



# **VARDHAMAN COLLEGE OF ENGINEERING**

## **(AUTONOMOUS)**

**(Permanently Affiliated to JNTUH, Approved by AICTE, New Delhi and Accredited by NBA)**  
**Shamshabad – 501 218, Hyderabad**

## **BACHELOR OF TECHNOLOGY**

### **CIVIL ENGINEERING**

**ACADEMIC REGULATIONS, COURSE STRUCTURE AND SYLLABI**  
**UNDER AUTONOMOUS STATUS**  
**FOR THE BATCHES ADMITTED FROM THE ACADEMIC YEAR 2011 - 12**

**B.Tech. Regular Four Year Degree Programme**  
**(For the batches admitted from the academic year 2011–12)**  
**&**  
**B.Tech. (Lateral Entry Scheme)**  
**(For the batches admitted from the academic year 2012 - 13)**

Note: The regulations hereunder are subject to amendments as may be made by the Academic Council of the College from time to time. Any or all such amendments will be effective from such date and to such batches of candidates (including those already undergoing the program) as may be decided by the Academic Council.

## PRELIMINARY DEFINITIONS AND NOMENCLATURES

- “Autonomous Institute / College” means an institute / college designated as autonomous institute / college by the Jawaharlal Nehru Technological University, Hyderabad (JNTUH), as per the JNTUH Autonomous College Statutes, 2011.
- “Academic Autonomy” means freedom to a College in all aspects of conducting its academic programs, granted by the University for promoting excellence.
- “Commission” means University Grants Commission.
- “AICTE” means All India Council for Technical Education.
- “University” the Jawaharlal Nehru Technological University, Hyderabad.
- “College” means Vardhaman College of Engineering, Hyderabad unless indicated otherwise by the context.
- “Program” means:
  - Bachelor of Technology (B.Tech) degree program
  - UG Degree Program: B.Tech
- “Branch” means specialization in a program like B.Tech degree program in Civil Engineering, B.Tech degree program in Computer Science and Engineering etc.
- “Course” or “Subject” means a theory or practical subject, identified by its course – number and course-title, which is normally studied in a semester. For example, ABS11T01: Mathematics - I, ACS11T02: Data Structures through C, etc.
- T – Tutorial, P – Practical, D – Drawing, L - Theory, C - Credits

## FOREWORD

The autonomy is conferred on Vardhaman College of Engineering by J N T University, Hyderabad based on its performance as well as future commitment and competency to impart quality education. It is a mark of its ability to function independently in accordance with the set norms of the monitoring bodies like UGC and AICTE. It reflects the confidence of the affiliating University in the autonomous institution to uphold and maintain standards it expects to deliver on its own behalf and thus awards degrees on behalf of the college. Thus, an autonomous institution is given the freedom to have its own **curriculum, examination system** and **monitoring mechanism**, independent of the affiliating University but under its observance.

Vardhaman College of Engineering is proud to win the credence of all the above bodies monitoring the quality in education and has gladly accepted the responsibility of sustaining, if not improving upon the standards and ethics for which it has been striving for more than a decade in reaching its present standing in the arena of contemporary technical education. As a follow up, statutory bodies like Academic Council and Boards of Studies are constituted with the guidance of the Governing Body of the College and recommendations of the JNTU Hyderabad to frame the regulations, course structure and syllabi under autonomous status.

The autonomous regulations, course structure and syllabi have been prepared after prolonged and detailed interaction with several expertise solicited from academics, industry and research, in accordance with the vision and mission of the college to order to produce a quality engineering graduate to the society.

All the faculty, parents and students are requested to go through all the rules and regulations carefully. Any clarifications needed are to be sought at appropriate time and with principal of the college, without presumptions, to avoid unwanted subsequent inconveniences and embarrassments. The Cooperation of all the stake holders is sought for the successful implementation of the autonomous system in the larger interests of the college and brighter prospects of engineering graduates.

**PRINCIPAL**



# VARDHAMAN COLLEGE OF ENGINEERING

(Autonomous)

(Permanent Affiliation with JNTUH, Approved by AICTE, New Delhi and Accredited by NBA)

## ACADEMIC REGULATIONS

**B.Tech. Regular Four Year Degree Programme**  
**(for the batches admitted from the academic year 2011 - 12)**  
**&**  
**B.Tech. (Lateral Entry Scheme)**  
**(for the batches admitted from the academic year 2012 - 13)**

For pursuing four year undergraduate Bachelor Degree programme of study in Engineering (B.Tech) offered by Vardhaman College of Engineering under Autonomous status and herein after referred to as VCE:

### 1. APPLICABILITY

All the rules specified herein, approved by the Academic Council, will be in force and applicable to students admitted from the academic year 2011-2012 onwards. Any reference to "College" in these rules and regulations stands for Vardhaman College of Engineering.

### 2. EXTENT

All the rules and regulations, specified herein after shall be read as a whole for the purpose of interpretation and as and when a doubt arises, the interpretation of the Chairman, Academic Council is final. As per the requirements of statutory bodies Principal, Vardhaman College of Engineering shall be the Chairman, Academic Council.

### 3. ADMISSION

#### 3.1. Admission into first year of four year B.Tech degree programme of study in engineering:

##### 3.1.1. Eligibility:

A candidate seeking admission into the first year of four year B.Tech degree programme should have

- (i) Passed either Intermediate Public Examination (I.P.E) conducted by the Board of Intermediate Education, Andhra Pradesh, with Mathematics, Physics and Chemistry as optional subjects or any equivalent examination recognized by Board of Intermediate Education, Andhra Pradesh or a Diploma in Engineering in the relevant branch conducted by the Board of Technical Education, Andhra Pradesh or equivalent Diploma recognized by Board of Technical Education for admission as per the guidelines of APSCHE.
- (ii) Secured a rank in the EAMCET examination conducted by A.P. State Council for Higher Education for allotment of a seat by the Convener, EAMCET, for admission.

##### 3.1.2. Admission Procedure:

Admissions are made into the first year of four year B.Tech. Degree programme as per the stipulations of A.P State Council of Higher Education (APSCHE), Government of Andhra Pradesh.

- (a) Category A seats are filled by the Convener, EAMCET.
- (b) Category B seats are filled by the Management.

### **3.2. Admission into the second year of four year B.Tech degree programme in engineering**

#### **3.2.1. Eligibility:**

A candidate seeking admission under lateral entry into the III semester B.Tech degree Programme should have passed the qualifying exam (B.Sc. Mathematics & Diploma holders), based on the rank secured by the candidate at Engineering Common Entrance Test ECET (FDH) in accordance with the instructions received from the Convener, ECET and Government of Andhra Pradesh.

#### **3.2.2. Admission Procedure:**

Admissions are made into the III semester of four year B.Tech degree programme through Convener, ECET (FDH) against the sanctioned strength in each programme of study as lateral entry students.

## **4. PROGRAMS OFFERED**

**Vardhaman College of Engineering**, an autonomous college affiliated to JNTUH, offers the following B.Tech programmes of study leading to the award of B.Tech degree under the autonomous scheme.

- 1) B.Tech (Aeronautical Engineering)
- 2) B.Tech (Civil Engineering)
- 3) B.Tech (Computer Science & Engineering)
- 4) B.Tech (Electrical & Electronics Engineering)
- 5) B.Tech (Electronics & Communication Engineering)
- 6) B.Tech (Information Technology)
- 7) B.Tech (Mechanical Engineering)

## **5. DURATION OF THE PROGRAMS**

### **5.1 Normal Duration**

5.1.1 B.Tech degree program extends over a period of four academic years leading to the Degree of Bachelor of Technology (B.Tech) of the Jawaharlal Nehru Technology University, Hyderabad.

5.1.2 For students admitted under lateral entry scheme, B.Tech degree program extends over a period of three academic years leading to the Degree of Bachelor of Technology (B.Tech) of the Jawaharlal Nehru Technology University, Hyderabad.

### **5.2 Maximum Duration**

5.2.1 The maximum period within which a student must complete a full-time academic program is 8 years for B.Tech. If a student fails to complete the academic program within the maximum duration as specified above, he / she will be required to withdraw from the program.

5.2.2 For students admitted under lateral entry scheme in B.Tech degree program, the maximum period within which a student must complete a full-time academic program is 6 years. If a student fails to complete the academic program within the maximum duration as specified above, he / she will be required to withdraw from the program.

5.2.3 The period is reckoned from the academic year in which the student is admitted first time in to the degree programme.

## 6. SEMESTER STRUCTURE

The College shall follow semester pattern. An academic year shall consist of a first semester and a second semester and the summer term follows in sequence. Each semester shall be of 23 weeks duration and this period includes time for course work, examination preparation, and conduct of examinations. Each semester shall have a minimum of 90 working days. The academic calendar is shown in Table 1 is declared at the start of the semester.

The first and second semesters shall have the duration to accommodate a minimum of 17 instructional weeks per semester.

**Table 1: Academic Calendar**

<b>FIRST SEMESTER (23 weeks)</b>	I Spell Instruction Period	: 9 weeks	19 weeks	
	I Mid Examinations	: 1 week		
	II Spell Instruction Period	: 8 weeks		
	II Mid Examinations	: 1 Week		
	Preparation & Practical Examinations			2 weeks
	External Examinations			2 weeks
<b>Semester Break</b>			2 weeks	
<b>SECOND SEMESTER (23 weeks)</b>	I Spell Instruction Period	: 9 weeks	19 weeks	
	I Mid Examinations	: 1 week		
	II Spell Instruction Period	: 8 weeks		
	II Mid Examinations	: 1 Week		
	Preparation & Practical Examinations			2 weeks
	External Examinations			2 weeks
<b>Summer Vacation</b>			4 weeks	

## 7. COURSE STRUCTURE

Every programme of study shall be designed to have 42 - 45 theory courses and 14 - 16 laboratory courses.

The Programme of instruction consists of:

- (i) A general core programme comprising Basic Sciences, Mathematics, Basic Engineering, Humanities, Social Sciences and Management.
- (ii) An Engineering Core programme imparting to the student the fundamentals of engineering in the branch concerned.
- (iii) An elective programme enabling the students to take up a group of departmental and interdepartmental courses of interest to him / her.

In addition, a student has to carry out a mini project, project work, technical seminar and comprehensive viva.

Every course of the B Tech programme will be placed in one of the ten groups of courses with minimum credits as listed in the Table 2.

**Note:** All components prescribed in the curriculum of any programme of study shall be conducted and evaluated.

**Contact Periods:** Depending on the complexity and volume of the course the number of contact periods per week will be assigned.

**Table 2: Group of Courses**

S. NO	GROUP OF COURSES	CATEGORY	MINIMUM CREDITS
1	Humanities, Social Sciences and Management	HS	18
2	Basic Sciences	BS	30
3	Basic Engineering	BE	26
4	Core Engineering	CE	114
5	Professional Elective	PE	12
6	Inter Departmental Elective	IE	04
7	Mini Project	MP	02
8	Technical Seminar	TS	02
9	Comprehensive Viva	CV	02
10	Project Work	PW	10
<b>TOTAL</b>			<b>220</b>

## 8. CREDIT BASED SYSTEM

All the academic programs under autonomy are based on credit system. Credits are assigned based on the following norms:

- 8.1. The duration of each semester will normally be 23 weeks with 6 days a week (the second and fourth Saturdays will be observed as holidays in a month). A working day shall have 6 periods each of 60 minutes duration.

Each course is normally assigned a certain number of credits as follows:

- 1 credit per lecture / tutorial period per week.
- 2 credits for three (or more) period hours of practicals.
- 2 credits for mini project.
- 2 credits for technical seminar with 6 periods per week.
- 2 credits for comprehensive viva examination.
- 10 credits for project work with 12 periods per week.

- 8.2. The four year curriculum of any B.Tech programme of study shall have total of 220 credits. The exact requirements of credits for each course will be as recommended by the Board of Studies concerned and approved by the Academic Council.

In the case of lateral entry students, B.Tech programme for III, IV, V, VI VII and VIII semesters of study shall have a total 168 credits.

- 8.3. For courses like mini project / project work / technical seminar / comprehensive viva, where formal contact hours are not specified, credits are assigned based on the complexity of the work to be carried out.

## 9. METHOD OF EVALUATION

The performance of a student in each semester shall be evaluated subject-wise with a maximum of 100 marks each for theory and 75 marks for practical / computer aided engineering drawing lab. In addition, mini-project, technical seminar, comprehensive viva and project work shall be evaluated for 50, 50, 50 and 200 marks respectively.

### 9.1 THEORY

For all lecture based theory courses, the evaluation shall be for 25 marks through internal evaluation and 75 marks through external end semester examination of three hours duration.

#### 9.1.1. Internal evaluation

The 25 internal marks are divided as shown in Table 3:

**Table 3: Internal marks distribution**

Subjective Type Test	20 marks
Assignment / Tutorial	05 marks

For theory subjects, during the semester there shall be 2 midterm examinations. Each midterm examination consists of subjective test. The subjective test is for 20 marks, with duration of 2 hours. Subjective test of each semester shall contain 5 one mark compulsory questions in part-A and part-B contains 5 questions, the student has to answer 3 questions, each carrying 5 marks.

First midterm examination shall be conducted for the first two and half units of syllabus and second midterm examination shall be conducted for the remaining portion.

The internal marks shall be computed as the average of the two internal evaluations, of two subjective tests.

Five marks are earmarked for assignments. There shall be two assignments in every theory course. Marks shall be awarded considering the average of two assignments in each course.

#### 9.1.2. External Evaluation

The question paper shall be set externally and valued both internally and externally. The external end semester examination question paper in theory subjects will be for a maximum of 75 marks to be answered in three hours duration. There shall be two questions of descriptive type from each unit with internal choice. Each question carries 15 marks. Each theory course shall consist of five units of syllabus.

### 9.2 PRACTICALS

Practicals shall be evaluated for 75 marks, out of which 50 marks are for external examination and 25 marks are for internal evaluation. The 25 internal marks are distributed as 15 marks for day-to-day work and 10 marks for internal examination. The external end - examination shall be conducted by the teacher concerned and an external examiner from outside the college.

**12 out of 14 to 16 experiments / exercises recommended are to be completed in a semester.**

9.3. For Engineering Drawing, Advanced Engineering Drawing and Machine Drawing 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 evaluations in a semester and the average of the two internal evaluations is considered for the award of marks for internal marks.



- 9.4. The Computer Aided Engineering Drawing Lab, Computer Aided Aircraft Engineering Drawing Lab wherever offered is to be treated as a practical subject. Evaluation method adopted for practical subjects shall be followed here as well.

### **9.3 Mini Project**

The mini project in an industry shall be carried out during the summer break for a minimum of 4 weeks after the VI Semester and completed before the start of the VII semester. A report has to be submitted for assessment to an internal evaluation committee comprising Head of the Department or his / her nominee and two faculty of the department including the project supervisor for 50 marks. A minimum of 40% of maximum marks shall be obtained to earn the corresponding credits. The mini project and its report shall be evaluated in VIII semester.

### **9.4 Technical Seminar**

The seminar shall have two components, one chosen by the student from the course-work without repetition and approved by the faculty supervisor. The other component is suggested by the supervisor and can be a reproduction of the concept in any standard research paper or an extension of concept from earlier course work. A hard copy of the information on seminar topic in the form of a report is to be submitted for evaluation along with presentation. The presentation of the seminar topics shall be made before an internal evaluation committee comprising the Head of the Department or his/her nominee, seminar supervisor and a senior faculty of the department. The two components of the seminar are distributed between two halves of the semester and are evaluated for 50 marks each. The average of the two components shall be taken as the final score. A minimum of 40% of maximum marks shall be obtained to earn the corresponding credits.

### **9.5 Comprehensive Viva**

The comprehensive Viva will be conducted by a committee comprising Head of the Department or his/her nominee, two senior faculty of the respective department and an external examiner from outside the college. This is aimed at assessing the student's understanding of various subjects studied during the entire program of 4 years. The comprehensive viva shall be evaluated for 50 marks at the end of VIII semester. A minimum of 40% of maximum marks shall be obtained to earn the corresponding credits.

### **9.6 Project Work**

The project work shall be evaluated for 200 marks out of which 50 marks for internal evaluation and 150 marks for end-semester evaluation. The project work shall be spread over in VII semester and in VIII semester. The project work shall be somewhat innovative in nature, exploring the research bent of mind of the student. A project batch shall comprise of not more than four students.

At the end of VII semester, students should submit synopsis summarizing the work done in VII semester. The project is expected to be completed by the end of VIII semester.

In VIII semester a mid-course review is conducted by Head of the Department and the project supervisor on the progress for 25 marks. On completion of the project a second evaluation is conducted for award of internal marks of another 25 marks before the report is submitted making the total internal marks 50. The end semester examination shall be based on the report submitted and a viva-voce exam for 150 marks by committee comprising of the Head of the Department, project supervisor and an external examiner. A minimum of 40% of maximum marks shall be obtained to earn the corresponding credits.

## **10. ATTENDANCE REQUIREMENTS TO APPEAR FOR THE SEMESTER-END EXAMINATION**

- 10.1. A student shall be eligible to appear for semester-end examinations if he acquires a minimum of 75% of attendance in aggregate of all the subjects in a semester.
- 10.2. Condonation of shortage of attendance in aggregate upto 10% (65% and above and below 75%) in each semester may be granted by the College Academic Committee.

- 10.3. Shortage of attendance below 65% in aggregate shall in no case be condoned.
- 10.4. The shortage of attendance shall not be condoned more than twice during the entire course.
- 10.5. Students whose shortage of attendance is not condoned in any semester are not eligible to take their semester-end examination of that class and their registration shall stand cancelled.
- 10.6. A student will not be promoted to the next semester unless he satisfies the attendance requirements of the current semester. The student may seek readmission for the semester when offered next. He will not be allowed to register for the subjects of the semester while he is in detention. A student detained due to shortage of attendance, will have to repeat that semester when offered next.
- 10.7. A stipulated fee shall be payable towards condonation of shortage of attendance to the College.
- 10.8. Attendance may also be condoned as per the recommendations of academic council for those who participate in prestigious sports, co-curricular and extra-curricular activities provided as per the Govt. of AP norms in vogue.

## **11. EVALUATION**

**Following procedure governs the evaluation.**

- 11.1. Marks for components evaluated internally by the faculty should be submitted to the Controller of Examinations one week before the commencement of the semester-end examinations. The marks for the internal evaluation components will be added to the external evaluation marks secured in the semester-end examinations, to arrive at total marks for any subject in that semester.
- 11.2. Performance in all the courses is tabulated course-wise and will be scrutinized by the Examination Committee and moderation is applied if needed, based on the recommendations of moderation committee and course-wise marks lists are finalized.
- 11.3. Student-wise tabulation is done and student-wise memorandum of marks is generated which is issued to the student.

## **12. PERSONAL VERIFICATION**

Students shall be permitted for personal verification of the semester-end examination answer scripts within a stipulated period after payment of prescribed fee.

## **13. SUPPLEMENTARY EXAMINATION**

Supplementary examinations for the odd semester shall be conducted with the regular examinations of even semester and vice versa, for those who appeared and failed in regular examinations. Such of the candidates writing supplementary examinations may have to write more than one examination per day.

## **14. ACADEMIC REQUIREMENTS FOR PROMOTION / COMPLETION OF REGULAR B.TECH PROGRAMME OF STUDY**

The following academic requirements have to be satisfied in addition to the attendance requirements for promotion / completion of regular B.Tech programme of study.

### **FOR STUDENTS ADMITTED INTO B.TECH. (REGULAR) PROGRAMME**

- i. A student shall be deemed to have satisfied the minimum academic requirements for each theory, practical, design, drawing subject or project, if he secures not less than 35% of marks in the semester-end examination and a minimum of 40% of marks in the sum of the internal evaluation and semester - end examination taken together.

- ii. In case of mini project, technical seminar and comprehensive viva a student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each of them if he/she secures not less than 40% of marks.
- iii. In case of project work, a student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted if he/she secures not less than 40% of marks on the aggregate in the internal evaluation and external end-evaluation taken together.
- iv. A student shall be promoted from IV semester to V semester of programme of study only if he fulfils the academic requirement of securing 40 credits from the examinations held up to end of III semester including supplementary examinations.
- v. A student shall be promoted from VI semester to VII semester of programme of study only if he fulfils the academic requirements of securing 68 credits out of which all 52 from I and II semesters shall be completed, from the examinations held up to V semester including supplementary examinations.
- vi. A student shall register for all the 220 credits and earn all the 220 credits. Marks obtained in all the 220 credits shall be considered for the award of the class based on aggregate of marks.
- vii. A student who fails to earn 220 credits as indicated in the course structure within **eight** academic years from the year of their admission shall forfeit their seat in B.Tech programme and their admission stands cancelled.
- viii. Students who are detained for want of attendance (or) who have not fulfilled academic requirements (or) who have failed after having undergone the course in earlier regulations (or) have discontinued and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work with the same (or) equivalent subjects as and when subjects are offered, and pursue the remaining course work with the academic regulations of the batch into which such students are readmitted. However, all such readmitted students shall earn all the credits of subjects they have pursued for completion of the course.

**FOR LATERAL ENTRY STUDENTS (BATCHES ADMITTED FROM 2012–2013)**

- i. A student shall be deemed to have satisfied the minimum academic requirements for each theory, practical, design, drawing subject or project if he secures not less than 35% of marks in the semester-end examination and a minimum of 40% of marks in the sum total of the internal evaluation and semester-end examination taken together.
- ii. In case of mini project, technical seminar and comprehensive viva a student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each of them if he/she secures not less than 40% of marks.
- iii. In case of project work, a student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted if he/she secures not less than 40% of marks on the aggregate in the internal evaluation and external end-evaluation taken together.
- iv. A student shall be promoted from VI semester to VII semester only if he fulfils the academic requirements of securing 42 credits from the examinations held up to V semester including supplementary examinations.
- v. A student shall register for all 168 credits and earn all the 168 credits. Marks obtained in all 168 credits shall be considered for the award of the class based on aggregate of marks.
- vi. A student who fails to earn 168 credits as indicated in the course structure within **six** academic years from the year of their admission shall forfeit their seat in B.Tech programme and their admission stands cancelled.
- vii. Students who are detained for want of attendance (or) who have not fulfilled academic requirements (or) who have failed after having undergone the course in earlier regulations (or) have discontinued and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work with the same (or) equivalent subjects as and when subjects

are offered, and pursue the remaining course work with the academic regulations of the batch into which such students are readmitted. However, all such readmitted students shall earn all the credits of subjects they have pursued for completion of the course.

## **15. TRANSITORY REGULATIONS**

Students who are detained for want of attendance (or) who have not fulfilled academic requirements (or) who have failed after having undergone the course in earlier regulations (or) have discontinued and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work with the same (or) equivalent subjects as and when subjects are offered, and pursue the remaining course work with the academic regulations of the batch into which such students are readmitted. A regular student has to satisfy all the eligibility requirements within the maximum stipulated period of eight years, and a lateral entry student within six years, for the award of B.Tech Degree.

## **16. TRANSCRIPTS**

After successful completion of the entire programme of study, a transcript containing performance of all academic years will be issued as a final record. Transcripts will also be issued, if required, after payment of requisite fee. Partial transcript will also be issued upto any point of study to a student on request, after payment of requisite fee.

## **17. AWARD OF DEGREE**

The degree will be conferred and awarded by Jawaharlal Nehru Technological University, Hyderabad on the recommendations of the Chairman, Academic Council.

**17.1. Eligibility:** A student shall be eligible for the award of B.Tech. Degree, if he fulfills all the following conditions:

- Registered and successfully completed all the components prescribed in the programme of study to which he is admitted.
- Successfully acquired the minimum required credits as specified in the curriculum corresponding to the branch of study within the stipulated time.
- Obtained not less than 40% of marks (minimum requirement for declaring as passed).
- Has no dues to the college, hostel, and library etc. and to any other amenities provided by the College.
- No disciplinary action is pending against him.

### **17.2. AWARD OF CLASS**

**Declaration of Class is based on percentage of marks to be secured.**

After a student has satisfied the requirement prescribed for the completion of the programme and is eligible for the award of B.Tech. Degree he shall be placed in one of the following four classes Shown in Table 4:

**Table 4: Declaration of Class is based on percentage of marks to be secured**

Class Awarded	% of marks to be secured	
First Class with Distinction	70% and above	From the aggregate marks secured for the 220 Credits.
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%	
Fail	Below 40%	

Sometimes, it is necessary to provide equivalence of percentages and/or Class awarded with *Grade Point Average (GPA)*. This shall be done by prescribing certain specific thresholds in averages for *Distinction, First Class and Second Class*, as in Table 5.

**Table 5: Percentage Equivalence of *Grade Points* (For a 10-Point Scale)**

Grade Point	Percentage of Marks / Class
4.75	40 (Pass Class)
5.25	45
5.75	50 (Second Class)
6.25	55
6.75	60 ( <i>First Class</i> )
7.25	65
7.75	70 ( <i>First Class with Distinction</i> )
8.25	75

**18. ADDITIONAL ACADEMIC REGULATIONS**

- i. Courses like projects / mini projects / seminars can be repeated only by re-registering for all the components in that semester.
- ii. When a student is absent for any examination (internal or external) he is treated as to have obtained absent in that component (course) and aggregate of marks is done accordingly.
- iv. When a component is cancelled as a penalty, he is awarded zero marks in that component.

**19. REGISTRATION**

Each student has to compulsorily register for course work at the beginning of each semester as per the schedule mentioned in the Academic Calendar. It is absolutely compulsory for the student to register for courses in time.

**20. TERMINATION FROM THE PROGRAM**

The admission of a student to the program may be terminated and the student is asked to leave the college in the following circumstances:

- i. The student fails to satisfy the requirements of the program within the maximum period stipulated for that program.
- ii. The student fails to satisfy the norms of discipline specified by the institute from time to time.

## 21. CURRICULUM

- 21.1 For each program being offered by the Institute, a Board of Studies (BOS) is constituted in accordance with AICTE / UGC / JNTUH statutes.
- 21.2. The BOS for a program is completely responsible for designing the curriculum once in three years for that program.

## 22. WITH-HOLDING OF RESULTS

If the candidate has not paid any dues to the college / if any case of indiscipline / malpractice is pending against him, the results of the candidate will be withheld. The issue of the degree is liable to be withheld in such cases.

## 23. GRIEVANCES REDRESSAL COMMITTEE

**“Grievance and Redressal Committee” (General)** constituted by the principal shall deal with all grievances pertaining to the academic / administrative / disciplinary matters. The composition of the complaints cum redressal committee shall be:

- Headed by Senior Faculty member
- Heads of all departments
- A senior lady staff member from each department (if available)

The committee constituted shall submit a report to the principal of the college, the penalty to be imposed. The Principal upon receipt of the report from the committee shall, after giving an opportunity of being heard to the person complained against, submit the case with the committee’s recommendation to the Governing Body of the college. The Governing Body shall confirm with or without modification the penalty recommended after duly following the prescribed procedure.

## 24. MALPRACTICE PREVENTION COMMITTEE

A malpractice prevention committee shall be constituted to examine and punish the students who does malpractice / behaves indiscipline in examinations. The committee shall consist of:

- Principal.
- Subject expert of which the subject belongs to.
- Head of the department of which the student belongs to.
- The invigilator concerned.
- In-charge Examination branch of the college.

The committee constituted shall conduct the meeting on the same day of examination or latest by next working day to the incidence and punish the student as per the guidelines prescribed by the J N T University, Hyderabad from time to time.

Any action on the part of candidate at the examination like trying to get undue advantage in the performance at examinations or trying to help another, or derive the same through unfair means is punishable according to the provisions contained hereunder. The involvement of the Staff, who are in charge of conducting examinations, valuing examination papers and preparing / keeping records of documents relating to the examinations in such acts (inclusive of providing incorrect or misleading information) that infringe upon the course of natural justice to one and all concerned at the examination shall be viewed seriously and recommended for award of appropriate punishment after thorough enquiry.

## 25. AMENDMENTS TO REGULATIONS

The Academic Council of Vardhaman College of Engineering reserves the right to revise, amend, or change the regulations, scheme of examinations, and / or syllabi or any other policy relevant to the needs of the society or industrial requirements etc., without prior notice.

## **26. STUDENTS' FEEDBACK**

It is necessary for the Colleges to obtain feedback from students on their course work and various academic activities conducted. For this purpose, suitable feedback forms shall be devised by the College and the feedback obtained from the students regularly in confidence, by administering the feedback form in print or on-line in electronic form.

The feedback received from the students shall be discussed at various levels of decision making at the College and the changes/ improvements, if any, suggested shall be given due consideration for implementation.

## **27. GRADUATION DAY**

The College shall have its own annual *Graduation Day* for the award of Degrees to students completing the prescribed academic requirements in each case, in consultation with the University and by following the provisions in the Statute.

The College shall institute Prizes and Awards to meritorious students, for being given away annually at the *Graduation Day*. This will greatly encourage the students to strive for excellence in their academic work.

## **28. AWARD OF A RANK UNDER AUTONOMOUS SCHEME**

28.1. Merit Rank will be declared only for those students who have been directly admitted in VCE under Autonomous Regulations and complete the entire course in VCE only within the minimum possible prescribed time limit, i.e., 4 years for B.Tech, 3 years for B.Tech under lateral entry scheme.

28.2. A student shall be eligible for a merit rank at the time of award of degree in each branch of Bachelor of Technology, provided the student has passed all subjects prescribed for the particular degree program in first attempt only.

28.3. Academic performance will be the sole criteria for awarding the merit rank and will be based only on performance of the student from the first to the eighth semester of the course.

28.4. The number of Merit Ranks to be announced for any course / program / branch / specialisation will be as follows:

- 3 (Three) Merit Ranks if the AICTE sanctioned intake is less than or up to 60.
- 4 (Four) Merit Ranks if the AICTE sanctioned intake is greater than 60.
- 5 (Five) Merit Ranks if the AICTE sanctioned intake is greater than 120.

28.5. Award of prizes, scholarships, or any other Honours shall be based on the rank secured by a candidate, consistent with the guidelines of the Donor, wherever applicable.

## **29. CONDUCT AND DISCIPLINE**

29.1 Each student shall conduct himself / herself in a manner befitting his / her association with VCE.

29.2 He / she is expected not to indulge in any activity, which is likely to bring disrepute to the college.

29.3 He / she should show due respect and courtesy to the teachers, administrators, officers and employees of the college and maintain cordial relationships with fellow students.

29.4 Lack of courtesy and decorum unbecoming of a student (both inside and outside the college), wilful damage or removal of Institute's property or belongings of fellow students, disturbing others in their studies, adoption of unfair means during examinations, breach of rules and regulations of the Institute, noisy and unruly behaviour and similar other undesirable activities shall constitute violation of code of conduct for the student.

- 29.5 **Ragging in any form is strictly prohibited and is considered a serious offence. It will lead to the expulsion of the offender from the college.**
- 29.6 Violation of code of conduct shall invite disciplinary action which may include punishment such as reprimand, disciplinary probation, debarring from the examination, withdrawal of placement services, withholding of grades / degrees, cancellation of registration, etc., and even expulsion from the college.
- 29.7 Principal, based on the reports of the warden of Institute hostel, can reprimand, impose fine or take any other suitable measures against an inmate who violates either the code of conduct or rules and regulations pertaining to college hostel.
- 29.8 A student may be denied the award of degree / certificate even though he / she has satisfactorily completed all the academic requirements if the student is found guilty of offences warranting such an action.
- 29.9 Attendance is not given to the student during the suspension period.

### 30. OTHER ISSUES

The quality and standard of engineering professionals are closely linked with the level of the technical education system. As it is now recognized that these features are essential to develop the intellectual skills and knowledge of these professionals for being able to contribute to the society through productive and satisfying careers as *innovators, decision makers and/or leaders* in the global economy of the 21st century, it becomes necessary that certain improvements are introduced at different stages of their education system. These include:

- a. Selective admission of students to a programme, so that merit and aptitude for the chosen technical branch or specialization are given due consideration.
- b. Faculty recruitment and orientation, so that qualified teachers trained in good teaching methods, technical leadership and students' motivation are available.
- c. Instructional/Laboratory facilities and related physical infrastructure, so that they are adequate and are at the contemporary level.
- d. Access to good library resources and Information & Communication Technology (ICT) facilities, to develop the student's *mind* effectively.

These requirements make it necessary for the College to introduce improvements like:

- a. Teaching-learning process on modern lines, to provide *Add-On Courses* for *audit/credit* in a number of peripheral areas useful for students' self development.
- b. Life-long learning opportunities for faculty, students and alumni, to facilitate their dynamic interaction with the society, industries and the world of work.
- c. Generous use of ICT and other modern technologies in everyday activities.

### 31. GENERAL

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

***Note: Failure to read and understand the regulations is not an excuse.***



# **COURSE STRUCTURE**

**B. TECH - CIVIL ENGINEERING**

**REGULATIONS: VCE-R11**

<b>I SEMESTER</b>									
Code	Subject	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A1001	Mathematics – I	BS	3	1	-	4	25	75	100
A1002	Engineering Physics	BS	4	-	-	4	25	75	100
A1003	Engineering Chemistry	BS	4	-	-	4	25	75	100
A1005	Probability, Statistics and Computational Techniques	BS	3	1	-	4	25	75	100
A1301	Engineering Mechanics	BE	4	-	-	4	25	75	100
A1010	Engineering Physics and Engineering Chemistry Lab	BS	-	-	3	2	25	50	75
A1302	Engineering Workshop	BE	-	-	3	2	25	50	75
A1303	Engineering Drawing	BE	-	2	3	2	25	75	100
<b>TOTAL</b>			<b>18</b>	<b>04</b>	<b>09</b>	<b>26</b>	<b>200</b>	<b>550</b>	<b>750</b>
<b>II SEMESTER</b>									
Code	Subject	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A1008	Technical English	HS	4	-	-	4	25	75	100
A1007	Mathematics – II	BS	3	1	-	4	25	75	100
A1004	Environmental Science	BS	4	-	-	4	25	75	100
A1502	Computer Programming	BE	4	-	-	4	25	75	100
A1202	Basic Electrical and Electronics Engineering	BE	3	1	-	4	25	75	100
A1009	English Language Communication Skills Lab	HS	-	-	3	2	25	50	75
A1502	Computer Programming Lab	BE	-	-	3	2	25	50	75
A1304	Advanced Engineering Drawing	BE	-	2	3	2	25	75	100
<b>TOTAL</b>			<b>18</b>	<b>04</b>	<b>09</b>	<b>26</b>	<b>200</b>	<b>550</b>	<b>750</b>
<b>III SEMESTER</b>									
Code	Subject	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A1013	Managerial Economics and Financial Analysis	HS	4	-	-	4	25	75	100
A1307	Mechanics of Fluids	CE	3	1	-	4	25	75	100
A1101	Building Materials and Construction	CE	3	1	-	4	25	75	100
A1102	Surveying – I	CE	3	1	-	4	25	75	100
A1103	Strength of Materials – I	CE	4	-	-	4	25	75	100
A1104	Concrete Technology	CE	4	-	-	4	25	75	100
A1105	Strength of Materials Lab	CE	-	-	3	2	25	50	75
A1106	Surveying – I Lab	CE	-	-	3	2	25	50	75
<b>TOTAL</b>			<b>21</b>	<b>03</b>	<b>06</b>	<b>28</b>	<b>200</b>	<b>550</b>	<b>750</b>

**B. TECH - CIVIL ENGINEERING**

**REGULATIONS: VCE-R11**

<b>IV SEMESTER</b>									
Code	Subject	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A1215	Electrical Technology	BE	3	1	-	4	25	75	100
A1107	Strength of Materials-II	CE	3	1	-	4	25	75	100
A1108	Structural Analysis – I	CE	3	1	-	4	25	75	100
A1109	Hydraulics and Hydraulic Machines	CE	4	-	-	4	25	75	100
A1110	Building Planning and Drawing	CE	4	-	-	4	25	75	100
A1111	Surveying – II	CE	4	-	-	4	25	75	100
A1112	Fluid Mechanics and Hydraulic Machinery Lab	CE	-	-	3	2	25	50	75
A1113	Surveying – II Lab	CE	-	-	3	2	25	50	75
<b>TOTAL</b>			<b>21</b>	<b>03</b>	<b>06</b>	<b>28</b>	<b>200</b>	<b>550</b>	<b>750</b>
<b>V SEMESTER</b>									
Code	Subject	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A1114	Design of Reinforced Concrete Structure	CE	3	1	-	4	25	75	100
A1115	Geo Technical Engineering-I	CE	4	-	-	4	25	75	100
A1116	Water Resources Engineering-I	CE	4	-	-	4	25	75	100
A1117	Structural Analysis-II	CE	3	1	-	4	25	75	100
A1118	Engineering Geology	CE	4	-	-	4	25	75	100
A1119	Estimating and Costing	CE	3	1	-	4	25	75	100
A1120	Geo Technical Engineering Lab	CE	-	-	3	2	25	50	75
A1121	Engineering Geology Lab	CE	-	-	3	2	25	50	75
<b>TOTAL</b>			<b>21</b>	<b>03</b>	<b>06</b>	<b>28</b>	<b>200</b>	<b>550</b>	<b>750</b>
<b>VI SEMESTER</b>									
Code	Subject	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A1015	Industrial Management and Psychology	HS	4	-	-	4	25	75	100
A1122	Design of Steel Structures	CE	3	1	-	4	25	75	100
A1123	Geo Technical Engineering-II	CE	3	1	-	4	25	75	100
A1124	Water Resources Engineering - II	CE	3	1	-	4	25	75	100
A1125	Environmental Engineering-I	CE	4	-	-	4	25	75	100
<b>INTERDEPARTMENTAL ELECTIVE-I</b>		HS	4	-	-	4	25	75	100
A1126	Environmental Engineering Lab	CE	-	-	3	2	25	50	75
A1127	Concrete and Highway Engineering Lab	CE	-	-	3	2	25	50	75
<b>TOTAL</b>			<b>21</b>	<b>03</b>	<b>06</b>	<b>28</b>	<b>200</b>	<b>550</b>	<b>750</b>

## B. TECH - CIVIL ENGINEERING

REGULATIONS: VCE-R11

<b>VII SEMESTER</b>									
Code	Subject	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A1128	Remote Sensing and GIS Applications	CE	4	-	-	4	25	75	100
A1129	Finite Elements Methods in CIVIL Engineering	CE	3	1	-	4	25	75	100
A1130	Environmental Engineering-II	CE	4	-	-	4	25	75	100
A1131	Transportation Engineering	CE	4	-	-	4	25	75	100
<b>INTERDEPARTMENTAL ELECTIVE – II</b>		IE	4	-	-	4	25	75	100
<b>PROFESSIONAL ELECTIVE – I</b>		PE	3	1	-	4	25	75	100
A1128	Computer Aided Drafting of Buildings Lab	CE	-	-	3	2	25	50	75
A1129	Structural Drawing (Steel and RCC)	CE	-	-	3	2	25	50	75
A1130	Project Work (Stage - I)	PW	-	2	-	-	-	-	-
<b>TOTAL</b>			<b>22</b>	<b>04</b>	<b>06</b>	<b>28</b>	<b>200</b>	<b>550</b>	<b>750</b>
<b>VIII SEMESTER</b>									
Code	Subject	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
A1141	Advanced Structural Design	CE	3	1	-	4	25	75	100
<b>PROFESSIONAL ELECTIVE – II</b>		PE	3	1	-	4	25	75	100
<b>PROFESSIONAL ELECTIVE – III</b>		PE	3	1	-	4	25	75	100
A1154	Geographical Information Systems Lab	CE	-	-	6	2	25	50	75
A1155	Technical Seminar	TS	-	-	6	2	50	-	50
A1156	Comprehensive Viva	CV	-	-	-	2	-	75	75
A1157	Mini Project	MP	-	-	-	2	50	-	50
A1140	Project Work (Stage - II)	PW	-	-	12	8	50	150	200
<b>TOTAL</b>			<b>09</b>	<b>03</b>	<b>24</b>	<b>28</b>	<b>250</b>	<b>500</b>	<b>750</b>

## B. TECH - CIVIL ENGINEERING

REGULATIONS: VCE-R11

<b>ELECTIVES</b>	
<b>INTERDEPARTMENTAL ELECTIVE - I</b>	
<b>Code</b>	<b>Subject</b>
A1610	Image Processing
A1228	Energy Management
A1710	Air Transportation Systems
A1330	Operations Research
A1503	Data Structures through C
A1453	Digital Electronics and Microprocessors
<b>INTERDEPARTMENTAL ELECTIVE – II</b>	
A1016	Human Values and Ethics
A1017	Human Resource Management
A1018	Entrepreneurship
A1019	Business Communication
A1020	Intellectual Property and Patent Rights
A1021	Project Planning and Management
<b>PROFESSIONAL ELECTIVE - I</b>	
A1132	Design and Drawing of Hydraulic Structures
A1133	Pavement Analysis and Design
A1134	Environmental Impact Assessment Methodologies
A1135	Advanced Structural Analysis
A1136	Rehabilitation and Retrofitting Structures
A1137	Urban Planning and Information Systems
<b>PROFESSIONAL ELECTIVE - II</b>	
A1142	Earth Quake Resistant Design Structures
A1143	Industrial Waste and Waste Management
A1144	Ground Improvement Techniques
A1145	Urban Disaster and Intelligent Control Systems
A1146	Bridge Engineering
A1147	Multy Storeyed Structures
<b>PROFESSIONAL ELECTIVE - III</b>	
A1148	Air Pollution and Control Methodologies
A1149	Pre stressed Concrete Structures
A1150	Soil Dynamics And Machine Foundation
A1151	Traffic Engineering
A1152	Geoinformatics for Environmental Monitoring
A1153	Industrial Structures

# **SYLLABI FOR I SEMESTER**

**MATHEMATICS - I**  
(Common to all Branches)

Course Code: A1001

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>-</b>	<b>4</b>

**UNIT - I**

**DIFFERENTIAL EQUATIONS OF FIRST ORDER AND THEIR APPLICATIONS:** Overview of differential equations, exact, linear and Bernoulli. Applications to Newton's law of cooling, law of natural growth and decay and orthogonal trajectories.

**UNIT - II**

**HIGHER ORDER LINEAR DIFFERENTIAL EQUATIONS AND THEIR APPLICATIONS:** Linear differential equations of second and higher order with constant coefficients, RHS term of the type  $Q(x) = e^{ax}$ ,  $\sin ax$ ,  $\cos ax$ , and  $x^n$ ,  $e^{ax}V(x)$ ,  $x^n V(x)$ , method of variation of parameters. Applications to electrical circuits, simple harmonic motion.

**UNIT - III**

**FUNCTIONS OF SINGLE VARIABLE AND THEIR APPLICATIONS AND MULTIPLE INTEGRALS:** Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, generalized mean value theorem (all theorems without proof), functions of several variables, functional dependence, Jacobian - maxima and minima of functions of two variables with and without constraints. Radius, centre and circle of curvature – evolutes and envelopes. Multiple integrals, double and triple integrals, change of order of integration, change of variables

**UNIT - IV**

**LAPLACE TRANSFORMS:** Laplace transform of standard functions, inverse transform, first shifting theorem, transforms of derivatives and integrals, unit step function, second shifting theorem, Dirac's delta function, convolution theorem, periodic function, differentiation and integration of transforms, application of Laplace transforms to ordinary differential equations.

**UNIT - V**

**VECTOR CALCULUS:** Gradient, divergence, curl and their related properties, potential function, Laplacian and second order operators. Line integral, work done, surface integrals, flux of a vector valued function. Vector integrals theorems: Green's - Stoke's and Gauss's divergence theorems (statement & their verification).

**TEXT BOOKS:**

1. Grewal B.S (2007), *Higher Engineering Mathematics*, 40<sup>th</sup> Edition, Khanna Publishers, New Delhi.
2. Iyengar T.K.V., Krishna Gandhi B. & Others (2011), *Engineering Mathematics Vol - I*, 10<sup>th</sup> Revised Edition, S. Chand & Company Limited, New Delhi.

**REFERENCE BOOKS:**

1. Jain R. K, Iyengar S. R. K (2008), *Advanced Engineering Mathematics*, 3<sup>rd</sup> edition, Narosa Publication House, New Delhi.
2. Shahanaz Bathul (2007), *Engineering Mathematics-I*, 3<sup>rd</sup> Edition, Right Publishers, Hyderabad.
3. Ramana B.V (2010), *Engineering Mathematics*, Tata McGraw Hill Publishing Co. Limited, New Delhi.

**ENGINEERING PHYSICS**  
(Common to AE, ME, EEE & CE)

Course Code: A1002

L	T	P	C
4	-	-	4

**UNIT - I**

**BONDING IN SOLIDS:** Ionic bond, Covalent bond, Metallic bond, Hydrogen bond, Vander-Waal's bond, calculation of cohesive energy.

**CRYSTALLOGRAPHY AND CRYSTAL STRUCTURES:** Space lattice, Unit cell lattice parameters, Crystal systems, Bravais lattices, Atomic radius, co-ordination number and packing factor of SC, BCC, FCC, diamond and HCP structures, structures of NaCl, ZnS, CsCl.

**UNIT - II**

**CRYSTAL PLANES & X-RAY DIFFRACTION:** Miller indices, Crystal planes and directions, Inter planar spacing of orthogonal crystal systems, Basic principles of X-ray diffraction, Bragg's law, Laue method, Powder method, applications of X- ray diffraction.

**NANOTECHNOLOGY:** Origin of Nanotechnology, Nano scale, surface to volume ratio, bottom-up fabrication: Sol-gel, precipitation, Combustion methods; Top-down fabrication: Chemical vapour deposition, physical vapour deposition, pulsed laser vapour deposition methods and applications.

**UNIT - III**

**PRINCIPLES OF QUANTUM MECHANICS:** Waves and particles, De Broglie hypothesis, matter waves, Davisson and Germer's experiment, g. P. Thomson experiment, Schrödinger's time independent wave equation, physical significance of the wave function - particle in one dimensional potential box.

**BAND THEORY OF SOLIDS:** Electron in a periodic potential, Bloch theorem, Kronig-penny model(qualitative treatment), origin of energy band formation in solids, classification of materials into conductors, semi conductors & insulators, concept of effective mass of an electron.

**UNIT - IV**

**DIELECTRIC PROPERTIES:** Electric dipole moment, dielectric constant, polarization, electric susceptibility internal fields in solids, Clausius - Mossotti equation and its derivation, Piezo-electricity and Ferro- electricity.

**MAGNETIC PROPERTIES:** Origin of magnetic moment, classification of magnetic materials on the basis of magnetic moment, domain theory of Ferro magnetism, hysteresis curve, soft and hard magnetic materials.

**SUPERCONDUCTIVITY:** Introduction to superconductivity, Meissner effect, BCS theory, applications of superconductors.

**UNIT- V**

**LASERS:** Characteristics of lasers, spontaneous and stimulated emission of radiation, meta-stable state, population inversion, lasing action, Einstein's coefficients, ruby laser, Helium-neon laser, semiconductor diode laser, applications of lasers.

**FIBER OPTICS:** Principle of optical fiber, acceptance angle, numerical aperture, types of optical fibers, attenuation of signal in optical fibers, application of optical fibers.

**TEXT BOOKS:**

1. S. O. Pillai, Sivakami (2009), *Engineering Physics*, 2<sup>nd</sup> edition, New Age International (P) Ltd, Delhi.

**REFERENCE BOOKS:**

1. C. Kittel (2009), *Introduction to Solid State Physics*, 8<sup>th</sup> edition, Wiley Eastern Publications, India.
2. A. J. Dekker (1999), *Solid State Physics*, Macmillan India Ltd, Chennai.
3. M. Ratner, D. Ratner (2003), *Nanotechnology*, Pearson Edition, India.
4. P. Sarah (2008), *Lasers & Optical Fiber communications*, IK International (P) Ltd, New Delhi.



**ENGINEERING CHEMISTRY**  
(Common to AE, ME, EEE & CE)

Course Code: A1003

L	T	P	C
4	-	-	4

**UNIT - I**

**ELECTROCHEMISTRY AND BATTERIES:** Concept of Electrochemistry, Conductance Electrolyte in solution, Conductance specific, Equivalent and molar conductance, Ionic Mobilities, Kolrausch's law & applications. *EMF:* Galvanic cells, Nernst equation, Galvanic series, Numerical problems.

**BATTERIES:** Primary and secondary cells, Lead-acid cell, NI-CD cell, Lithium cells. Applications of batteries, *Fuel cells:* Hydrogen – Oxygen fuel cells, advantages of fuel cells.

**UNIT - II**

**WATER:** Introduction, *Hardness:* causes, expression of hardness units, types of hardness, estimation of temporary and permanent hardness of water, numerical problems. Softening of water internal and external treatment, Zeolite, ion exchange process and numerical problems, reverse osmosis, electro dialysis.

**UNIT - III**

**POLYMERS:** Types of polymerization, *Plastics:* Thermoplastic resins & thermo set resins. Compounding & fabrication of plastics, preparation, properties, engineering applications of: polyethylene, PVC, PS, Teflon, Nylon. *Rubber:* vulcanization. *Elastomers:* Buna-s, Buna-n, Thiokol rubbers, fibers polyester, applications.

**SURFACE CHEMISTRY:** Solid surfaces, types of adsorption, Longmuir adsorption isotherm, application adsorption, classification of colloids, electrical & optical properties of colloids, applications of colloids in industry. *Nano materials:* Introduction, preparation and applications of nano materials.

**UNIT - IV**

**ENERGY SOURCES:** Fuels, classification, conventional fuels (solid, liquid, gaseous) solid fuels, coal analysis proximate and ultimate analysis and their significance liquid fuels, primary petroleum, refining of petroleum. *Gaseous Fuels:* natural gas, analysis of flue gas by Orsat's method combustion, problems.

**UNIT - V**

**PHASE RULE:** Definitions, phase, component, degree of freedom and phase rule equation. Phase diagrams, one component system: Water system. Two component system: Lead silver system.

**MATERIAL CHEMISTRY:** *Cement:* Composition of Portland cement, manufacture of Port land cement. *Lubricants:* Criteria of a good lubricant. *Refractories:* Classification, characteristics of good refractory. *Insulators & conductors:* Classification of insulators, characteristics of thermal & electrical insulators and applications of superconductors.

**TEXT BOOKS:**

1. Dara S. S., Mukkanti (2006), *Engineering Chemistry*, S. Chand & Company Limited, New Delhi.

**REFERENCE BOOKS:**

1. Jain. P. C. and Monica Jain (2008), *Engineering Chemistry*, Dhanpat Rai Publishing Company, New Delhi.
2. Mishra. K. N., Mani R.P. and Rama Devi. B (2009), *Chemistry of Engineering Materials*, Cengage learning.
3. Kuriacase J. C and Rajaram. J (2004), *Engineering Chemistry*, Tata Mc Graw Hill Co., New Delhi.

**PROBABILITY, STATISTICS AND COMPUTATIONAL TECHNIQUES**  
(Common to AE, CSE, IT & CE)

Course Code:A1005

L T P C  
3 1 - 4

**UNIT - I**

**PROBABILITY, RANDOM VARIABLES AND DISTRIBUTIONS:** Sample space and events – probability – the axioms of probability. Random variables – discrete distribution – continuous distribution– binomial distribution - poisson distribution -normal distribution – normal approximation to binomial distribution.

**UNIT - II**

**TESTING OF HYPOTHESIS:** Tests of hypothesis point estimations – interval estimations. Large samples - null hypothesis - alternative hypothesis type i & type ii errors – critical region, confidence interval for mean, difference between the means, single proportion and difference of proportions. Confidence interval for the t-distribution - tests of hypothesis - t-distributions, f-distribution and chi-square distribution.

**UNIT - III**

**SOLUTIONS OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS:** Bisection method – regular falsi method – iteration method - newton raphson method.

**INTERPOLATION:** Newton’s forward interpolation – newton’s backward interpolation – interpolation with unequal intervals –lagrange’s interpolation – newton’s divided difference interpolation. Derivatives using newton’s forward formula – derivatives using newton’s backward formula.

**UNIT - IV**

**CURVE FITTING AND NUMERICAL INTEGRATION:** Curve fitting: fitting a straight line – second degree curve - exponential curve - power curve by method of least squares. Numerical integration – newton cote’s formula - trapezoidal rule – simpson’s 1/3 rule – simpson’s 3/8 rule.

**UNIT - V**

**NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS:** Single step methods: Taylor’s series method - euler’s and modified euler’s methods - fourth order runge-kutta method for solving first and second order equations- multistep methods: Milne’s and adam’s, predictor and corrector methods.

**TEXT BOOKS:**

1. Grewal B.S (2007), *Higher Engineering Mathematics*, 40<sup>th</sup> Edition, New Delhi, Khanna Publishers.
2. Iyengar T.K.V., Krishna Gandhi B. & Others (2011), *Probability and Statistics*, 3<sup>rd</sup> Revised Edition, New Delhi, S. Chand & Company Limited.

**REFERENCE BOOKS:**

1. Iyengar T. K. V., Krishna Gandhi B. & Others (2011), *Mathematical Methods*, 6<sup>th</sup> Revised Edition, New Delhi, S. Chand & Company Limited.
2. Bali N. P. and Narayana Iyengar N. Ch (2004), *A Textbook of Engineering Mathematics*, Sixth Edition, New Delhi, Laxmi Publications.
3. Sastry S. S (2005), *Introductory Methods of Numerical Analysis*, 4<sup>th</sup> Edition, New Delhi, PHI Learning Pvt. Ltd.

**ENGINEERING MECHANICS**  
**(Common to AE, ME & CE)**

Course Code: **A1301**

**L T P C**  
**4 - - 4**

**UNIT - I**

**INTRODUCTION TO ENGINEERING MECHANICS:** Basic concepts, systems of forces: coplanar concurrent forces - components in space – resultant – moment of force and its application – couples and resultant of force systems.

**EQUILIBRIUM OF SYSTEMS OF FORCES:** free body diagrams, equations of equilibrium of coplanar systems and spatial systems for concurrent forces.

**UNIT - II**

**FRICTION:** Types of Friction – Limiting Friction – Laws of Friction – angle of repose, equilibrium body laying on rough inclined plane – ladder friction - wedge friction.

**UNIT - III**

**CENTROID AND CENTER OF GRAVITY:** Centroids of lines – centroids of area - centroids of composite figures theorems of pappus - centre of gravity of bodies – centroids of volumes centre of gravity of composite bodies.

**UNIT - IV**

**AREA MOMENTS OF INERTIA:** Introduction definition of moment of inertia – polar moment of inertia, radius of gyration - transfer theorems for moment of inertia – moments of inertia by integration – movements of inertia of composite figures, products of inertia, transfer formula for product of inertia.

**MASS MOMENT OF INERTIA:** Introduction, moment of inertia of masses – radius of gyration - transfer formula for mass moments of inertia – mass moments of inertia by integration - mass moment of inertia of composite bodies.

**UNIT - V**

**VIRTUAL WORK:** Introduction – principle of virtual work – applications – beams, lifting machines, simple framed structures (ladder problems).

**TEXT BOOKS:**

1. Fedinand L. Singer (1998), *Engineering Mechanics*, Harper – Collins Publishers, New Delhi.
2. S. S. Bhavikatti, J. G. Rajasekharappa (2006), *Engineering Mechanics*, New Age International, India.

**REFERENCES BOOKS:**

1. Timoshenko & Young (2007), *Engineering Mechanics*, Mc Graw Hill, India.
2. A.R. Tayal (2009), *Engineering Mechanics*, Umesh Publications, New Delhi.
3. R.S. Khurmi (2009), *Engineering Mechanics*, S. Chand & Company Limited, New Delhi.
4. K.L Kumar (2009), *Engineering Mechanics*, Tata Mc Graw Hill, New Delhi.
5. Irving. H. Shames (1999), *Engineering Mechanics*, Prentice-Hall, India.

**ENGINEERING PHYSICS AND ENGINEERING CHEMISTRY LAB**  
(Common to AE, ME, EEE & CE)

Course Code: **A1010**

**L T P C**  
**- - 3 2**

**ENGINEERING PHYSICS LAB**

1. Study of I-V characteristics of an LED.
2. Determination of numerical aperture - optical Fibers.
3. Determination of time constant – R-C circuit.
4. Determination of energy gap of a given semiconductor material.
5. Determination of rigidity modulus of the material of a given wire– Torsional pendulum.
6. Determination of frequency of vibrating tuning fork – Melde’s experiment.
7. Determination of wavelength and angular divergence of given laser source.
8. Determination of frequency of AC supply – Sonometer.
9. Determination of dispersive power of the material of the given prism – spectrometer.
10. Study of variation of magnetic field along a circular current carrying conductor – Stewart & Gee apparatus.

**ENGINEERING CHEMISTRY LAB**

1. **TITRIMETRY:** Estimation of hardness of water by EDTA method (or) Estimation of calcium in limestone by Permanganometry.
2. **MINERAL ANALYSIS:** Determination of percentage of copper in brass

**INSTRUMENTAL METHODS:**

3. **COLORIMETRY:** Determination of ferrous ion in cement by colorimetric method (Or) Estimation of copper by colorimetric method.
4. **CONDUCTOMETRY:** Conductometric titration of strong acid vs strong base (or) Conductometric titration of mixture of acids vs strong base.
5. **POTENTIOMETRY:** Titration of strong acid vs strong base by Potentiometry (or) Titration of weak acid vs strong base by Potentiometry.

**PHYSICAL PROPERTIES:**

6. Determination of viscosity of sample oil by redwood/ Ostwald’s viscometer.
7. Determination surface tension of lubricants.
8. **IDENTIFICATION AND PREPARATIONS:** preparation of organic compounds: aspirin (or) Benzimidazole.

**KINETICS:**

9. To determine the rate constant of hydrolysis of methyl acetate Catalysed by an acid and also the energy of Activation (or) to study the kinetics of reaction between  $K_2S_2O_8$  and KI.
10. **DEMONSTRATION EXPERIMENTS (ANY ONE OF THE FOLLOWING):**
  - a. Preparation of Thiokol rubber
  - b. Adsorption on charcoal

**1. TRADES FOR EXERCISES:**

- a. Carpentry
- b. Fitting
- c. House Wiring
- d. Tin-Smithy
- e. Foundry

**2. DEMONSTRATION TRADES:**

- a. Black Smithy
- b. Welding
- c. Plumbing

**TEXT BOOKS:**

1. H. S. Bawa (2007), *Workshop Practice*, Tata McGraw-Hill Publishing Company Limited, New Delhi.
2. A. Rajendra Prasad, P. M. M. S. Sarma (2002), *Workshop Practice*, Sree Sai Publication, New Delhi.

**REFERENCE BOOKS:**

1. K. Jeyachandran, S. Natarajan, S. Balasubramanian (2007), *A Primer on Engineering Practices Laboratory*, Anuradha Publications, New Delhi.
2. T. Jeyapoovan, M. Saravanapandian, S. Pranitha (2006), *Engineering Practices Lab Manual*, Vikas Publishing House Private Limited, New Delhi.

**ENGINEERING DRAWING**  
**(Common to AE, ME & CE)**

Course Code: **A1303**

**L T P C**  
**- 2 3 2**

**UNIT - I**

**INTRODUCTION TO ENGINEERING DRAWING:** Principles of engineering graphics and their significance – drawing instruments and their use – conventions in drawing – lettering – BIS conventions. Dimensioning rules, geometrical construction.

**SCALES:** Different types of scales, plain scales, diagonal scales, comparative scales, vernier scales, scale of chords.

**CURVES USED IN ENGINEERING PRACTICE AND THEIR CONSTRUCTIONS:** Conic Sections, Special Curves and Involutives.

**UNIT - II**

**DRAWING OF PROJECTIONS OR VIEWS ORTHOGRAPHIC PROJECTION IN FIRST ANGLE PROJECTION ONLY:** Principles of orthographic projections – conventions – first and third angle projections. Projections of points and lines inclined to planes, true lengths, traces, application problems.

**UNIT - III**

**PROJECTIONS OF PLANES AND SOLIDS:** Projections of regular planes, inclined to both planes. Projections of regular solids inclined to both planes.

**UNIT - IV**

**SECTIONS AND SECTIONAL VIEWS:** Right regular solids – sections of prisms, cylinders, pyramids and cones.

**UNIT - V**

**DEVELOPMENT OF SURFACES:** Development of surfaces of right, regular solids – development of prisms, cylinders, pyramids, cones and their parts.

**TEXT BOOKS:**

1. N. D. Bhat (2006), *Engineering Drawing*, Charotar Publications, New Delhi.

**REFERENCE BOOKS:**

2. Venugopal (2010), *Engineering Drawing and Graphics*, 2<sup>nd</sup> edition, New Age Publications, New Delhi.
3. Johle (2009), *Engineering Drawing*, Tata Mc Graw Hill, New Delhi, India.
4. Trymbaka Murthy (2007), *Computer Aided Engineering Drawing*, I.K. International Publishers, New Delhi.
5. R.B. Choudary (2005), *Engineering graphics with Auto CAD*, Anuradha Publishers, New Delhi.

# **SYLLABI FOR II SEMESTER**

**TECHNICAL ENGLISH**  
(Common to AE, ME, EEE & CE)

Course Code: A1008

L T P C  
4 - - 4

**UNIT - I**

1. *Sir CV Raman: A Path breaker in the Saga of Indian Science* from *Enjoying Every Day English*
2. *Mother Teresa* from *Inspiring Speeches and Lives*

**FOCUSING ON** Word formation with prefixes and suffixes, synonyms and antonyms, noun phrases, infinitive and gerund, subject-verb agreement (concord), tenses, impersonal passive conditional sentences, adjectives and degrees of comparison, conjunctions and prepositions.

**UNIT - II**

1. *The Connoisseur* from *Enjoying Every Day English*
2. *Sam Pitroda* from *Inspiring Speeches and Lives*

**FOCUSING ON** Word formation with prefixes and suffixes, synonyms and antonyms, noun phrases, infinitive and gerund, subject-verb agreement (concord), tenses, impersonal passive conditional sentences, adjectives and degrees of comparison, conjunctions and prepositions.

**UNIT - III**

1. *Bubbling Well Road* from *Enjoying Every Day English*
2. *I Have a Dream - by Martin Luther King* from *Inspiring Speeches and Lives*

**FOCUSING ON** Word formation with prefixes and suffixes, synonyms and antonyms, noun phrases, infinitive and gerund, subject-verb agreement (concord), tenses, impersonal passive conditional sentences, adjectives and degrees of comparison, conjunctions and prepositions.

**UNIT - IV**

**LETTERS, MEMOS AND E-MAIL:** Letters, business letters, significance, structure and layout, principles, types and samples, claim letters, adjustment letters, sales letters, job application letters, memos, classification and purpose style, E-mails, E-mail etiquettes, sample E- mail messages, effectiveness and security.

**UNIT - V**

**REPORTS:** Objectives, characteristics of a report, types of reports, importance of reports, formats, rewriting structure of reports, writing the report, visual aids, revising, editing and proof reading, proof reading symbols.

**TEXT BOOKS:**

1. Ramakrishna Rao. A (2009), *Enjoying Every Day English*, Sangam Books, Hyderabad.
2. Yadava Raju. B and Muralikrishna. C (2009), *Inspiring Speeches and Lives*, Maruthi Publications, Guntur.
3. Meenakshi Raman, Sangeeta Sharma (2009), *Technical Communication*, Oxford University Press, New Delhi.

**REFERENCE BOOKS:**

1. Edgar Thorpe and Showick Thorpe (2008), *Basic Vocabulary for Competitive Examination*, Pearson Education, New Delhi, India.
2. Ashraf Rizvi M (2005), *Effective Technical Communication*, Tata Mc Graw Hill, New Delhi.
3. Raymond Murphy (2004), *Murphy's English Grammar with CD*, 3<sup>rd</sup> Edition, Cambridge University Press, USA.



**MATHEMATICS - II**  
(Common to all Branches)

Course Code: A1007

L	T	P	C
3	1	-	4

**UNIT - I**

**SOLUTION FOR LINEAR SYSTEMS AND EIGEN VALUES & EIGEN VECTORS:** *Matrices and linear systems of equations:* Elementary row transformations - rank - echelon form, normal form, solution of linear systems, direct methods. Eigen values, Eigen vectors - properties. Cayley-Hamilton theorem (without proof) - inverse and powers of a matrix by Cayley-Hamilton theorem, diagonalization of matrix, calculation of powers of a matrix, modal and spectral matrices.

**UNIT - II**

**LINEAR TRANSFORMATIONS:** Real matrices, symmetric, skew symmetric, orthogonal, linear transformation, orthogonal transformation. *Complex matrices:* Hermitian, Skew Hermitian and unitary, Eigen values and Eigen vectors of complex matrices and their properties. Quadratic forms- reduction of quadratic form to canonical form -rank - positive, negative definite - semi definite - index - signature.

**UNIT - III**

**PARTIAL DIFFERENTIAL EQUATIONS:** Formation of partial differential equation by elimination of arbitrary constants and arbitrary functions - solutions of first order linear (Lagrange) equation and nonlinear (standard type) equations. Method of separation of variables for second order equations -two dimensional wave equation.

**UNIT - IV**

**FOURIER SERIES:** Determination of Fourier coefficients, Fourier series, even and odd functions, Fourier series in an arbitrary interval, even and odd periodic continuation. Half-range Fourier sine and cosine expansions. Fourier integral theorem, Fourier sine and cosine integral.

**UNIT - V**

**FOURIER TRANSFORMS AND Z - TRANSFORMS:** Fourier transform, Fourier sine and cosine transforms, properties, inverse transforms, finite Fourier transforms. Z-transforms, inverse Z-transforms, properties, Damping rule, Shifting rule, initial and final value theorems, Convolution theorem, Solution of difference equations by Z-transforms.

**TEXT BOOKS:**

1. Grewal B. S (2007), *Higher Engineering Mathematics*, 40<sup>th</sup> edition, Khanna Publishers, New Delhi.
2. Iyengar T.K.V., Krishna Gandhi B. & Others (2011), *Mathematical Methods*, 10<sup>th</sup> revised edition, S. Chand & Company Limited, New Delhi.

**REFERENCE BOOKS:**

1. Shahanaz Bathul (2007), *Mathematical Methods*, 3<sup>rd</sup> edition, Right Publishers, Hyderabad.
2. Jain R. K., Iyengar S. R. K (2008), *Advanced Engineering Mathematics*, 3<sup>rd</sup> edition, Narosa Publication House, New Delhi.
3. Dass H. K ,Rajnish Verma Er (2007), *Higher Engineering Mathematics*, First Edition, S. Chand & Company Limited, New Delhi.

**ENVIRONMENTAL SCIENCE**  
(Common to AE, ME, EEE & CE)

Subject Code: A1004

L	T	P	C
4	-	-	4

**UNIT - I**

**ENVIRONMENTAL SCIENCE INTRODUCTION AND NATURAL RESOURCES:** *Introduction:* 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, 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. *Food Resources:* World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, Organic farming and Food miles. *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**

**ECOSYSTEM AND BIODIVERSITY:** *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: forest ecosystem, grassland ecosystem, desert ecosystem, aquatic ecosystems (ponds, streams, lakes, rivers, oceans and estuaries). *Biodiversity and Its Conservation:* Introduction - definition: genetic, species and ecosystem diversity, value of biodiversity- consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity at global, national and local levels. India as 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 - III**

**ENVIRONMENTAL POLLUTION, GLOBAL ENVIRONMENTAL ISSUES AND CONTROL MEASURES:** *Environmental Pollution:* definition, cause, effects and control measures of air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution and 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. E-waste and plastic waste - recycling and reuse. *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, climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case Studies, wasteland reclamation.

**UNIT - IV**

**GREEN ENVIRONMENTAL ISSUES:** Introduction, Clean development mechanism, Carbon foot printing, Carbon credits, Carbon sequestration, Polluter pay principle. Green building, practices, approaches to green computing, Nanotechnology ISO14000. Role of Information Technology in environment and human health, case studies.

**UNIT - V**

**ENVIRONMENTAL ETHICS, ENVIRONMENTAL IMPACT ASSESMENT & ROLE OF NGOS:** *Environmental Ethics:* 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. *Environmental Impact Assesment:* Conceptual facts of EIA, baseline data acquisition, planning and management of impact studies, operational aspects of EIA, methods for impact identification, prediction of impacts(air, water, noise, soil, biological and socio-economics), environmental management plan, role of NGOs in creating awareness among people regarding environmental issues.

**TEXT BOOKS:**

1. Benny Joseph (2005), *Environmental Studies*, Tata McGraw Hill Publishing Company Limited, New Delhi.
2. Erach Bharucha (2005), *Textbook of Environmental Studies for Undergraduate Courses*, Universities Press, Hyderabad.

**REFERENCE BOOKS:**

1. Anji Reddy. M (2007), *Textbook of Environmental Sciences and Technology*, BS Publications, Hyderabad.
2. Rajagopalan. R (2009), *Environmental Studies*, Oxford University Press, New Delhi.
3. Anubha Kaushik (2006), *Perspectives in Environmental Science*, 3rd Edition, New age international, New Delhi.

**COMPUTER PROGRAMMING**  
(Common to AE, ME & CE)

Course Code: A1501

L	T	P	C
4	-	-	4

**UNIT - I**

**INTRODUCTION TO COMPUTERS:** Introduction to computers, computer systems, computing environments, computer languages, creating and running programmes, software development method, algorithms, pseudo code, flow charts, applying the software development method.

**INTRODUCTION TO C LANGUAGE:** Basic structures of C language, C tokens, data types and sizes, declaration of variables, assigning values

**OPERATORS AND EXPRESSIONS:** Statements, arithmetic, relational and logical operators, increment and decrement operators, conditional operator, bitwise operators, type conversions, expressions and evaluation, input and output statements, sample programs.

**UNIT - II**

**CONTROL STATEMENTS:** If and switch statements, while, do while and for statements, sample programs.

**FUNCTIONS:** Defining and accessing, passing arguments, function prototypes, library functions, static functions, user defined functions, recursive functions, variables and storage classes, scope rules, block structure, header files, C preprocessor, example C programs.

**ARRAYS:** Defining and processing, one dimensional and two dimensional arrays, initialization, passing arrays to a function, multi dimensional arrays, command line arguments.

**UNIT - III**

**STRINGS:** Defining and operations on strings, string variables declaration, reading, writing. Basics of functions, parameter passing, string handling functions.

**POINTERS:** Basic Concepts, pointer to pointer, passing pointers to a function, operations on pointers, pointer arithmetic, pointers and arrays, arrays of pointers, function pointers, dynamic memory allocation.

**UNIT - IV**

**STRUCTURES AND UNIONS:** Structure definition, initializing, assigning values, passing of structures as arguments, arrays of structures, pointers to structures, self reference to structures, unions, typedef, bit fields, sample programs.

**UNIT - V**

**CONSOLE AND FILE I/O:** File, types of files, file vs. console, file structure, file attributes, file operations, standard I/O, formatted I/O, sample programs.

**TEXT BOOKS:**

1. B. A. Fouruzan and R. F. Gilberg (2006), *Computer Science: A structured programming approach using C*, 3<sup>rd</sup> edition, Thomson Publications, New Delhi.
2. Yashawanth Kanethkar (2008), *Let us C*, 8<sup>th</sup> edition, Jones & Bartlett Publishers, India.

**REFERENCE BOOKS:**

1. Herbert Schildt (2000), *C: The Complete Reference*, 4<sup>th</sup> Edition, New Delhi, Osborne Mc Graw Hill.
2. B. W. Kernighan, Dennis M. Ritchie (1988), *The C Programming Language*, 2<sup>nd</sup> edition, Prentice Hall Software Series, India.
3. Stephen G. Kochan (2004), *Programming in C*, 3<sup>rd</sup> Edition, Pearson Education Private Limited.

**BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**  
**(Common to AE, ME & CE)**

Course Code: A1202

L T P C  
4 1 - 4

**UNIT - I**

**INTRODUCTION TO ELECTRICAL ENGINEERING:** Essence of electricity, conductors, semiconductors and insulators (elementary treatment only); electric field; electric current, potential and potential difference, electromotive force, electric power, ohm's law, basic circuit components, electromagnetism related laws, magnetic field due to electric current flow, force on a current carrying conductor placed in a magnetic field, faradays laws of electromagnetic induction. Types of induced EMF's, Kirchhoff's laws, simple problems.

**UNIT - II**

**ALTERNATING QUANTITIES:** Principle of AC voltages, waveforms and basic definitions, root mean square and average values of alternating currents and voltages, form factor and peak factor, phasor representation of alternating quantities, J operator and phasor algebra, analysis of AC circuits with single basic network element, single phase series circuits, single phase parallel circuits, single phase series parallel circuits, power in ac circuits.

**UNIT - III**

**NETWORK THEOREMS:** Superposition, reciprocity, thevenin's, norton's and maximum power transfer theorems with DC excitation.

**INSTRUMENTS:** Basic principle of indicating instruments - permanent magnet moving coil and moving iron instruments.

**CATHODE RAY OSCILLOSCOPE:** Principles of CRT (Cathode Ray Tube), deflection, sensitivity, electrostatic and magnetic deflection, applications of CRO - voltage, current and frequency measurements.

**UNIT - IV**

**DIODE AND ITS CHARACTERISTICS:** P-N junction diode, symbol, V-I characteristics, rectifiers - half wave, full wave and bridge rectifiers (simple Problems).

**UNIT - V**

**TRANSISTORS:** P-N-P and N-P-N junction transistor, CE, CB and CC transistor configurations.

**TEXT BOOKS:**

1. T. K. Nagasarkar, M. S. Suhkija (2007), Basic Electrical Engineering, 2<sup>nd</sup> Edition, Oxford University Press, New Delhi.
2. S. Salivahanan, N Suresh Kumar, A. Vallavaraj (2007), *Electronic Devices and Circuits*, Tata McGraw Hill, India.

**REFERENCE BOOKS:**

1. Sudhakar Shyam Mohan S P (2005), Network Analysis, 2<sup>nd</sup> Edition, Tata McGraw-Hill, New Delhi.
2. L. Thereja and A. K. Thereja (2008), A Text Book of Electrical Technology, First Edition, S. Chand & Company limited, New Delhi.
3. V. K. Mehta (2006), *Principles of Electrical Engineering and Electronics*, 2<sup>nd</sup> Edition, S. Chand & Company, New Delhi.
4. M. S. Naidu and S. Kamakshaiah (2011), *Basic Electrical Engineering*, 1<sup>st</sup> Edition, Mc Graw-Hill, New Delhi.
5. Kothari and Nagarath (2003), *Basic Electrical Engineering*, 2nd Edition, Tata Mc Graw-Hill, New Delhi.

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

**SYLLABUS:**

The following course content is prescribed for the English Language Laboratory sessions:

1. Introduction to phonetics
2. Sounds of English- vowels, diphthongs & consonants
3. Introduction to stress and intonation
4. Oral presentations- prepared
5. Oral Presentations- Extempore
6. Situational dialogues / role play
7. 'Just A Minute' sessions (JAM)
8. Information transfer
9. Telephoning skills
10. Describing objects, situations and people
11. Giving directions
12. Listening for specific information
13. Listening to record telephone conversations
14. Debate

**SUGGESTED SOFTWARE:**

- Cambridge advanced learners' English dictionary with cd.
- The Rosetta stone English library.
- Clarity pronunciation power – part I.
- Oxford advanced learner's compass, 7th Edition.
- Learning to speak English - 4 CDs.
- Vocabulary in use, Michael McCarthy, felicity o'den, Cambridge.
- Murphy's English grammar, Cambridge with CD.

**REFERENCE BOOKS:**

1. Suresh Kumar. E. & Sreehari P.A (2007), *Handbook for English Language Laboratories*, Cambridge University Press India Pvt. Ltd, New Delhi.
2. Mandal S. K (2006), *Effective Communication & Public Speaking*, Jaico Publishing House, New Delhi.
3. Grant Taylor (2004), *English Conversation Practice*, Tata McGraw Hill, New Delhi.
4. Balasubramanian .T (2000), *A text book of English Phonetics for Indian Student*, Mac Millan Publishers, India.
5. Kamalesh Sadanand, Susheela Punitha (2008), *Spoken English: A foundation Course: Parts 1 & 2*, New Delhi, Orient Longman Pvt. Ltd.

**LIST OF EXPERIMENTS:**

1. To write C programs for the following:
  - a) Sum of individual digits of a positive integer.
  - b) A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence.  
Write a C program to generate to generate the first n terms of the Fibonacci sequence.
2.
  - a) To write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user
  - b) To write a C program to calculate the following sum:  
Sum= $1+x^2/2!+x^4/4!$  ———— upto given 'n' terms.
  - c) To write a C program to find the roots of a quadratic equation.
3. To write C programs that uses both recursive and non-recursive functions
  - a) To find the factorial of a given number.
  - b) To find the GCD (greatest common divisor) of two given integers.
  - c) To solve Towers of Hanoi problem.
4. The total distance traveled by vehicle in 't' seconds is given by distance= $ut+1/2at^2$  where 'u' and 'a' are the initial velocity (m/sec) and acceleration (m/sec<sup>2</sup>). Write a C program to find the distance traveled at regular intervals of time given values of 'u' and 'a'. The program should provide the flexibility to the user to select his own time intervals and repeat the calculations for different values of 'u' and 'a'.
5. Using switch-case statement, write a C program that takes two operands and one operator from the user, performs the operation and then prints the answer. (consider operators +, -, \*, and %).
6. Write a C program to find the largest and smallest number in a list of integers.
7. Write a C program that uses functions to perform the following
  - a. Addition of Two Matrices
  - b. Multiplication of Two Matrices
8. Write a C program that uses functions to perform the following operations
  - a. To insert a sub-string in to given main string from a given position
  - b. To delete n characters from a given position in given string.
9. Write a C program to determine if the given string is a palindrome or not.
10.
  - a) Write a C program that displays the position or index in the string S where the string T begins, or -1 if S does not contain T.
  - b) Write a C program to count the lines, words and characters in a given text.
11. To write a C program
  - a) To generate Pascal's triangle
  - b) To construct a pyramid of numbers
12. To write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression  $1+x+x^2+x^3+...x^n$   
For example: if n is 3 and x is 5, then the program computes  $1+5+25+125$ . Print x, n, the sum. Perform error checking. For example the formula does not make sense for negative Exponents – if n is less than 0. Have your program print an error message if  $n < 0$ , then go back and read in the next pair of numbers of without computing the sum. Are any values of x also illegal? If so, test for them too.
13. To write a C program
  - a) To find the 2's compliments of a binary number.
  - b) To convert a Roman numeral to its decimal equivalent

14. To write a C program that uses functions to perform the following operations
  - a. Reading a complex number
  - b. Writing a complex number
  - c. Addition of 2 complex numbers
  - d. Multiplication of 2 complex numbers(Note: represent complex number using a structure)
  
15. To write a C program
  - a) To copy the contents from one file to another.
  - b) To reverse the first n characters in a file.  
(Note: the file name and n are specified on the command line)
  - c) To find the no. of characters, no. of words, no. of lines in a given file.

**REFERENCE BOOKS:**

1. Pradip Dey, Ghosh Manas (2009), *Programming in C*, Oxford University Press, USA.
2. E. Balaguruswamy (2009), *C and Data Structures*, 5<sup>th</sup> Edition, TMH publications, India.
3. M.K. Jain, S.R.K. Iyengar & R.K. Jain (2007), *Numerical Methods for Scientific and Engineering Computation*, 5<sup>th</sup> edition, New Age International Publishers, New Delhi.
4. Aitkinson, Han (2006), *Elementary Numerical Analysis*, 3<sup>rd</sup> Edition, John Wiley & Sons (Asia) Private Ltd., India.

**ADVANCED ENGINEERING DRAWING**  
**(Common to AE, ME & CE)**

Course Code: **A1304**

**L T P C**  
**- 2 3 2**

**UNIT - I**

**PROJECTIONS OF PLANES:** Projections of plane by auxiliary plane method, auxiliary inclined plane, auxiliary vertical plane.

**PROJECTIONS OF SOLIDS:** Projections of solids by auxiliary plane method, auxiliary inclined plane, auxiliary vertical plane.

**UNIT - II**

**SECTIONS AND SECTIONAL VIEWS:** Right regular solids – prism, cylinder, pyramid, cone - auxiliary views.

**DEVELOPMENT AND INTERPENETRATION OF SOLIDS:** Development of interpenetration of right regular solids.

**UNIT - III**

**INTERSECTION OF SOLIDS:** Intersection of cylinder vs cylinder, cylinder vs prism, cylinder vs cone, prism by another solid.

**TRANSFORMATION OF PROJECTIONS:** Conversion of isometric views to orthographic views –conventions.

**UNIT - IV**

**ISOMETRIC PROJECTIONS:** Principles of isometric projection - isometric scale – isometric views - conventions – isometric views of lines, plane figures, simple and compound solids – isometric projection of objects having non-isometric lines. Isometric projection of spherical parts.

**UNIT - V**

**PERSPECTIVE PROJECTIONS:** Perspective view: points, lines, plane figures and simple solids, vanishing point method and its alternative method, visual ray method and its alternative method.

**AN INTRODUCTION TO COMPUTER AIDED DRAFTING:** Generation of points, lines, curves, polygons, simple solids, dimensioning.

**TEXT BOOKS:**

1. N. D. Bhat (2006), *Engineering Drawing*, Charotar Publications, New Delhi.

**REFERENCE BOOKS:**

1. Venugopal (2010), *Engineering Drawing and Graphics*, 2<sup>nd</sup> edition, New age publications, New Delhi.
2. Johle (2009), *Engineering Drawing*, Tata Mc Graw Hill, New Delhi, India.
3. R.B. Choudary (2005), *Engineering graphics with Auto CAD*, Anuradha Publishers, New Delhi.



# **SYLLABI FOR III SEMESTER**

**MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**  
(Common to CE, CSE, IT, EEE & AE)

Course Code: A1013

L T P C  
4 - - 4

**UNIT - I**

**INTRODUCTION TO MANAGERIAL ECONOMICS:** Definition, Nature and Scope Managerial Economics, *Demand Analysis:* Demand Determinants, Law of Demand and its exceptions.

**ELASTICITY OF DEMAND:** Definition, Types, Measurement and Significance of Elasticity of Demand. Demand Forecasting, Factors governing demand forecasting, methods of demand forecasting (survey methods, statistical methods, expert opinion method, test marketing, controlled experiments, judgmental approach to demand forecasting).

**UNIT - II**

**THEORY OF 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), termination of Break Even Point (simple problems), Managerial Significance and limitations of BEA.

**UNIT - III**

**INTRODUCTION TO MARKETS AND PRICING STRATEGIES:** *Market structures:* Types of competition, Features of Perfect competition, Monopoly and Monopolistic Competition.

**PRICE DETERMINATION AND PRICE STATISTICS:** Price-Output Determination in case of Perfect Competition and Monopoly, Pricing Strategies.

**UNIT - IV**

**BUSINESS AND 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.

**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:** Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments).

**FINANCIAL ANALYSIS THROUGH RATIOS:** Computation, Analysis and Interpretation of Liquidity Ratios (Current Ratio and quick ratio), Activity Ratios (Inventory turnover ratio and Debtor Turnover ratio), Capital structure 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:**

1. Aryasri (2005), *Managerial Economics and Financial Analysis*, 2<sup>nd</sup> edition, Tata Mcgraw Hill, New Delhi, India.
2. Varshney, Maheswari (2003), *Managerial Economics*, Sultan Chand, New Delhi, India.

**REFERENCE BOOKS:**

1. Ambrish Gupta (2004), *Financial Accounting for Management*, Pearson Education, New Delhi, India.
2. Domnick Salvatore (2011), *Managerial Economics in a Global Economy*, 7<sup>th</sup> edition, Oxford University Press, USA.
3. Narayanaswamy (2005), *Financial Accounting, A Managerial Perspective*, Prentice Hall of India private Ltd, New Delhi, India.

**MECHANICS OF FLUIDS**  
**(Common to CE, ME & AE)**

Course Code: **A1307**

**L T P C**  
**3 1 - 4**

**UNIT - I**

**FLUID PROPERTIES AND FLUID STATICS:** Density, Specific weight, Specific gravity, viscosity, Vapour pressure, compressibility, Surface tension Pressure at a point, Pascal's law, pressure variation with temperature, density and altitude. Hydro static law, Piezometer, Simple and differential manometers, pressure gauges, total pressure and center of pressure plane, vertical and inclined surfaces. Buoyancy and stability of floating bodies.

**UNIT - II**

**FLUID KINEMATICS :** Stream line, path line, streak line, stream tube, classification of flows, steady, unsteady, uniform, non-uniform, laminar, turbulent, rotational, irrotational flows, one, two and three dimensional flows, Continuity equation in 3D flow, stream function, velocity potential function.

**FLUID DYNAMICS:** Surface and Body forces, Euler's and Bernoulli's equation derivation, Navier stokes equation (explanation only), Momentum equation - applications, Vortex Free and Forced. Forced vortex with free surface.

**UNIT - III**

**SIMILITUDE AND FLOW MEASUREMENT:** Flow through venturimeter and orifice meter, flow through notches and weirs Viscometers hot weir anemometers, pitot tube flow through nozzles, Characteristics of real fluids.

**REYNOLDS EXPERIMENT:** Darcy's equation, Minor losses - pipes in series, pipes in parallel, total energy line and hydraulic gradient line, numerical problems.

**UNIT - IV**

**BOUNDARY LAYER CONCEPTS:** Definition, thicknesses, characteristics along thin plate, laminar and turbulent layers (No Derivation) boundary layer in transition, separation of boundary layer submerged objects drag and lift.

**UNIT - V**

**FLOW OF COMPRESSIBLE FLUID:** Introduction, Thermodynamic relations, basic equations of compressible flow, Velocity of sound wave in a fluid for isothermal and adiabatic process, Mach number and its applications, Mac angle propagation of pressure waves and stagnation properties.

**TEXT BOOKS:**

1. P. N. Modi, S. M. Seth (2011), *Hydraulics and fluid mechanics including hydraulic machines*, 18<sup>th</sup> revised edition Standard Book House, India.
2. Yumus A. Cengel, John M. Cimbala (2010), *Fluid Mechanics (SI Units)*, 2<sup>nd</sup> edition, Tata McGraw hill education (P) Ltd, New Delhi, India.

**REFERENCE BOOKS:**

1. R. K. Bansal (2011), *A Textbook of Fluid Mechanics and Hydraulic Machines*, 10<sup>th</sup> edition, Laxmi Publications, New Delhi, India.
2. Frank M. White (2011), *Fluid Mechanics*, 7<sup>th</sup> edition, Tata McGraw Hill, New Delhi, India.
3. John F. Douglas (2005), *Fluid Mechanics*, 5<sup>th</sup> edition, Pearson Education Limited, New Delhi, India.

**UNIT - I**

**STONES, BRICKS AND TILES:** Properties of building stones, relation to their structural requirements. Classification of stones – Stone quarrying – precautions in blasting, Dressing of stone, Composition of good brick earth, various methods of manufacture of bricks. Comparison between clamp burning and kiln burning. Qualities of a good brick. Characteristics of good tile, manufacturing methods, Types of tiles. Use of Materials like aluminum, gypsum, glass and bituminous materials and their quality.

**UNIT - II**

**TIMBER, CEMENT AND ADMIXTURES:** WOOD: Structure, properties, Seasoning of timber. Classification of various types of woods used in buildings, Defects in timber. Alternative materials for wood, Galvanized Iron, Fiber-reinforced plastics, steel, Aluminum and plasticizers. Various types of cement and their properties. Various field and laboratory tests for Cement. Various ingredients of Cement concrete and their importance – various tests for concrete. Types of Admixtures, mineral and chemical and its uses.

**UNIT - III**

**MASONRY:** Types of Rubble and Ashlar masonry, cavity and masonry, English and Flemish bonds, partition walls.

**FOUNDATIONS:** Shallow foundations, Spread, combined strap and mat footings.

**UNIT - IV**

**BUILDING COMPONENTS:** Lintels, Arches, and Vaults-stair cases, types. Different types of floors, Concrete, Mosaic, Terrazo floors, pitched, flat and curved Roofs. Lean-to-Roof, Coupled Roofs, Collar Roofs, Trussed roofs, King and Queen Post Trusses. RCC Roofs, Madras Terrace/Shell Roofs. Panalled Door, paneled and glazed door, glazed windows, paneled windows, Swing ventilator, Fixed ventilator.

**UNIT - V**

**FORMWORK AND FINISHINGS:** Form work, Under Pinning and scaffolding. Damp proofing and water proofing, materials used. Plastering, pointing, white washing and distempering, Painting, Constituents of paint, Types of paints, Painting of new/old Wood, Varnish.

**TEXT BOOKS:**

1. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain (2005), *Building Construction*, Laxmi Publications (P) Ltd., New Delhi, India.
2. P. C. Varghese (2005), *Building materials*, Prentice Hall of India private Ltd, New Delhi, India.

**REFERENCE BOOKS:**

1. P. C. Varghese (2007), *Building Construction*, Prentice-Hall of India private Ltd, New Delhi, India.
2. S. K. Duggal (2008), *Building material* Second Edition, New Age International Publishers, New Delhi, India.

**UNIT - I**

**INTRODUCTION:** Overview of plane surveying (chain, compass and plane table), Objectives, Principles and classifications.

**UNIT - II**

**DISTANCES AND DIRECTION:** Distance measurement conventions and methods, use of chain and tape, Electronic distance measurements, Meridians, Azimuths and Bearings, declination, computation of angle.

**UNIT - III**

**LEVELING:** Concept and Terminology, Temporary and permanent Adjustments, method of leveling.

**CONTOURING:** Characteristics and Uses of contours- methods of conducting contour surveys and their plotting.

**UNIT - IV**

**COMPUTATION OF AREAS AND VOLUMES:** Area from field notes, computation of areas along irregular boundaries and area consisting of regular boundaries. Embankments and cutting for a level section and two level sections with and without transverse slopes, determination of the capacity of reservoir, volume of barrow pits.

**UNIT - V**

**THEODOLITE:** Theodolite, description, uses and adjustments temporary and permanent, Measurement of horizontal and vertical angles. Principles of Electronic Theodolite, Trigonometrically leveling, traversing.

**TEXT BOOKS:**

1. B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain (2005), *Surveying (Vol -1)*, Laxmi Publications (P) Ltd., New Delhi, India.
2. R. Subramanian (2007), *Surveying and leveling*, Oxford university press, New Delhi, India.

**REFERENCE BOOKS:**

1. Duggal S. K (2004), *Surveying (Vol 1 & 2)*, Tata McGraw Hill Publishing Co. Ltd., New Delhi, India.
2. Aror K. R (2004), *Surveying (Vol 1, 2 & 3)*, Standard Book House, New Delhi, India.
3. Chandra A. M (2007), *Plane Surveying*, New Age International Pvt. Ltd. Publishers, New Delhi, India.
4. Katekar (1988), *Surveying and Leveling*, Pune Vidyarthi Griha Prakashan, India.

**UNIT - I**

**SIMPLE STRESSES AND STRAINS:** Elasticity and plasticity, Types of stresses and strains, Hooke's law, Working stress, Factor of safety, Lateral strain, Poisson's ratio and volumetric strain, Elastic modules and the relationship between them, Bars of varying section, composite bars, Temperature stresses.

**STRAIN ENERGY:** Resilience, Gradual, sudden, impact and shock loadings, simple applications.

**UNIT - II**

**SHEAR FORCE AND BENDING MOMENT:** Definition of beam, Types of beams, Concept of shear force and bending moment, shear force and bending moment diagrams for cantilever, simply supported and overhanging beams subjected to point loads, U.D.L., uniformly varying loads and combinations, Point of contra flexure, Relation between shear force, bending moment and rate of loading at a section of a beam.

**UNIT - III**

**THIN CYLINDERS:** Thin seamless cylindrical shells, Derivation of formula for longitudinal and circumferential stresses, hoop, longitudinal and volumetric strains, changes in dia, and volume of thin cylinders, Thin spherical shells.

**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 - IV**

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

**UNIT - V**

**DEFLECTION OF BEAMS:** Uniform 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.

**TEXT BOOKS:**

1. S. Ramamrutham (2008), *Strength of Materials*, Dhanpat Rai Publications, New Delhi, India.
2. R. K. Bansal (2010), *Introduction to text book of Strength of materials*, Laxmi publications Pvt. Ltd., New Delhi.

**REFERENCE BOOKS:**

1. R. K. Rajput (1999), *Strength of materials*, S.Chand & Co, New Delhi, India.
2. R. Subramanian (2010), *Strength of materials*, Oxford university press, New Delhi, India
3. Bhavi Katti (2009), *Strength of Materials*, Vikas Publishing House Pvt Ltd, India.

**UNIT - I**

**CEMENTS AND AGGREGATES:** Portland cement, chemical composition, Hydration, Setting of cement, Structure of hydrate cement, Test on physical properties, Different grades of cement. Classification of aggregate, Particle shape and texture, Bond, strength and other mechanical properties of aggregate, Specific gravity, Bulk density, porosity, adsorption and 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 and coarse Aggregates, Gap graded aggregate, Maximum aggregate size.

**UNIT - II**

**FRESH CONCRETE AND HARDENED CONCRETE:** Workability, Factors affecting workability, Measurement of workability by different tests, Setting times of concrete, Effect of time and temperature on workability, Segregation and bleeding, Mixing and vibration of concrete, Steps in manufacture of concrete, Quality of mixing water. Water / Cement ratio, Abram's Law, Gel space ratio, Nature of strength of concrete, Maturity concept, Strength in tension and compression, Factors affecting strength, Relation between compression and tensile strength, Curing.

**UNIT - III**

**TESTING OF HARDENED CONCRETE:** Compression tests, Tension tests, Factors affecting strength, Flexure tests, Splitting tests, Non-destructive testing methods, codal provisions for NDT.

**ELASTICITY, CREEP AND SHRINKAGE:** Modulus of elasticity, Dynamic modulus of elasticity, Poisson's ratio, Creep of concrete, Factors influencing creep, Relation between creep and time, Nature of creep, Effects of creep, Shrinkage, types of shrinkage.

**UNIT - VI**

**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.

**UNIT - V**

**SPECIAL CONCRETES:** Light weight aggregates, Light weight aggregate concrete, Cellular concrete, No-fines concrete, High density concrete, Fibre reinforced concrete, Different types of fibres, Factors affecting properties of F.R.C, Applications, Polymer concrete, Types of Polymer concrete, Properties of polymer concrete, Applications, High performance concrete, Self consolidating concrete, SIFCON.

**TEXT BOOKS:**

1. M. S. Shetty (2004), *Concrete Technology*, S. Chand & Co, New Delhi, India.
2. M. L. Gambhir (2004), *Concrete Technology*, Tata McGraw- Hill Publishers, New Delhi, India.

**REFERENCE BOOKS:**

1. Adam M. Neville (1996), *Properties of Concrete*, 4th edition, Low price Edition, John Wiley & Sons, New Delhi.
2. A. R. Santha Kumar (2007), *Concrete Technology*, Oxford University Press, New Delhi, India.

**LIST OF EXPERIMENTS:**

1. Tension test
2. Bending test on (Steel / Wood) Cantilever beam.
3. Bending test on simple support beam.
4. Torsion test
5. Hardness test
6. Spring test
7. Compression test on wood or concrete
8. Impact test
9. Shear test
10. Verification of Maxwell's Reciprocal theorem on beams.
11. Use of electrical resistance strain gauges
12. Continuous beam – deflection test.

**LIST OF MAJOR EQUIPMENT:**

1. UTM for conducting tension test on rods
2. Steel beam for flexure test
3. Wooden beam for flexure test
4. Torsion testing machine
5. Brinnell's / Rock well's hardness testing machine
6. Setup for spring tests
7. Compression testing machine
8. Izod Impact machine
9. Shear testing machine
10. Beam setup for Maxwell's theorem verification.
11. Continuous beam setup
12. Electrical Resistance gauges.



**LIST OF EXPERIMENTS:**

1. Survey of an area by chain survey (closed traverse) & Plotting
2. Chaining across obstacles
3. Determination of distance between two inaccessible points with compass.
4. Surveying of a given area by prismatic compass (closed traverse) and plotting after Adjustment.
5. Radiation method, intersection methods by plane Table survey
6. Two point and three point problems in plane table survey
7. Traversing by plane table survey
8. Fly leveling (differential leveling)
9. An exercise of L.S and C.S and plotting
10. Two exercises on contouring.

**LIST OF EQUIPMENTS:**

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.

# **SYLLABI FOR IV SEMESTER**

**ELECTRICAL TECHNOLOGY  
(Common to CE, ME & AE)**

Course Code: A1215

L	T	P	C
3	1	-	4

**UNIT - I**

**DC GENERATORS:** Principle of operation of DC Generator, EMF equation, Types of generators, Magnetization and load characteristics of DC generators.

**DC MOTORS:** DC Motors, Types of DC Motors, Characteristics of DC motors, 3-point starters for DC shunt motor, Losses and efficiency, Swinburne's test, Speed control of DC shunt motor, Flux and Armature voltage control methods.

**UNIT - II**

**TRANSFORMERS:** Principle of operation of single phase transformer, types, Constructional features, Phasor diagram on No Load and Load Equivalent circuit.

**PERFORMANCE OF TRANSFORMERS:** Losses and Efficiency of transformer and Regulation - OC and SC tests, Predetermination of efficiency and regulation (Simple Problems).

**UNIT - III**

**THREE PHASE INDUCTION MOTORS:** Principle of operation of three-phase induction motors, Slip ring and Squirrel cage motors, Slip-Torque characteristics, Efficiency calculation, Starting methods.

**UNIT - IV**

**ALTERNATORS:** Alternators, Constructional features, Principle of operation, Types, EMF Equation, Distribution and Coil span factors, Predetermination of regulation by Synchronous Impedance Method, OC and SC tests.

**SYNCHRONOUS MOTOR:** Principle of operation, Numerical problems.

**UNIT - V**

**SINGLE PHASE MOTORS:** Principle of operation, Shaded pole motors, Capacitor motors, AC servomotor, AC tachometers, Synchronos, Stepper Motors, Characteristics.

**TEXT BOOKS**

1. B. L. Theraja, A. K. Theraja (2010), *Electrical Technology*, 3<sup>rd</sup> edition, S. Chand Publishers, New Delhi, India.
2. J. B. Gupta (2006), *Electrical Machines*, 14<sup>th</sup> edition, S. K. Publishers, New Delhi, India.

**REFERENCE BOOKS**

1. V. K. Mehta (2002), *Principles of Electrical Engineering*, S. Chand Publications, New Delhi, India.
2. I. J. Nagarath, D. P. Kothari (2004), *Theory and Problems of basic electrical engineering*, 4<sup>th</sup> edition, Prentice Hall of India, New Delhi, India.
3. M. S. Naidu, S. Kamakshaiah (2002), *Principles of Electrical Engineering*, 6<sup>th</sup> edition, Tata McGraw-Hill Publications, New Delhi, India.

**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 FAILURES:** Introduction, Various Theories of failures like Maximum Principal Stress theory, Maximum Principal strain theory, Maximum shear stress theory, Maximum strain energy theory and Maximum shear strain energy 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 and Gordon formula, Long columns subjected to eccentric loading, Secant formula, Empirical formulae, Straight line formula and Prof. Perry's formula. Laterally loaded struts – subjected to uniformly distributed and concentrated loads, Maximum B.M. and stress due to transverse and lateral loading.

**UNIT - III**

**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, Torsion moment of resistance, Polar section modulus, Power transmitted by shafts, Combined bending and Torsion and end thrust, Design of shafts according to theories of failure.

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

**UNIT - IV**

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

**UNIT - V**

**ANALYSIS OF PIN-JOINTED PLANE FRAMES :** Determination of Forces in members of plane, pin-jointed, perfect trusses by (i) method of joints and (ii) method of sections. Analysis of various types of cantilever and simply supported trusses by method of joints and method of sections.

**TEXT BOOKS:**

1. R. K. Bansal (2010), *A Text book of Strength of materials*, Laxmi Publications (P) Ltd., New Delhi, India.
2. R. Subramanian (2010), *Strength of Materials*, Oxford University Press, New Delhi, India.

**REFERENCE BOOKS:**

1. R. S. Khurmi (2009), *strength of Materials*, s. chand, New Delhi, India.
2. S. Ramamrutham (2008), *Strength of Materials*, Dhanpat Rai Publications, New Delhi, India.
3. Bhavi Katti (2009), *Strength of Materials*, Vikas Publishing House Pvt Ltd, New Delhi, India.
4. B. S. Basavarajaiah (2010), *Strength of Materials*, Taylor Francis, USA.

**UNIT - I**

**PROPPED CANTILEVERS:** Analysis of propped cantilevers-shear force and bending moment diagrams, Deflection of propped cantilevers.

**UNIT - II**

**FIXED BEAMS:** Introduction to statically indeterminate beams with U.D. 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-Deflection of fixed beams effect of sinking of support, effect of rotation of a support.

**CONTINUOUS BEAMS:** Introduction, Clapeyron's theorem of three moments- Analysis of continuous beams with constant moment of inertia with one or both ends fixed-continuous beams with overhang, continuous beams with different moment of inertia for different spans-Effects of sinking of supports-shear force and Bending moment diagrams.

**UNIT - III**

**MOVING LOADS:** 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.

**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-Deflections of simple beams and pin jointed trusses.

**UNIT - IV**

**INFLUENCE LINES:** 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 single point load, U.D. load longer than the span, U.D. load shorter than the span- Influence lines for forces in members of Pratt and Warren trusses.

**SLOPE-DEFLECTION METHOD:** Introduction, derivation of slope deflection equation, application to continuous beams with and without settlement of supports.

**UNIT - V**

**INDETERMINATE STRUCTURAL ANALYSIS:** Indeterminate Structural Analysis, Determination of static and kinematic indeterminacies, Solution of trusses with up to two degrees of internal and external indeterminacies, Castigliano's theorem.

**TEXT BOOKS:**

1. V. N. Vazirani, M. M. Ratwani (1997), *Analysis of Structures* Vol. I and Vol. II, Khanna Publications, New Delhi.
2. S. S. Bhavikatti (2009), *Structural Analysis*, vol. 1, Vikas publishing House Pvt. Ltd, New Delhi, India.

**REFERENCE BOOKS:**

1. T. S. Thandavamoorthy (2011), *Analysis of Structures*, Oxford University Press, New Delhi, India.
2. Gupta, Pandit, Gupta (2008), *Theory of Structures*, Tata McGraw Hill Publishing Co.Ltd. , New Delhi, India.
3. B. D. Nautiyal (2001), *Introduction to structural analysis*, New age international publishers, New Delhi, India.

**UNIT - I**

**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.

**UNIT - II**

**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 - III**

**OPEN CHANNEL FLOW - I:** 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.

**OPEN CHANNEL FLOW - II:** 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 - IV**

**HYDRAULIC TURBINES - I:** Layout of a typical Hydropower installation, Heads and efficiencies, classification of turbines- pelton wheel, Francis turbine and Kaplan turbine working, working proportions, velocity diagram, hydraulic design, draft tube, theory and function efficiency.

**HYDRAULIC TURBINES - II:** Governing of turbines, surge tanks, unit and specific turbines, unit speed, unit quantity, unit power and specific speed performance characteristics, geometric similarity, cavitations.

**UNIT - V**

**CENTRAIFUGAL PUMPS:** Pump installation details, classification, Manometric head, minimum starting speed, losses and efficiencies, specific speed multistage pumps, pumps in parallel, performance of pumps, characteristic curves, NPSH-cavitations.

**TEXT BOOKS:**

1. Modi, Seth (2004), *Fluid Mechanics, Hydraulic and Hydraulic Machines*, Standard book house, New Delhi, India.
2. Dr. R. K. Bansal (2002), *A text of Fluid mechanics and hydraulic machines*, Laxmi Publications (P) Ltd., New Delhi, India.

**REFERENCE BOOKS:**

1. R. S. Khurmi (2004), *A text book of Hydraulics, Fluid Mechanics and Hydraulic machines*, S. Chand, New Delhi, India.
2. K. R. Sharma (2003), *Fluid Mechanics and Machinery*, Anuradha Publications, New Delhi, India.
3. Banga, Sharma (1994), *Hydraulic Machines*, Khanna Publishers, New Delhi, India.

**UNIT - I**

**BUILDING BYELAWS AND REGULATIONS:** Introduction, Terminology, Objectives of building byelaws, Floor area ratio (FAR) and Floor space Index (FSI), Principles underlying building byelaws, classification of bye buildings, Open space requirements, built up area limitations, Height of Buildings, Wall thickness, lighting and ventilation requirement.

**UNIT - II**

**RESIDENTIAL BUILDINGS:** Minimum standards for various parts of buildings, requirements of different rooms and their grouping, characteristics of various types of residential buildings.

**PUBLIC BUILDINGS:** Planning of Educational institutions, hospitals, dispensaries, Office buildings, banks, industrial buildings, hotels and motels, buildings for recreation.

**UNIT - III**

**PLANNING OF CONSTRUCTION PROJECTS:** Scheduling and monitoring Bar chart, CPM and PERT Network planning, Computation of times and floats their significance.

**UNIT - IV**

**SIGN CONVENTIONS AND BONDS:** Brick, Stone, Plaster, Sand filling, Concrete, Glass, Steel, Cast iron, Copper alloys, Aluminum alloys etc., Lead, Zinc, tin, white lead etc., Earth, Rock, Timber and Marble. English bond & Flemish bond odd and even courses for one, one and half, two and two and half brick walls in thickness at the junction of a corner.

**DOORS WINDOWS, VENTILATORS AND ROOFS:** Panalled Door-paneled and glazed door, glazed windows – paneled Windows, Swing ventilator and fixed ventilator, Couple roof and Collar roof, King Post truss and Queen post truss.

**UNIT - V**

**SLOPED AND FLAT ROOF BUILDINGS:** Given line diagram with specification to draw plan, section and elevation.

**TEXT BOOKS:**

1. Dr. B. C. Punmia, Khandelwal (2002), *PERT and CPM, Project planning and control*, Laxmi publications, New Delhi, India.
2. Dr. N. Kumaraswamy (1992), *Building Planning and Drawing*, Tata McGraw-Hill, New Delhi, India.

**REFERENCE BOOKS:**

1. R. L. Peurifoy et al (2010), *Construction Planning, Equipment and methods*, Tata McGraw- Hill Publications, New Delhi, India.
2. B. N. Dutta (2000), *Estimating and Costing*, UBS publishers, New Delhi, India.

**UNIT - I**

**COMPASS TRAVERSING:** Introduction, Definition, Principles of compass surveying, Traversing, Method of traversing, check on closed traverse, Types of compass, whole circle Bearing, quadrant bearing, Fore Bearing and back Bearing, Magnetic Declination, Included Angle, Local Attraction

**UNIT - II**

**PLANE TABLE SURVEYING:** Principle, Accessories of Plane Table, orientation, setting up over a station, Methods of plane Tabling, Errors and Precautions, Advantages and Disadvantages

**UNIT - III**

**TACHEOMETRIC SURVEYING:** Stadia and tangential methods of Tachometry. Distance and Elevation formulae for Staff Vertical position.

**UNIT - IV**

**INTRODUCTION TO GEODETIC SURVEYING:** Total Station and Global positioning system, Introduction to Geographic information system (GIS).

**UNIT - V**

**CURVES:** Types of curves, design and setting out simple and compound curves.

**TEXT BOOKS:**

1. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain (2005), *Surveying, Vol 1, 2 & 3*, Laxmi Publications (P) Ltd., New Delhi, India.
2. Duggal S. K (2004), *Surveying, Vol 1 & 2*, Tata McGraw- Hill Publishing Co. Ltd. , New Delhi, India.

**REFERENCE BOOKS:**

1. Arthur R. Benton, Philip J. Taety (2000), *Elements of Plane Surveying*, Tata McGraw- Hill, New Delhi, India.
2. R. Subramanian (2007), *Surveying and leveling* Oxford university press, New Delhi, India.
3. Candra A. M (2007), *Plane Surveying*, New Age International Pvt. Ltd, New Delhi, India.
4. Arora K. R (2004), *Surveying, Vol. 1, 2 & 3*, Standard Book House, New Delhi, India.



**B. Tech. CIVIL IV SEMESTER**

**FLUID MECHANICS AND HYDRAULIC MACHINERY LAB  
(Common to CE & ME)**

Course Code: **A1112**

**L T P C**  
**- - 3 2**

**LIST OF EXPERIMENTS:**

1. Calibration of Venturimeter & Orifice meter
2. Determination of Coefficient of discharge for a small orifice by a constant head method.
3. Determination of Coefficient of discharge for an external mouth piece by variable head method.
4. Calibration of contracted Rectangular Notch and /or Triangular Notch
5. Determination of Coefficient of loss of head in a sudden contraction and friction factor.
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. Efficiency test on centrifugal pump.
12. Efficiency test on reciprocating pump.

**LIST OF EQUIPMENT:**

1. Venturimeter setup.
2. Orifice meter setup.
3. Small orifice setup.
4. External mouthpiece setup.
5. Rectangular and Triangular notch setups.
6. Friction factor test setup.
7. Bernoulli's theorem setup.
8. Impact of jets.
9. Hydraulic jump test setup.
10. Pelton wheel and Francis turbines.
11. Centrifugal and Reciprocating pumps.

**LIST OF EXPERIMENTS:**

1. Study of theodolite in detail - practice for measurement of horizontal and vertical angles.
2. Measurement of horizontal angles by method of repetition and reiteration.
3. Trigonometric Leveling - Heights and distance problem (Two Exercises)
4. Heights and distance using Principles of tacheometric surveying (Two Exercises)
5. Curve setting – different methods. (Two Exercises)
6. Setting out works for buildings & pipe lines.
7. Determination of area using total station
8. Traversing using total station
9. contouring using total station
10. Determination of remote height using total station
11. State-out using total station
12. Distance, gradient, Diff, height between tow inaccessible points using total stations

**LIST OF EQUIPMENT:**

1. Theodolites and leveling staffs.
2. Tachometers.
3. Total station.

# **SYLLABI FOR V SEMESTER**

**UNIT - I**

**INTRODUCTION OF LIMIT STATE DESIGN:** Concepts of limit state design, Basic statistical principles, Characteristic loads, Characteristic strength, Partial load and safety factors, representative stress, strain curves for cold worked deformed bars and mild steel bars. Assumptions in limit state design, block parameters, limiting moment of Resistance.

**UNIT - II**

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

**UNIT - III**

**SHEAR, TORSION AND BOND:** Limit state analysis and design of section for shear and torsion, concept of bond, anchorage and development length, I.S. code provisions.

**DESIGN OF BEAMS:** Design examples in simply supported and continuous beams, detailing. Limit state design for serviceability for deflection, cracking and codal provision.

**UNIT - IV**

**AXIAL LOADS:** Short and Long columns under axial loads, uniaxial bending and biaxial bending, Braced and un-braced columns, I S Code provisions.

**FOOTINGS:** Different types of footings, Design of isolated, square, rectangular and circular footings.

**UNIT - V**

**SLABS:** Design of Two way slabs, one way slab and continuous slab Using IS Coefficients. Limit state design for serviceability for deflection, cracking and codal provision.

**TEXT BOOKS:**

1. S. Unnikrishna Pillai, Devdas Menon (2003), *Reinforced concrete design*, Tata McGraw Hill, New Delhi, India.
2. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain (2003), *Limit State Design*, Laxmi Publications Pvt. Ltd., New Delhi, India.

**REFERENCE BOOKS:**

1. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain (1992), *Reinforced concrete structures, Vol.1*, Laxmi, publications Pvt. Ltd., New Delhi, India.
2. N. Krishna Raju, R. N. Pranesh (2012), *Reinforced concrete design*, New age International Publishres, New Delhi, India.
3. P. C. Varghese (2004), *Limit state design of reinforced concrete*, Prentice Hall of India, New Delhi, India.

**UNIT - I**

**INTRODUCTION:** Soil formation, soil structure and clay mineralogy, Adsorbed water, Mass volume relationship, Relative density.

**INDEX PROPERTIES OF SOILS:** Grain size analysis - Sieve and Hydrometer methods, consistency limits and indices, I.S. Classification of soils

**UNIT - II**

**PERMEABILITY:** Soil water - capillary rise, flow of water through soils, Darcy's law, permeability - Factors affecting laboratory determination of coefficient of permeability, Permeability of layered systems.

**SEEPAGE THROUGH SOILS:** Total, neutral and effective stresses quick sand condition, Seepage through soils, Flow nets: Characteristics and Uses.

**UNIT - III**

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

**CONSOLIDATION:** Stress history of clay; e-p and e-log p curves, magnitude and rate of 1-D consolidation, Terzaghi's Theory.

**UNIT - IV**

**STRESS DISTRIBUTION IN SOILS:** Boussinesq's and Westergaard's theories for point loads and areas of different shapes, Newmark's influence chart.

**UNIT - V**

**SHEAR STRENGTH OF SOILS:** Mohr and Coulomb Failure theories, Types of laboratory strength tests - strength tests based on drainage conditions, Shear strength of sands, Critical Void Ratio, Liquefaction and shear strength of clays.

**TEXT BOOKS:**

1. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain (2010), *Soil Mechanics and Foundation*, Laxmi publications Pvt. Ltd., New Delhi, India.
2. K. R. Arora (1989), *Soil Mechanics and Foundation Engg*, Standard Publishers and Distributors, New Delhi, India.

**REFERENCE BOOKS:**

1. Gopal Ranjan, A. S. R. Rao (2007), *Basic and Applied Soil Mechanics*, New age International Pvt. Ltd, New Delhi, India.
2. C. Venkataramiah (2002), *Geotechnical Engineering*, New Age International Pvt. Ltd, New Delhi, India.
3. T. W. Lambe, Whitman (1969), *Soil Mechanics*, Mc-Graw Hill Publishing Company, New York.

**UNIT - I**

**INTRODUCTION:** 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. Abstraction from rainfall, evaporation - factors affecting evaporation, measurement of evaporation and evapotranspiration, Infiltration - factors affecting infiltration, measurement of infiltration, infiltration indices. Runoff - components of runoff, factors affecting runoff, stream gauging, effective rainfall, separation of base flow.

**UNIT - II**

**UNIT HYDROGRAPH:** Definition, and limitations of applications of Unit hydrograph, derivation of Unit Hydrograph, S-hydrograph, IUH, Synthetic Unit Hydrograph. Classification of canals, design of Irrigation canals by Kennedy's and Lacey's theories, balancing depth of cutting, canal lining.

**UNIT - III**

**GROUND WATER:** Ground water - Occurrence, types of aquifers, aquifer parameters, porosity, specific yield, permeability, transmissivity and storage coefficient, types of wells, Darcy's law, radial flow to wells in confined and unconfined aquifers.

**IRRIGATION:** 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, preparation of land for Irrigation, standards of quality for Irrigation water.

**UNIT - IV**

**DESIGN DISCHARGE:** Computation of design discharge - rational formula, SCS method, flood frequency analysis, Gumbel's method, log Pearson III method, basic concepts of flood routing - hydraulic and hydrologic routing, channel and reservoir routing.

**UNIT - V**

**SOIL WATER:** Soil-water plant relationship, vertical distribution of soil moisture, soil moisture constants, soil moisture tension, consumptive use, estimation of consumptive use, Duty and delta, factors affecting duty, depth and frequency of Irrigation, irrigation efficiencies.

**TEXT BOOKS:**

1. Punmia, Lal (2010), *Irrigation and water power engineering*, Laxmi publications Pvt. Ltd., New Delhi, India.
2. P. N. Modi (2008), *Irrigation and Water Resources and Water Power*, Standard Book House, New Delhi, India.

**REFERENCE BOOKS:**

1. K. R. Arora (2011), *Irrigation water Power and Water Resources Engineering*, Standard Publishers, New Delhi, India.
2. G. L. Asawa (2011), *Irrigation and water Resources Engineering*, New Age International, New Delhi, India.
3. R. K. Sharma, J. K. Sharma (2012), *Irrigation Engineering*, S. Chand, New Delhi, India.

**UNIT - I**

**ARCHES:** Three hinged arches, Elastic theory of arches, Eddy's theorem, Determination of horizontal thrust, bending moment, normal thrust and radial shear, effect of temperature.

**TWO HINGED ARCHES:** Determination of horizontal thrust bending moment, normal thrust and radial shear, Rib shortening and temperature stresses, tied arches, fixed arches (No analytical question).

**UNIT - II**

**ANALYSIS OF CONTINUOUS BEAMS:** Including settlement of supports and single bay portal frames with side sway by Kani's method.

**UNIT - III**

**MOMENT DISTRIBUTION METHOD:** Stiffness and carry over factors, Distribution factors, Analysis of continuous beams with and without sinking of supports, storey portal frames, including Sway-Substitute frame analysis by two cycles.

**SLOPE DEFLECTION METHOD:** Derivation of slope deflection equation of supports application to continuous beams including settlement of supports single bay, single sway, portal frame including side sway.

**UNIT - IV**

**FLEXIBILITY METHODS:** Introduction, application to continuous beams including support settlements.

**UNIT - V**

**STIFFNESS METHOD:** Introduction, application to continuous beams including support settlements.

**TEXT BOOKS:**

1. Vazrani, Ratwani (1983), *Analysis of structures*, Khanna Publications, New Delhi, India.
2. R. S. Khurmi (2010), *Theory of Structures*, S. Chand, New Delhi, India.

**REFERENCE BOOKS:**

1. Ramamuratam (1982), *Theory of structures*, Dhanpat Rai publications, New Delhi, India.
2. T. S. Thandavamoorthy (2011), *Analysis of Structures*, Oxford University Press, New Delhi, India.
3. S. S. Bhavikatti (2011), *Structural Analysis*, 4<sup>th</sup> Edition, Vikas publishing house Pvt. Ltd., New Delhi, India.
4. Gupta, Pandit, Gupta (2008), *Theory of Structures*, Tata McGraw Hill Publishing Co.Ltd., New Delhi, India.
5. B. D. Nautiyal (2001), *Introduction to structural analysis*, new age international publishers, New Delhi, India.

**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, Chrochite, Galena, Pyrolusite, Graphite, Magnesite, and Bauxite.

**UNIT - III**

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

**STRUCTURAL GEOLOGY:** Out crop, strike and dip study of common geological structures associating with the rocks such as folds, faults unconformities, and joints, their importance.

**UNIT - IV**

**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 AND RESERVOIRS:** Types of dams and bearing of Geology of site in their selection, Geological Considerations in the selection of a dam site. Factors contributing to the success of a reservoir, Geological factors influencing water tightness and life of reservoirs.

**TUNNELS:** Purpose of tunneling, Effects of Tunneling on the ground, Role of Geological Considerations (ie. lithological, structural and ground water) in tunneling over break and lining in tunnels.

**TEXT BOOKS:**

1. N. Chennkesavulu (2005), *Engineering Geology*, Mc-Millan India Ltd., New Delhi, India.
2. D. Venkat Reddy (2011), *Engineering geology*, Vikas Publications, New Delhi, India.

**REFERENCE BOOKS:**

1. K. V. G. K. Gokhale (2005), *Principles of engineering Geology*, BS Publications, New Delhi, India.



**UNIT - I**

**INTRODUCTION:** General items of work in Building, Standard Units Principles of working out quantities for detailed and abstract estimates, approximate method of Estimating.

**UNIT - II**

**ESTIMATES OF BUILDINGS:** Detailed Estimates of Buildings, Earthwork for roads and canals.

**UNIT - III**

**RATE ANALYSIS:** Working out data for various items of work over head and contingent charges. Reinforcement bar bending and bar requirement schedules.

**UNIT - IV**

**CONTRACTS:** Types of contracts, Contract Documents, Conditions of contract.

**UNIT - V**

**VALUATION OF BUILDINGS:** Standard specifications for different items of building construction.

**TEXT BOOKS:**

1. B. N. Dutta (2000), *Estimating and Costing*, UBS publishers, New Delhi, India.
2. G. S. Birdie (1982), *Estimating and Costing*, Dhanpat Rai publications, New Delhi, India.

**REFERENCE BOOKS:**

1. M. Chakraborti (2010), *Estimation Costing and Specifications*, Laxmi publications, New Delhi, India.
2. S. C. Rangwala, K. S. Rangwala (1990), *Elements of Estimating and Costing*, Charotar Publications, India

**LIST OF EXPERIMENTS:**

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

**LIST OF EQUIPMENT:**

1. Casagrande's liquid limit apparatus.
2. Apparatus for plastic and Shrinkage limits
3. Field Density apparatus for
  - a. Core cutter method
  - b. Sand Replacement method
4. Set of sieves: 4.75mm, 2mm, 1mm, 0.6mm, 0.42mm, 0.3mm, 0.15mm, and 0.075mm.
5. Hydrometer
6. Permeability Apparatus for
  - a. Constant Head test
  - b. Variable Head test
7. Universal Auto compactor for I.S light and heavy compaction tests.
8. Apparatus for CBR test
9. Sampling tubes and sample extractors.
10. Tons loading frame with proving rings of 0.5 tons and 5 tons capacity
11. One dimensional consolidation test apparatus with all accessories.
12. Tri-axial cell with provision for accommodating 38 mm dia specimens.
13. Box shear test apparatus
14. Laboratory vane shear apparatus.
15. Hot Air ovens (Range of Temperature 50-150<sup>0</sup>C)
16. Moisture cans – 2 dozens.
17. Electronic balances pf 500 g capacity with 0.01g least count and 5 kg capacity with least count of 1gm
18. Measuring Jars - 1000CC - 6  
- 100CC - 4
19. Mercury - 500 g
20. Rammers - 2  
Crow bars - 2

**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. Interpretation and drawing of sections for geological maps showing tilted beds, faults, uniformities etc.
4. Simple Structural Geology problems.

# **SYLLABI FOR VI SEMESTER**

**INDUSTRIAL MANAGEMENT AND PSYCHOLOGY**  
(Common to CE, EEE & ME)

Course Code: A1015

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4 - - 4

**UNIT - I**

**CONCEPTS OF MANAGEMENT AND ORGANISATION:** Functions of management, evolution of management thought, Taylor's scientific management, fayol's principles of management, Hertzberg's Maslow's hierarchy of human needs, systems approach to management.

**DESIGNING ORGANISATIONAL STRUCTURES:** Basic concepts related to organization, departmentation and decentralization, types of mechanistic and organic structures of organisation (line organization, line and staff organization, functional organization).

**UNIT - II**

**PLANT LOCATION:** Definition, factors affecting the plant location, comparison of rural and urban sites, methods for selection of plant- matrix approach. Plant layout - definition, objectives, types of production, types of plant layout, various data analyzing forms travel chart.

**WORK STUDY:** Definition, objectives, method study - definition, objectives, steps involved- various types of associated charts, difference between micromotion and memomotion studies. Work measurement- definition, time study, steps involved, equipment, different methods of performance rating, allowances, standard time calculation. Work Sampling - definition, steps involved, standard time calculations, differences with time study.

**UNIT - III**

**INTRODUCTION TO PERT / CPM :** Project management, network modeling-probabilistic model, various types of activity times estimation, programme evaluation review techniques, critical path, probability of completing the project, deterministic model, critical path method (CPM), critical path calculation, crashing of simple of networks.

**INSPECTION AND QUALITY CONTROL:** Types of inspections, statistical quality control, techniques, variables and attributes, assignable and non assignable causes, variable control charts, and R charts, attributes control charts, p charts and c charts. Acceptance sampling plan, single sampling and double sampling plans, OC curves. Introduction to TQM - quality circles, ISO 9000 series procedures.

**UNIT - IV**

**MATERIALS MANAGEMENT:** Objectives, inventory functions, types, associated costs, inventory classification techniques-ABC and VED analysis. Inventory control systems, continuous review system, periodical review system. Stores management and stores records. Purchase management, duties of purchase of manager, associated forms.

**INTRODUCTION TO HUMAN RESOURCE MANAGEMENT:** Functions of HRM, job evaluation, different types of evaluation methods. Job description, merit rating, difference with job evaluation, different methods of merit ratings, wage incentives, different types of wage incentive schemes. Marketing, marketing vs. selling, marketing mix, product life cycle.

**UNIT - V**

**INDUSTRIAL PSYCHOLOGY:** Definition and concept, industrial psychology vs. personnel management, aims and objectives of industrial psychology, scope of industrial psychology, individual and group, individual differences in behavior, group dynamics, theory x and y, Hawthorne experiment, morale, motivation, working environmental conditions, industrial fatigue.

**TEXT BOOKS:**

1. O. P. Khanna (2004), *Industrial Engineering and Management*, Dhanpat Rai, New Delhi.

**REFERENCE BOOKS:**

1. Stoner, Freeman (2005), *Gilbert, Management*, 6<sup>th</sup> edition, Pearson Education, New Delhi.
2. Panner Selvam (2004), *Production and Operations Management*, Prentice Hall of India, New Delhi.
3. Ralph M. Barnes (2004), *Motion and Time Studies*, John Wiley and Sons.
4. L. S. Srinath (2000), *PERT / CPM*, affiliate East-West Press, New Delhi.
5. Gary Dessler (2002), *Human Resource Management*, Pearson Education Asia, India.

**UNIT - I**

**MATERIALS:** Making iron and steel, types of structural steel, mechanical properties of steel, concepts of plasticity, yield strength. Concepts of limits state design, limits state, design strength, deflection limits, serviceability and stability check.

**UNIT - II**

**CONNECTIONS:** Bolted connections and riveted connections, IS -800-2007- specifications, Design strength, efficiency of joint and prying action. Welded connections, types of welded joints, specifications and design requirements. Design of eccentric connection, framed, stiffened and seat connection. Design of tension members, Design strength, Design procedure, splice lug- angle.

**UNIT - III**

**DESIGN OF COMPRESS:** Design of compress in members, buckling class, slenderness ratio, strength design, laced, battened columns, splice column base, slab.

**DESIGN OF BEAMS:** Plastic moment, bending and shear strength / buckling, built-up section, laterally /supported beams.

**UNIT - IV**

**DESIGN OF ROOF TRUSSES:** Design of roof trusses type loads, purlin design, design of joints and end bearings.

**UNIT - V**

**DESIGN OF PLATE GIRDERS:** Elements, economical depth, design of main section, connections between web flange, design of stiffness bearing, intermediate stiffeners, design of websplice at flange splice.

**TEXT BOOKS:**

1. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain (2011), *Design of steel structures*, S. Chand, New Delhi, India.
2. N. Subramanian (2009), *Design of Steel Structures*, Oxford University Press, New Delhi, India.

**REFERENCE BOOKS:**

1. S. K. Duggal (2010), *Limit state Design of Steel Structures*, Tata McGraw Hill, New Delhi, India.
2. P. Dayartnam (2010), *design of Steel Structures*, S. Chand, New Delhi, India.
3. Vazirani, Ratwani (2010), *Design and analysis of steel structures*, Khanna Publications, New Delhi, India.
4. S. S. Bhavikatti (2009), *Design of Steel Structures (as per IS 800-2007)*, I.K. International Pvt. Ltd, New Delhi, India.

**UNIT - I**

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

**UNIT - II**

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

**UNIT - III**

**EARTH PRESSURE THEORIES:** Rankine's theory of earth pressure, earth pressures in layered soils, Coulomb's earth pressure theory, and Culmann's graphical method

**RETAINING WALLS:** Types of retaining walls, stability of retaining walls.

**UNIT - IV**

**SHALLOW FOUNDATIONS:** Types, choice of foundation, Location of depth, Safe Bearing Capacity, Terzaghi, Meyerhof, Kempton and IS Methods Safe bearing pressure based on N- value, allowable bearing pressure, safe bearing capacity and settlement from plate load test, allowable settlements of structures, Settlement Analysis.

**UNIT - V**

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

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

**TEXT BOOKS:**

1. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain (2005), *Soil Mechanics and Foundations*, Laxmi, publications Pvt. Ltd., New Delhi, India.
2. K. R. Arora (2011), *Soil Mechanics and foundation engineering*, Standard Publishers, New Delhi, India.

**REFERENCE BOOKS:**

1. Gopal Ranjan, A. S. R. Rao (2004), *Basic and Applied Soil Mechanics*, New Age International Pvt. Ltd. , New Delhi, India.
2. V. N. S. Murthy (2010), *Geotechnical Engineering*, Marcel Dekkar Inc., New Delhi, India.

**UNIT - I**

**INTRODUCTION:** Types of dams, merits and demerits, factors affecting selection of type of dam, factors governing selecting site for dam, types of reservoirs, selection of site for reservoir, zones of storage of a reservoir, reservoir yield, estimation of capacity of Reservoir using mass curve.

**UNIT - II**

**GRAVITY DAMS:** Forces acting on a gravity dam, causes of failure of a gravity dam, elementary profile and practical profile of a gravity dam, limiting height of a low gravity dam, stability analysis, drainage 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.

**UNIT - III**

**CANAL STRUCTURES - I:** Types of falls and their location, design principles of Sarda type fall, trapezoidal notch fall and straight glacis fall.

**CANAL STRUCTURES - II:** Canal regulation works, principles of design of distributory and head regulators, canal outlets, types of canal modules, proportionality, sensitivity and flexibility.

**UNIT - IV**

**DIVERSION HEAD WORKS:** Types of Diversion head works-diversion and storage head works, weirs and barrages, layout of diversion head works, components. Causes and failure of hydraulic structures on permeable foundations, Bligh's creep theory, Khosla's theory, determination of uplift pressure, impervious floors using Bligh's and Khosla's theory, exit gradient, functions of U/s and d/s sheet piles.

**UNIT - V**

**SPILLWAYS:** Types of spillways, design principles of Ogee spillways, types of spillway gates.

**CROSS DRAINAGE WORKS:** Types, selection of site, design principles of aqueduct, siphon aqueduct and super passage.

**TEXT BOOKS:**

1. K. R. Arora (2002), *Irrigation engineering*, standard publishing house, New Delhi, India.
2. P. N. Modi (2012), *Irrigation water resources and water power engineering*, Standard Publishers, New Delhi.

**REFERENCE BOOKS:**

1. G. L. Asawa (2006), *Irrigation and water resources engineering*, New Age International Publishers, New Delhi, India.
2. B. C. Punmia (1992), *Irrigation and Water Power Engineering*, Laxmi Publications, New Delhi, India.
3. R. K. Sharma, T. K. Sharma (2008), *Irrigation Engineering*, S. Chand Publishers, New Delhi, India.



**UNIT - I**

**INTRODUCTION:** Waterborne diseases, Population forecasts, design period, water demand, factors affecting fluctuations, fire demand, storage capacity, water quality and testing, and drinking water standards.

**SOURCES OF WATER:** Comparison from quality and quantity and other considerations, intakes, infiltration galleries distribution systems, requirements, methods and layouts.

**UNIT - II**

**WATER TREATMENT UNITS:** Layout and general outline of water treatment units, sedimentation, principles and design factors, coagulation and flocculation, clarifier design, coagulants, feeding arrangements. Filtration, theory, working of slow and rapid gravity filters and multimedia filters, design of filters, troubles in operation of filters, disinfection, theory of chlorination, chlorine demand, and other disinfection practices, Miscellaneous treatment methods.

**UNIT - III**

**CONSERVANCY AND WATER CARRIAGE SYSTEMS:** Sewage and storm water estimation, time of concentration, storm water overflows combined flow. Characteristics of sewage, cycles of decay, decomposition of sewage, examination of sewage, B.O.D. and C.O.D. equations.

**SEWERS AND COMPONENTS:** Shapes and materials, sewer appurtenances, manholes, inverted siphon, catch basins, flushing tanks and ejectors, pumps and pump houses, house drainage, components requirements, sanitary fittings, traps, one pipe and two pipe systems of plumbing, ultimate disposal of sewage, sewage farming and dilution.

**UNIT - IV**

**LAYOUTS:** Layout and general outline of various units in a waste water treatment plant, primary treatment, design of screens, grit chambers and skimming tanks, Biological treatment, trickling filters standard and high rate.

**UNIT - V**

**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. *Distribution systems:* Design procedures- Hardy Cross and equivalent pipe methods, Service reservoirs – joints, valves such as sluice valves, air valves, scour valves and check valves water meters, laying and testing of pipe lines, pump house.

**TEXT BOOKS:**

1. K. N. Duggal (2009), *Elements of environmental engineering*, S. Chand Publishers, New Delhi, India.
2. G. S. Birdi (1992), *Water supply and sanitary Engineering*, Dhanpat Rai & Sons Publishers, New Delhi, India.

**REFERENCE BOOKS:**

1. B. C. Punmia, Ashok Jain, Arun Jain (2009), *Water Supply Engineering, Vol. 1, waste water Engineering, Vol. II*, Laxmi publications, New Delhi, India.
2. Mark J. Hammar, Mark J. Hammar (2008), *Water and Waste Water Technology*, Prentice hall Publishers, New Delhi, India.
3. Metcalf, Eddy, George Tchobanoglous (1981), *Waste water Engineering*, Tata McGraw Hill, Inda.
4. J. Glynn Henry, Gary W. Heinke (1996), *Environmental science and engineering*, Prentice Hall of India, India.

**IMAGE PROCESSING**  
**Interdepartmental Elective - I**  
**(Common to CE & ME)**

Course Code: A1610

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**UNIT - I**

**FUNDAMENTALS OF IMAGE PROCESSING:** Image acquisition, image model, sampling, quantization, relationship between pixels, distance measures, connectivity, image geometry, photographic film.

**IMAGE TRANSFORMS:** A detail discussion on Fourier transform, DFT, FFT, properties. A brief discussion on WALSH transform, WFT, HADAMARD transform, DCT.

**UNIT - II**

**IMAGE ENHANCEMENT (by SPATIAL Domain Methods):** Histogram Processing - definition, equalization, matching, local enhancement, use of histogram statistics for image enhancement, Arithmetic and logical operations, pixel or point operations, size operations, Smoothing filters-mean, median, mode filters, sharpening spatial filtering.

**IMAGE ENHANCEMENT (by FREQUENCY Domain Methods):** Design of low pass, high pass, edge enhancement, smoothing filters in frequency domain. Butter worth filter, sharpening frequency domain filters, homomorphic filters in frequency domain.

**UNIT - III**

**IMAGE COMPRESSION:** Fundamentals, image compression models, elements of information theory, error-free compression, lossy compression, image compression standards.

**UNIT - IV**

**IMAGE SEGMENTATION:** Detection of discontinuities, edge linking and boundary detection, thresholding, region based segmentation, segmentation by morphological watersheds, the use of motion in segmentation.

**UNIT - V**

**COLOR IMAGE PROCESSING:** Fundamentals, models, pseudo color image, color transformation, smoothing, color segmentation, noise in color image, color image compression.

**MORPHOLOGY:** Dilation, erosion, opening, closing, hit-and-miss transform, boundary extraction, region filling, connected components, thinning, thickening, skeletons, pruning extensions to gray scale image application of morphology in image processing.

**TEXT BOOKS:**

1. Rafael C. Gonzalez, Richard E. Woods (2008), *Digital Image Processing*, Low Price Edition, Pearson Education, New Delhi, India.

**REFERENCE BOOKS:**

1. Arthur R. Weeks (1996), *Fundamentals of Electronic Image Processing*, Prentice Hall of India, New Delhi.
2. Milan Sonka, Vaclav Hlavac, Roger Boyle (2008), *Image processing, Analysis and Machine vision*, Thomson Publications, India.

**ENERGY MANAGEMENT**  
**Interdepartmental Elective - I**  
**(Common to CE & ME)**

Course Code: **A1228**

L	T	P	C
4	-	-	4

**UNIT - I**

**INTRODUCTION:** Principles of Energy Management, Managerial Organization. Functional Areas for Manufacturing Industry, Process Industry, Commerce, Government. Role of Energy Manager in each of the organization. Initiating, Organizing and Managing Energy Management Programs.

**UNIT - II**

**ENERGY AUDIT:** Definition and Concepts, Types of Energy Audits, Basic Energy Concepts. Resources for Plant Energy Studies, Data Gathering, Analytical Techniques. Energy Conservation: Technologies for Energy Conservation, Design for Conservation of Energy materials, energy flow networks, critical assessment of energy usage, formulation of objectives and constraints, synthesis of alternative options and technical analysis of options, process integration.

**UNIT - III**

**ECONOMIC ANALYSIS:** Scope, Characterization of an Investment Project, Types of Depreciation, Time Value of money, budget considerations, Risk Analysis.

**UNIT - IV**

**METHODS OF EVALUATION OF PROJECTS:** Payback, Annualized Costs, Investor's Rate of return, Present worth, Internal Rate of Return. Pros and Cons of the common methods of analysis, replacement analysis. Energy Consultant: Need of Energy Consultant, Consultant Selection Criteria.

**UNIT - V**

**ALTERNATIVE ENERGY SOURCES:** Solar Energy: Types of devices for Solar Energy Collection, Thermal Storage System. Control Systems, Wind Energy, Availability, Wind Devices, Wind Characteristics, Performance of Turbines and systems.

**TEXT BOOKS:**

1. W. R. Murphy, G. McKay (2008), *Energy Management*, 1<sup>st</sup> edition, B.S. Publications, New Delhi.

**REFERENCE BOOKS:**

1. B. Smith (2007), *Energy Management Principles*, 1<sup>st</sup> edition, Pergamon Press, Inc., England.

**AIR TRANSPORTATION SYSTEMS**  
(Interdepartmental Elective - I)

Course Code: **A1710**

L	T	P	C
4	-	-	4

**UNIT - I**

**AVIATION INDUSTRY:** Introduction, history of aviation evolution, development, growth, challenges. Aerospace industry, air transportation industry, economic impact- types and causes. Airline Industry structure and economic characteristics. Airlines as oligopolists, other unique economic characteristics. Significance of airline passenger load factors.

**UNIT - II**

**NATURAL ENVIRONMENT:** The earth as a habitat, The Earth: physical issues affecting demand: surface, core, continents. Shape of demand. Demand forecasting based on historical data, comparative analysis, theoretical demand models. Reliability of forecasts, Atmosphere of earth- gaseous properties, distance and speed, weather- weather effects on navigation.

**REGULATORY ENVIRONMENT:** The breadth of regulation- ICAO, IATA, national authorities (DGCA, FAA). Service properties, service volumes, international air service agreements, deregulation, privatization. Safety regulations, risk assessment, human factors and safety, security regulations, environmental regulations.

**UNIT - III**

**OPERATIONAL ENVIRONMENT:** Introduction. Evolution, communication, navigation and surveillance systems (CNSS). Radio communications: VHF, HF, ACARS, SSR, ADS. Navigation- NDB, VOR, DME, area-navigation systems( R-Nav), ILS, MLS, GPS, INS, laser-INS. Surveillance- SSR, ADS . Airborne elements- AFCS, PMS, electronic control and monitoring /engine instrumentation and central automated systems, EFIS, FMS, GPWS, TCAS- future trends.

**AIRCRAFT:** Costs- project cash-flow, aircraft price. Compatibility with the operational infrastructure. Direct and indirect operating costs. Balancing efficiency and effectiveness, payload-range, fuel efficiency, technical contribution to performance, operating speed and altitude, aircraft field length performance. Typical operating costs. Effectiveness, wake-vortices, cabin dimensions, flight deck.

**UNIT - IV**

**AIRLINES:** Setting up an airline, modern airline objectives. Route selection and development, airline fleet planning, annual utilization and aircraft size, seating arrangements. Indirect operating costs. Aircraft buy or lease. Revenue generation, Computerized reservation systems, yield management. Integrating service quality into the revenue generation process. Marketing the seats. Airline scheduling. Evaluating success financial viability, regulatory compliance, efficient use of resources, effective service.

**AIRPORTS:** Setting up an airport- airport demand, airport setting, runway characteristics: length, declared distances, aerodrome areas, obstacle safeguarding. Runway capacity, evaluating runway capacity, sustainable runway capacity. Runway pavement length, Manoeuvring area airfield lighting, aprons, Passenger terminals-terminal sizing and configuration. Airport demand, capacity and delay.

**UNIT - V**

**AIRSPACE:** Categories of airspace, separation minima, airspace sectors, capacity, demand and delay. Evolution of air traffic control system procedural ATC system, procedural ATC with radar assistance, first generation 'automated' ATC system, current generation radar and computer-based ATC systems. Aerodrome air traffic control equipment and operation - ICAO future air-navigation systems (FANS). Air-navigation service providers as businesses.

**TEXT BOOKS:**

1. Mike Hirst (2008), *The Air Transport System*, Cambridge Woodhead Publishing Ltd, US

**REFERENCE BOOKS:**

1. John G Wensveen (2008), *Air Transportation: A Management Perspective*, 6<sup>th</sup> Edition, Ashgate, New Delhi
2. Peter Belobaba, Amedeo R Odoni and Cynthia Barnhart (2009), *Global Airline Industry*, 1<sup>st</sup> Published, Wiley, US
3. Massoud Bazargan(2010), *Airline Operations and Scheduling*, 2<sup>nd</sup> Edition , Ashgate, New Delhi
4. Michael S Nolan (2011), *Fundamentals of Air Traffic Control*, 5<sup>th</sup> Edition, Delmar Cengage Learning. New York.
5. Seth B Young; Alexander Wells(2011), *Airport Planning and Management*, 6<sup>th</sup> Edition, McGraw-Hill, New Delhi

**OPERATIONS RESEARCH**  
**Interdepartmental Elective - I**  
**(Common to CE & AE)**

Course Code: A1330

**L T P C**  
**4 - - 4**

**UNIT - I**

**INTRODUCTION TO OPERATIONS RESEARCH:** Basics definition, scope, objectives, phases, models and limitations of Operations Research. Linear Programming Problem, Formulation and Graphical solution of Linear Programming Problem. Simplex Method, Artificial variables Techniques, big -M method, two -phase simplex method, degeneracy and unbound solutions.

**UNIT - II**

**TRANSPORTATION PROBLEM:** Formulation, solution, unbalanced Transportation problem. Finding basic feasible solutions, North-West corner rule, least cost method and Vogel's approximation method. Optimality test - MODI method.

**ASSIGNMENT MODEL:** Formulation, Hungarian method for optimal solution, solving unbalanced problem, Traveling salesman problem as assignment problem.

**UNIT - III**

**SEQUENCING MODELS:** Solution of Sequencing Problem, Processing n Jobs through two machines, Processing n Jobs through three machines, Processing two Jobs through m machines, Processing n Jobs through m Machines.

**QUEUING THEORY:** Introduction, Single Channel, Poisson arrivals, exponential service times with infinite population and finite population models.

**UNIT - IV**

**REPLACEMENT MODELS:** Replacement of Items that Deteriorate whose maintenance costs increase with time without change in the money value, Replacement of items that fail suddenly, individual replacement policy, group replacement policy.

**INVENTORY MODELS:** Inventory costs, Models with deterministic demand model: (a) Demand rate uniform and production rate infinite, (b) Demand rate non-uniform and production rate infinite, (c) Demand rate uniform and production rate finite.

**UNIT - V**

**GAME THEORY:** Competitive game, rectangular game, saddle point, minimax (maximin) method of optimal strategies, value of the game. Solution of games with saddle points, dominance principle, Rectangular games without saddle point, mixed strategy for 2 X 2 games.

**DYNAMIC PROGRAMMING:** Characteristics of dynamic programming, Dynamic programming approach for priority management employment smoothening, Capital budgeting, Stage Coach/Shortest Path, cargo loading and Reliability problems.

**TEXT BOOKS:**

1. A. M. Natarajan, P. Balasubramani, A. Tamilarasi (2006), *Operations Research*, Pearson Education, India.
2. S. D. Shama (2009), *Operation Research*, Tata McGraw Hill, New Delhi.

**REFERENCE BOOKS:**

1. J. K. Sharma (2007), *Operations Research – Theory and Applications*, 3<sup>rd</sup> edition, Macmillan India Ltd, India.
2. R. Panneerselvam (2008), *Operations Research*, 2<sup>nd</sup> edition, Prentice Hall of India, India.
3. F. S. Hillier, G. J. Lieberman (2007), *Introduction to Operations Research*, 8<sup>th</sup> edition, Tata McGraw Hill, New Delhi, India.

**DATA STRUCTURES THROUGH C**  
(Interdepartmental Elective - I)

Course Code: A1503

L	T	P	C
4	-	-	4

**UNIT - I**

**RECURSION AND LINEAR SEARCH:** Preliminaries of algorithm, algorithm analysis and complexity. Recursion definition, design methodology and implementation of recursive algorithms, linear and binary recursion, recursive algorithms for factorial function, GCD computation, Fibonacci sequence, Towers of Hanoi, tail recursion. List searches using linear search, binary search, Fibonacci search, analyzing search algorithms.

**UNIT - II**

**SORTING TECHNIQUES:** Basic concepts, Sorting by: Insertion (insertion sort), Selection (heap sort), Exchange (bubble sort, quick sort), Distribution (radix sort) and Merging (merge sort) algorithms.

**UNIT - III**

**STACKS:** Basic stack operations, representation of a stack using arrays, *Stack Applications:* Reversing list, factorial calculation, in-fix- to postfix transformation, evaluating arithmetic expressions.

**QUEUES:** Basic queues operations, representation of a queue using array, implementation of Queue operations using Stack, applications of Queues-Round Robin Algorithm, Enqueue, Dequeue, Circular queues, Priority queues.

**UNIT - IV**

**LINKED LISTS:** Introduction, single linked list, representation of a linked list in memory, operations on a single linked list, merging two single linked lists into one list, reversing a single linked list, applications of single linked list to represent polynomial expressions and sparse matrix manipulation, advantages and disadvantages of single linked list, circular linked list, double linked list.

**UNIT - V**

**TREES:** Basic tree concepts, *Binary Trees:* Properties, representation of binary trees using arrays and linked lists, operations on a binary tree, binary tree traversals, creation of binary tree from in-order and pre (post) order traversals, tree travels using stack, threaded binary trees.

**GRAPHS:** Basic concepts, *Representations of Graphs:* Using Linked list and adjacency matrix, graph algorithms, graph traversals (BFS & DFS)

**TEXT BOOKS:**

1. Horowitz, Ellis, Sahni, Sartaj, Anderson-Freed, Susan (2008), *Fundamentals of Data Structure in C*, 2<sup>nd</sup> Edition, University Press, India.
2. Richard F. Gilberg, Behrouz A. Forouzan (2005), *Data Structures: A Pseudo code approach with C*, 2<sup>nd</sup> Edition, Thomson, India.

**REFERENCE BOOKS:**

1. Seymour, Lipschutz (2005), *Data Structures*, Schaum's Outlines Series, Tata McGraw-Hill, India.
2. Debasis, Samanta (2009), *Classic Data Structures*, 2<sup>nd</sup> Edition, Prentice Hall of India, India.
3. G. A. V. Pai (2008), *Data Structures and Algorithms: Concepts, Techniques and Applications*, Tata McGraw-Hill Education, India.
4. A. M. Tanenbaum, Y. Langsam, M. J. Augustein (1991), *Data Structures using C*, Prentice Hall of India, New Delhi, India.

**DIGITAL ELECTRONICS AND MICROPROCESSORS**

Interdepartmental Elective - I

(Common to CE, ME & AE)

Course Code: A1453

L	T	P	C
4	-	-	4

**UNIT - I**

**BINARY SYSTEMS:** Digital Computers and Digital Systems, Binary Numbers, Number base conversions, Octal and Hexadecimal Numbers, complements, Signed binary numbers, Binary codes, Binary Storage and Registers, Binary Logic.

**BOOLEAN ALGEBRA AND LOGIC GATES:** Basic Definitions, Axiomatic definition of Boolean Algebra, Basic theorems and properties of Boolean algebra, Boolean functions canonical and standard forms, other logic operations, Digital logic gates.

**UNIT - II**

**SIMPLIFICATION OF BOOLEAN FUNCTIONS:** The map method, Two, three, four and five variable maps, product of sums simplification, NAND and NOR implementation, other Two-level implementations, Don't-care conditions, Tabulation method, determination and selection of prime implicants.

**COMBINATIONAL LOGIC:** Introduction, design procedure, Adders, Subtractors, magnitude comparator, Decoders, Encoders, Multiplexers, Demultiplexers, Code converters and Parity Generators.

**UNIT - III**

**SEQUENTIAL LOGIC:** Introduction, latches, Flip-Flops, truth tables and excitation tables, triggering OF flip-flops, Registers, shift Registers, Ripple counters, shift register counters (Ring, Johnson and LFSR Counters).

**UNIT - IV**

**8085 MICROPROCESSOR:** Introduction to microprocessors, Architecture of 8085, Pin Diagram of 8085, Timing Diagram, Addressing Modes, Instruction Set, Interrupt structure of 8085.

**UNIT - V**

**MICROPROCESSOR PERIPHERAL INTERFACING:** Methods of Interfacing I/O Ports: I/O Mapped I/O, Memory Mapped I/O, Programmable Peripheral interface 8255 – Various Modes of Operation and Interfacing to 8085, Need for DMA, DMA data transfer Method, Interfacing with DMA Controller 8257.

**TEXT BOOKS:**

1. M. Morris Mano (2012), *Digital Design*, 4<sup>th</sup> edition, Pearson Education/Prentice Hall of India, New Delhi, India.
2. Ramesh S. Goankar(2011), *Microprocessor Architecture, Programming and Applications with the 8085*, Prentice Hall of India, India.

**REFERENCE BOOKS:**

1. C. V. S. Rao (2010), *Switching Theory and Logic Design*, Pearson Education, India.
2. K. Uday Kumar, B. S. Uma Shankar (2008), *The 8085 Microprocessor Architecture, Programming and Interfacing*, Pearson Publications, India.

**LIST OF EXPERIMENTS:**

1. Determination of pH and Turbidity
2. Determination of Conductivity and Total dissolved solids.
3. Determination of Alkalinity/Acidity.
4. Determination of Chlorides.
5. Determination and Estimation of total solids, organic solids and inorganic solids.
6. Determination of iron.
7. Determination of Dissolved Oxygen.
8. Determination of Nitrogen.
9. Determination of total Phosphorous.
10. Determination of B.O.D
11. Determination of C.O.D
12. Determination of Optimum coagulant dose.
13. Determination of Chlorine demand.
14. Presumptive coli form test.

**LIST OF EQUIPMENT:**

1. pH meter
2. Turbidity meter
3. Conductivity meter
4. Hot air oven
5. Muffle furnace
6. Dissolved Oxygen meter
7. U -V visible spectrophotometer
8. Reflux Apparatus
9. Jar Test Apparatus
10. BOD incubator

**TEXT BOOKS:**

1. Sawyer, Mc. Carty (1994), *Chemistry for Environmental Engineering*, 4<sup>th</sup> edition, McGraw-Hill Publishing Company, New Delhi.
2. APHA (2005), *Standard Methods for Analysis of water and Waste Water*, American Public Health Administration (APHA), USA.



**LIST OF EXPERIMENTS:**

**I. ROAD AGGREGATES:**

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

**II. BITUMINOUS MATERIALS:**

1. Penetration Test.
2. Ductility Test.
3. Softening Point Test.
4. Flash and fire point tests.

**III. CEMENT AND CONCRETES:**

**TESTS ON CEMENTS:**

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

**LIST OF EQUIPMENT:**

1. Apparatus for aggregate crushing test
2. Aggregate Impact testing machine
3. Pycnometers
4. Los angles Abrasion test machine
5. Deval's Attrition test machine
6. Length and elongation gauges
7. Bitumen penetration test setup
8. Bitumen Ductility test setup
9. Ring and ball apparatus
10. Penskey – Morten's apparatus
11. Vicat's apparatus
12. Specific gravity bottle
13. Lechatlier's apparatus
14. Slump and compaction factor setups
15. Longitudinal compresso meter and 16. Rebound hammer, Pulse velocity machine

# **SYLLABI FOR VII SEMESTER**

**UNIT - I**

**REMOTE SENSING -I:** Basic concepts and foundation of remote sensing, elements involved in remote sensing, electromagnetic spectrum, remote sensing terminology and units.

**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 - II**

**INTRODUCTION TO PHOTOGRAMMETRY:** Principle and types of aerial photographs, stereoscopy, Map Vs Mosaic, ground control, Parallax measurements for height, determinations Geographic Information System: Introduction, GIS definition and terminology, GIS categories, components of GIS, fundamental operations of GIS, A theoretical framework for GIS.

**UNIT - III**

**DATA COLLECTION:** Data collection and input overview, data input and output. Keyboard entry and coordinate geometry procedure, manual digitizing and scanning.

**TYPES OF DATA REPRESENTATION:** 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. James B. Campbell, Randolph H. Wynne (2011), *Introduction to Remote Sensing*, 5<sup>th</sup> edition, Guilford Publications Inc., New York, USA.
2. L. R. A. Narayana (1999), *Remote Sensing and its applications*, Universities Press, India.
3. M. Anji Reddy (2001), *Remote Sensing and Geographical Information systems*, B. S. Publications, New Delhi, India.

**REFERENCE BOOKS:**

1. Thomas M. Lillesand, Ralph W. Kiefer (1994), *Remote Sensing and Image Interpretation*, Wiley & Sons, New Delhi, India.
2. Peter A. Burrage, Rachael (2011), *Principals of Geo physical Information Systems*, Oxford Press, India.
3. S. Kumar (2005), *Basics of remote sensing and GIS*, Laxmi Publications, New Delhi, India.

## B. Tech. CIVIL VII SEMESTER

### FINITE ELEMENT METHODS IN CIVIL ENGINEERING

Course Code: A1129

L	T	P	C
3	1	-	4

#### UNIT - I

**INTRODUCTION:** Concepts of FEM, Steps involved merits & demerits, energy principles, Discretization, Rayleigh - Ritz method of functional approximation.

#### UNIT - II

**PRINCIPLES OF ELASTICITY:** Equilibrium equations, strain displacement relationships in matrix form, Constitutive relationships for plane stress, plane strain and Axi-symmetric bodies of revolution with axi-symmetric loading. One Dimensional FEM: Stiffness matrix for bar element, shape functions for one dimensional element, one dimensional problem.

#### 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.

#### UNIT - IV

**ELEMENT STIFFNESS AND NODAL LOAD MATRICES:** Generation of element stiffness and nodal load matrices for 3-node triangular element and four node rectangular elements. Isoperimetric formulation, Concepts of isoperimetric elements for 2D analysis -formulation of CST element, 4 - noded and 8 -noded iso-parametric quadrilateral elements, Lagrangian and Serendipity elements.

#### UNIT - V

**AXI-SYMMETRIC ANALYSIS:** Basic principles-Formulation of 4-node iso-parametric axi-symmetric element Solution Techniques: Numerical Integration, Static condensation, assembly of elements and solution techniques for static loads.

#### TEXT BOOKS:

1. Tirupati. R. Chandrepatta, Ashok D. Belegundu (1997), *Finite Elements Methods in Engineering*, Pearson Education Publications, New Delhi, India.
2. S. S. Bhavakatti (2007), *Finite element analysis*, New age international publishers, New Delhi, India.

#### REFERENCE BOOKS:

1. Robert D. Cook, David (2001), *Concepts and Applications of Finite Element Analysis*, Wiley publications, New Delhi, India.
2. David V. Hutton (2003), *Finite element analysis*, Tata McGraw- Hill, New Delhi, India.
3. S. Malkus, Michael E. Plesha (2002), *concepts and applications of Finite Element Analysis*, John Wiley & Sons, India.
4. C. S. Krishna (1995), *Finite Element analysis Theory & Programming*, Tata McGraw- Hill Publishers, New Delhi, India.
5. P. Seshu (2004), *Text book of Finite Element analysis*, Prentice Hall of India, New Delhi, India.

**UNIT - I**

**AIR POLLUTION AND CONTROL:** Air Pollution, sources of pollution, Classification of pollutants, effects on human beings, Global effects of Air pollution. Air pollution Control Methods, Particulate control devices, General Methods of Controlling Gaseous Emission.

**NOISE POLLUTION:** Effects of noise and control methods, Effluent standards, Air emission standards.

**UNIT - II**

**SPECIAL TREATMENT METHODS:** Adsorption, Reverse Osmosis, Defluoridation, 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 of Solid waste, disposal methods – Land filling, Incineration and composting.

**UNIT - V**

**HAZARDOUS WASTE:** Nuclear waste, Biomedical wastes, chemical wastes their disposal and treatment methods.

**TEXT BOOKS:**

1. C. S. Rao (2006), *Environmental Pollution control Engineering*, New Age International Publications, New Delhi, India.
2. Dr. Suresh K. Dhameja (2005), *Environmental Engineering and Management*, 2<sup>nd</sup> edition, S. K. Katarai & Sons, New Delhi, India.

**REFERENCE BOOKS:**

1. M. N. Rao, H. N. Rao (1988), *Air Pollution*, Tata Mc Graw-Hill, New Delhi, India.
2. J. G. Henry, G. W. Heinke (1989), *Environmental Science and Engineering*, Person Education, New Delhi, India.
3. Weber (1972), *Physico-Chemical process for water quality control*, Wiley-Inter science, New Delhi, India.

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

**UNIT - II**

**INTERSECTION DESIGN:** Types of Intersections, Conflicts at Intersections, Types of At-Grade Intersections. Channelization: Objectives, Traffic Islands and Design criteria, Types of Grade Separated Intersections, Rotary Intersection, Concept of Rotary and Design Criteria, Advantages and Disadvantages of Rotary Intersection.

**UNIT - III**

**TRAFFIC ENGINEERING:** Basic Parameters of Traffic-Volume, Speed and Density, Traffic Volume Studies, Data Collection and Presentation, speed studies, Data Collection and Presentation, Parking Studies and Parking characteristics, Road Accidents, Causes and Preventive measures, Accident Data Recording, Condition Diagram and Collision Diagrams.

**TRAFFIC REGULATION AND MANAGEMENT:** Road Traffic Signs, Types and Specifications. Road markings, need for Road Markings, Types of Road Markings. Design of Traffic Signals, Webster Method and IRC Method.

**UNIT - IV**

**INTRODUCTION TO RAILWAY ENGINEERING:** Permanent way components, Cross Section of Permanent Way, Functions of various Components like Rails, Sleepers and Ballast. Rail Fastenings, Creep of Rails, Theories related to creep. Adzing of Sleepers, Sleeper density.

**GEOMETRIC DESIGN OF RAILWAY TRACK:** Gradients , Grade Compensation, Cant and Negative Super elevation, Cant Deficiency, Degree of Curve, Crossings and Turn outs.

**UNIT - V**

**AIRPORT ENGINEERING:** Factors affecting Selection of site for Airport, Aircraft Characteristics. Geometric Design of Runway - Computation of Runway length, Correction for runway length, Orientation of Runway, Wind Rose Diagram and Runway Lighting system.

**TEXT BOOKS:**

1. S. K. Khanna, C. E. G. Justo (2000), *Highway Engineering*, 7<sup>th</sup> edition, Nemchand & Bros., New Delhi, India.
2. S. P. Chadula (2001), *Railway Engineering - A text book of Transportation Engineering*, S. Chand & Co. Ltd., New Delhi, India.

**REFERENCE BOOKS:**

1. Rangwala (2004), *Highway engineering*, Charotar Publishing House, India.
2. Dr. L. R. Kadyali (1997), *Traffic Engineering and Transportation Planning*, 6th Edition, Khanna publications, New Delhi, India.

**HUMAN VALUES AND ETHICS**  
**Interdepartmental Elective - II**  
**(Common to CE, EEE, ME & AE)**

Course Code: **A1016**

**L T P C**  
**4 - - 4**

**UNIT - I**

**HUMANVALUES:** Morals, Values and Ethics, Integrity, Work Ethic, Service Learning, Civic Virtue, Respect for Others, Living Peacefully, caring, Sharing, Honesty, Courage, Valuing Time, Co-operation, Commitment, Empathy, Self-Confidence, Character, Spirituality.

**UNIT - II**

**ENGINEERING ETHICS:** Senses of 'Engineering Ethics', variety of moral issued, types of inquiry, moral dilemmas, moral autonomy, Kohlberg's theory, Gilligan's theory, consensus and controversy, Models of Professional Roles, theories about right action, Self-interest, customs and religion, uses of ethical theories.

**UNIT - III**

**ENGINEERING AS SOCIAL EXPERIMENTATION:** Engineering as experimentation, engineers as responsible experimenters, codes of ethics, a balanced outlook on law, the challenger case study

**UNIT - IV**

**SAFETY, RESPONSIBILITIES AND RIGHTS:** Safety and risk, assessment of safety and risk, risk benefit analysis and reducing risk, the Three Mile Island and Chernobyl case studies.

Collegiality and loyalty, respect for authority, collective bargaining, confidentiality, conflicts of interest, occupational crime, professional rights, employee rights, Intellectual Property Rights (IPR), discrimination.

**UNIT - V**

**GLOBAL ISSUES:** Multinational corporations, Environmental ethics, computer ethics, weapons development, engineers as managers-consulting engineers-engineers as expert witnesses and advisors -moral leadership-sample code of Ethics like ASME, ASCE, IEEE, Institution of Engineers (India), Indian Institute of Materials Management, Institution of electronics and telecommunication engineers (IETE),India, etc.

**TEXT BOOKS:**

1. Mike Martin and Roland Schinzinger, (1996), *Ethics in Engineering*, McGraw-Hill, New York.
2. Govindarajan M, Natarajan S, Senthil Kumar V. S, (2004), *Engineering Ethics*, Prentice Hall of India, New Delhi, India.

**REFERENCE BOOKS:**

1. Charles D. Fleddermann, (2004), *Engineering Ethics*, Pearson Education / Prentice Hall, New Jersey.
2. Charles E Harris, Michael S. Protchard and Michael J Rabins, (2000), *Engineering Ethics – Concepts and Cases*, Wadsworth Thompson Learning, United States.
3. John R Boatright, (2003), *Ethics and the Conduct of Business*, Pearson Education, New Delhi, India.
4. Edmund G Seebauer and Robert L Barry, (2001), *Fundamentals of Ethics for Scientists and Engineers*, Oxford University Press, New York.

**HUMAN RESOURCE MANAGEMENT**  
**Interdepartmental Elective - II**  
**(Common to CE, EEE, ME & AE)**

Course Code: **A1017**

L	T	P	C
4	-	-	4

**UNIT - I**

**INTRODUCTION HUMAN RESOURCE MANAGEMENT:** Introduction and significance of HRM, Scope, functions of HRM, changing environment of HRM and Challenges. Human Resource Planning, Objectives, Factors influencing Human Resource planning, HR Planning Process.

**UNIT - II**

**JOB ANALYSIS AND RECRUITMENT:** Process and Sources of Recruitment; Selection, process of selection and techniques, Retention of Employees.

**UNIT - III**

**HUMAN RESOURCES DEVELOPMENT:** Training Vs Development, Need, Process of training, Methods of training, Training Evaluation, Career planning, Performance Management System, Methods of Appraisal, Common Errors.

**UNIT - IV**

**COMPENSATION MANAGEMENT:** Concepts and components of wages, Factors influencing wage fixation, Job evaluation, Methods of payment, Incentives and Fringe benefits.

**UNIT - V**

**MANAGING INDUSTRIAL RELATIONS:** Components of Industrial Relation, Trade Unions, functions of Trade Union, Employee Participation, Importance and Schemes, Collective Bargaining, Grievance Redressal, Industrial Dispute Settlement machinery.

**TEXT BOOKS:**

1. Biswajeet Pattnayak (2009), *Human Resource Management*, Prentice hall of India, New Delhi, India.
2. R. Wayne Mondy and Robert M. Noe (2009), *Human Resource Management*, Pearson, India.

**REFERENCE BOOKS:**

1. Aswathappa. K. (2007), *Human Resources and Personnel Management*, Tata Mc Graw Hill, New Delhi, India.
2. Monappa. A, Saiyadain. M. (1979), *Personnel Management*, Tata Mc Graw Hill, New Delhi, India.
3. C. B. Mamoria (2003), *Personnel Management*, Himalaya Publishing House, India.



**ENTREPRENEURSHIP**  
**Interdepartmental Elective - II**  
**(Common to CE, EEE, ME & AE)**

Course Code: **A1018**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>4</b>	<b>-</b>	<b>-</b>	<b>4</b>

**UNIT - I**

**ENTREPRENEURSHIP:** Importance and role of entrepreneurship, Characteristics of entrepreneurship, Qualities of an entrepreneur, Functions of entrepreneur; Theories of entrepreneurship, Stimulants of entrepreneurship and Barriers to entrepreneurship, Ethics and Social Responsibility, Role of entrepreneur in economic development.

**UNIT - II**

**INSTITUTIONAL SUPPORT:** Role of Government; Role of IDBI, SIDBI, SIDO, NIESBUD, SISI, DIC, Entrepreneurship Development Institute, MSMEs.

**UNIT - III**

**WOMEN ENTREPRENEURSHIP:** Role and Importance, Functions of women entrepreneur, Profile of Indian Women Entrepreneur, Problems of Women Entrepreneurs, Women Entrepreneurship Development in India and in Foreign Countries.

**UNIT - IV**

**PROJECT MANAGEMENT:** Concept of project and classification of project identification, project formulation - project report - project design, Project appraisal - profitability appraisal - project planning - social cost benefit analysis - financial analysis and project financing.

**UNIT - V**

**TRAINING:** Designing appropriate training programmes to inculcate Entrepreneurial Spirit, significance of entrepreneurial training, Training for New and Existing Entrepreneurs, Feedback and Performance of Trainees.

**TEXT BOOKS:**

1. Bholanath Datta (2009), *Entrepreneurship*, Excel publications, India.

**REFERENCE BOOKS:**

1. Robert Hisrich, Michael P. Peter, Dean A. Shepherd (2010), *Entrepreneurship*, Tata Mc Graw Hill, New Delhi.
2. David H Holt (2010), *Entrepreneurship*, Prentice hall of India, New Delhi, India.

**BUSINESS COMMUNICATION**  
**Interdepartmental Elective - II**  
**(Common to CE, EEE, ME & AE)**

Course Code: **A1019**

**L T P C**  
**4 - - 4**

**UNIT - I**

**INTRODUCTION TO MANAGERIAL COMMUNICATION:** Meaning, Importance and objectives, Principles of Communication, Forms of communication, Communication Process, Barriers To effective communication, Gateways to effective communication.

**UNIT - II**

**NONVERBAL COMMUNICATION:** Body Language, Gestures, Postures, Facial Expressions, Dress Code. Listening and Speaking Skills, Probing questions, Observation, Business and Social etiquette.

**UNIT - III**

**MANAGERIAL SPEECHES:** Principles of Effective Speech & Presentations. Technical and Non-technical presentations. Speech of introduction, speech of thanks, occasional speech, theme speech, Use of audio visual aids.

**UNIT - IV**

**INTERVIEW TECHNIQUES:** Mastering the art of conducting and giving interviews, Placement interviews, discipline/technical interviews, appraisal interviews, exit Interviews. *Group communication:* Importance, Meetings, group discussions, Video conferencing.

**UNIT - V**

**INTRODUCTION TO BUSINESS CORRESPONDENCE:** *Business letters:* Enquiries, Circulars, Quotations, Orders, Acknowledgments, Executions, Complaints, Persuading letters, Sales letters, Job application letters, Bio-data, Covering Letter, Interview Letters, Letter of Reference, Memos, minutes, Circulars and Notices. *Reports:* Types of Business Reports - Format, Choice of vocabulary, Coherence, paragraph writing, organization reports by individual, Report by committee.

**TEXT BOOKS:**

1. Lesikar R. V, Flatley M. E (2005), *For Empowering the Internet Generation*, Tata McGraw Hill Publishing Company Ltd., New Delhi, India.
2. Ludlow. R, Panton. F (1998), *The Essence of Effective Communications*, Prentice Hall of India Pvt. Ltd., New Delhi, India.

**REFERENCE BOOKS:**

1. Adair .J (2003), *Effective Communication*, Pan Macmillan, London.
2. Pan Mcmillan Thill J. V, Bovee G. L (1993), *Excellence in Business Communication*, Tata McGraw Hill, New York.
3. Bowman J.P, Branchaw P. P (1987), *Business Communications: From Process to Product*, Dryden Press, Chicago.

**INTELLECTUAL PROPERTY AND PATENT RIGHTS**

**Interdepartmental Elective - II**

**(Common to CE, EEE, ME & AE)**

Course Code: **A1020**

L	T	P	C
4	-	-	4

**UNIT - I**

**INTRODUCTION TO INTELLECTUAL PROPERTY:** Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

**UNIT - II**

**TRADE MARKS:** Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark' trade mark registration Processes.

**UNIT - III**

**LAW OF COPY RIGHTS :** Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right regisffation, notice of copy right' international copy right law.

**LAW OF PATENTS:** Foundation of patent law patent searching process' ownership rights and transfer.

**UNIT - IV**

**TRADE SECRETS:** Trade Secrete law, determination of trade secrete status' liability for misappropriations of trade secrets, protection for submission, trade secrete Litigation.

**UNFAIR COMPETITION:** Misappropriation right of publicity, false advertising.

**UNIT - V**

**NEW DEVELOPMENT OF INTELLECTUAL PROPERTY:** new developments in trade mark law; copy right law patent law, intellectual property audits'

International overview on intellectual property, international - trade mark law, copy right law, international patent law, and international development trade secrets law.

**TEXT BOOKS:**

1. Deborah. E. Bouchoux (2009), *Intellectual property*, Cengage learning, India.
2. Deborah. E. Bouchoux (2001), *Protecting your companies intellectual property*, AMACOM, USA.

**REFERENCE BOOKS:**

1. Prabudda ganguli (2003), *Intellectual property right*, Tata McGraw Hill Publishing company ltd., India.
2. Robert Hisrich, Michael P.Peter, Dean A. Shepherd (2010), *Entrepreneurship*, Tata Mc Graw Hill., India.

**PROJECT PLANNING AND MANAGEMENT**  
**Interdepartmental Elective - II**  
**(Common to CE, EEE, ME & AE)**

Course Code: **A1021**

**L T P C**  
**4 - - 4**

**UNIT - I**

**PERT AND CPM** : Introduction, origin of PERT and CPM, planning, scheduling and controlling, bar charts, milestone charts, weaknesses in bar charts, PERT and CPM networks comparison, event, activity, rules for drawing networks, numbering the events (Fulkerson's law), dummy activities.

**UNIT - II**

**CPM - PERT NETWORK ANALYSIS** : Time estimate, expected time, earliest allowable occurrence time, latest allowable occurrence time, slack, project duration, probability of completion, start and finish time estimates, floats, project scheduling, critical and sub-critical path. Updating - process of updating, when to update.

**UNIT - III**

**CPM COST MODEL & RESOURCES ALLOCATIONS, RESOURCE SCHEDULING** : Cost analysis, direct and indirect costs, operation time, normal and crash times and costs, optimizing project cost, crash limit, free float limit, optimization. Resource smoothening, resource leveling.

**UNIT - IV**

**MANAGEMENT**: Scope of construction management, significance of construction management, concept of scientific management, psychology in management, a historical account of management philosophy, qualities of manager, the roles/functions performed by effective and competent managers, the manager - as a decision maker, as a motivator, as a communication-link, as a conflict resolver, as a well wisher of co-employees and the employer etc.

**UNIT - V**

**ORGANIZATION**: Types of organization, merits and demerits of different types of organization, authority, policy, recruitment process and training; development of personnel department; labor problems; labor legislation in India; 'workmen's compensation act of 1923 and minimum wages act of 1948', and subsequent amendments. Safety in construction.

**TEXT BOOKS:**

1. Punmia, Khandelwal (2006), *Project planning and control with PERT and CPM*, 3<sup>rd</sup> edition, Laxmi Publications, New Delhi, India.

**REFERENCE BOOKS:**

1. L. S. Srinath (1975), *PERT and CPM*, 2nd Edition, Afflicted East West Press Pvt. Ltd, New Delhi, India.
2. U. K. Shrivastava (1999), *Construction Planning and Management*, Galgotia Publications Pvt. Ltd., New Delhi, India.

B. Tech. CIVIL VII SEMESTER

**DESIGN AND DRAWING OF HYDRAULIC STRUCTURES  
(Professional Elective - I)**

Course Code: **A1132**

L	T	P	C
3	1	-	4

**UNIT - I**

**SLOPING GLACIS WEIR:** Design and Drawing of Sloping glacis weir.

**UNIT - II**

**TANK SLUICE WITH TOWER HEAD:** Design and drawing of tank sluice with tower head.

**UNIT - III**

**TYPE - III SIPHON AQUEDUCT:** Design and drawing of Type - III siphon aqueduct.

**CANAL REGULATOR:** Design and drawing of Canal regulator.

**UNIT - IV**

**SURPLUS WEIR:** Design and drawing of surplus weir.

**UNIT - V**

**NOTCH FALL:** Design and drawing of trapezoidal notch fall.

**TEXT BOOKS:**

1. C. Satyanarayana Murthy (2006), *Water Resources engineering principles and practices*, New Age International, New Delhi, India.

**REFERENCE BOOKS:**

1. S. K. Garg (1991), *Irrigation engineering and Hydraulic structures*, Standard Book House, India.

**PAVEMENT ANALYSIS AND DESIGN  
(Professional Elective - I)**

Course Code: **A1133**

**L T P C**  
**3 1 - 4**

**UNIT - I**

**INTRODUCTION AND FACTORS AFFECTING DESIGN OF PAVEMENTS:** Types of pavement, Factors affecting design of pavements, wheel loads. ESWL Concept - tyre pressure, contact pressure, Material characteristics. Environmental and other factors. Stresses in flexible pavement, layered systems concept, one layer system, Boussinesq Two layer system, Burmister Theory for Pavement Design.

**UNIT - II**

**STRESSES IN PAVEMENTS:** Stresses in rigid pavements, relative stiffness of slab, modulus of sub-grade reaction, stresses due to warping, stresses due to loads, stresses due to friction.

**UNIT - III**

**PAVEMENT DESIGN:** CBR Method of Flexible Pavement Design, IRC method of flexible pavement design. AASHTO Method of Flexible Pavement design and IRC method of rigid pavement design. Importance of Joints in Rigid Pavements, Types of Joints, Use of Tie Bars and Dowel Bars.

**STABILIZATION OF SOILS:** Soil Stabilization – Methods and Objectives, Soil-cement Stabilization and Soil-lime Stabilization.

**UNIT - IV**

**HIGHWAY MATERIALS:** Soil, Aggregate and Bitumen- Tests on aggregates – Aggregate Properties and their Importance, Tests on Bitumen, Bituminous Concrete, Requirements of Design Mix, Marshall's Method of Bituminous Mix design. Highway construction – Construction of Earth Roads, Gravel Roads, WBM Roads, Bituminous Pavements and Cement Concrete Roads, Steps in Construction, Reinforced Concrete Pavements

**UNIT - V**

**PAVEMENT FAILURES:** Need for Highway Maintenance, Pavement Failures - Failures in Flexible Pavements - Types and Causes. Rigid Pavement Failures - Types and causes, Pavement Evaluation, Benkelman Beam method, Strengthening of Existing Pavements, Overlays.

**TEXT BOOKS:**

1. S. K. Khanna, C. J. Justo (2000), *Highway Engineering*, 7<sup>th</sup> edition, Nemchand & Bros, New Delhi, India.
2. Rangwala (2011), *Highway Engineering*, Charotar, India.

**REFERENCE BOOKS:**

1. Dr. L. R. Kadiyali, Dr. N. B. Lal (2003), *Principles and Practices of Highway Engineering*, Khanna publishers, New delhi, India.
2. Yoder, Wit zorac (2001), *Principles of pavement design*, John Wiley & Sons, New Delhi, India.
3. Yang H. Haung(2008), *Pavement analysis and design*, Pearson Education ,New Delhi, India.

**B. Tech. CIVIL VII SEMESTER**

**ENVIRONMENTAL IMPACT ASSESSMENT AND METHODOLOGIES  
(Professional Elective - I)**

Course Code: **A1134**

**L T P C**  
**3 1 - 4**

**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**

**IMPACT OF DEVELOPMENTAL ACTIVITIES AND LAND USE:** Introduction and Methodology for the assessment of soil and ground water, Delineation of study area, Identification of actives.

**UNIT - III**

**EIA OF WATER, AIR AND BIOLOGICAL ENVIRONMENT:** Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures. E- I- A of surface water, Air and Biological environment: Methodology for the assessment of Impacts on surface water environment.

**EIA OF VEGETATION AND WILD LIFE:** Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation, Causes and effects of deforestation.

**UNIT - IV**

**ENVIRONMENTAL AUDITING:** Environmental Audit and Environmental legislation objectives of Environmental Audit, Types of environmental Audit, stages of Environmental Audit, onsite activities, evaluation of Audit data and preparation of Audit report. Post Audit activities.

**UNIT - V**

**ENVIRONMENTAL LEGISLATION:** The Environmental protection Act, The water Act, The Air (Prevention & Control of pollution Act.), Motor Act, Wild life Act.

**TEXT BOOKS:**

1. Y. Anjaneyulu (2011), *Environmental Impact Assessment Methodologies*, B.S. Publication, Sultan Bazar, Hyderabad.
2. J. Glynn, Gary W. Hein Ke (1989), *Environmental Science and Engineering*, Prentice Hall of India Publishers, New Delhi, India.

**REFERENCE BOOKS:**

1. Suresh K. Dhaneja (2009), *Environmental Science and Engineering*, S. K. Katania & Sons Publication, New Delhi, India.
2. Larry W. Canter (1997), *Environmental Impact Assessment*, Tata McGraw- Hill, New Delhi, India.

**ADVANCED STRUCTURAL ANALYSIS  
(Professional Elective - I)**

Course Code: **A1135**

**L T P C**  
**3 1 - 4**

**UNIT - I**

**ANALYSIS TWO HINGED AND THREE HINGED ARCHES USING INFLUENCE LINES:** *Flexibility Method:* Introduction to the structural analysis by flexibility concept using Matrix approach and application to continuous beams and plane trusses.

**UNIT - II**

**STIFFNESS AND FLEXIBILITY METHOD:** Introduction to the structural analysis by stiffness concept using Matrix approach and application to continuous beams and plane trusses.

**UNIT - III**

**MOMENT DISTRIBUTION METHOD:** Application to the analysis of portal frames with inclined legs, gable frames  
Strain energy method: Application to the analysis of continuous beams and simple portal frames.

**INFLUENCE LINES:** Influence line diagrams for Reaction, Shearing force and bending moment in case of determinate beams and Influence line diagrams for member forces in determinate trusses – application of influence line diagrams.

**UNIT - IV**

**ANALYSIS OF PORTAL FAMES:** Analysis of portal fames by flexibility and stiffness methods. Drawing of bending moment diagram.

**UNIT - V**

**PLASTIC ANALYSIS:** Introduction, Idealized stress, Strain diagram, shape factors for various sections. Moment curvature relationship, ultimate moment, Plastic hinge, lower and upper bound theorems, ultimate strength of fixed and continuous beams.

**TEXT BOOKS:**

1. Vazrani, Ratwani (1983), *Analysis of structures*, Vol. I & II, Khanna publications, New Delhi, India.
2. R. S. Khurmi (2010), *Theory of Structures*, S. Chand, New Delhi, India.

**REFERENCE BOOKS:**

1. Ramamuratam (1982), *Theory of structures*, Dhanpatrai publications, New Delhi, India.
2. Dr. Vaidyanathan, Dr. P. Perumal, (2008), *Comprehensive Structural Analysis*, Vol.1 & 2, Laxmi, publications Pvt. Ltd., New Delhi, India.
3. Pandit, Gupta (2001), *Matrix methods of Structural Analysis*, Tata McGraw Hill, New Delhi, India.
4. Bhavi Katti (2005), *Structural Analysis*, Vol. I & II, Vikas Publications, New Delhi, India.



**REHABILITATION AND RETROFITTING STRUCTURES  
(Professional Elective - I)**

Course Code: A1136

L	T	P	C
3	1	-	4

**UNIT - I**

**INTRODUCTION:** Deterioration of Structures, Distress in Structures, causes and Prevention. Mechanism of Damage and Types of Damage.

**UNIT - II**

**CORROSION OF STEEL REINFORCEMENT:** Causes, Mechanism and Prevention. Damage of Structures due to Fire - Fire Rating of Structures, Phenomena of Desiccation.

**UNIT - III**

**REPAIRS AND MAINTENANCE:** Repair of Structure, Common Types of Repairs, Repair in Concrete Structures, Repairs in Under Water Structures, Guniting, Shot Create, Underpinning. Inspection and Testing - Symptoms and Diagnosis of Distress, Damage assessment, NDT.

**UNIT - IV**

**STRENGTHENING OF STRUCTURES:** Strengthening Methods, Retrofitting and Jacketing.

**UNIT - V**

**HEALTH MONITORING OF STRUCTURES:** Use of Sensors, Building instrumentation.

**TEXT BOOKS:**

1. James Douglas, Bill Ransom (2007), *Understanding Building Failures*, 3<sup>rd</sup> edition, Taylor and Francis, USA.
2. B. A. Richardson (1991), *Building Failures: Diagnosis and Avoidance*, EF & N Spon, London.

**REFERENCE BOOKS:**

1. Barry A. Richardson (2001), *Defects and Deterioration in Buildings*, E F & N Spon, London.
2. B. L. Gupta, Amit Gupta (2007), *Maintenance and Repair of CIVIL Structures*, Standard Publications, India.

**URBAN PLANNING AND INFORMATION SYSTEMS**  
**(Professional Elective - I)**

Course Code: **A1137**

**L T P C**  
**3 1 - 4**

**UNIT - I**

**INTRODUCTION:** *Planning:* Background and principles; Need for planning; Urbanization and its impact, Distribution of land use/land cover; Town planning in ancient India and new towns of India; Requirements and possible types of development of towns; Geo informatics application in Urban Planning.

**UNIT - II**

**FORMULATION OF PLANS:** Objectives and contents, Regional plan, Perspective plan, Master plan, Development plan, Project (scheme) plan, Delineation of planning area, Trend analysis, Land suitability analysis, Land use planning, Zoning and principles of zoning, Building Bye-laws and its principles, Requirement of urban & regional planners, Remote sensing for different levels of development planning.

**UNIT - III**

**IMPORTANCE OF HOUSING:** Urban housing demand and production, Slums and squatters, Housing problem in India. National Housing policy; Site analysis, Layout design, Housing projects / Slum housing. Urban renewal projects, urban infrastructure planning.

**UNIT - IV**

**TRANSPORTATION PLANNING:** Classification of urban roads, Traffic surveys: speed, time, delay surveys. Use of speed, journey time and delay studies. Traffic volume, Origin Destination surveys, Parking surveys, Utility of remote sensing in traffic and transportation studies.

**UNIT - V**

**URBAN INFORMATION SYSTEM:** Land; Housing; Transportation; Infrastructure; Trends in mapping using remote sensing, GIS and GPS; Database creation for Infrastructure development Decision support system for urban and regional management.

**TEXT BOOKS:**

1. Rangwala (2009), *Town Planning*, Charotar Publishing House, Anand, India
2. Gallian B. Arthu, Simon Eisner (1975), *The Urban Pattern, City Planning and Design*, van Nostrand.

**REFERENCE BOOKS:**

1. Margaret Roberts (1974), *Introduction to Town Planning Techniques*, Hutchinson, London.

**B. Tech. CIVIL VII SEMESTER**

**COMPUTER AIDED DRAFTING OF BUILDINGS LAB**

Course Code: **A1138**

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

**LIST OF EXPERIMENTS:**

1. Introduction to Computer Aided Drafting
2. Software for Cad-Introduction to Different Software
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 building
  - b. multi storeyed buildings
6. Detailing of building components like Doors, Windows, Roof Trusses etc. using CAD software's
7. Exercises on development of working of buildings

**LIST OF EXPERIMENTS:**

**RCC**

1. Beams ( single reinforced, double reinforced sections)
2. Continuous beams
3. One way slab, two way slab
4. Continuous slabs
5. Columns/footings

**STEEL**

1. Riveted joints
2. Column with Gusset base plate and slab base.
3. Longitudinal section and cross section of welded plate girder.
4. Lacing and battening system for columns
5. Roof Truss

# **SYLLABI FOR VIII SEMESTER**

**UNIT - I**

**DESIGN OF RETAINING WALLS, CANTILEVER:** Design of Retaining walls, cantilever and counter fort

**DESIGN OF WATER TANKS:** Design of RCC water tanks, Circular and rectangular types, Design of steel water tanks.

**UNIT - II**

**DESIGN OF BUNKERS, CHIMNEYS:** Introduction to bunkers, silos and Chimney, concepts of loading and Design.

**UNIT - III**

**DESIGN OF GIRDERS:** Design of plate girder railway bridges and gantry girders.

**DESIGN OF TRUSS BRIDGES:** Design of steel truss bridges for railway loading

**UNIT - IV**

**DESIGN OF BRIDGES:** Introduction to concrete bridges, IRC loading, slab bridges and T - beam bridges design concepts.

**UNIT - V**

**DESIGN OF MULTY STOREYED BUILDINGS:** Multistory building system –detailing for Ductility, Design for earthquake and wind forces.

**TEXT BOOKS:**

1. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain (1992), *Reinforced concrete structures*, Vol.2, Laxmi publications Pvt. Ltd., New Delhi, India.
2. S. Unnikrishna Pillai, Devdas Menon (2003), *Reinforced concrete design*, Tata McGraw Hill, New Delhi, India.

**REFERENCE BOOKS:**

1. S. U. Pillai and D.Menon (2003), *Reinforced concrete design*, Tata McGraw hill, New Delhi, India.
2. N. Krishna Raju (2005), *Design drawing of concrete and steel structures*, Universities Press, Hyderabad, India.
3. Vargheesh (2005), *Advanced Reinforced concrete design*, Prentice Hall of India Pvt. Ltd, New Delhi, India.

**EARTH QUAKE RESISTANT DESIGN STRUCTURES**  
(Professional Elective - II)

Course Code: A1142

L	T	P	C
3	1	-	4

**UNIT - I**

**INTRODUCTION:** Introduction to Earthquake Engineering seismology, Causes of earthquakes and seismic waves, magnitude, intensity and energy release, characteristics of strong earthquake ground motions, Seismic Risk.

**UNIT - II**

**INTRODUCTION TO THEORY OF VIBRATIONS:** Basic theory of vibrations, earth quake Response of structures, Single-degree of freedom dynamics, Concept of Response Spectra and introduction to multi-degree of freedom systems, Design response spectrum, Idealization of Structures Flexibility of long and short period structures, Response spectrum analysis.

**UNIT - III**

**EARTHQUAKE RESISTENT DESIGN:** Philosophy of earthquake resistant design, Ductility, Redundancy & over strength.

**DAMPING:** Damping, Supplemented damping, Code provisions, building forms for earthquake resistance, performance of buildings in past earthquakes.

**UNIT - IV**

**SEISMIC BEHAVIOR:** Seismic behavior of concrete, steel and masonry structures, Material properties, Behavior and analysis of members under cyclic loads, Seismic detailing provisions, Review of damage in past earthquakes.

**UNIT - V**

**IS CODES FOR BUILDING DESIGN:** Equivalent static lateral earthquake force (IS: 1893), Seismic design and detailing of masonry buildings (IS: 4326, IS: 13827 IS: 13828), Seismic design and detailing of RC buildings (IS: 13920) Soil effects and liquefaction, concepts of base isolation and energy dissipation devices.

**TEXT BOOKS:**

1. S. K. Duggal (2007), *Earth quake resistant design of structures*, Oxford University Press, India.
2. Pankaj Agarwal, Manish Shrikhande (2006), *Earth quake resistant design of structures*, Prentice Hall of India, New Delhi, India.

**REFERENCE BOOKS:**

1. Miha Tomazevic (1999), *Earth quake resistant design of Masonry Buildings*, Imperial College Press, London.
2. P. C. Varghese (2006), *Advanced Reinforced concrete design*, Prentice Hall of India, New Delhi, India.

**RELEVANT IS CODES:**

1. IS:1893
2. IS:4326
3. IS:13827
4. IS:13828
5. IS:13920

**INDUSTRIAL WASTE AND WASTE MANAGEMENT**  
(Professional Elective - II)

Course Code: A1143

L T P C  
3 1 - 4

**UNIT - I**

**QUALITY OF WATER AND WATER MANGEMENT:** Quality requirements of boiler and cooling waters, Quality requirements of process water for Textiles, Food processing and Brewery Industries, Boiler and cooling water treatment methods. Basic Theories of Industrial Waste water Management, Volume reduction and Strength reduction. Neutralization, Equalization and proportioning. Joint treatment of industrial wastes, consequent problems.

**UNIT - II**

**EFFLUENT DISCHARGE AND ITS PROBLEMS:** Industrial waste water discharges into streams, Lakes and oceans and problems, Recirculation of Industrial Wastes, Use of Municipal Waste Water in Industries.

**UNIT - III**

**TEXTILE, PAPER AND PULP, THERMAL POWER PLANTS:** Manufacturing Process and origin of liquid waste from Textiles, Paper and Pulp industries, Thermal Power Plants and Tanneries, Special Characteristics, Effects and treatment methods.

**FERTILIZER, DISTILLERY AND DAIRY INDUSTRIES:** Manufacturing Process and origin of liquid waste from Fertilizers, Distillers, and Dairy, Special Characteristics, Effects and treatment methods.

**UNIT - IV**

**SUGAR, STEEL, REFINERY AND PHARMACEUTICAL PLANTS:** Manufacturing Process and design origin of liquid waste from Sugar Mills, Steel Plants, Oil Refineries, and Pharmaceutical Plants, Special Characteristics, Effects and treatment methods.

**UNIT - V**

**COMMON EFFLUENT TREATMENT PLANTS:** Advantages and Suitability, Limitations, Effluent Disposal Methods.

**TEXT BOOKS:**

1. M. N. Rao, Dutta (2009), *Waste Water Treatment*, Oxford & IBH, New Delhi.

**REFERENCE BOOKS:**

1. Met Calf, Eddi (1979), *waste water engineering*, Mc Graw-Hill Publications, New Delhi, India.
2. Mark J. Hammer, Mark J. Hammer (2008), *Water and Waste Water technology*, Prentice Hall, New York.



**GROUND IMPROVEMENT TECHNIQUES**  
(Professional Elective - II)

Course Code: A1144

L	T	P	C
3	1	-	4

**UNIT - I**

**DEWATERING:** Methods of de-watering- sumps and interceptor ditches- single, multi stage well points, vacuum well points, Horizontal wells, foundation drains, blanket drains, criteria for selection of fill material around drains, Electro-osmosis.

**UNIT - II**

**GROUTING:** Objectives of grouting, grouts and their properties, grouting methods, ascending, descending and stage grouting, hydraulic fracturing in soils and rocks- post grout test. In - situ densification methods in granular Soils. Vibration at the ground surface, Impact at the Ground Surface, Vibration at depth, Impact at depth. In - situ densification methods in cohesive soils, preloading or dewatering, Vertical drains, Sand Drains, Sand wick geo drains, Stone and lime columns, thermal methods.

**UNIT - III**

**STABILISATION:** Methods of stabilization, cement, lime, bituminous, chemical stabilization with calcium chloride, sodium silicate and gypsum.

**REINFORCED EARTH:** Principles, Components of reinforced earth, factors governing design of reinforced earth walls, design principles of reinforced earth walls.

**UNIT - IV**

**GEOSYNTHETICS:** Geo textiles, Types, Functions and applications, geo grids, geo foams and geo membranes, functions and applications.

**UNIT - V**

**EXPANSIVE SOILS:** Problems of expansive soils, tests for identification, and methods of determination of swell pressure. Improvement of expansive soils, Foundation techniques in expansive soils, under reamed piles.

**TEXT BOOKS:**

1. Purushotham Raj (2005), *Ground Improvement Techniques*, Laxmi Publications, New Delhi, India.
2. Hausmann M.R. (1990), *Engineering Principles of Ground Modification*, Tata McGraw-Hill International Edition, New Delhi, India.

**REFERENCE BOOKS:**

1. Xanthakos P. P, Abramson L. W, Brucwe D.A (1994), *Ground Control and Improvement*, John Wiley and Sons, New York, USA.
2. Robert M. Koerner (1986), *Designing with Geosynthetics*, Prentice Hall, New Jersey, USA.

**B. Tech. CIVIL VIII SEMESTER**

**URBAN DISASTER AND INTELLIGENT CONTROL SYSTEMS**

(Professional Elective - II)

Course Code: **A1145**

L	T	P	C
3	1	-	4

**UNIT - I**

**DISASTERS:** Types of disaster, significant aspects of disasters, economic impact of disasters, Risk aspects, Hazards disasters. Urban Disaster and their environmental impacts: Impact of earthquakes, floods, fires, droughts, landslides, Congestion pollution, accident risk on urban environment policies for remedial measures. Technology to forecast their impact.

**UNIT - II**

**TECHNOLOGY TO TRACK URBAN DISASTERS:** Monitoring profile, cameras, sensors and communication systems engineering profiles.

**UNIT - III**

**PLANNING PROFILE:** *Impact on urban Disasters:* planning profile, GPS, satellite technology and photographic technique. Total station, terrestrial scanners, and other survey equipment

**UNIT - IV**

**INFORMATION SYSTEMS:** Geography information system - different packages and over view, MIS- Architecture, web enabled communication systems, over view

**UNIT - V**

**INTELLIGENT CONTROL SYSTEMS:** Technology enabled online monitoring systems, post evaluation multi criteria systems, fore casting approaches through decision supporting systems. Disasters, case studies on disaster mitigation measures.

**TEXT BOOKS:**

1. Rajib Shaw R, R. Krishna Murthy (2009), *Disasters- global challenges and local solutions*, Universities press, New Delhi, India.
2. Pradeep sahani Alka Dhameja (2004), *Disaster mitigation- Experiences and reflections*, Prentice Hall of India, New Delhi, India.

**REFERENCE BOOKS:**

1. Lawrence A. Klein (2001), *Sensor Technologies and Data requirement if ITS*.

**BRIDGE ENGINEERING**  
**(Professional Elective - II)**

Course Code: **A1146**

L	T	P	C
3	1	-	4

**UNIT - I**

**LOADING STANDARDS AS PER IRC:** Railway load, Equivalent Uniformly Distributed live load, Influence line diagram for member of Pratt truss.

**UNIT - II**

**DESIGN OF BRIDGES:** Slab Bridge, T-Beam Bridge.

**UNIT - III**

**DESIGN OF BRIDGES:** Balanced Cantilever Bridge.

**DESIGN OF BRIDGES:** Steel Truss Bridge.

**UNIT - IV**

**DESIGN OF WELLS:** construction; open sinking of wells, Plugging, sand filling and casting of well cap.

**UNIT - V**

**PIERS AND ABUTMENTS:** Piers, abutments, wing walls factors effecting and stability, well foundations.

**TEXT BOOKS:**

1. D. Johnson Victor (2001), *Essentials of Bridge Engineering*, 5<sup>th</sup> Edition, Oxford & IBH Publishing Co. Pvt. Ltd, New Delhi, India.

**REFERENCE BOOKS:**

1. S. Ponnuswamy(2008), *Bridge Engineering*, Tata McGraw Hill, New Delhi, India.

**MULTI STOREYED STRUCTURES**  
(Professional Elective - II)

Course Code: A1147

L	T	P	C
3	1	-	4

**UNIT - I**

**ANALYSIS OF GABLE:** Analysis of Gable by Moment Distribution Methods with and without sway.

**UNIT - II**

**INTRODUCTION TO MATRIX METHODS:** Analysis of continuous beams and single bay single storey portal Frames by stiffness method.

**UNIT - III**

**ANALYSIS OF FRAMES:** Analysis of single bay single storey portal frames.

**ANALYSIS OF BEAMS:** Analysis of continuous beams by Flexibility matrix methods.

**UNIT - IV**

**ANALYSIS OF MULTI STOREYED FRAMES:** Analysis of Multi storeyed frames by substitute frame method.

**UNIT - V**

**ANALYSIS OF MULTI STOREYED FRAMES:** Analysis of Multistoried frames for wind loads by portal, cantilever and Girder Factor methods.

**TEXT BOOKS:**

1. V. N. Vazirani, M. M. Ratwani (2004), *Analysis of Structures, Vol.II*, Khanna Publishers, New Delhi, India.
2. S. S. Bhavikatti (2005), *Structural Analysis, Vol. II*, 2<sup>nd</sup> edition, Vikas Publishing House Pvt. Ltd, New Delhi, India.

**REFERENCE BOOKS:**

1. S. P. Gupta, G. S. Pandit, R. Gupta (2003), *Theory of Structures, Vol.II*, Second Reprint, Tata McGraw Hill, New Delhi, India.

**AIR POLLUTION AND CONTROL METHODOLOGIES**  
(Professional Elective - III)

Course Code: A1148

L	T	P	C
3	1	-	4

**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. Effects of air pollutants on man, material and vegetation: global effects of air pollution - green house effect, heat islands, acid rains, ozone holes etc.

**UNIT - II**

**THERMODYNAMICS AND KINETICS OF AIR - POLLUTION:** Applications in the removal of gases like SO<sub>x</sub>, NO<sub>x</sub>, CO, HC etc., air-fuel ratio. Computation and Control of products of combustion. Meteorology and plume Dispersion,

**UNIT - III**

**PROPERTIES OF ATMOSPHERE:** Heat, Pressure, Wind forces, Moisture and relative Humidity, Influence of Meteorological phenomena on Air Quality-wind rose diagrams.

**LAPSE RATES:** Pressure Systems, Winds and moisture plume behavior and plume Rise Models; Gaussian Model for Plume Dispersion.

**UNIT - IV**

**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. General Methods of Control of NO<sub>x</sub> and Sox emissions – In-plant Control Measures, process changes, dry and wet methods of removal and recycling.

**UNIT - V**

**AIR QUALITY MANAGEMENT:** Monitoring of SPM, SO<sub>2</sub>; NO and CO Emission Standards.

**TEXT BOOKS:**

1. M. N. Rao, H. V. N. Rao (1988), *Air pollution*, Tata McGraw Hill Education, New Delhi, India.
2. C. S. Rao (2006), *Environmental Pollution control Engineering*, New age international, New Delhi, India.

**REFERENCE BOOKS:**

1. R. K. Trivedy, P. K. Goel (2003), *Introduction to Air pollution*, ABD Publications, New Delhi, India.
2. Wark, Warner (1998), *Air pollution its origin and control*, Addison-Wesley, New York.

**PRE STRESSED CONCRETE STRUCTURES**  
(Professional Elective - III)

Course Code: A1149

L T P C  
3 1 - 4

**UNIT - I**

**INTRODUCTION:** Historic development, General principles of pre stressing pre tensioning and post tensioning. Advantages and limitations of pre stressed concrete, Materials, High strength concrete and high tensile steel their characteristics. I.S. Code provisions, Methods and Systems of Pre stressing; Pre-tensioning and post tensioning methods, Analysis of post tensioning. Different systems of pre stressing like Hoyer System, Magnel System Freyssinet system and Gifford – Udall System.

**UNIT - II**

**LOSSES OF PRESTRESS:** Loss of pre stress in pre-tensioned and post-tensioned members due to various causes like elastic shortage of concrete, shrinkage of concrete, creep of concrete, Relaxation of steel, slip in anchorage bending of member and frictional losses.

**UNIT - III**

**ANALYSIS OF SECTIONS FOR FLEXURE;** Elastic analysis of concrete beams pre stressed with straight, concentric, eccentric, bent and parabolic tendons.

**DESIGN OF SECTIONS FOR FLEXURE AND SHEAR:** Allowable stress, Design criteria as per I.S. Code. Elastic design of simple rectangular and I-section for flexure, shear, and principal stresses, design for shear in beams, Kern - lines, cable profile.

**UNIT - IV**

**ANALYSIS OF END BLOCKS:** Analysis of end blocks by Guyon’s method and Mugnel method, Anchorage zone trusses, approximate method of design, Anchorage zone reinforcement, Transfer of pre stress pre-tensioned members.

**COMPOSITE SECTION:** Introduction, Analysis of stress, Differential shrinkage, General designs considerations.

**UNIT - V**

**DEFLECTIONS OF PRESTRESSED CONCRETE BEAMS:** Importance of control of deflections, factors influencing deflections, short term deflections of un cracked members prediction of long term deflections.

**TEXT BOOKS:**

1. Krishna Raju (2006), *Pre stressed Concrete*, Tata Mc. Graw Hill Publications, New Delhi, India.
2. S. Ramamrutham(1994), *Pre stressed Concrete*, 2<sup>nd</sup> edition, Dhanpat Rai & Sons, New Delhi, India.

**REFERENCE BOOKS:**

1. T. Y. Lin, Ned H. Burns (1981), *Design of Pre stressed concrete structures*, 3<sup>rd</sup> Edition, John Wiley & Sons, United States of America.
2. Dayartatnam (1985), *Prestressed Concrete Structures*, Oxford IBH Publishing Company, New Delhi, India.

**SOIL DYNAMICS AND MACHINE FOUNDATION**  
(Professional Elective - III)

Course Code: A1150

L	T	P	C
3	1	-	4

**UNIT - I**

**THEORY OF VIBRATIONS:** Basic definitions, free and forced vibrations with and without damping for single degree freedom system. Resonance and its effect, magnification, Logarithmic decrement. Transmissibility Natural frequency of foundation, Soil system, Barkan's and IS methods, pressure bulb concept, Pauw's Analogy.

**UNIT - II**

**WAVE PROPAGATION:** Elastic waves in Rods, Waves in elastic half space. *Dynamic Soil Properties:* Field and Laboratory methods of determination, Up hole, down hole and cross hole methods, Cyclic plate load test, Block vibration test, Determination of Damping factor.

**UNIT - III**

**MACHINE FOUNDATIONS:** Types, Design criteria, permissible amplitudes and bearing pressure.

**BLOCK FOUNDATION:** Degrees of freedom, analysis under different modes of vibration

**UNIT - IV**

**ANALYSIS OF TWO DEGREE FREEDOM SYSTEMS:** Analysis of Two Degree freedom systems under free and forced vibrations. Principles of Design of Foundations for reciprocating and impact machines as per IS code.

**UNIT - V**

**VIBRATION ISOLATION:** Types and methods, Isolating materials and their properties.

**TEXT BOOKS:**

1. P. Srinivasulu, G. V. Vaidyanathan (2009), *Handbook of Machine Foundations*, Tata McGraw-Hill, New Delhi, India.
2. Shamsheer Prakash (1981), *Soil Dynamics*, Tata McGraw-Hill, New Delhi, India.

**REFERENCE BOOKS:**

1. Barken (1962), *Dynamics of Bases and Foundations*, McGraw Hill Publishing Co., New York.
2. Richart Hall, Woods (1970), *Vibration of Soils and Foundations*, Prentice Hall, eaglewood Cliffs, New Jersey, USA.

**TRAFFIC ENGINEERING**  
(Professional Elective - III)

Course Code: A1151

L T P C  
3 1 - 4

**UNIT - I**

**TRAFFIC CHARACTERISTICS:** Basic characteristics of Traffic, Volume, Speed and Density. Relationship among Traffic parameters.

**TRAFFIC MEASUREMENT:** Traffic Volume Studies: Objectives, Types of Volume Studies, Concept of PCU. Data Collection and Presentation, Speed Studies, Types of Speeds. Objectives of Speed Studies. Methods of Conducting speed studies. Data collection and Presentation, Statistical Methods for Analysis of Speed Data.

**UNIT - II**

**HIGHWAY CAPACITY:** Definition of Capacity, Importance of capacity, Factors affecting Capacity, Concept of Level of Service, different Levels of Service, Concept of Service Volume, Peak Hour Factor.

**UNIT - III**

**TRAFFIC CONTROL AND REGULATION:** Traffic Problems in Urban areas, Importance of Traffic Control and regulation, Traffic Regulatory Measures, Channelization, Traffic Signals, Saturation Flow, Signal Design by Webster Method, Signal Phasing and Timing Diagrams. Detrimental effect of traffic on environment, Air Pollution, Pollutants due to Traffic, Measures to reduce Air Pollution due to Traffic- Noise Pollution, Measures to reduce Noise Pollution.

**UNIT - IV**

**PARKING STUDIES:** Types of parking facilities, on street and Off Street Parking Facilities. Parking Studies, Parking Inventory Study, Parking Survey by Patrolling Method, Analysis of Parking Data and parking characteristics, Multi Story Car Parking Facility, Design standards.

**UNIT - V**

**TRAFFIC SIGNS AND ROAD MARKINGS:** Types of Traffic Signs, cautionary, Regulatory and Informative Signs, Specifications. Pavement markings, Types of Markings, Lane markings and Object markings. Standards and Specifications for Road Markings. Problem of Highway Safety, Types of Road accidents, Causes. Engineering Measures to reduce Accidents, Enforcement Measures, Educational Measures, Road Safety Audit, Principles of Road Safety Audit.

**TEXT BOOKS:**

1. L. R. Kadiyali (1987), *Traffic Engineering and Transportation planning*, Khanna publishers, New Delhi, India.
2. Partha Chakroborthy, Animesh Das (2004), *Principles of Transportation Engineering*, Prentice Hall of India, New Delhi, India.

**REFERENCE BOOKS:**

1. C. J. Khisty (2003), *Transportation Engineering – An Introduction*, Prentice Hall of India, New Delhi, India.
2. C.S. Papacostas (1987), *Fundamentals of Transportation Engineering*, Prentice Hall of India, New Delhi, India.
3. Mannering, Kilareski (2007), *Highway Engineering and Traffic Analysis*, John Wiley Publications, New York.



**B. Tech. CIVIL VIII SEMESTER**

**GEOINFORMATICS FOR ENVIRONMENTAL MONITORING**  
**(Professional Elective - III)**

Course Code: **A1152**

**L T P C**  
**3 1 - 4**

**UNIT - I**

**WATER AND THE ENVIRONMENT:** R.S. of fluorescence, water quality, water pollution, potential pollution sources, water runoff, Remote Sensing and Water quality management, snow surface cover, flood prediction. Soils and land forms, insects and disease, soil erosion, salinity, flood damage, soil limitation, soil degradation using Remote Sensing and GIS.

**UNIT - II**

**URBAN ENVIRONMENT:** General consideration rural structure, urban areas, Impact of industrial pollution, chemical effluents, land reclamation, disposal of solid waste, mining pollution.

**UNIT - III**

**AIR POLLUTION:** R. S. techniques for Air quality monitoring, case studies, weather forecasting and climatology, emissivity characteristics.

**GLOBAL CLIMATOLOGY:** Measurement of atmospheric temperature, composition, constituent distribution and concentration, wind flows and air circulation, Hurricane tracking, meteorological satellite systems.

**UNIT - IV**

**MARINE ENVIRONMENT:** Sensors for environmental monitoring, sensors, visible and outside visible wave length, absorption spectrometers, selection of ground truth sites, sea truth observations, Radar techniques for sensing ocean surface, thermal measurements, application of sensing, mapping oil slicks, Chlorophyll detection, Fisheries resources, Coastal marine studies – determination of temperature and sea state.

**UNIT - V**

**CASE STUDIES**

**TEXT BOOKS:**

1. Barrett E. C, Culis I. F(1997), *Introduction to Environmental Remote Sensing*, 3<sup>rd</sup> edition, Chapman and Hall, New York.
2. Lintz J, Simonent D. S (1976), *Remote Sensing of environment*, Addison Wesley, USA.

**REFERENCE BOOKS:**

1. James B. Campbell, Randolph H. Wynne (2011), *Introduction to Remote Sensing*, 5<sup>th</sup> edition, Guilford Publications Inc., New York.
2. L. R. A. Narayana (1999), *Remote Sensing and its applications*, University Press, Hyderabad, India.

**INDUSTRIAL STRUCTURES**  
(Professional Elective - III)

Course Code: **A1153**

L	T	P	C
3	1	-	4

**UNIT - I**

**CONNECTIONS:** Design of Frame, seated moment resisting connections (both welded and bolted).

**UNIT - II**

**ANALYSIS OF FRAMES:** Analysis of Pitched (Gable) Portal frames, Assumptions, Bending Moment and Shear Force diagrams.

**UNIT - III**

**GIRDERS:** Analysis and design of gantry girders, Steel Bracket design.

**DESIGN OF FRAMES:** Design of portal frame (dead live and wind loads).

**UNIT - IV**

**TOWERS:** Towers, Principles of Analysis and Design of Lattice towers, Transmission towers. Design of latic towers and transmission towers (only sessional work).

**UNIT - V**

**ANALYSIS OF MILL BLENDS:** Introduction, Analysis of Mill Bends.

**TEXT BOOKS:**

1. M. Raghupati (2000), *Design of Steel Structures*, Mc Graw Hill Education Pvt. Ltd, New Delhi, India.

**REFERENCE BOOKS:**

1. P. Dayaratnam (1996), *Design of Steel Structures*, 2nd edition, S. Chand, New Delhi, India.
2. Kazmi, Zindal (1988), *Design of Steel Structures*, Prentice hall of India, New Delhi, India.

**LIST OF EXPERIMENTS:**

1. Digitization of Map/Toposheet
2. Creation of thematic maps.
3. Study of features estimation
4. Developing Digital Elevation model
5. Simple applications of GIS in water Resources Engineering & Transportation Engineering

**SOFTWARE:**

1. Arc GIS 9.0
2. ERDAS 8.7
3. MapInfo 6.5

**1. OBJECTIVE:**

Seminar is an important component of learning in an Engineering College, where the student gets acquainted with preparing a report & presentation on a topic.

**2. PERIODICITY / FREQUENCY OF EVALUATION: Twice**

**3. PARAMETERS OF EVALUATION:**

1. The seminar shall have two components, one chosen by the student from the course-work without repetition and approved by the faculty supervisor. The other component is suggested by the supervisor and can be a reproduction of the concept in any standard research paper or an extension of concept from earlier course work.
2. The two components of the seminar are distributed between two halves of the semester and are evaluated for 50 marks each. The average of the two components shall be taken as the final score.
3. The students shall be required to submit the rough drafts of the seminar outputs within one week of the commencement of the class work.
4. Supervisor shall make suggestions for modification in the rough draft. The final draft shall be presented by the student within a week thereafter.
5. Presentation schedules will be prepared by different Departments in line with the academic calendar.

**The Seminars shall be evaluated in two stages as follows:**

**A. Rough draft**

In this stage, the student should collect information from various sources on the topic and collate them in a systematic manner. He/ She may take the help of the concerned supervisor.

The report should be typed in “MS-Word” file with “calibri” font, with font size of 16 for main heading, 14 for sub-headings and 11 for the body text. The contents should also be arranged in Power Point Presentation with relevant diagrams, pictures and illustrations. It should normally contain 18 to 25 slides, consisting of the followings:

1.	Topic, name of the student & guide	1 Slide
2.	List of contents	1 Slide
3.	Introduction	1 - 2 Slides
4.	Descriptions of the topic (point-wise)	7 - 10 Slides
5.	Images, circuits etc.	6 - 8 Slides
6.	Conclusion	1 - 2 Slides
7.	References/Bibliography	1 Slide

The soft copy of the rough draft of the seminar presentation in MS Power Point format along with the draft Report should be submitted to the concerned supervisor, with a copy to the concerned HOD within 30 days of the commencement of class work.

The evaluation of the Rough draft shall generally be based upon the following.

1.	Punctuality in submission of rough draft and discussion	2 Marks
2.	Resources from which the seminar have been based	2 Marks
3.	Report	3 Marks
4.	Lay out, and content of Presentation	3 Marks
5.	Depth of the students knowledge in the subject	5 Marks
Total		15 Marks

After evaluation of the first draft the supervisor shall suggest further reading, additional work and fine tuning, to improve the quality of the seminar work.

Within 7 days of the submission of the rough draft, the students are to submit the final draft incorporating the suggestions made by the supervisor.

**B. Presentation:**

After finalization of the final draft, the students shall be allotted dates for presentation (in the designated seminar classes) and they shall then present it in presence students, supervisor, faculties of the department and at least one faculty from some department / other department.

The student shall submit 3 copies of the Report neatly bound along with 2 soft copies of the PPT in DVD medium. The students shall also distribute the title and abstract of the seminar in hard copy to the audience. The final presentation has to be delivered with 18-25 slides.

The evaluation of the Presentation shall generally be based upon the following.

1.	Contents	10 Marks
2.	Delivery	10 Marks
3.	Relevance and interest the topic creates	5 Marks
4.	Ability to involve the spectators	5 Marks
5.	Question answer session	5 Marks
Total		35 Marks

**4. WHO WILL EVALUATE?**

The presentation of the seminar topics shall be made before an internal evaluation committee comprising the Head of the Department or his/her nominee, seminar supervisor and a senior faculty of the department / other department.

**1. OBJECTIVE:**

- To enable the examiners to assess the candidate's knowledge in his or her particular field of learning.
- To test the student's awareness of the latest developments and relate them to the knowledge acquired during the classroom teaching.

**2. PARAMETERS OF EVALUATION:**

Subject Knowledge	Current Awareness	Career Orientation	Communication Skills	Total
20	10	10	10	50

**3. WHO WILL EVALUATE?**

The comprehensive Viva will be conducted by a committee comprising Head of the Department or his/her nominee, two senior faculty of the respective department and an external examiner from outside the college. The comprehensive viva shall be evaluated for 50 marks at the end of VIII semester. A minimum of 40% of maximum marks shall be obtained to earn the corresponding credits.

**4. PERIODICITY / FREQUENCY OF EVALUATION: Once****5. PEDAGOGY:**

- The viva will be held on a face to face basis.
- The students will be expected to answer the questions related to latest developments and all courses taken till date.
- Viva voce will be conducted within week before the beginning of midterm examinations. However, in exceptional circumstances it can be scheduled immediately after the end of midterm examinations.
- Students will have to make themselves available on the date of the viva voce.

**1. OBJECTIVE:**

The main objective of the Project Work is for the students to learn and experience all the major phases and processes involved in solving “real life engineering problems”.

**2. EXPECTED OUTCOME:**

The major outcome of the B. Tech project must be well-trained students. More specifically students must have acquired:

- System integration skills
- Documentation skills
- Project management skills
- Problem solving skills

**3. PROJECT SELECTION:**

Projects are suggested by the faculty, with or without collaboration with an industry. All faculty are to suggest projects. Students are also encouraged to give project proposals after identifying a faculty who would be willing to supervise the work. A Project brief is to be given by the faculty to the group defining the project comprehensively.

All B. Tech major projects are to be done in the Institute. For industry specified projects, students will be permitted to spend 1-2 weeks in the industry on recommendation by the supervisor. The number of students per batch should be between 2 and 4. If more number of students is really needed, the project may be split into functional modules and given to subgroups.

**4. WHO WILL EVALUATE?**

The end semester examination shall be based on the report submitted and a viva-voce exam for 150 marks by committee comprising of the Head of the Department, project supervisor and an external examiner.

**5. EVALUATION:**

The basic purpose is to assess the student competencies with regard to his project work. More specifically to assess the student’s individual contribution to the project, to establish the level of understanding of basic theoretical knowledge relevant to the project and to ensure that the student has good understanding and appreciation of design and development decisions taken in the course of the project. It is desirable that all faculty members are present for the evaluations as this is a platform to get to know the student projects and to motivate the students to do good projects. The faculty should adopt a clear and consistent pattern of asking questions from general to specific aspects of the project. The presentation and evaluation is open to other students of the department.

The project work shall be evaluated for 200 marks out of which 50 marks for internal evaluation and 150 marks for end-semester evaluation. The evaluation shall be done on the following basis

Semester VII	Semester VIII
Preliminary Evaluation - 10 marks	Design Evaluation II - 25 marks
Design Evaluation I - 15 marks	Final Evaluation – 150 marks

**6. GUIDELINES FOR THE PREPARATION OF B. TECH PROJECT REPORTS**

- 1.1. Project reports should be typed neatly only on one side of the paper with 1.5 or double line spacing on a A4 size bond paper (210 x 297 mm). The margins should be: Left - 1.25", Right - 1", Top and Bottom - 0.75".
- 1.2. The total number of reports to be prepared are:
  - One copy to the department
  - One copy to the concerned guide(s)
  - One copy to the candidate.
- 1.3. Before taking the final printout, the approval of the concerned guide(s) is mandatory and suggested corrections, if any, must be incorporated.
- 1.4. For making copies dry tone Xerox is suggested.
- 1.5. Every copy of the report must contain
  - Inner title page (White)
  - Outer title page with a plastic cover
  - Certificate in the format enclosed both from the college and the organization where the project is carried out.
  - An abstract (synopsis) not exceeding 100 words, indicating salient features of the work.
- 6.6. The organization of the report should be as follows:

1.	Inner title page	Usually numbered in roman
2.	Abstract or Synopsis	
3.	Acknowledgments	
4.	Table of Contents	
5.	List of table & figures (optional)	

- 6.7. Chapters (to be numbered) containing Introduction, which usually specifies the scope of work and its importance and relation to previous work and the present developments, Main body of the report divided appropriately into chapters, sections and subsections.
  - The chapters, sections and subsections may be numbered in the decimal form for e.g. Chapter 2, sections as 2.1, 2.2 etc., and subsections as 2.2.3, 2.5.1 etc.
  - The report should be typed in "MS-Word" file with "calibri" font. The chapter must be left or right justified (font size 16). Followed by the title of chapter centered (font size 18), section/subsection numbers along with their headings must be left justified with section number and its heading in font size 16 and subsection and its heading in font size 14. The body or the text of the report should have font size 11.
  - The figures and tables must be numbered chapter wise for e.g.: Fig. 2.1 Block diagram of a serial binary adder, Table 3.1 Primitive flow table, etc.
  - The last chapter should contain the summary of the work carried, contributions if any, their utility along with the scope for further work.
- 6.8. **Reference OR Bibliography:** The references should be **numbered serially** in the order of their occurrence in the text and their numbers should be indicated within square brackets for e.g. [3]. The section on references should list them in serial order in the following format.
  - 1. For textbooks - A.V. Oppenheim and R.W. Schafer, Digital Signal Processing, Englewood, N.J., Prentice Hall, 3 Edition, 1975.
  - 2. For papers - Devid, Insulation design to combat pollution problem, Proc of IEEE, PAS, Vol 71, Aug 1981, pp 1901-1907.
- 6.9. Only SI units are to be used in the report. Important equations must be numbered in decimal form for e.g.  $V = IZ$  ..... **(3.2)**
- 6.10. All equation numbers should be right justified.



- 6.11. The project report should be brief and include descriptions of work carried out by others only to the minimum extent necessary. Verbatim reproduction of material available elsewhere should be strictly avoided. Where short excerpts from published work are desired to be included, they should be within quotation marks appropriately referenced.
- 6.12. Proper attention is to be paid not only to the technical contents but also to the organization of the report and clarity of the expression. Due care should be taken to avoid spelling and typing errors. The student should note that report-write-up forms the important component in the overall evaluation of the project
- 6.13. Hardware projects must include: the component layout, complete circuit with the component list containing the name of the component, numbers used, etc. and the main component data sheets as Appendix. At the time of report submissions, the students must hand over a copy of these details to the project coordinator and see that they are entered in proper registers maintained in the department.
- 6.14. Software projects must include a virus free disc, containing the software developed by them along with the read me file. Read me file should contain the details of the variables used, salient features of the software and procedure of using them: compiling procedure, details of the computer hardware/software requirements to run the same, etc. If the developed software uses any public domain software downloaded from some site, then the address of the site along with the module name etc. must be included on a separate sheet. It must be properly acknowledged in the acknowledgments.
- 6.15. Sponsored Projects must also satisfy the above requirements along with statement of accounts, bills for the same duly attested by the concerned guides to process further, They must also produce NOC from the concerned guide before taking the internal viva examination.
- 6.16. The reports submitted to the department/guide(s) must be hard bounded, with a plastic covering.
- 6.17. Separator sheets, used if any, between chapters, should be of thin paper

## **VARDHAMAN COLLEGE OF ENGINEERING**

(Autonomous)

Shamshabad – 501 218, Hyderabad

Department of .....

### **CERTIFICATE**

Certified that the project work entitled ..... carried out by Mr./Ms. ...., Roll Number ....., a bonafide student of .....in partial fulfillment for the award of **Bachelor of Technology** in ..... of the Jawaharlal Nehru Technological University, Hyderabad during the year ..... It is certified that all corrections / suggestions indicated for Internal Assessment have been incorporated in the Report deposited in the departmental library. The project report has been approved as it satisfies the academic requirements in respect of Project work prescribed for the said Degree.

**Name & Signature of the Guide**

**Name Signature of the HOD**

**Signature of the Principal**

#### External Viva

Name of the examiners

Signature with date

- 1.
- 2.

# Certificate issued at the Organization where the project was carried out

(On a separate sheet, If applicable)

NAME OF THE INDUSTRY / ORGANIZATION, Address with pin code

## CERTIFICATE

Certified that the project work entitled ..... carried out by  
Mr./Ms . . . . ., Roll Number....., a bonafide student of  
.....in partial fulfillment for the award of **Bachelor of Technology** in  
..... of the Jawaharlal Nehru Technological University, Hyderabad  
during the year ..... It is certified that, he/she has completed the project satisfactorily

Name & Signature of the Guide

Name & Signature of the Head of Organization

### 7. DISTRIBUTION OF MARKS FOR B.TECH DISSERTATION EVALUATION

S No.	Particulars	Max. Marks
1	Relevance of the subject in the present context	10
2	Literature Survey	10
3	Problem formulation	20
4	Experimental observation / theoretical modeling	10
5	Results – Presentation & Discussion	20
6	Conclusions and scope for future work	10
7	Overall presentation of the Thesis / Oral presentation	40
8	Project Report Writing	30
<b>Total Marks</b>		<b>150</b>

**MALPRACTICES RULES**  
**DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS**

	Nature of Malpractices/Improper conduct	Punishment
	<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/year. The Hall Ticket of the candidate is to be cancelled and sent to the University.
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	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

	any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.
9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	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.  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/year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year 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.	

## Frequently asked Questions and Answers about autonomy

- 1. Who grants Autonomy? UGC, Govt., AICTE or University**  
In case of Colleges affiliated to a university and where statutes for grant of autonomy are ready, it is the respective University that finally grants autonomy.
- 2. Shall VCE award its own Degrees?**  
No. Degree will be awarded by Jawaharlal Nehru Technological University, Hyderabad with a mention of the name Vardhaman College of Engineering on the Degree Certificate.
- 3. What is the difference between a Deemed University and an Autonomy College?**  
A Deemed University is fully autonomous to the extent of awarding its own Degree. A Deemed University is usually a Non-Affiliating version of a University and has similar responsibilities like any University. An Autonomous College enjoys Academic Autonomy alone. The University to which an autonomous college is affiliated will have checks on the performance of the autonomous college.
- 4. How will the Foreign Universities or other stake – holders know that we are an Autonomous College?**  
Autonomous status, once declared, shall be accepted by all the stake holders. Foreign Universities and Indian Industries will know our status through our college website.
- 5. What is the change of Status for Students and Teachers if we become Autonomous?**  
An autonomous college carries a prestigious image. Autonomy is actually earned out of continued past efforts on academic performances, capability of self-governance and the kind of quality education we offer.
- 6. Who will check whether the academic standard is maintained / improved after Autonomy? How will it be checked?**  
There is a built in mechanism in the autonomous working for this purpose. An Internal Committee called Academic Programme Evaluation Committee is a Non – Statutory body, which will keep a watch on the academics and keep its reports and recommendations every year. In addition to Academic Council, the highest academic body also supervises the academic matters. At the end of three years, there is an external inspection by the University for this purpose. The standards of our question papers, the regularity of academic calendar, attendance of students, speed and transparency of result declaration and such other parameters are involved in this process.
- 7. Will the students of VCE as an Autonomous College qualify for University Medals and Prizes for academic excellence?**  
No. VCE has instituted its own awards, medals, etc. for the academic performance of the students. However for all other events like sports, cultural and co-curricular organized by the University the students shall qualify.
- 8. Can VCE have its own Convocation?**  
No, since the University awards the Degree the Convocation will be that of the University.
- 9. Can VCE give a provisional degree certificate?**  
Since the examinations are conducted by VCE and the results are also declared by VCE, the college sends a list of successful candidates with their final percentage of marks to the University. Therefore with the prior permission of the University the college will be entitled to give the provisional certificate.
- 10. Will Academic Autonomy make a positive impact on the Placements or Employability?**  
Certainly. The number of students qualifying for placement interviews is expected to improve, due to rigorous and repetitive classroom teaching and continuous assessment, besides the autonomous status is more responsive to the needs of the industry. As a result, there will be a lot of scope for

industry oriented skill development built-in into the system. The graduates from an autonomous college will therefore represent better employability.

- 11. What is the proportion of Internal and External Assessment as an Autonomous College?**  
Presently, it is 25 % for internal assessment and 75 % for external assessment. As the autonomy matures the internal assessment component shall be increased at the cost of external assessment.
- 12. Will there be any Revaluation or Re-Examination System?**  
No. There will not be any Revaluation system or Re-examination. But, there is a personal verification of the answer scripts.
- 13. How fast Syllabi can be and should be changed?**  
Autonomy allows us the freedom to change the syllabi as often as we need.
- 14. Will the Degree be awarded on the basis of only final year performance?**  
No. The percentage of marks will reflect the average performance of all the semesters put together.
- 15. Who takes Decisions on Academic matters?**  
The Academic Council of College is the top academic body and is responsible for all the academic decisions. Many decisions are also taken at the lower level like the BOS which are like Boards of Studies of the University.
- 16. What is the role of Examination committee?**  
The Exam Committee is responsible for the smooth conduct of inter and external examinations. All matters involving the conduct of examinations, spot valuations, tabulations, preparation of Memorandum of Marks etc fall within the duties of the Examination Committee.
- 17. Is there any mechanism for Grievance Redressal?**  
Yes, the college has grievance redressal committee, headed by a senior faculty member of the college.
- 18. How many attempts are permitted for obtaining a Degree?**  
All such matters are defined in Rules & Regulations.
- 19. Who declares the result?**  
The result declaration process is also defined. After tabulation work the entire result is reviewed by the Moderation Committee. Any unusual deviations or gross level discrepancies are deliberated and removed. The entire result is discussed in the College Academic Council for its approval. The result is then declared on the college notice boards as well put on the web site of the college. It is eventually sent to the University.
- 20. What is our relationship with the Jawaharlal Nehru Technological University, Hyderabad?**  
We remain an affiliated college of the Jawaharlal Nehru Technological University, Hyderabad. The University has the right to nominate its members on the academic bodies of the college.
- 21. Shall we require University approval if we want to start any New Courses?**  
Yes, It is expected that approvals or such other matters from an autonomous college will receive priority.
- 22. Shall we get autonomy for PG and Doctoral Programmes also?**  
Yes, presently our PG programmes are also enjoying autonomous status.
- 23. How many exams will be there as an autonomous college?**  
This is defined in the Rules & Regulations.