhanpatrai and Sons, New Delhi.
2. Highway, railway, Airport and Harbour Engineering – K.P. Subramanian
3. Harbour, Dock and Tunnel Engineering – R. Srinivasan
4. Dock and Harbour Engineering – Hasmukh P Oza, Gutam H Oza

#### **Course Objectives**

##### **After completion of this course, student should be able to**

- Explain the role of transportation systems play in the development of communities.
- Discuss, in general terms, the major issues and challenges facing road, rail, ship and air transportation in the 21<sup>st</sup> century.

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**(A97106) SOLID WASTE MANAGEMENT  
(DEPARTMENTAL ELECTIVE-II)**

**Course Objectives:**

**Student will be able to**

- Develop an understanding the necessity of solid waste management
- Develop an understanding of the collection of solid waste
- Develop an understanding of solid waste disposal methods
- Develop an understanding of bio medical waste management
- Develop an understanding of e-waste management

**UNIT – I Introduction**

Solid Waste problem, Meaning and definition of solid waste, concept and classification of municipal solid waste, Impacts of solid waste on environment, Solid waste management rules and regulations.

**UNIT – II**

**Collection and Transfer of Municipal Solid Waste**

Developing a solid waste collection and transfer system characterizing waste generation, determining public and private collection/transfer options.

**UNIT – III**

**Solid Waste management techniques**

Solid waste management Hierarchy, waste avoidance /waste prevention, Definition of source Reduction, waste reduction at source using 5R's Technique.

**UNIT – IV**

**Waste Disposal Techniques**

Introduction, composting, principles of composting, factors affecting composting, vermi composting, waste to energy techniques, Landfill technique, and design and operating procedure of landfill.

**UNIT – V**

**Solid waste management of Biomedical Waste, plastic and E- Waste**

Biomedical Waste – Sources and generation, biomedical waste management. Plastic– Dangers of plastic wastes, Recycling and disposal of plastic wastes. E-Wastes – Definition, Health hazards, E-Waste management and conclusion.

## **TEXT BOOKS**

1. Solid waste management by K. Sasi Kumar & S. Gopi Krishna
2. Integrated Solid Waste Management, Tchobanoglous, Theissen & Vigil. McGraw Hill Publication

## **Course Outcomes:**

**After completion of this course, students should be able to**

- Acquire the knowledge of solid waste management
- Acquire the knowledge of solid waste disposal techniques
- Acquire the knowledge of Bio medical waste disposal techniques
- Acquire the knowledge of e- waste disposal techniques

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**IV Year B.Tech. Civil Engg. I-Sem**

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**(A97107) FINITE ELEMENT METHODS  
(DEPARTMENT ELECTIVE-III)**

**Course objectives**

**Student will be able to**

- Understand the general steps of finite element methods.
- Understand the basic finite element formulation techniques.
- Equip with the Finite Element Analysis fundamentals.
- Perform engineering simulations

**UNIT I**

**Introduction:** Concepts of FEM - steps involved - merits and demerits - energy principles – discrimination - Raleigh - Ritz method of functional approximation.

**Principles of Elasticity:** Stress equations - strain displacement relationships in matrix form plane stress, plane strain and axi-symmetric bodies of revolution with axi-symmetric loading.

**UNIT II**

**One dimensional FEM:** Stiffness matrix for beam and bar elements - shape functions for 1D elements.

**UNIT III**

**Two dimensional FEM:** Different types of elements for plane stress and plane strain analysis - displacement models - generalized coordinates - shape functions - convergent and compatibility requirements - geometric invariance - natural coordinate system - area and volume coordinates - generation of element stiffness and nodal load matrices

**UNIT IV**

**Isoparametric formulation:** Concept - different isoparametric elements for 2D analysis - formulation of 4-noded and 8-noded isoparametric quadrilateral elements - Lagrange elements - serendipity elements.

**UNIT V**

**Axi Symmetric Analysis:** bodies of revolution - axi symmetric modeling - strain displacement relationship - formulation of axi symmetric elements. Three dimensional FEM: Different 3-D elements-strain-displacement relationship – formulation of hexahedral and isoparametric solid element.

**TEXT BOOK:**

1. A first course in Finite Element Method by Daryl L. Logan, 5<sup>th</sup> Edition, Cengage Learning India Pvt. Ltd.
2. Introduction to Finite Elements in Engineering by Tirupathi R. Chandrupatla, and Ashok D. Belegundu, Prentice Hall of India

**REFERENCES:**

1. Finite Element Analysis by P.Seshu, PHI Learning Private Limited
2. Concepts and applications of Finite Element Analysis by Robert D. Cook David S. Malkus, Michael E. Plesha, Robert J. Witt, Wiley India Pvt. Ltd.
3. Applied Finite Element Analysis by G.Ramamurty, I.K.International Publishing House Pvt. Ltd.

**Course Outcomes:**

**After completion of this course, student should be able to**

- Solve multi-disciplinary problems
- Derive equations in finite element methods for 1D and 2D problems.
- Formulate and solve basic problems in structural mechanics using different elements.
- Apply knowledge of mathematics and Engineering

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**(A97108) PAVEMENT DESIGN  
(DEPARTMENTAL ELECTIVE-III)**

**Course objectives**

**Student will be able to**

- Understand the basic modelling concepts used to analyze flexible and rigid pavements.
- Appreciate pavement management concepts to better manage road pavement.
- Apply the various types of highway appurtenance to enhance the safety of motorists.
- Learn to estimate traffic noise and the effect of noise attenuation measures.

**UNIT – I**

**Factors Affecting Pavement Design:** Variables Considered in Pavement Design, Types of Pavements, Functions of Individual Layers, Classification of Axle Types of Rigid Chassis and Articulated Commercial Vehicles, Legal Axle and Gross Weights on Single and Multiple Units, Tire Pressure, Contact Pressure, EAL and ESWL Concepts, Traffic Analysis: ADT, AADT, Truck Factor, Growth Factor, Lane, Directional Distributions & Vehicle Damage Factors, Effect of Transient & Moving Loads.

**UNIT – II**

**Stresses In Pavements:** Vehicle-Pavement Interaction: Transient, Random & Damping Vibrations, Steady State of Vibration, Experiments on Vibration, Stress Inducing Factors in Flexible and Rigid pavements. **Stresses In Flexible Pavements:** Visco-Elastic Theory and Assumptions, Layered Systems Concepts, Stress Solutions for One, Two and Three Layered Systems, Fundamental Design Concepts. **Stresses In Rigid Pavements:** Westergaard's Theory and Assumptions, Stresses due to Curling, Stresses and Deflections due to Loading, Frictional Stresses, Stresses in Dowel Bars & Tie Bars

**UNIT – III**

**Material Characteristics:** CBR and Modulus of Subgrade Reaction of Soil, Mineral aggregates – Blending of aggregates, binders, polymer and rubber modified bitumen, Resilient, Diametral Resilient and Complex (Dynamic) Moduli of Bituminous Mixes, Permanent Deformation Parameters and other Properties, Effects and Methods of Stabilisation and Use of Geo Synthetics.



#### **UNIT - IV**

**Design Of Flexible Pavements:** Flexible Pavement Design Concepts, Asphalt Institute's Methods with HMA and other Base Combinations, AASHTO, IRC Methods

**Design Of Rigid Pavements:** Calibrated Mechanistic Design Process, PCA, AASHTO & IRC Specifications, Introduction to Prestressed and Continuously Reinforced Cement Concrete Pavement Design.

#### **UNIT – V**

**Design of Pavement for Low Volume Roads:** Pavement design for low volume roads, Rural road designs – code of practice. **Design of Overlays:** Types of Overlays, Suitability, Design of overlays.

#### **Text Books:**

1. Concrete Pavements, AF Stock, Elsevier, Applied Science Publishers
2. Pavement Analysis & Design, Yang H. Huang, Prentice Hall Inc

#### **References:**

1. Design of Functional Pavements, Nai C. Yang, McGraw Hill Publications
2. Principles of Pavement Design, Yoder.J. & Witzorac Mathew, W. John Wiley & Sons Inc
3. Pavement and Surfacing for Highway & Airports, Micheal Sargious, Applied Science Publishers Limited.
4. IRC Codes for Flexible and Rigid Pavements design

#### **Course Outcomes:**

**After completion of this course, student should be able to**

- Design flexible and rigid pavements
- Propose a pavement management system framework
- Design highway appurtenance and highway drainage
- Design mitigation measures to attenuate traffic noise

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**(A97109) GROUND IMPROVEMENT TECHNIQUES  
(DEPARTMENTAL ELECTIVE-III)**

**Course Objectives:**

**Student will be able to**

- Learn and understand various ground improvement technique.
- Learn various methods of compaction for ground improvement in its strength.
- Learn various physical and chemical modification for ground improvement

**Unit. I**

**Introduction to Engineering Ground Modification:** Need and objectives, Identification of soil types, In situ and laboratory tests to characterise problematic soils; Mechanical, Hydraulic, Physico-chemical, Electrical, Thermal methods, etc. and their applications.

**Unit. II**

**Mechanical Modification** – Principles of soil densification – Properties of Compacted soil, Compaction control tests, Specification of compaction requirements, 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, Filtration, Drainage and seepage control with Geosynthetics, Preloading and vertical drains, Electro-kinetic dewatering.

**Unit. IV**

**Physical and Chemical Modification** – Modification by admixtures, Shotcreting and Guniting 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 with strip, bar, mesh, sheet and grid reinforced soil. In-situ ground reinforcement, ground anchors, rock bolting and soil nailing.

**Text Books:**

1. Hausmann, M. R. (1990) – Engineering Principles of Ground Modifications, McGraw Hill publications
2. Mosley – Ground Improvement

**References:**

1. Koerner, R. M (1994) – Designing with Geosynthetics – 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

**Course Outcomes:****After completion of this course, student should be able to**

- Select the ground improvement technique which is suitable and economical for soil strengthening.
- Select different techniques based on the various types of soils in-situ.
- Design reinforced earth structures.

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**IV Year B.Tech. Civil Engg. I-Sem**

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**(A97110) ENVIRONMENTAL ENGINEERING LAB**

**Course Objectives**

**Student will be able to**

- Understands the test to determine  $p^H$  and conductivity of water
- Understand procedures to test water and waste water
- Understand procedures to determine BOD and COD of water
- Understands the procedure to find chloride content in water

**LIST OF EXPERIMENTS**

1. Determination of pH
2. Determination of Turbidity
3. Determination of Conductivity
4. Determination of Acidity.
5. Determination of iron.
6. Determination of Dissolved Oxygen.
7. Determination of Nitrates.
8. Determination of Chlorine demand
9. Determination of total Phosphorous.
10. Determination of B.O.D
11. Determination of C.O.D

**Course Outcomes**

**After completion of this course, student should be able to**

- Test water and waste water samples to determine  $p^H$  and conductivity
- Determine BOD and COD of water
- Determine chloride content in water

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**IV Year B.Tech. Civil Engg. I-Sem**

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**(A97111) STRUCTURAL DRAFTING LAB**

**Course Objectives**

**Student will be able to**

- Analyze the detailing of reinforcement to be provided in beams
- Analyze the detailing of reinforcement to be provided in columns and footings
- Draw the steel compression, tension members and Irrigation structures.
- Draft the steel girders.

**LIST OF EXERCISES**

1. Drawing plan of RCC building with foundations details – design & detail estimate
2. Detailing of reinforcement in RC isolated footings - square, rectangular, circular and combined footings on different types of soils
3. Detailing of reinforcement in square, rectangular, tied and spirally reinforced columns
4. Detailing of reinforcement in Cantilever, Simply supported and Continuous Beams (Both Singly & Doubly Reinforced Beams)
5. Detailing of reinforcement in RC one way, two way slab and dog legged stair case.
6. Drawing of Irrigation structures
7. Drawing of Steel bolted and welded connections.
8. Drawing of steel compression and tension members.
9. Drafting of steel beams-built-up sections.
10. Drafting of steel plate girder

**Course Outcomes**

**After completion of this course, student should be able to**

- Draw, Estimate and show the detailing of reinforcement in beams, columns, footings and slabs.
- Draw the Irrigation structures
- Draft the steel structures.

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**(A97112) SEMINAR**

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**(A97113) INDUSTRY ORIENTED MINI PROJECT**

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**IV Year B.Tech. Civil Engg. II-Sem**

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**(A98101) RS & GIS  
(DEPARTMENTAL ELECTIVE-IV)**

**Course Objectives**

**Student will be able to**

- Understand the concepts of remote sensing which serves the purpose of accurate mapping of all features under different spatial and temporal scales of all kinds of terrain and land under water bodies.
- Understand the concepts of remote sensing its advantageous comparatively to traditional surveying techniques in terms of time, accuracy and output.
- Understand the concepts of GIS its software which can be used for collecting, storing and analyzing of data which is useful for real world applications.

**UNIT – I**

Introduction to Photogrammetry: Principle and types of aerial photographs, stereoscopy, Map Vs Mosaic, ground control, Parallax measurements for height, determinations.

Remote Sensing – I: Basic concepts and foundation of remote sensing – elements involved in remote sensing, electromagnetic spectrum, remote sensing terminology and units.

**UNIT - II**

Remote Sensing – II: Energy resources, energy interactions with earth surface features and atmosphere, resolution, sensors and satellite visual interpretation techniques, basic elements, converging evidence, interpretation for terrain evaluation, spectral properties of water bodies, introduction to digital data analysis.

**UNIT – III**

Geographic Information System: Introduction, GIS definition and terminology, GIS categories, components of GIS, fundamental operations of GIS, A theoretical framework for GIS.

Types of data representation: Data collection and input overview, data input and output. Keyboard entry and coordinate geometry procedure, manual digitizing and scanning, Raster GIS, Vector GIS – File management, Spatial data – Layer based GIS, Feature based GIS mapping.

#### **UNIT – IV**

GIS Spatial Analysis: Computational Analysis Methods (CAM), Visual Analysis Methods (VAM), Data storage-vector data storage, attribute data storage, overview of the data manipulation and analysis. Integrated analysis of the spatial and attribute data.

#### **UNIT – V**

Water Resources Applications-I: Land use/Land cover in water resources, Surface water mapping and inventory, Rainfall – Runoff relations and runoff potential indices of watersheds, Flood and Drought impact assessment and monitoring, Watershed management for sustainable development and Watershed characteristics.

Water Resources Applications – II: Reservoir sedimentation, Fluvial Geomorphology, water resources management and monitoring, Ground Water Targeting, Identification of sites for artificial Recharge structures, Drainage Morphometry, Inland water quality survey and management, water depth estimation and bathymetry.

#### **TEXT BOOKS:**

1. Remote Sensing and Image Interpretation, 6th Edition by Thomas Lillesand, Ralph W. Kiefer, Jonathan Chipman, Wiley
2. Remote Sensing and its applications by LRA Narayana University Press 1999.
3. Principals of Geo physical Information Systems – Peter A Burrough and Rachael A. Mc Donnell, Oxford Publishers 2004.

#### **REFERENCES:**

1. Concepts & Techniques of GIS by C.P.Lo Albert, K.W. Yongg, Prentice Hall (India) Publications.
2. GIS by Kang – tsung chang, TMH Publications & Co.,
3. Basics of Remote sensing & GIS by S.Kumar, Laxmi Publications.
4. Fundamental of GIS by Mechanical designs John Wiley & Sons.

#### **Course Outcomes:**

##### **After completion of this course, student should be able to**

- Acquire thorough knowledge to choose the remote sensing image from different sensors, resolutions, spatial and temporal scales.
- Understand remote sensing which gives the provision of understanding and to comprehend large tracks of earth surface with less time and cost but more accuracy.
- Communicate to the common man his analysis of different problems, developments, benefits by preparing different thematic maps.

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**(A98102) EARTH AND ROCKFILL DAMS  
(DEPARTMENTAL ELECTIVE-IV)**

**Course Objectives:**

**Student will be able to**

- Identify, formulate, and solve soil stability related problems.
- Develop an understanding of professional responsibility.
- Understand the impact of engineering solutions in economic and environmental context.

**UNIT-I**

**Earth and Rockfill Dams:** General features, Selection of site; Merits and demerits of the earth and rock fill dams, Classification of earth dams, Materials of construction and requirements, Causes of failure, Safe design criteria. Instrumentation in earth dams: Pore pressure measurements, Settlement gauges, Inclinometers, Stress measurements, seismic measurements.

**UNIT-II**

**Failures, Damages and Protection of Earth Dams:** Nature and importance of failure, Piping through embankment and foundations, Methods of seepage control through embankments and foundations, Design Criteria for filters, Treatment of upstream and downstream of slopes, Drainage control, Filter design.

**UNIT-III**

**Slope Stability Analysis:** Types of Failure: Failure surfaces – Planar surfaces, Circular surfaces, Non-circular surfaces, Limit equilibrium methods, Total stress analysis versus effective Stress analysis, Use of Bishop's pore pressure parameters, Short term and Long term stability in slopes.

**UNIT-IV**

**Methods of Slope Stability:** Taylor Charts, Method of Slices, Effect of Tension Cracks, Vertical Cuts. Bishop's Analysis, Bishop and Morgenstern Analysis, Noncircular Failure Surfaces: Morgenstern and Price Analysis, Janbu Analysis, Spencer Analysis, Sliding Block Analysis, Seismic stability, Stabilization of slopes: Drainage measures, Soil reinforcement (geosynthetics/soil nailing/micro piles etc), soil treatment (cement/lime/thermal treatment), surface protection (vegetation/erosion control mats/shotcrete).

## **UNIT-V**

**Rockfill Dams:** Requirements of compacted rockfill, Shear strength of rockfill, Rockfill mixtures, Rockfill embankments, Earth-core Rockfill dams, Stability, Upstream & Downstream slopes, Dynamic analysis.

### **Text Books:**

1. Sherard – Earth and Earth Rock Dams.
2. Sowers, G. F. and Salley, H. I. – Earth and Rockfill Dams
3. Bharat Singh and Sharma, H. D. – Earth and Rockfill Dams.
4. Abramson, L. W., Lee, T. S. and Sharma, S. – Slope Stability and Stabilisation methods – John Wiley & sons.

### **References:**

1. Bromhead, E. N. (1992). The Stability of Slopes, Blackie academic and professional, London.
2. Christian, Earth & Rockfill Dams – Principles of Design and Construction, Kutzner Published Oxford and IBH.
3. Ortiago, J. A. R. and Sayao, A. S. F. J. – Handbook of Slope Stabilisation, 2004.

### **Course Outcomes:**

**After completion of this course, students should be able to**

- Develop an ability to apply knowledge of geotechnical engineering to solve problems related to dams and stability.
- Design embankment or sloped land for economic and safe aspects for the society.
- Identify, formulate and solve stability related problems.

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**(A98103) ADVANCED TOPICS IN ENVIRONMENTAL ENGINEERING  
(DEPARTMENTAL ELECTIVE-IV)**

**Course Objectives:**

**Student will be able to**

- Develop an understanding of estimation of sewage and storm water
- Develop an understanding of design of sewers
- Develop an understanding of waste water treatment process
- Develop an understanding of solid waste disposal
- Develop an understanding of Industrial waste treatment concepts

**UNIT – I**

Air Pollution – sources of pollution – Classification – effects on human beings – Global effects of Air pollution.

**UNIT – II**

Air pollution Control Methods – Particulate control devices – General Methods of Controlling Gaseous Emission, Special Treatment Methods – Adsorption – Reverse Osmosis – De-fluoridation – Ion exchange – Ultra Filtration.

**UNIT –III**

Theories industrial waste treatment – Volume reduction – strength reduction – Neutralization – Equalization – Proportioning – Nitrification and Denitrification – Removal of Phosphates.

**UNIT – IV**

Solid waste Management – sources, composition and properties of solid waste – collection and handling – separation and processing, Solid waste disposal methods – Land filling – Incineration composting.

**UNIT – V**

Hazardous Waste – Nuclear waste – Biomedical wastes – chemical wastes – Effluent – disposal and Control methods, Noise Pollution – effects of noise and control methods – Effluent standards – Air emission standards – Water Act – Air Act – Environment Protection Act.

**TEXT BOOKS:**

1. Environmental Science and Engineering by J.G.Henry and G.W.Heinke – Person Education.
2. Environmental Engineering and Management – Dr.Suresh K.Dhameja – S.K.Kartarai & Sons 2<sup>nd</sup> Edition 2005.

## **REFERENCES:**

1. Physico – Chemical process for waster quality control by Weber
2. Air Pollution and Control by MN Rao & H.N.Rao

## **Course Outcomes:**

**After completion of this course, student should be able to**

- Acquire the knowledge of the estimation of sewage and storm water
- Acquire the knowledge of design of sewers
- Develop skills in design of waste water treatment plant
- Acquire the knowledge in Industrial waste treatment units

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**(A98104) CONSTRUCTION TECHNOLOGY AND PROJECT MANAGEMENT**

**Course Objectives:**

**Students will be able to:**

- Learn the fundamentals of construction law.
- Learn the fundamentals of construction safety.
- Understand various equipments used in construction.
- Learn Fundamentals of Project Planning.

**UNIT-I**

Fundamentals of construction Technology – Construction activities – process – construction schedule – construction records – documents – quality – safety – codes and regulations.

**UNIT-II**

Construction method – earthwork – piling – concrete and concreting – formwork – fabrication and erection - Mechanized construction – construction equipment – equipment economics – excavators – Rollers – Dozers – Scrapers – Handling equipment – concrete equipment – cranes – draglines and clamshalls

**UNIT-III**

Quality control, Assurance and safety – ISO – 9000 – quality systems – principles on safety – personnel, fire and electrical safety – environment protection – concept of green building.

**UNIT-IV**

Contract management – project estimation – types of estimation – contract document – classification with specific reference to PPP and BOT Projects – bidding – procurement process - Construction planning – project planning techniques – planning of manpower, material, equipment and finance.

**UNIT-V**

Project scheduling – PERT – CPM, Resource leveling - Construction claims, Dispute and project closure – source of claim – claim management – Dispute Resolution – Arbitration – Construction Closure – Contract Closure – Documentation.

**TEXT BOOKS**

1. Ghalot, P.S., Dhir,D.M., Construction Planning and Management, Wiley Eastern Limited,1992.
2. Chitkara,K.K., Construction Project Management, Tata McGraw Hill Publishing Co, Ltd., New Delhi,998.
3. Subir K.Sarkar, Subhajt Saraswati, Construction Technology, Oxford University Press
4. Niraj kumar jha, Construction Project Management – Theory and Practice, Pearson Education

**REFERENCES:**

1. B. Sengupta and H. Guha, Construction Management and Planning, tata mcgraw-hill publications
2. Punmia,B,C., Project Planning and Control with PERT and CPM, Laxmi Publications, New Delhi,1987.

**Course Outcomes:**

**After completion of this course, student should be able to**

- Differentiate construction equipment.
- Prepare Plan and control resources of projects.
- Prepare Construction Schedule by using different methods.
- Know ISO 9000 Standards.

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**(A98105) COMPREHENSIVE VIVA**

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**(A98106) PROJECT WORK**

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