

# **ACADEMIC REGULATIONS (R17)**

## **COURSE STRUCTURE AND DETAILED SYLLABUS**

**(CHOICE BASED CREDIT SYSTEM (CBCS))**

### **CIVIL ENGINEERING**

**For**

**B. Tech. - Regular Four Year Degree Course**

*(Applicable for the batches admitted from 2017 - 2018)*

**&**

**B. Tech. - Lateral Entry Scheme**

*(Applicable for the batches admitted from 2018 - 2019)*



## **CMR INSTITUTE OF TECHNOLOGY**

*(UGC - Autonomous)*

Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with A Grade and NBA

Kandlakoya(V), Medchal (M), Ranga Reddy (DisT.), Hyderabad-501 401, Telangana State

Landline: 08418-200720; Fax: 08418-200240

E-mail: [principalmrit@gmail.com](mailto:principalmrit@gmail.com)

Web: [www.cmritonline.ac.in](http://www.cmritonline.ac.in)

## FOREWORD

CMR Institute of Technology, established in the year 2005 has been bestowed with autonomous status by the UGC from the Academic Year 2017-18 for its remarkable academic accomplishments accompanied by its unflinching spirit and dedication to impart quality technical education to the deserving aspirants. The institution has commenced functioning independently within the set norms prescribed by UGC and AICTE. The performance of the institution manifests the confidence that the prestigious monitoring body, the UGC has on it, in terms of upholding its spirit and sustenance of the expected standards of functioning on its own consequently facilitating the award of degrees for its students. Thus, an autonomous institution is provided with the necessary freedom to have its own **curriculum, examination system and monitoring mechanism**, independent of the affiliating University but under its observance.

CMR Institute of Technology takes pride for having won the confidence of such distinguished academic bodies meant for monitoring the quality in technology education. Besides, the institution is delighted to sustain the same spirit of discharging the responsibilities that it has been conveying since a decade to attain the current academic excellence, if not improving upon the standards and ethics. Consequently, statutory bodies such as the Academic Council and the Boards of Studies have been constituted under the supervision of the Governing Body of the College and with the recommendations of the JNTU Hyderabad, to frame the regulations, course structure and syllabi for autonomous status.

The autonomous regulations, course structure and syllabi have been framed in accordance with the vision and mission of the institution along with certain valuable suggestions from professionals of various ancillary fields such as the academics, the industry and the research, all with a noble vision to impart quality technical education and contribute in catering full-fledged engineering graduates to the society.

All the faculty members, the parents and the students are requested to study all the rules and regulations carefully and approach the Principal to seek any clarifications, if needed, 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 institution and for brightening the career prospects of engineering graduates.

**PRINCIPAL**

## CMR INSTITUTE OF TECHNOLOGY

**Vision:** To create world class technocrats for societal needs.

**Mission:** Impart global quality technical education for a better future by providing appropriate learning environment through continuous improvement and customization.

**Quality Policy:** Strive for global excellence in academics & research to the satisfaction of students and stakeholders.

### Department of Civil Engineering (CE)

**Vision:** To be a centre of excellence that nurtures technically competent civil engineers and promotes high-end research to meet the global challenges.

**Mission:** Provide fundamentals and emerging technical skills to design, build, operate and manage the infrastructure requirements of the society through education, training, research and consultancy.

#### I. PROGRAMME EDUCATIONAL OBJECTIVES (PEO's)

**PEO1:** Graduate will build successful career in the diversified sectors of the engineering industry and/or higher studies by acquiring knowledge in mathematical, scientific and engineering fundamentals.

**PEO2:** Graduate will plan, analyze and design civil engineering systems with societal responsibility.

**PEO3:** Graduate exhibits professional ethics, communication skills, teamwork and adapts to changing environments of engineering and technology by engaging in lifelong learning.

#### II. PROGRAMME OUTCOMES (PO's)

- 1. Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- 2. Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- 3. Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- 4. Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- 5. Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- 6. The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- 7. Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- 8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- 9. Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

- 10. Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
  - 11. Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
  - 12. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
  - 13. PSO1:** Identify, understand, formulate and analyze civil engineering problems related to structural, geo-technical, hydraulic, water resources, transportation and environmental engineering towards R&D, professional, career and societal needs.
  - 14. PSO2:** Apply modern techniques, software's and multi-disciplinary knowledge for the design and execution of civil engineering projects within stipulated time and cost.
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**B.Tech. - Regular Four Year Degree Program**  
**(For batches admitted from the academic year 2017 - 18)**  
**&**  
**B.Tech. - Lateral Entry Scheme**  
**(For batches admitted from the academic year 2018 - 19)**

**PREAMBLE**

For pursuing four year under graduate Bachelor Degree Programme in Engineering (B.Tech.) offered by **CMR Institute of Technology** under Autonomous status will herein be referred to as CMRIT (Autonomous).

All the specified rules are herein approved by the Academic Council. These rules will be in force and are applicable to students admitted from the Academic Year 2017-18 onwards. Any reference to “Institute” or “College” in these rules and regulations stand for CMRIT (Autonomous).

All the rules and regulations specified shall hereafter be read as a whole for the purpose of interpretation, as and when a doubt arises, the interpretation of the Chairman, Academic Council is final. As per the requirements of statutory bodies, the Principal, CMRIT (Autonomous) shall be The Chairman, Academic Council.

**1. UNDER GRADUATE PROGRAMS OFFERED (E&T)**

**CMR Institute of Technology**, an autonomous college affiliated to JNTUH, offers 4 Year (8 Semesters) **Bachelor of Technology** (B.Tech.) Degree Programme, under Choice Based Credit System (CBCS) with effect from the Academic Year 2017 - 18 onwards, in the following Branches of Engineering:

- 1) B.Tech.- Civil Engineering
- 2) B.Tech. - Mechanical Engineering
- 3) B.Tech. - Electronics and Communication Engineering
- 4) B.Tech. - Computer Science and Engineering

**2. ADMISSION CRITERIA AND MEDIUM OF INSTRUCTION**

**2.1. Admission into first year of four year B.Tech. (Regular) Degree Programme:**

**2.1.1. Eligibility:** A candidate seeking admission into the first year of four year B. Tech. Degree Programme should have:

- (i) Passed either Intermediate Public Examination (IPE) conducted by the Board of Intermediate Education, Telangana, with Mathematics, Physics and Chemistry as optional subjects or any equivalent examination recognized by Board of Intermediate Education, Telangana or a Diploma in Engineering conducted by the Board of Technical Education, Telangana or equivalent Diploma recognized by Board of Technical Education for admission as per guidelines defined by the Regulatory bodies of Telangana State Council for Higher Education (TSCHE) and AICTE.
- (ii) Secured a rank in the TSEAMCET examination conducted by TSCHE for allotment of a seat by the Convener, TSEAMCET.

**2.1.2. Admission Procedure:** Admissions are made into the first year of four year B.Tech. Degree Programme as per the stipulations of the TSCHE.

- (a) Category A: 70% of the seats are filled through TSEAMCET counseling.
- (b) Category B: 30% of the seats are filled by the Management.

## **2.2. Admission into the second year of four year B. Tech. (Regular) Degree Programme Under Lateral Entry Scheme.**

**2.2.1 Eligibility:** A candidate seeking admission under Lateral Entry Scheme (LES) into the II year I Semester B. Tech. Regular Degree Programme should have passed the qualifying examination (B.Sc. Mathematics or Diploma in concerned course) and have secured a rank at Engineering Common Entrance Test TSECET (FDH). Admissions are made in accordance with the instructions received from the Convener, TSECET and Government of Telangana State.

**2.2.2 Admission Procedure:** Admissions are made into the II year of four year B.Tech. (Regular) Degree Programme through Convenor, TSECET (FDH) against the sanctioned intake in each Programme of study as lateral entry student.

**2.3. Branch Transfers:** There shall be no Branch transfers after the completion of Admission Process.

**2.4. Medium of Instruction:** The Medium of Instruction and Examinations for the entire B.Tech. programme will be in **English** only.

## **3. B.Tech. PROGRAMME STRUCTURE**

### **3.1 Admitted under Four year B. Tech. (Regular) degree Programme:**

**3.1.1** A student after securing admission shall pursue the under graduate programme in B.Tech. in a minimum period of **four** academic years (8 semesters), and a maximum period of **eight** academic years (16 semesters) starting from the date of commencement of first year first semester, failing which, students shall forfeit their seat in B.Tech course.

**3.1.2** Each semester is structured to provide 24 credits, totaling to 192 credits for the entire B.Tech. programme.

**3.1.3** Each student shall secure 192 credits (with CGPA  $\geq 5$ ) required for the completion of the under graduate programme and award of the B.Tech. degree.

### **3.2 Admitted under Lateral Entry Scheme (LES) into B. Tech. degree Programme:**

**3.2.1** The LES students after securing admission shall pursue a course of study for not less than three academic years (6 Semesters) and not more than six academic years (12 Semesters), failing which students shall forfeit their seat in B.Tech programme.

**3.2.2** The student shall register for 144 credits and secure 144 credits with CGPA  $\geq 5$  from II year to IV year B.Tech. programme (LES) for the award of B.Tech. degree.

**3.3 UGC / AICTE** specified definitions / descriptions are adopted appropriately for various terms and abbreviations used in these Academic Regulations / Norms, which are listed below:

#### **3.3.1 Semester Scheme:**

Each B.Tech. (Regular) Programme is of 4 Academic Years (8 Semesters) and B.Tech. (LES) Programme is of 3 Academic Years (6 Semesters)), with the academic year being divided into two semesters of 22 weeks ( $\geq 90$  Instructional days per semester), each Semester having - 'Continuous Internal Evaluation (CIE)' and 'Semester End Examination (SEE)', Choice Based Credit System (CBCS) and Credit Based Semester System (CBSS) as indicated by UGC and Curriculum / Course Structure as suggested by AICTE.

### 3.3.2 Credit Courses:

a) All Subjects / Courses are to be registered by a student in a Semester to earn Credits. Credits shall be assigned to each Subject / Course in a L: T: P: C (Lecture Periods: Tutorial Periods: Practical Periods : Credits) Structure based on the following general pattern:

- One Credit - for One hour /Week / Semester for Theory /Lecture (L) Courses; and
- One Credit - for Two hours / Week / Semester for Laboratory / Practical (P) Courses

All Mandatory Courses, Study Tour, Guest Lecture, Tutorials, etc., will not carry any Credits.

b) **Contact Hours:** Weekly contact hours - equal to 33 hours per week (i.e. 1 hour = 60 Minutes) including credit and non-credit courses.

### 3.3.3 Subject / Course Classification and Nomenclature:

CMRIT has followed almost all the guidelines specified by AICTE / UGC / JNTUH for the classification of all subjects / courses offered at B.Tech. programme and are mentioned below.

S. No.	Broad Course Classification	Course Group / Category	Course Description	Range of Credits
1	Foundation Courses (FnC)	BS – Basic Sciences	Includes - Mathematics, Physics and Chemistry Subjects	15%-20%
2		ES – Engg. Sciences	Includes fundamental engineering subjects.	15%-20%
3		HS – Humanities and Social Sciences	Includes subjects related to Humanities, Social Sciences and Management.	5%-10%
4	Core Courses (CoC)	PC – Professional Core	Includes core subjects related to the Parent Discipline/ Department/ Branch of Engg.	30%-40%
5	Elective Courses (E/C)	PE – Professional Electives	Includes Elective subjects related to the Parent Discipline / Department / Branch of Engg.	10%-15%
6		OE – Open Electives	Elective subjects which include inter-disciplinary subjects or subjects in an area outside the Parent Discipline/ Department / Branch of Engg.	5%-10%
7	Core Courses	Project Work	B.Tech. Project or UG Project or UG Major Project.	10%-15%
8		Industrial Training / Mini-Project	Industrial Training/ Internship/ UG Mini-Project/ Mini-Project.	
9		Technical Seminar	Seminar / Colloquium based on core contents related to Parent Discipline/ Department/ Branch of Engg.	
10	Minor Courses	Minor Courses	1 or 2 Credit Courses (subset of HS)	-
11	Mandatory Courses (MC)	MC - Mandatory Courses	These courses are non-credit courses with evaluation.	-
12	Audit Courses (AC)	AC - Audit Courses	These courses are non-credit courses without evaluation	-
<b>Total Credits for UGP (B. Tech.) Programme</b>				<b>192 (100%)</b>

**4. COURSE REGISTRATION**

- 4.1** A **‘faculty advisor or counselor’** shall be assigned to each student, who advises the student about the B.Tech. programme, its course structure and curriculum, choice / option for subjects / courses, based on his/her competence, progress, pre-requisites and interest.
- 4.2** The academic section of the college invites ‘registration forms’ from students before the beginning of the semester through online submission, ensuring **‘date and time stamping’**. The online registration requests for any ‘current semester’ shall be completed **before the commencement of SEEs (Semester End Examinations) of the ‘preceding semester’**.
- 4.3** A student can apply for **online** registration, **only after** obtaining the **‘written approval’** from his faculty advisor or counselor, which should be submitted to the college academic section through the Head of the Department. A copy of it shall be retained with Head of the Department, faculty advisor and the student.
- 4.4** A student may be permitted to register for his/her subjects/course of **choice** with a total of 24 credits per semester (minimum of 20 credits and maximum of 28 credits, permitted deviation being  $\pm 17\%$ ), based on the student’s **progress** and SGPA / CGPA, and completion of the **‘pre-requisites’** as indicated for various subjects/courses, in the department course structure and syllabus contents. However, a **minimum** of 20 credits per semester must be registered to ensure the **studentship** in any semester.
- 4.5** Choice for **‘additional subjects / courses’** to reach the maximum permissible limit of 28 credits (above the typical 24 credit norm) must be clearly indicated, which needs the specific approval and signature of the faculty advisor / counselor.
- 4.6** If the student submits ambiguous choices or multiple options or erroneous (incorrect) entries during **online** registration for the subject(s) / course(s) under a given/specified course group / category as listed in the course structure, only the first mentioned subject / course in that category will be taken into consideration.
- 4.7** Subject / course options exercised through **online** registration are final and **cannot** be changed or inter- changed; further, alternate choices will not be considered. However, if the subject / course that has already been listed for registration by Head of the Department in a semester could not be offered due to any unforeseen or unexpected reasons, then the student shall be allowed to have alternate choice - either for a new subject (subject to offering of such a subject), or for another existing subject (subject to availability of seats), which may be considered. Such alternate arrangements will be made by Head of the Department, with due notification and time-framed schedule, within the **first week** from the commencement of class-work for that semester.
- 4.8** Dropping of subjects / courses may be permitted, only after obtaining prior approval from the faculty advisor / counselor (subject to retaining a minimum of 20 credits), **‘within a period of 15 days’** from the commencement of that semester.
- 4.9** **Open electives:** Students have to choose one open elective wherever offered from the list of open electives given for their stream. However, student cannot opt for an open elective subject offered by their own (parent) department, if it is already listed under any category of the subjects offered by parent department in any semester.
- 4.10** **Professional electives:** Students have to choose professional elective wherever offered from the list of professional electives given. However, students may opt for professional elective subjects offered in the related area.
- 4.11** **Mandatory Courses (Non-Credit):** All mandatory courses where ever offered require prior registration.



**4.11.1 NSS / Physical Education / Yoga Requirements:**

- i) The student has to enroll for NSS / Physical Education / Yoga programme from the date of commencement of class work for I year I semester.
- ii) The NSS / Physical Education / Yoga programme schedule will be announced time to time by the respective coordinator(s).
- iii) The Student has to submit the NSS / Physical Education / Yoga certificate on or before the last instruction day of I year I semester, otherwise his / her Semester End Examination results will not be declared.

**4.11.2 Micro Project Requirements:**

- i) The student has to enroll for Micro-Project from the date of commencement of I Year II Semester class work in any topic of their choice, in consultation with the class coordinator / Counselor.
- ii) The student has to collect relevant information on Science / Engineering & Technological advancements, prepare and present a report to the department evaluation committee for assessment.

**4.11.3 Internship / Industrial Training / Certification Course / MOOCs :**

- i) Student has to Enroll for Internship / Industrial Training / Certification Course / MOOCs under the guidance and approval from the concerned faculty advisor / Counselor on or before the date of commencement of class work for II Year I Semester.
- ii) Internship / Industrial Training / Certification Course / MOOCs completion certificate must be submitted to the Head of the Department on or before the last instruction day of III Year II Semester, otherwise his / her Semester End Examination results will be withheld.

**5. SUBJECTS / COURSES TO BE OFFERED**

**5.1** A subject/course may be offered to the students, **if only** a minimum 1/3 of students register to the course.

- i) More than **one faculty member** may offer the **same subject** (lab / practical's may be included with the corresponding theory subject in the same semester) in any semester. However, selection choice for students will be based on **'first come first serve** basis and **CGPA criterion'** (i.e. the first focus shall be on early **on-line entry** from the student for registration in that semester, and the second focus, if needed, will be on CGPA of the student).
- ii) If more entries for registration of a subject come into picture, then the concerned Head of the Department shall take necessary decision, whether or not to offer such a subject / course for **two (or multiple) sections**.

**6. ATTENDANCE REQUIREMENTS**

**6.1** A student shall be eligible to appear for the semester end examinations, if the student acquires a minimum 75% of attendance in aggregate (excluding the days of midterm examinations) for all the subjects / courses (excluding attendance in mandatory courses) in that semester.

**6.2** Condoning of shortage of attendance in aggregate up to 10% (65% and above, and below 75%) in each semester may be granted by the college academic committee on genuine and valid grounds, based on the student's representation with supporting evidence.

- 6.3** A stipulated fee shall be payable towards condoning of shortage of attendance.
- 6.4** Shortage of attendance below 65% in aggregate shall in **no** case be condoned.
- 6.5** **Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examinations of that semester. They get detained and their registration for that semester shall stand cancelled. They will not be promoted to the next semester.** They may seek re-registration for all those subjects registered in that semester in which student was detained, by seeking re-admission into that semester as and when offered; in case if there are any professional electives and / or open electives, the same may also be re-registered, if offered. However, if those electives are not offered in later semesters, then alternate electives may be chosen from the **same** set of elective subjects offered under that category.
- 6.6** A student fulfilling the attendance requirement in the present semester shall not be eligible for readmission into the same class.

**7. ACADEMIC REQUIREMENTS**

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

- 7.1** A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course, if student secures not less than 35% marks in the semester end examination (SEE), and a minimum of 40% of marks in the sum total of the Continuous Internal Evaluation (CIE) and Semester End Examination (SEE) taken together; in terms of letter grades, this implies securing **C** grade or above in that subject / course.
- 7.2** A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to industry oriented mini-project and seminar, if student secures not less than 40% of the total marks in each of them. The student would be treated as failed, if student (i) does not submit a report on his industry oriented mini-project, or does not make a presentation of the same before the evaluation committee as per the schedule, or (ii) does not present the seminar as required in the IV year I/II semester, or (iii) secures less than 40% of marks in industry oriented mini-project / seminar evaluations. Student may reappear once for each of the above evaluations, when they are scheduled again; if he fails in such ‘one re-appearance’ evaluation also, student has to reappear for the same in the next subsequent semester, as and when it is scheduled.

**7.3 Promotion Rules**

**7.3.1 Four year B.Tech. (Regular):**

S. No.	Promotion	Conditions to be fulfilled
1	First year first semester to first year second semester	Regular course of study of first year first semester.
2	First year second semester to second year first semester	(i) Regular course of study of first year second semester.  (ii) Must have secured at least 24 credits out of 48 credits i.e., 50% credits upto first year second semester from all the relevant regular and supplementary examinations whether the student takes those examinations or not.
3	Second year first semester to second year second semester	Regular course of study of second year first semester.
4	Second year second semester to third year first semester	(i) Regular course of study of second year second semester.  (ii) Must have secured at least 58 credits out of 96 credits i.e., 60% credits upto second year

		second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
5	Third year first semester to third year second semester	Regular course of study of third year first semester.
6	Third year second semester to fourth year first semester	(i) Regular course of study of third year second semester.  (ii) Must have secured at least 86 credits out of 144 credits i.e., 60% credits upto third year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
7	Fourth year first semester to fourth year second semester	Regular course of study of fourth year first semester.

**7.3.2 Four year B.Tech. (LES):**

S. No.	Promotion	Conditions to be fulfilled
1	Second year first semester to second year second semester	Regular course of study of second year first semester.
2	Second year second semester to third year first semester	(i) Regular course of study of second year second semester.  (ii) Must have secured at least 29 credits out of 48 credits i.e., 60% credits up to second year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
3	Third year first semester to third year second semester	Regular course of study of third year first semester.
4	Third year second semester to fourth year first semester	(i) Regular course of study of third year second semester.  (ii) Must have secured at least 58 credits out of 96 credits i.e., 60% credits upto third year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
5	Fourth year first semester to fourth year second semester	Regular course of study of fourth year first semester.

**7.4** A student has to register for all subjects covering 192 credits (144 credits in case of LES) as specified and listed (with the relevant course / subject classifications as mentioned) in the course structure, fulfill all the attendance and academic requirements for 192 credits (144 credits in case of LES) securing a minimum of ‘C’ grade or above in each subject, and ‘earn all 192 credits (144 credits in case of LES) securing SGPA  $\geq$  5.0 (in each semester), and CGPA (at the end of each successive semester)  $\geq$  5.0, to successfully complete the under graduate programme.

**7.5** After securing the necessary 192 credits (144 credits in case of LES) as specified for the successful completion of the entire under graduate programme, the student can avail exemption of two subjects up to 6 credits, that is, one open elective and one professional elective subject or two professional elective subjects for optional drop out from these 192 credits (144 credits in case of LES) earned; resulting in 186 credits (138 credits in case of LES) for under graduate programme performance evaluation, i.e., the performance of the student in these 186 credits (138 credits in case of LES) shall alone be taken into account for the calculation of ‘the final CGPA (at the end of under graduate programme, which takes the SGPA of the IV year II semester into account)’, and shall be indicated in the grade card of IV year II semester. However, the performance of student in the earlier individual semesters, with the corresponding SGPA and CGPA for which grade cards have already been given will not be altered.

- 7.6** If a student registers for some more ‘**extra subjects**’ (in the parent department or other departments / branches of engineering) other than those listed subjects totaling to 192 credits (144 credits in case of LES) as specified in the course structure of parent department, the performances in those ‘**extra subjects**’ (although evaluated and graded using the same procedure as that of the required 192 credits (144 credits in case of LES)) will not be taken into account while calculating the SGPA and CGPA. For such ‘**extra subjects**’ registered, % of marks and letter grade alone will be indicated in the grade card as a performance measure, subject to completion of the attendance and academic requirements as stated in regulations 6 and 7.1 to 7.5 above.
- 7.7** A student eligible to appear in the semester end examination for any subject / course, but absent from it or failed (thereby failing to secure ‘**C**’ grade or above) may reappear for that subject / course in the supplementary examination as and when conducted. In such cases, internal marks (CIE) assessed earlier for that subject / course will be carried over, and added to the marks to be obtained in the SEE supplementary examination for evaluating performance in that subject.
- 7.8** A student **detained in a semester due to shortage of attendance may be re-admitted when the same semester is offered in the next academic year for fulfillment of academic requirements.** The academic regulations under which student has been readmitted shall be applicable. However, no grade allotments or SGPA / CGPA calculations will be done for the entire semester in which student has been detained.
- 7.9** A student **detained due to lack of credits, shall be promoted to the next academic year only after acquiring the required academic credits.** The academic regulations under which student has been readmitted shall be applicable.

## **8. EVALUATION - DISTRIBUTION AND WEIGHTAGE OF MARKS**

- 8.1** The performance of a student in each semester shall be evaluated subject-wise / course-wise (irrespective of credits assigned) with a maximum of 100 marks. These evaluations shall be based on 30 marks allotted for CIE (Continuous Internal Evaluation) and 70 marks for SEE (Semester End Examination), and a letter grade corresponding to the percentage of marks obtained shall be given.

### **8.2 Evaluation of Theory Subjects / Courses**

- A) Continuous Internal Evaluation:** For each theory subject, during the semester, there shall be 2 mid-term examinations of 30 marks each. Each mid-term examination consists of subjective paper for 25 marks & assignment for 5 marks and the average of the two mid-term examinations marks shall be taken as the final marks.
- I.** The first mid-term examination shall be conducted for the first 50% of the syllabus, and the second mid-term examination shall be conducted for the remaining 50% of the syllabus.
  - II.** The subjective paper shall be conducted for duration of 2 hours. Each subjective paper shall contain 2 parts (Part-A and Part-B). Part-A consists of one compulsory question with five sub questions carrying two marks each. Part-B consists of 3 essay questions carrying five marks each with internal choice; the student has to answer all 3 questions.
  - III.** First assignment should be submitted before the commencement of the first mid-term examinations, and the second assignment should be submitted before the commencement of the second mid-term examinations. The assignments shall be specified / given by the concerned subject teacher.

**IV. Absence in mid-term examination(s):**

- i) If any student is absent in one mid-term examination for any course on health grounds / any valid reasons approved by the college academic committee, only one test shall be conducted on all units by the college in each course at the end of each semester on payment of prescribed fee.
- ii) If any student is absent in both mid-term examinations for any course on health grounds / any valid reasons approved by the college academic committee, only one test for 25 marks shall be conducted on all units and the marks secured out of 25 shall be divided by two, which shall be awarded against the said mid-term examination(s) on payment of prescribed fee.

**B) Semester End Examinations:** The duration of SEE is 3 hours. The details of the question paper pattern are as follows:

- The end semester examinations will be conducted for 70 marks consisting of two parts viz. i) **Part- A** for 20 marks, ii) **Part - B** for 50 marks.
- Part-A is compulsory question which consists of ten sub-questions (two from each unit) carry 2 marks each.
- Part-B consists of five questions (numbered from 2 to 6) carrying 10 marks each. One question from each unit (may contain sub-questions) with internal choice.

**8.3 Evaluation of Practical Subjects / Courses:** In any semester, a student has to complete a minimum of 10 experiments / exercises in each laboratory course and get the record certified by the concerned Head of the Department to be eligible for Semester End Examination.

For practical subjects, there shall be a Continuous Internal Evaluation (CIE) during the Semester for 30 internal marks and 70 marks for Semester End Examination (SEE).

**A) Continuous Internal Evaluation (CIE):** Out of the 30 marks, 15 marks are allocated for day-to-day work evaluation and for the remaining 15 marks - two mid-term examinations of each 15 marks will be conducted by the concerned laboratory teacher for a duration of two hours and the average of the two mid-term examinations is taken into account.

**I. Absence in Laboratory Internal Examinations:**

- a. If any student is absent in one laboratory internal examination for any laboratory course on health grounds / for any valid reasons approved by the college academic committee, only one test shall be conducted for 15 marks on all experiments of that laboratory course, by the college at the end of the semester.
- b. If any student is absent in both the laboratory internal examinations on health grounds / for any valid reasons approved by the college academic committee, only one test shall be conducted on all experiments and the marks secured out of 15 marks shall be divided by two, which shall be awarded against the said laboratory internal examinations.

**B) Semester End Examination (SEE):** The SEE for practical subject / course shall be conducted at the end of the semester with duration of 3 hours by one internal and one external examiner appointed by the Head of the Institution as per the recommendation of the concerned Head of the Department.

- 8.4 Evaluation of Design / Drawing Subjects / Courses:** For the subjects such as Engineering Graphics, Machine Drawing and estimation, the distribution shall be 30 marks for CIE (15 marks for day-to-day work and 15 marks for internal examination) and 70 marks for SEE. There shall be two internal examinations in a semester and the average of the two shall be considered for the award of marks for internal examinations.
- 8.5 Evaluation of Industry-Oriented Mini-Project:** There shall be an industry-oriented mini-project, in collaboration with an industry of their specialization, to be registered immediately after III year II semester examinations, and taken up during the summer vacation for four weeks duration. The industry oriented mini-project shall be submitted in a report form and presented before the committee in IV year I semester. It shall be evaluated for 100 marks by the committee consisting of Head of the Department, concerned supervisor and two senior faculty members of the department. There shall be no internal marks for industry-oriented mini-project.
- 8.6 Evaluation of Technical Seminar:** The student has to enroll and get approval for technical seminar on a specialized topic from the concerned advisor / counselor in the beginning of IV year II semester. The student should collect the information on a specialized topic, prepare a technical report, give seminar presentation on the topic and submit it to the department as notified by the concerned Head of the Department. It shall be evaluated by the departmental committee consisting of Head of the Department, seminar supervisor and two senior faculty members. The seminar report and the seminar presentation shall be evaluated for 100 marks. There shall be no semester end examination for the seminar.
- 8.7 Evaluation of Major Project:** Student shall enroll for the project work during the IV year I semester, as per the instructions of the project guide / supervisor assigned by the Head of Department. Out of total 100 marks allotted for the project work 30 marks shall be for continuous internal evaluation and 70 marks for the end semester viva-voce examination. Out of 30 marks allocated for CIE, 15 marks shall be awarded by the project supervisor (based on the continuous evaluation of student's performance throughout the project work period), and the other 15 marks shall be awarded by a Departmental Committee consisting of Head of the Department and Project Supervisor, and two senior faculty members, based on the work carried out and the presentation made by the student during internal reviews (at least two internal reviews shall be conducted). The project viva-voce shall be conducted by a committee comprising an external examiner, Head of the Department and Project Supervisor.
- 8.8 Evaluation of Mandatory Non-Credit Courses:** For Mandatory non credit courses 'Satisfactory' or "Unsatisfactory" shall be indicated instead of marks or letter grade and this will not be counted for the computation of SGPA / CGPA.
- (i) For mandatory non-credit theory or practical courses such as Environmental Science & Technology, Gender Sensitization Lab, Human Values & Professional Ethics, Verbal Ability, Analytical Skills, Soft Skills, Quantitative Aptitude, the student has to secure  $\geq 65\%$  attendance and not less than 40 marks out of 100 marks in the CIE, then the student is declared as **pass** and will be qualified for the award of the degree.
  - (ii) For mandatory non-credit courses such as NSS / Physical Education / Yoga, Micro Project, Internship / Industrial Training / Certification Course / MOOCs, the student has to submit **satisfactory participation certificate** from the concerned authority.

## **9. GRADING PROCEDURE**

- 9.1** Marks will be awarded to indicate the performance of each student in each theory subject, lab/practical's, design/drawing practice, technical seminar, industry oriented mini-project and major project. Based on the percentage of marks obtained in Continuous Internal Evaluation plus Semester End Examination, both taken together, as specified in item 8 above, a corresponding letter grade shall be given.

- 9.2** As a measure of the student’s performance, a 10-point Absolute Grading System using the following letter grades (UGC Guidelines) and corresponding percentage of marks shall be followed..

<b>% of Marks Secured (Class Intervals)</b>	<b>Letter Grade (UGC Guidelines)</b>	<b>Grade Points</b>
90% and above ( $\geq 90\%$ , $\leq 100\%$ )	O (Outstanding)	10
Below 90% but not less than 80% ( $\geq 80\%$ , $< 90\%$ )	A <sup>+</sup> (Excellent)	9
Below 80% but not less than 70% ( $\geq 70\%$ , $< 80\%$ )	A (Very Good)	8
Below 70% but not less than 60% ( $\geq 60\%$ , $< 70\%$ )	B <sup>+</sup> (Good)	7
Below 60% but not less than 50% ( $\geq 50\%$ , $< 60\%$ )	B (above Average)	6
Below 50% but not less than 40% ( $\geq 40\%$ , $< 50\%$ )	C (Average)	5
Below 40% ( $< 40\%$ )	F (Fail)	0
Absent	Ab	0

- 9.3** A student obtaining ‘F’ grade in any subject shall be considered ‘**failed**’ and will be required to reappear as ‘**supplementary student**’ in the end semester examination (SEE), as and when offered. In such cases, his internal marks (CIE marks) in those subject(s) will remain same as those he obtained earlier.
- 9.4** A letter grade does not imply any specific % of marks.
- 9.5** In general, a student shall not be permitted to repeat any subject/course (s) only for the sake of ‘**grade improvement**’ or ‘SGPA/CGPA improvement’. However, he has to repeat all the subjects/courses pertaining to that semester if he is detained.
- 9.6** A student earns grade point (GP) in each subject/course, on the basis of the letter grade obtained by him in that subject/course (excluding mandatory non-credit courses). Then the corresponding ‘**credit points**’ (CP) are computed by multiplying the grade point with credits for that particular subject/course.

$$\text{Credit Points (CP)} = \text{Grade Point (GP)} \times \text{Credits}$$

- 9.7** The student passes the subject/course only when he gets  $GP \geq 5$  (C grade or above).
- 9.8** The Semester Grade Point Average (SGPA) is calculated by dividing the sum of credit points ( $\Sigma CP$ ) secured from all subjects / courses registered in a semester, by the total number of credits registered during that semester. SGPA is rounded off to **two** decimal places. SGPA is thus computed as

$$\text{SGPA (S}_i\text{)} = \Sigma (C_i \times G_i) / \Sigma C_i$$

Where  $C_i$  is the number of credits of the  $i^{\text{th}}$  course and  $G_i$  is the grade point scored by the student in the  $i^{\text{th}}$  course.

- 9.9** The Cumulative Grade Point Average (CGPA) is a measure of the overall cumulative performance of a student over all semesters considered for registration. The CGPA is the ratio of the total credit points secured by a student in **all** registered courses in **all** Semesters, and the total number of credits registered in **all** the semesters. CGPA is rounded off to **two** decimal places. CGPA is thus computed from the I year second semester onwards, at the end of each semester, as per the formula

$$\text{CGPA} = \Sigma (C_i \times S_i) / \Sigma C_i$$

where  $S_i$  is the SGPA of the  $i^{\text{th}}$  semester and  $C_i$  is the total number of credits in that semester.

Illustration of calculation of SGPA					Illustration of calculation of CGPA			
Course /Subject	Credits	Letter Grade	Grade Points	Credit Points	Semester	Credits	SGPA	Credits x SGPA
Course 1	4	A	8	4 x 8 = 32	Sem I	24	7	24 x 7= 168
Course 2	4	O	10	4 x 10 = 40	Sem II	24	6	24 x 6= 144
Course 3	4	C	5	4 x 5 = 20	Sem III	24	6.5	24 x 6.5 =156
Course 4	3	B	6	3 x 6 = 18	Sem IV	24	6	24 x 6 = 144
Course 5	3	A+	9	3 x 9 = 27	Sem V	24	7.5	24 x 7.5 =180
Course 6	3	C	5	3 x 5 = 15	Sem VI	24	8	24 x 8 = 192
<b>Total</b>	<b>21</b>			<b>152</b>	Sem VII	24	8.5	24 x 8.5 =204
<b>SGPA = 152/21 = 7.23</b>					Sem VIII	24	8	24 x 8 = 192
					<b>Total</b>	<b>192</b>		<b>1380</b>
					<b>CGPA = 1380/192 = 7.18</b>			

**9.10** For merit ranking or comparison purposes or any other listing, **only** the ‘rounded off’ values of the CGPAs will be used.

**9.11** For calculations listed in Item 9.6–9.10, performance in failed subjects/courses (securing **F** grade) will also be taken into account, and the credits of such subjects/courses will also be included in the multiplications and summations. However, mandatory courses will not be taken into consideration.

## **10 PASSING STANDARDS**

**10.1** A student shall be declared ‘**successful**’ or ‘**passed**’ in a semester, if student secures a  $GP \geq 5$  (‘C’ grade or above) in every subject/course in that semester (i.e. when student gets an  $SGPA \geq 5.00$  at the end of that particular semester); and a student shall be declared ‘**successful**’ or ‘**passed**’ in the entire under graduate programme, only when he/she gets a  $CGPA \geq 5.00$  for the award of the degree as required.

**10.2** A Student shall be declared ‘**successful**’ or ‘**passed**’ in any non-credit subject/course, if he secures a ‘**Satisfactory Participation Certificate**’ for that mandatory course.

**10.3** After the completion of each semester, a grade card or grade sheet (or transcript) shall be issued to all the registered students of that semester, indicating the letter grades and credits earned. it will show the details of the courses registered (course code, title, no. of credits, grade earned etc.), credits earned, SGPA, and CGPA.

## **11 DECLARATION OF RESULTS**

**11.1** Computation of SGPA and CGPA are done using the procedure listed in 9.6– 9.9.

**11.2** For Final percentage of marks equivalent to the computed final CGPA, the following formula may be used:

$$\text{Percentage of Marks} = (\text{final CGPA} - 0.5) \times 10$$

## **12 AWARD OF DEGREE**

**12.1** After a student has satisfied the requirement prescribed for the completion of the program and is eligible for the award of B. Tech. degree he shall be placed in one of the following four classes based on CGPA:

Class Awarded	Grade to be Secured	Remarks
First Class with Distinction	$\geq 8$ CGPA	<b>From the aggregate marks secured from 192 Credits for Regular Students and 144 Credits for Lateral Entry Students.</b>
First Class	$\geq 6.5$ to $< 8$ CGPA	
Second Class	$\geq 5.5$ to $< 6.5$ CGPA	
Pass Class	$\geq 5.00$ to $< 5.5$ CGPA	
FAIL	CGPA $< 5$	



**12.2** First class with distinction will be awarded to those students who clear all the subjects in single attempt during his / her regular course of study by fulfilling the following conditions:

- (i) Should have passed all the subjects/courses in '**first appearance**' within the first 4 academic years (or 8 sequential semesters) for B.Tech. (Regular) and first 3 academic years (or 6 sequential semesters) for B.Tech. (LES) from the date of commencement of first year first semester for B.Tech. (Regular) and II year I semester for B.Tech. (LES).
- (ii) Should have secured a CGPA  $\geq 8.00$ , at the end of each of the 8 sequential semesters (6 sequential semesters for LES), starting from I year I semester (starting from II year I semester for LES) onwards.
- (iii) Should not have been detained or prevented from writing the end semester examinations in any semester due to shortage of attendance or any other reason, shall be placed in '**first class with distinction**'.

**12.3 Award of Medals:** Students fulfilling the conditions listed under item 12.2 alone will be eligible for award of '**College Ranks**' and '**Medals**'.

**12.4 Graduation Day:** The College shall have its own Annual Graduation Day for the award of Degrees issued by the University.

**12.5 Transcripts:** After successful completion of prerequisite credits for the award of degree a transcript containing performance of all academic years will be issued as a final record. Duplicate transcripts will also be issued if required after the payment of requisite fee and also as per norms in vogue.

### **13 WITH HOLDING OF RESULTS**

If the student has not paid the fee to college at any stage, or has dues pending against his/her name due to any reason what so ever, or if any case of indiscipline is pending against him/her, the result of the student may be withheld, and he/she will not be allowed to go into the next higher semester.

### **14 SUPPLEMENTARY EXAMINATIONS**

Supplementary examinations for odd semester subjects will be conducted along with even semester regular examinations and vice versa.

### **15. TRANSITORY REGULATIONS**

#### **A. For students detained due to shortage of attendance:**

1. A Student who has been detained in I year of R09/R13/R15/R16 Regulations due to lack of attendance, shall be permitted to join I year I semester of R17 Regulations and he is required to complete the study of B.Tech. programme within the stipulated period of eight academic years from the date of first admission in I Year.
2. A student, who has been detained in any semester of II, III and IV years of R09/R13/R15/R16 regulations for want of attendance, shall be permitted to join the corresponding semester of R17 regulations and is required to complete the study of B.Tech. within the stipulated period of eight academic years from the date of first admission in I Year. The R17 Academic Regulations under which a student has been readmitted shall be applicable to that student from that semester.

See rule (C) for further Transitory Regulations.

**B. For students detained due to shortage of credits:**

3. A student of R09/R13/R15/R16 Regulations, who has been detained due to lack of credits, shall be promoted to the next semester of R17 Regulations only after acquiring the required credits as per the corresponding regulations of his/her first admission. The student is required to complete the study of B.Tech. within the stipulated period of eight academic years from the year of first admission. The R17 Academic Regulations are applicable to a student from the year of readmission onwards.

See rule (C) for further Transitory Regulations.

**C. For readmitted students in R17 Regulations:**

4. A student who has failed in any subject under any regulation has to pass those subjects in the same regulations.
5. The maximum credits that a student acquires for the award of degree, shall be the sum of the total number of credits secured in all the regulations of his/her study including R17 Regulations. The performance evaluation of the student will be done after the exemption of two subjects if total credits acquired are  $\leq 206$ , three subjects if total credits acquired are  $> 206$  (see R16 Regulations for exemption details).
6. If a student readmitted to R17 Regulations, has any subject with 80% of syllabus common with his/her previous regulations, that particular subject in R17 Regulations will be substituted by another subject to be suggested by the CMRIT Academic Council.

**Note:** If a student readmitted to R17 Regulations, has not studied any subjects/topics in his/her earlier regulations of study which is prerequisite for further subjects in R17 Regulations, the Principal shall conduct remedial classes to cover those subjects/topics for the benefit of the students.

- D. Promotion Rule:** Where the credits allotted to a semester/year under the regulations studied in are different from that under R17 regulations for the corresponding semester/year, the promotion rules of R17 vide section 7.3 shall be applied after normalization. Normalization is done by scaling down or up the number of credits of a semester/year under the previous regulations to equal the number of credits of the corresponding semester/year under R17 regulations and revising the secured credits also in the same proportion.

**16 STUDENT TRANSFERS**

There shall be no transfers from other colleges / streams.

**17 RULES OF DISCIPLINE**

- 17.1** Any attempt by any student to influence the teachers, examiners, faculty members and staff of Controller of Examination office for undue favours in the exams, and bribing them either for marks or attendance will be treated as malpractice case and the student can be debarred from the college.
- 17.2** When the performance of the student in any subject(s) is cancelled as a punishment for indiscipline, student is awarded zero marks in that subject(s).
- 17.3** When the student's answer book is confiscated for any kind of attempted or suspected malpractice the decision of the Malpractice Prevention Committee is final.

**18. MALPRACTICE**

**18.1 Malpractice Prevention Committee:** The committee shall examine the student’s malpractice and indiscipline cases occurred, while conducting the examinations and recommend appropriate punishment to the Academic Council after taking explanation from the student and concerned invigilator as per the malpractice rules mentioned below. The committee consists of

- a) Controller of Examinations - Chairman
- b) Addl. Controller of Examinations.- Convener
- c) Subject Expert - Member
- d) Head of the Department of which the student belongs to - Member
- e) The Invigilator concerned - Member

**18.2 Malpractice Rules:** Disciplinary Action for Improper Conduct in Examinations

S. No.	Nature of Malpractices / Improper Conduct	Punishment
1(a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
1(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 Principal.
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 practical’s 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 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 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 Addl. Controller of examinations / 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 addl. Controller of examinations or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the addl. Controller of examinations, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.
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 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 principal for further action to award suitable punishment.	

**19. SCOPE**

- i) The Academic Regulations should be read as a whole, for the purpose of any interpretation.
- ii) The above mentioned rules and regulations are applicable in general to both B.Tech. (Regular) and B.Tech. (LES), unless and otherwise specific.
- iii) In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Chairman of the Academic Council is final.

**20. REVISION AND AMENDMENTS TO REGULATIONS**

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

# COURSE STRUCTURE

**B.Tech. – R-17 COURSE STRUCTURE**

(Applicable from the batch admitted during 2017-18 and onwards)

I – B.Tech. – I - Semester							
S. No.	Subject Code	Subject	POs	Hours Per Week			Credits
				L	T	P	
1	17EC1101BS	Engineering Mathematics – I	1,2,12	4	1	-	4
2	17EC1102HS	Professional Communication in English	10,12	3	-	-	3
3	17EC1103ES	Basic Electrical & Electronics Engineering	1,2,3,12	4	1	-	4
4	17EC1104ES	Engineering Graphics	1,5,10	2	-	3	4
5	17EC1105ES	Computer Programming	1,2,3,12	3	1	-	3
6	17EC1106HS	English Language Communication Skills Lab	5,10	-	-	3	2
7	17EC1107ES	Computer Programming in C Lab	4	-	-	3	2
8	17EC1108ES	Basic Electrical & Electronics Engineering Lab	4	-	-	3	2
<b>TOTAL</b>				<b>16</b>	<b>3</b>	<b>12</b>	<b>24</b>
<b>Mandatory Course (Non-Credit)</b>							
9	17AC1109MC	NSS / Physical Education /Yoga	3,6,8,9,12	-	-	2	-

I – B.Tech. – II - Semester							
S. No.	Subject Code	Subject	POs	Hours Per Week			Credits
				L	T	P	
1	17EC1201BS	Engineering Mathematics – II	1,2,12	4	1	-	4
2	17EC1202BS	Applied Physics	1,2,12	4	1	-	4
3	17EC1203BS	Engineering Chemistry	1,2,12	4	1	-	4
4	17CE1204ES	Engineering Mechanics	1,2,12	3	-	-	3
5	17EC1205ES	Data Structures through C	1,2,3,12	3	1	-	3
6	17EC1206BS	Applied Physics /Engineering Chemistry Lab	4	-	-	3	2
7	17EC1207ES	Data Structures through C Lab	4	-	-	3	2
8	17EC1208ES	IT & Engineering Workshop	1,5,9,10	-	-	3	2
<b>TOTAL</b>				<b>18</b>	<b>4</b>	<b>9</b>	<b>24</b>
<b>Mandatory Course (Non-Credit)</b>							
9	17AC1209MC	Micro Project	1 to 14	-	-	2	-

<b>II – B.Tech. – I – Semester</b>							
S. No.	Subject Code	Subject	POs	Hours Per Week			Credits
				L	T	P	
1	17CE2101BS	Statistical & Numerical Methods	1,2,12	4	1	-	4
2	17CE2102PC	Strength of Materials – I	1,2,12,13	4	-	-	4
3	17CE2103ES	Building Materials, Construction & Planning	1,6,12,13	3	-	-	3
4	17CE2104BS	Engineering Geology	1,2,12	3	1	-	3
5	17CE2105PC	Surveying	1,2,12,13	4	-	-	4
6	17CE2106ES	Computer Aided Building Drawing Lab	4,5,10,14	-	-	3	2
7	17CE2107BS	Engineering Geology Lab	4	-	-	3	2
8	17CE2108PC	Surveying Lab-I	4,5,10,14	-	-	3	2
<b>TOTAL</b>				<b>18</b>	<b>2</b>	<b>9</b>	<b>24</b>
<b>Mandatory Course (Non-Credit)</b>							
9	17HS2109MC	Gender Sensitization Lab	9,12	-	-	2	-
10	17HS2110MC	Verbal Ability	9,10	-	-	2	-

<b>II – B.Tech. – II – Semester</b>							
S. No.	Subject Code	Subject	POs	Hours Per Week			Credits
				L	T	P	
1	17CE2201PC	Strength of Materials – II	2,12,13	4	-	-	4
2	17CE2202PC	Geo Technical Engineering	1,2,12,13	4	-	-	4
3	17CE2203PC	Structural Analysis – I	2,12,13	4	-	-	4
4	17CE2204PC	Fluid Mechanics	1,2,12,13	3	1	-	3
5	17CE2205HS	Financial Analysis, Management & Economics	11,12	3	-	-	3
6	17CE2206PC	Strength of Materials Lab	4,14	-	-	3	2
7	17CE2207PC	Geo Technical Engineering Lab	4,6,14	-	-	3	2
8	17CE2208PC	Surveying Lab- II	4,5,10,14	-	-	3	2
<b>TOTAL</b>				<b>18</b>	<b>1</b>	<b>9</b>	<b>24</b>
<b>Mandatory Course (Non-Credit)</b>							
9	17HS2209MC	Environmental Science and Technology	1,6,7,12	-	-	2	-
10	17BS2210MC	Analytical Skills	9,10	-	-	2	-

**Note:** 1. Enrollment of Internship / Industrial training / Certification course / MOOCs initiation from II-B.Tech.-I-Semester



<b>III – B.Tech. – I - Semester</b>							
<b>S. No.</b>	<b>Subject Code</b>	<b>Subject</b>	<b>POs</b>	<b>Hours Per Week</b>			<b>Credits</b>
				<b>L</b>	<b>T</b>	<b>P</b>	
1	17CE3101PC	Hydraulics & Hydraulic Machinery	2,12,13	4	-	-	4
2	17CE3102PC	Concrete Technology	3,8,12,13	4	-	-	4
3	17CE3103PC	Environmental Engineering	3,6,7,12,13	3	1	-	3
4	17CE3104PC	Design of Reinforced Concrete Structures	3,8,10,12,14	4	-	-	4
5	<b>Open Elective – I</b>			3	-	3	-
	17CE3105OE	Disaster Management	2,7,8,12				
	17ME3105OE	Operations Research	1,2,12				
	17EC3105OE	Electronic Measurements and Instrumentation	1,2,12				
	17CS3105OE	JAVA Programming	1,2,3,5,12				
6	17CE3106PC	Concrete Technology Lab	4,6,14	-	-	3	2
7	17CE3107PC	Fluid Mechanics & Hydraulic Machinery Lab	4,14	-	-	3	2
8	17CE3108PC	Environmental Engineering Lab	4,14	-	-	3	2
<b>TOTAL</b>				<b>18</b>	<b>1</b>	<b>9</b>	<b>24</b>
<b>Mandatory Course (Non-Credit)</b>							
9	17HS3109MC	Human Values & Professional Ethics	6,7,8,12	3	-	-	-
10	17HS3110MC	Soft Skills	9,10	-	-	2	-

<b>III – B.Tech. – II – Semester</b>							
S. No.	Subject Code	Subject	POs	Hours Per Week			Credits
				L	T	P	
1	17CE3201PC	Water Resources Engineering	2,3,12,13	4	1	-	4
2	17CE3202PC	Structural Analysis – II	2,12,13	4	1	-	4
3	17CE3203PC	Transportation Engineering	2,3,12,13	4	-	-	4
4	<b>Open Elective – II</b>			3	-	-	3
	17CE3204OE	Global Warming & Climate Change	2,6,7,8,12				
	17ME3204OE	Fundamentals of Robotics	1,2,5,12				
	17EC3204OE	Principles of Communication Systems	1,2,3,12				
	17CS3204OE	Database Management Systems	1,2,3,5,12				
5	<b>Professional Elective – I</b>			3	-	-	3
	17CE3205PE	Construction Technology and Management	11,12,14				
	17CE3206PE	Bridge Engineering	2,3,5,6,7,12,13				
	17CE3207PE	Geo Environmental Engineering	2,3,6,7,12,13				
	17CE3208PE	Elements of Earthquake Engineering	2,3,6,8,12,13				
6	17CE3209PC	Transportation Engineering Lab	4,7,14	-	-	3	2
7	17CE3210ES	Software Application in Construction Management Lab	4,5,14	-	-	3	2
8	17CE3211HS	Advanced English Communication Skills Lab	5,10	-	-	3	2
<b>TOTAL</b>				<b>18</b>	<b>2</b>	<b>9</b>	<b>24</b>
<b>Mandatory Course (Non-Credit)</b>							
9	17BS3212MC	Quantitative Aptitude	9,10	-	-	2	-
10	17AC3213MC	Internship / Industrial training / Certification Course / MOOCs Certificate	1 to 14	-	-	2	-

- Note:** 1. Industry Oriented Mini Project Carried out during summer vacation between III - B.Tech. – II – Sem. & IV- B.Tech. – I Sem. and evaluated in IV-B.Tech.-I-Semester
2. Internship / Industrial training / Certification course / MOOCs certificate submission on or before last instruction day of III-B.Tech.-II semester

IV – B.Tech. – I - Semester							
S. No.	Subject Code	Subject	POs	Hours Per Week			Credits
				L	T	P	
1	17CE4101PC	Design & Drawing of Steel Structures	3,8,10,12,14	4	1	-	4
2	17CE4102PC	Foundation Engineering	2,3,8,12,14	4	1	-	4
3	17CE4103PC	Estimation, Quantity Survey & Valuation	11,12,14	4	1	-	4
4	<b>Open Elective – III</b>			3	-	-	3
	17CE4104OE	Environmental Impact Assessment	6,7,10,12				
	17ME4104OE	Principles of Entrepreneurship	7,8,9,11,12				
	17EC4104OE	Principles of Embedded Systems	1,2,3,12				
	17CS4104OE	Web Technologies	2,3,5,6,12				
5	<b>Professional Elective – II</b>			3	-	-	3
	17CE4105PE	FEM for Civil Engineering	2,3,4,12,14				
	17CE4106PE	Air Pollution and Control	2,6,7,8,12,13				
	17CE4107PE	Prestressed Concrete	2,3,8,12,14				
	17CE4108PE	Ground Water Development & Management	2,12,13				
6	17CE4109PC	Computer Aided Design Lab (By Using Staad. Pro)	4,5,10,14	-	-	3	2
7	17CE4110PC	Advanced Concrete Lab	4,6,14	-	-	3	2
8	17CE4111CC	Industry Oriented Mini Project	1 to 14	-	-	-	2
<b>TOTAL</b>				<b>18</b>	<b>3</b>	<b>6</b>	<b>24</b>
<b>Mandatory Course (Non-Credit)</b>							
9	17HS4112MC	Foreign Language: French	9,10	2	-	-	-
	17HS4113MC	Foreign Language: German					

IV – B.Tech. – II - Semester							
S. No.	Subject Code	Subject	POs	Hours Per Week			Credits
				L	T	P	
1	17CE4201PC	Remote Sensing and GIS	2,5,7,12,14	4	1	-	4
2	<b>Professional Elective – III</b>			3	-	-	3
	17CE4202PE	Design of Hydraulics Structures	2,3,5,12,13				
	17CE4203PE	Modern Transport Engineering	2,3,7,12,13				
	17CE4204PE	Soil Dynamics and Machine Foundations	3,5,6,12,13				
	17CE4205PE	Repair and Rehabilitation of Structures	2,4,7,12,14				
3	<b>Professional Elective - IV</b>			3	-	-	3
	17CE4206PE	Architectrural Engineering	1,2,12,13				
	17CE4207PE	Waste Management	2,3,6,7,12,13				
	17CE4208PE	Pavement Design	3,6,8,12,14				
	17CE4209PE	Ground Improvement Techniques	2,12,13				
4	17CE4210CC	Technical Seminar	1 to 14	-	-	3	2
5	17CE4211CC	Major Project	1 to 14	-	-	18	12
<b>TOTAL</b>				<b>10</b>	<b>01</b>	<b>21</b>	<b>24</b>

**I-B.TECH.-I-SEMESTER  
SYLLABUS**

**ENGINEERING MATHEMATICS – I**  
**(Differential Equations & Matrix Algebra)**  
 (Common to all Branches)

I -B.Tech.-I-Sem

Subject Code: 17CE1101BS

L T P C  
 4 1 0 4

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO1	PO2	PO12
CO1	solve linear and non-linear ordinary differential equations	3	2	1
CO2	solve system of linear equations by using matrices	3	2	1
CO3	find Eigen values and Eigen vectors	3	2	1
CO4	find the extreme values of functions of several variables and evaluation of improper integrals by using Beta and Gamma functions	3	2	1
CO5	evaluate multiple integrals and find the line, surface and volume integrals and convert them by using multiple integrals	3	2	1

**Unit - I**

**Differential Equations:** Introduction, exact & Reducible to exact, Linear and Bernoulie’s Differential Equations Applications to Newton’s Law of cooling, Law of natural growth and decay, orthogonal trajectories, Non-homogeneous linear differential equations of second and higher order with constant coefficients with RHS term of the type  $e^{ax}$ ,  $\sin ax$ ,  $\cos ax$ , polynomials in  $x$ ,  $e^{ax}V(x)$ ,  $xV(x)$ , method of Variation of parameters. Applications: Simple Harmonic Motion (SHM)

**Unit-II**

**Linear System of Equations:** Types of real matrices and complex matrices, rank, Echelon form, normal form consistency and solution of linear systems (homogeneous and No- homogeneous) – Gauss Elimination, Gauss Jordon and LU decomposition methods-Applications: Finding current in the electrical circuits.

**Unit –III**

**Eigen values, Eigen vectors and Quadratic forms:**Eigen values, Eigen vectors and their properties, Cayley – Hamilton theorem (without proof),Inverse and powers of a matrix using Cayley – Hamilton, Diagonalization, Quadratic forms, Reduction of Quadratic forms into their canonical form, rank and nature of the Quadratic forms – index and signature

**Unit IV**

**Functions of Several Variables:** Functions of several variables-Partial differentiation, Functional dependence, Jacobian, Maxima and Minima of functions of two variables with constraints and without constraints.

**Beta and Gamma Functions:** Beta and Gamma functions, properties, relation between Beta and Gamma functions, evaluation of integrals using Beta and Gamma functions.

**Unit V**

**Multiple Integrals:** Double and triple integrals, Change of variables, Change of order of integration. Applications: Finding areas, volumes& Center of gravity (evaluation using Beta and Gamma functions).

**Text Books:**

1. B.S. Grewal, Higher Engineering Mathematics, 42<sup>nd</sup> Ed., Khanna Publishers, New Delhi, 2012
2. E. Kreyszig, Advanced Engineering Mathematics, 9<sup>th</sup> Ed., Wiley, 2012
3. R. K. Jain, S. R. K. Iyengar, Advanced Engineering Mathematics, 4<sup>th</sup> Ed., Narosa Publishing House, NewDelhi,2014

**References**

1. B. V. Ramana, Engineering Mathematics, 4<sup>th</sup> Ed., Tata McGraw Hill, New Delhi, 2009
2. D.S. Chandrashekharaiyah, Engineering Mathematics, Volume 1, Prism Publishers, 2010
3. T.K.V.Iyengar, B. Krishna Ghandhi, S. Ranganathan and M.V. S.S.N. Prasad, Engineering Mathematics, Volume-I, 12<sup>th</sup> Ed., S. Chand Publishers, 2014
4. U. M. Swamy, P. VijayaLaxmi, K. L. Sai Prasad and M. Phani Krishna Kishore, A Text Book of Engineering Mathematics–I, Excel Books, New Delhi, 2010

**PROFESSIONAL COMMUNICATION IN ENGLISH**

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

**Subject Code: 17CE1102HS**

**L T P C**

**3 0 0 3**

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO10	PO12
CO1	apply appropriate vocabulary and grammar	3	1
CO2	use effective writing skills in formal and informal situations	3	1
CO3	demonstrate reading skills to pursue research and academic activities	3	1
CO4	apply and exhibit professional and social Etiquette	3	1
CO5	employ reference and study skills for lifelong learning	3	1

**Syllabus**

**Reading Skills:**

**Course Objectives:**

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

To develop students' ability to guess meanings of words from the context and grasp the overall message of the text, draw inferences, etc., by way of:

1. Skimming and Scanning the text
2. Intensive and Extensive Reading
3. Reading for Pleasure
4. Identifying the topic sentence
5. Inferring lexical and contextual meaning
6. Recognizing Coherence/Sequencing of Sentences

**NOTE:** The students will be trained in reading skills using the prescribed texts for detailed study. They will be tested in reading comprehension of different 'unseen' passages which may be taken from authentic texts, such as magazines/newspaper articles.

**Writing Skills:**

**Course Objectives:**

1. To develop an awareness in the students about writing as an exact and formal skill
2. To create an awareness in students about the components of different forms of writing, beginning with the lower order ones through;
  - Writing of sentences
  - Use of appropriate vocabulary
  - Paragraph writing
  - Coherence and cohesiveness
  - Narration / description
  - Note Making
  - Formal and informal letter writing
  - Describing graphs using expressions of comparison

In order to improve the proficiency of the students in the acquisition of language skills mentioned above, the following text and course contents, divided into Five Units, are prescribed:

**Text Books:**

1. "Fluency in English – A Course book for Engineering Students" by Board of Editors: Hyderabad: Orient Black Swan Pvt. Ltd. 2016. Print.
2. "Fluency in English – A Practice Manual" for B.Tech I year I Sem (ECE&CE) & II Sem (CSE & ME) comprising the Five Units and practice exercises for all the topics.

**Note: Listening and Speaking skills are covered in the syllabus of ELCS Lab.**

**Unit –I: Motivation**

Chapter entitled ‘**Presidential Address**’ by **Dr. A.P.J. Kalam** from “Fluency in English– A Course book for Engineering Students” published by Orient Blackswan, Hyderabad.

- **Vocabulary:** Word Formation — Root Words –The Use of Prefixes and Suffixes– Changing Words from one form to another – Transition Words - Exercises for Practice.
- **Grammar:** Punctuation – Parts of Speech- Articles – Prepositions-Types & Kinds –Exercises for Practice with focus on identifying Errors.
- **Reading:** Double Angels by David Scott-Reading and Its Importance- Techniques for Effective Reading- Signal Words- Exercises for Practice
- **Writing:** Writing Sentences- Techniques for Effective Writing– Paragraph Writing- Types, Structure and Features of a Paragraph-Coherence and Cohesiveness: Logical, Lexical and Grammatical Devices – Patterns of Writing - Cause and Effect - Classification and Division - Compare and Contrast - Definition - Description - Exemplification - Narration - Persuasion - Process - Exercises for Practice

**Unit –II: Leadership**

Chapter entitled **Satya Nadella: Email to Employees on his First Day as CEO** from “Fluency in English– A Course book for Engineering Students” Published by Orient Black Swan, Hyderabad.

- **Vocabulary:** Collocations - Synonyms and Antonyms – Homonyms, Homophones, Homographs- Exercises for Practice
- **Grammar:** Verbs-Transitive, Intransitive and Non-finite Verbs –Gerund – Exercises for Practice with focus on identifying Errors.
- **Reading:** Sub-skills of Reading- Skimming, Scanning, Extensive Reading and Intensive Reading – **The Road Not Taken by Robert Frost** — Exercises for Practice
- **Writing:** Letter Writing –Format, Styles, Parts, Language to be used in Formal Letters- Letter of Apology – Letter of Complaint-Letter of Inquiry with Reply – Letter of Requisition — Exercises for Practice

**Unit –III: Human Relations**

Chapter entitled **The Gift of the Magi** by **O Henry** from the Course/Study Material.

- **Vocabulary:** Introduction- A Brief History of Words – Using the Dictionary and Thesaurus– Confusables- Spellings
- **Grammar:** Tenses: Present Tense- Past Tense- Future Tense- Active Voice – Passive Voice- Conditional Sentences – Adjective and Degrees of Comparison – Adverbs - Exercises for Practice with focus on identifying Errors.
- **Reading: The Cuddalore Experience** by **Anu George** -Improving Comprehension Skills – Techniques for Good Comprehension- Skimming and Scanning- Non-verbal Signals – Structure of the Text – Structure of Paragraphs – Punctuation – Author’s viewpoint (Inference)
- **Anticipation:** Determining the Meaning of Words – Summarizing- Typical Reading Comprehension Questions.
- **Writing:** Introduction- Letter Writing-Writing the Cover Letter- Cover Letters Accompanying Resumes- E-Correspondence – Emails – Social Networks – Dos and Don’ts.

**Unit –IV: Human Values and Professional Ethics**

Chapter entitled ‘**Good Manners**’ by **J.C. Hill** from Fluency in English – A Course book for Engineering Students” published by Orient Blackswan, Hyderabad.

- **Vocabulary:** Phrasal Verbs - Idiomatic Expressions –One- word Substitutes – Analogies (Exercises for Practice.)
- **Grammar:** Sequence of Tenses- Concord (Subject in Agreement with the Verb) – Exercises for Practice with focus on identifying Errors.
- **Reading: ‘If’ poem by Rudyard Kipling**–Tips for Writing a Review — Author’s Viewpoint – Reader’s Anticipation– Herein the Students will be required to Read and Submit a Review of a Book (Literary or Non-literary) of their choice – Exercises for Practice.
- **Writing:** Information Transfer-Bar Charts-Flow Charts-Tree Diagrams etc., — Exercises for Practice. Introduction – Steps to Effective Précis Writing – Guidelines- Samples



**Unit –V: Wisdom**

Chapter entitled ‘**Father Dear Father**’ by **Raj Kinger** from Fluency in English – A Course book for Engineering Students” Published by Orient Black Swan, Hyderabad

- **Vocabulary:** Foreign Words—Words borrowed from other Languages- Exercises for Practice
- **Grammar:** Direct and Indirect Speech- Question Tags- Common Errors in English - Exercises for Practice with focus on identifying Errors.
- **Reading:** Predicting the Content- Understanding the Gist – SQ3R Reading Technique- Study Skills – Note Making - Understanding Discourse - Coherence – Sequencing Sentences.
- **Writing:** Technical Reports- Introduction – Characteristics of a Report – Categories of Reports – Formats- Prewriting – Structure of Reports (Manuscript Format) – Types of Reports – Writing the Report - Exercises from both the texts not prescribed shall be used for classroom tasks.

**References**

1. Prof. N. Krishna Swamy Modern English A Book of Grammar, Usage and Composition
2. Prof. Krishna Swamy and Sri Ram
3. Green, David. Contemporary English Grammar –Structures and Composition. MacMillan India. 2014 (Print)
4. Rizvi, M. Ashraf. Effective Technical Communication. Tata Mc Graw –Hill. 2015 (Print)
5. Raman, Meenakshi and Sharma, Sangeeta. “Technical Communication- Principles and Practice”. Third Edition. New Delhi: Oxford University Press. 2015. Print.
6. Text for Communication Skills- Current English for Colleges – N. Krishnaswamy & T. Sriram - Mc Millian.
7. English for Science and Technology by.Prof.P.Ramani, Mc Millan
8. The Structure of Technical English - A.J.Hebert, Orient Longman
9. Communication in English for Technical Students – Curriculum Development Centre, Calcutta, Orient Longman
10. Business letters for Different Occasions - A.N. Kapoor, S.Chand & Company Pvt. Ltd.
11. Writing That Works: How to Communicate Effectively in Business by Kenneth Roman
12. Words that Sell by Richard Bayan
13. Business Writing Today: A Practical Guide by Natalie Canavor
14. A Course in English Grammar by Raj N Bakshi Orient Black Swan Pvt. Ltd. 2000. Print
15. O Henry 100 Short Stories
16. Novels and Short Story collections of W. Somerset Maugham
17. Selected Writings of R.K Narayan
18. Wings of Fire by APJ Kalam
19. Literary Horizon Orient Black Swan Pvt. Ltd. 2013
20. The Gardener by Rabindranath Tagore

**BASIC ELECTRICAL & ELECTRONICS ENGINEERING**

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

**Subject Code: 17CE1103ES**

**L T P C**

**4 1 0 4**

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO1	PO2	PO3	PO12
CO1	solve electrical circuits using circuit laws and explain single phase AC circuits	3	3	2	1
CO2	solve electrical circuits using network theorems and illustrate diode characteristic	3	3	2	1
CO3	identify special purpose devices and use diode circuits for various applications	3	3	2	1
CO4	illustrate the configurations and biasing techniques of Bi-polar junction transistor	3	3	2	1
CO5	characterize JFET	3	3	2	1

**Unit – I: Introduction to Electrical Circuits & Single Phase AC Circuits**

**Electrical Circuits:** R-L-C Parameters, Voltage and Current, Independent and Dependent Sources, Source Transformation – V-I relationship for passive elements, Kirchhoff’s Laws, Network reduction techniques – series, parallel, series-parallel, star-to-delta, delta-to-star transformation, Nodal Analysis & Mesh Analysis.

**Single Phase AC Circuits:** R.M.S. and Average values, Form and peak factor, steady state analysis of series, parallel and series-parallel combinations of R, L and C with sinusoidal excitation, concept of reactance, impedance, susceptance and admittance – phase and phase difference, Concept of power factor, j-notation, complex and polar forms of representation.

**Unit - II: Network Theorems & P-N Junction Diode**

**Network Theorems:** Thevenin’s, Norton’s, Maximum power transfer, Superposition, Reciprocity, Tellegen’s Millman’s and compensation theorems for DC and AC excitations.

**P-N Junction Diode:** Diode equation, Energy Band diagram, Volt-Ampere characteristics, Temperature dependence, Ideal versus practical, Static and dynamic resistances, Equivalent circuit, Load line analysis, Diffusion and Transition Capacitances.

**Unit- III: Special Purpose Devices & Diode Circuits**

**Special Purpose Devices:** Breakdown Mechanisms in Semi-Conductor Diodes, Zener diode characteristics, Use of Zener diode as simple regulator, Principle of operation and Characteristics of Tunnel Diode (With help of Energy band diagram) and Varactor Diode.

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

**Unit- IV: Bipolar Junction Transistor**

**Bipolar Junction Transistor (BJT):** Construction, Principle of Operation, Symbol, Amplifying Action, Common Emitter, Common Base and Common Collector configurations. Comparison of CE, CB and CC configurations

Transistor Biasing And Stabilization - Operating point, DC & AC load lines, Biasing - Fixed Bias, Emitter Feedback Bias, Collector to Emitter feedback bias, Voltage divider bias, Bias stability, Stabilization against variations in  $V_{BE}$  and  $\beta$ , Bias Compensation using Diodes and Transistors. Principle of operation of SCR.

**Unit- V: Junction Field Effect Transistor**

**Junction Field Effect Transistor:** Construction, Principle of Operation, Symbol, Pinch-Off Voltage, Volt-Ampere Characteristic, Comparison of BJT and FET, Small Signal Model, Biasing FET.

**Text Books:**

1. Circuit Theory (Analysis and synthesis) - A. Chakrabarti, Dhanpat Rai&co (Pvt) Ltd 7th Ed,2015
2. Electrical Technology Vol-I B.L. Theraja. S. Chand publications
3. Electronic Devices and Circuits – R.L. Boylestad and Louis Nashelsky, PEI/PHI, 9<sup>th</sup> Ed, 2006.
4. Integrated Electronics – J.Millman and C.C.Halkias, Satyabratajit, TMH.
5. Basic Electrical and electronics Engineering- M S Sukija TK Nagasarkar Oxford University.

**References:**

1. Engineering circuit analysis- by William Hayt and Jack E. Kemmerly, Mc Graw Hill Company, 6<sup>th</sup> edition
2. Introduction to Electronic Devices and Circuits-Rober T. Paynter, Pearson Education.
3. Electronic Devices and Circuits - K. Lal Kishore, B.S. Publications, 2<sup>nd</sup> Edition, 2005.
4. Electronic Devices and Circuits – Anil K. Maini, Varsha Agarwal –Wiley India Pvt. Ltd. 1/e 2009.
5. Linear circuit analysis (time domain phasor and Laplace transform approaches)- 2<sup>nd</sup> edition by Raymond A. De Carlo and Pen-Min-Lin, Oxford University Press-2004.
6. Network Theory by N.C.Jagan & C.Lakshminarayana, B.S. Publications.
7. Network Theory by Sudhakar, Shyam Mohan Palli, TMH.
8. Electronic Devices and Circuits – 2<sup>nd</sup> Edition by Muhammad H.Rashid, Cengage Learning.

## ENGINEERING GRAPHICS

I-B.Tech.-I-Sem.

Subject Code: 17CE1104ES

L T P C

2 0 3 4

## Course Outcomes (COs) &amp; CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO5	PO10
CO1	apply engineering drawing concepts in technical graphic communication	3	3	2
CO2	construct conic sections using various methods	3	3	2
CO3	draw orthographic projections of points, lines, planes and solids	3	3	2
CO4	draw development of solid surfaces	3	3	2
CO5	draw the conversions of orthographic to isometric projections & vice versa	3	3	2

**Unit – I**

**Introduction to Engineering Drawing:** Principles of Engineering Graphics and their significance, Conic Sections - ellipse, parabola, hyperbola, including the Rectangular Hyperbola. Cycloid, Epicycloid and Hypocycloid, Involute.  
Scales – Plain and Diagonal.

**Unit- II**

**Orthographic Projections:** Principles of Orthographic Projections – Conventions – Projections of Points and Straight Lines.  
Projections of Plane regular geometric figures. - Auxiliary Planes.

**Unit – III**

**Projections of Regular Solids** - Auxiliary Views.

**Unit – IV**

**Sections and developments;** Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views.  
Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone.

**Unit – V**

**Isometric and Orthographic Projections:** Principles of Isometric Projection – Isometric Scale – Isometric Views – Conventions – Isometric Views of Lines, Plane Figures, Simple Solids. Conversion of Isometric Views to Orthographic Views and Vice-versa.

**Text Books:**

1. Engineering Drawing N.D. Bhatt / Charotar
2. A Text Book of Engineering Drawing / basant agarwal.
3. Engineering Drawing and Graphics Rane and Shah/ Pearson Edu.

**References**

1. A Text Book of Engineering Drawing / Dhawan R K / S. Chand
2. Engineering Graphics with Auto CAD / James D Bethune / Pearson Edu.

**COMPUTER PROGRAMMING**

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

**Subject Code: 17CE1105ES**

**L T P C**

**3 1 0 3**

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO1	PO2	PO3	PO12
CO1	write simple programs using C language	3	3	2	2
CO2	design structured programs using functions	3	3	2	2
CO3	develop programs using arrays, strings and pointers	3	3	2	2
CO4	construct programs for heterogeneous data	3	3	2	2
CO5	implement various file operations in C programming	3	3	2	2

**Unit – I**

Introduction to Computers – Computer Systems, Computing Environments, Computer Languages, Creating and running programs, Program Development, algorithms and flowcharts. Introduction to C Language – Background, C Programs, Identifiers, Types, Variables, Constants, Input / Output, Operators(Arithmetic, relational, logical, bitwise etc.), Expressions, Precedence and Associativity, Expression Evaluation, Type conversions, Statements- Selection Statements(making decisions) – if and switch statements, Repetition statements ( loops)-while, for, do-while statements, Loop examples, other statements related to looping – break, continue, goto, Simple C Program examples.

**Unit – II**

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

Arrays – Concepts, using arrays in C, inter function communication, array applications- linear search, binary search and bubble sort, two – dimensional arrays, multidimensional arrays, C program examples.

**Unit – III**

Pointers – Introduction (Basic Concepts), Pointers for inter function communication, pointers to pointers, compatibility, Pointer Applications-Arrays and Pointers, Pointer Arithmetic and arrays, Passing an array to a function, memory allocation functions, array of pointers, programming applications, pointers to void, pointers to functions.

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

**Unit – IV**

Enumerated, Structure and Union Types – The Type Definition (typedef), Enumerated types, Structures –Declaration, initialization, accessing structures, operations on structures, Complex structures-Nested structures, structures containing arrays, structures containing pointers, arrays of structures, structures and functions, Passing structures through pointers, self referential structures, unions, bit fields, C programming examples, command–line arguments, Pre processor commands.

**Unit – V**

Input and Output – Concept of a file, streams, text files and binary files, Differences between text and binary files, State of a file, Opening and Closing files, file input / output functions (standard library input / output functions for files), file status functions (error handling), Positioning functions (fseek, rewind and ftell), C program examples.

**Text Books:**

1. Computer Science: A Structured Programming Approach Using C, B. A. Forouzan and R. F. Gilberg, Third Edition, Cengage Learning.
2. Programming in C. P. Dey and M Ghosh , Second Edition, Oxford UniversityPress.

**Reference Books:**

1. The C Programming Language, B.W. Kernighan and Dennis M. Ritchie, Second Edition, Pearson Education.
2. Programming with C, B. Gottfried, 3rd edition, Schaum's outlines, McGraw Hill Education (India) Pvt Ltd.
3. C From Theory to Practice, G S. Tselikis and N D. Tselikas, CRC Press.
4. Basic computation and Programming with C, Subrata Saha and S. Mukherjee, Cambridge University Press.

**ENGLISH LANGUAGE COMMUNICATION SKILLS LAB**

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

**Subject Code: 17CE1106HS**

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

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

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO5	PO10
CO1	apply the sounds of English for proper pronunciation	3	3
CO2	use the right accent and intonation in formal and informal situations	3	3
CO3	distinguish and neutralize various accents for intelligibility	3	3
CO4	develop speaking and listening skills through audio-visual experiences	3	3
CO5	demonstrate employability skills through various activities	3	3

**COMPUTER ASSISTED LANGUAGE LEARNING (CALL) LAB**

**Exercise – I**

Introduction to Phonetics -Speech Sounds -Vowels and Consonants  
Minimal Pairs- Consonant Clusters  
Past Tense Marker and Plural Marker

**Exercise – II**

Structure of Syllables  
Word Stress-Sentence Stress – Intonation  
Basic Rules of Word Accent - Stress Shift

**Exercise - III**

Errors in Pronunciation-the Influence of Mother Tongue (MTI)  
Common Indian Variants in Pronunciation – Differences between British and American Pronunciation

**Exercise – IV**

Listening for General Details  
Listening Comprehension Tests

**Exercise – V**

Listening for Specific Details  
Listening Comprehension Tests

**Online Resources for Teaching Listening Skills**

**Listening for General & Specific Details**

[www.learnenglishteens.britishcouncil.org](http://www.learnenglishteens.britishcouncil.org)

<http://learnenglishteens.britishcouncil.org/skills/listening-skills-practice>

<https://www.skillsyouneed.com/ips/listening-skills.html>

<https://www.youtube.com/watch?v=qYb0LCqqJbU>

<https://www.englishlistening.com/>

<http://esl-lab.com/>

<http://www.trainyouraccent.com/>

**Listening Comprehension Test**

[www.examenglish.com/IELTS/IELTS\\_listening.html](http://www.examenglish.com/IELTS/IELTS_listening.html)

<https://www.englishlistening.com/index.php/listen-to-passages/>

[www.examenglish.com/TOEFL/toefl\\_listening.html](http://www.examenglish.com/TOEFL/toefl_listening.html)

**INTERACTIVE COMMUNICATION SKILLS (ICS) LAB**

**Exercise – I**

Ice-Breaking Activity - Introducing Oneself and Others  
JAM Session

**Exercise – II**

Situational Dialogues – Greetings – Taking Leave  
Role-Play- Expressions in Various Situations  
Making Requests and Seeking Permissions  
Telephone Etiquette

**Exercise – III**

Descriptions- Narrations  
Giving Directions and Guidelines

**Exercise – IV**

Public Speaking – Exposure to Structured Talks  
Non-verbal Communication  
Presentation Skills  
Making a Short Speech  
Extempore- Making a Presentation

**Exercise – V**

Group Discussion- Interview Skills  
Group Discussion Activity - Mock Interviews

**Minimum Requirement of infrastructural facilities for ELCS Lab:**

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

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

**System Requirement (Hardware component):**

*Computer network with LAN facility (minimum 40 systems with multimedia) with the following specifications:*

1. Computers with Suitable Configuration
- ii) High Fidelity Headphones

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

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

**Lab Manuals:**

- 1) A book entitled “*ELCS Lab Manual – A Workbook for CALL and ICS Lab Activities*” by Board of Editors: Hyderabad: Orient BlackSwan Pvt. Ltd. 2016. Print.
- 2) Hart Steve; Nair, Aravind R.; Bhambhani, Veena. “*EMBARK- English for undergraduates*” Delhi: Cambridge University Press. 2016. Print.

**References:**

1. Jayashree Mohanraj. *Let Us Hear Them Speak*. New Delhi: Sage Texts. 2015. Print. Hancock, M. *English Pronunciation in Use. Intermediate Cambridge*: Cambridge University Press. 2009. Print.



## COMPUTER PROGRAMMING IN C LAB

I-B.Tech.-I-Sem

Subject Code: 17CE1107ES

L T P C

0 0 3 2

## Course Outcomes (COs) &amp; CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO4
CO1	execute simple programs using C compiler	3
CO2	apply control statements in designing programs	3
CO3	design programs using functions, arrays, strings and pointers	3
CO4	construct programs for heterogeneous data	3
CO5	implement various file operations in C programming	3

**Week1: Basics**

1. Write a program to print sample strings like “hello world”, “Welcome to C Programming” with different formats using escape sequences.
2. Write a Program to print different data types in „C” and their ranges.
3. Write a Program to initialize, assignment & printing variables of different data types.

**Week2: Operators**

1. Write a Program to demonstrate arithmetic operators. (+,-,\*,/,%)
2. Write a Program to demonstrate logical operators.(logical AND, logical OR)
3. Write a Program to read radius value from the keyboard and calculate the area of circle and print the result in both floating and exponential notation.
4. Write a Program to calculate simple interest.
5. Write a Program to convert temperature. (Fahrenheit –Centigrade and vice-versa)

**Week3: Operators**

1. Write a Program to demonstrate relational operators.(<,>,<=,>=,==,!=)
2. Write a program to check equivalence of two numbers using conditional operator.
3. Write a Program to demonstrate pre increment and post increment.(++a, a++ where a is a Value to be initialized)
4. Write a program for computing the volume of sphere, cone and cylinder assume that Dimensions are integers use type casting where ever necessary.

**Week4: Decision Statements**

1. Write a Program to read marks of a student in six subjects and print whether pass or fail (Using if-else).
2. Write a Program to calculate roots of quadratic equation (using if-else).
3. Write a Program to calculate electricity bill. Read starting and ending meter reading.

The charges are as follows.

No. of Units Consumed Rate in(Rs)

1-100 1.50 per unit

101-300 2.00 per unit for excess of 100 units

301-500 2.50 per unit for excess of 300 units

501-above 3.25 per unit for excess of 500 units

**Week5: Switch operations**

1. Write a Program to perform arithmetic operations using switch case.
2. Write a Program to display colors using switch case (VIBGYOR).
3. Write a Program to display vowels and consonants using switch case.
4. Write a Program to display names of days in a Week using switch case.

**Week6: Basic Loop operations**

Do the Following Programs Using for, while, do-while loops.

1. Write a program to calculate sum of individual digits of a given number.
2. Write a program to check whether given number is palindrome or not.
3. Write a program to print prime numbers in the given range.
4. Write a program to display multiplication tables from 1 to 10 except 3 and 5.

**Week7: Advanced loops**

1. Write a program to print the Fibonacci series for given „N“ value.
2. Write a program to check whether a given number is a Fibonacci number or not.
3. Write a program to read 2 numbers x and n then compute the sum of the Geometric Progression.

$$1+x+x^2+x^3+ \dots +x^n$$

4. Write a program to print the following formats.
 

```

1          *
1 2        * *
1 2 3      * * *
1 2 3 4    * * * *
```
5. Write a C Program to construct pyramid of numbers.

**Week8: 1-D arrays**

1. Write a program to store 10 elements in the 1-D array and print sum of the array.
2. Write a program to print minimum and maximum elements in the 1-D array.
3. Write a program to count no. of positive numbers, negative numbers and zeros in the array.
4. Write a program to search the given element by using linear search and binary search.
5. Write a program to sort the given elements using bubble sort technique.

**Week9: 2-D arrays**

1. Write a program to perform matrix addition
2. Write a program to perform matrix multiplication by checking the compatibility.
3. Write a program to print the transpose of a matrix.

**Week10: Functions**

1. Write a program to find sum of two numbers using functions.
2. Write a program to find product of two numbers using functions without arguments, without return type.
3. Write a program to find difference of two numbers using functions without arguments, with return type.
4. Write a program to find sum of two numbers using functions with arguments &without return type.
5. Write a program to find product of two numbers using functions with arguments, with return type.

**Week11: Functions and Recursion**

1. Write a program to swap two numbers using
  - a) Call By Value B) Call By Reference.
2. Write a program to calculate factorial, gcd using recursion and non-recursion functions.
3. Write C program that reads two integers x and n and calls a recursive function to compute  $x^n$
4. Write a C program that reads two integers and calls a recursive function to compute ncr

**Week 12: Math Functions and I/O Functions**

1. Write a program to read values from keyboard and find the values using abs(),sqrt(),floor(),ceil()and pow().
2. Write a program to read and display a value using getch () and putch().
3. Write a program to read and display a value using getchar(), putchar(),gets() and puts().

**Week 13: Strings**

1. Write a program to perform various string manipulations using built-in functions.
2. Write a program to print the given strings in ascending order.
3. Write a program to verify the given string is palindrome or not (without built-in functions, with using built-in functions).
4. Write a program to concatenate two strings using arrays

**Week14: Structures**

1. Write a program to create structure for an account holder in a bank with following Fields: name, account number, address, balance and display the details of five account holders.
2. Write a program to find total marks of individual student and average marks for 10 students using structures.
3. Write a program to create structure called traveler and members of structure are train no, coach no, seat no, source ,destination , gender, age, name and departure date.
4. Write a program to illustrate passing an entire structure to a function.
5. Write a C Program to perform addition and multiplication of two complex numbers using structures.

**Week15: File operations**

1. Write a program which copies the contents of one file to another file.
2. Write a program to reverse the first n characters in a file.
3. Write a C program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file).
4. Write a C program to count the number of times a character occurs in a text file.

**Reference Books:**

1. Problem Solving and Program Design in C, 4th edition, by jeri R. Hanly and Elli B.Koffman.
2. Programming in C by Pradip Dey, Manas Ghosh 2nd edition Oxford University Press.
3. E.Balaguruswamy, Programming in ANSI C 5th Edition McGraw-Hill
4. A first book of ANSI C by Gray J.Brosin 3rd edition Cengagedelmer Learning India P.Ltd
5. AL Kelly, Iraphol, Programming in C, 4th edition Addison-Wesley – Professional
6. Brain W.Kernighan & Dennis Ritchie, C Programming Language, 2nd edition, PHI

**BASIC ELECTRICAL & ELECTRONICS ENGINEERING LAB**

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

**L T P C**

**Subject Code: 17CE1108ES**

**0 0 3 2**

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO4
<b>CO1</b>	design electrical circuits to verify circuit laws and network theorems	3
<b>CO2</b>	verify the V-I characteristics of various electronic devices	3
<b>CO3</b>	determine the efficiency of various rectifiers	3
<b>CO4</b>	illustrate the configurations of Bi-polar junction transistor	3
<b>CO5</b>	demonstrate the characteristics of FET and SCR	3

**PART A:**

**ELECTRICAL & ELECTRONIC WORKSHOP PRACTICE (in 3 lab sessions)**

1. Identification, Specifications, Testing of R, L, C Components (Color Codes), Potentiometers, Switches (SPDT, DPDT, and DIP), Coils, Gang Condensers, Bread Boards,
2. Identification, Specifications and Testing of Active Devices, Diodes, BJT's, Low power JFET's, Power Transistors, LED's, LCD's, SCR.
3. Study and operation of
  - Multimeters (Analog and Digital)
  - Regulated Power Supplies
  - Function Generator
  - CRO.

**PART B:**

**(For Laboratory examination list of experiments – Minimum of 10 experiments to be conducted)**

**PART-1 ELECTRICAL LAB**

1. Verification of KVL & KCL.
2. Verification of Superposition and Reciprocity theorems.
3. Verification of maximum power transfer theorem. Verification on DC, verification on AC with Resistive and Reactive loads.
4. Experimental determination of Thevenin's Theorem equivalent circuits and verification by direct test.
5. Experimental determination of Norton's Theorem equivalent circuits and verification by direct test.

**PART-2 ELECTRONICS LAB**

6. Forward and reverse bias characteristics of PN-Junction Diode.
7. Zener diode V-I characteristics and Zener diode as voltage regulator.
8. Half wave rectifier with & without filters.
9. Full wave rectifier with & without filters.
10. Input & output characteristics of Transistor in CB/CE configuration.
11. FET Characteristics.
12. SCR Characteristics.

**Equipment required for Laboratory:**

1. Regulated Power supplies (RPS) : 0-30 V
2. CRO's: 0-20 MHz
3. Function Generators: 0-1 MHz
4. Multimeters
5. Decade Resistance Boxes/Rheostats
6. Decade Capacitance Boxes
7. Ammeters (Analog or Digital) : 0-20  $\mu$ A, 0-50 $\mu$ A, 0-100 $\mu$ A, 0-200 $\mu$ A, 10mA, 20 mA
8. Voltmeters (Analog or Digital) : 0-30V, 0-50V,
9. Electronic Components: Resistors, Capacitors, BJTs, SCRs, FETs, LEDs, Diodes-Ge & Si type, Transistors – NPN, PNP type

**NATIONAL SERVICE SCHEME (NSS) / PHYSICAL EDUCATION / YOGA  
MANDATORY COURSE (NON-CREDIT)**

**I-B.Tech.-I-Sem.**  
**Subject Code: 17AC1109MC**

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

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO3	PO6	PO8	PO9	PO12
CO1	harness physical literacy and lifelong engagement	3	3	3	3	3
CO2	use aesthetic appreciation	2	1	2	3	3
CO3	build competence and confidence to face challenges	1	2	1	3	3
CO4	develop Sports related values and attitudes	3	3	2	2	3
CO5	follow appropriate etiquette and sports	1	1	2	3	3

**Aim of NSS Programme:** The programme aims to inculcate social welfare in students, and to provide service to society without bias. NSS volunteers work to ensure that everyone who is needy gets help to enhance their standard of living and lead a life of dignity. In doing so, volunteers learn from people in villages how to lead a good life despite a scarcity of resources. It also provides help in natural and man-made disasters by providing food, clothing and first aid to the disaster victims. The Main Objectives and outcomes are:

S.No.	Name of the Activity	S.No.	Name of the Activity
1	First-aid	9	Anti-Ragging Awareness
2	Blood donation camp	10	Social Activities Awareness
3	Traffic awareness program	11	Cyber Crime
4	Environmental Awareness	12	Digital India
5	Swachh Bharat Abhiyan	13	Substance Abuse Awareness Program (SAAP)
6	Health awareness program	14	Telanganaku Haritha Haram (Sapling Plantation)
7	Fire Safety Awareness	15	Garments / Essential Education Material Collection and distribution
8	Non-formal education		

**Aim of Physical Education:** The aim of course is to make Physical Education as an integral part of Educational System. Students studying in the colleges should have the benefit of Physical Education to improve their health during the course of college education. It is designed to ensure that on completion of this training they would attain the minimum prescribed standard.

Name of the Individual Event		Name of the Team Event	
S.No.	Event	S.No.	Event
1	Badminton	1	Basketball
2	Gymnastics	2	Football
3	Judo	3	Hockey
4	Swimming	4	Kabaddi
5	Table Tennis	5	Kho –Kho
6	Tennis	6	Volleyball
7	Weight Lifting and Power Lifting	7	Cricket
8	Wrestling	8	Hand ball
9	<b>Yoga</b>	9	Throw ball
10	Archery	10	Badminton
11	Body Building	11	Table Tennis
12	Carroms	12	Tennis
13	Chess	13	Swimming
14	Boxing	14	Carroms
15	Taekwondo	15	Taekwondo
16	Fencing	16	Fencing
17	Athletics	17	Athletics

**I-B.TECH.-II-SEMESTER  
SYLLABUS**

**ENGINEERING MATHEMATICS – II**  
**(Vector Calculus, Fourier Analysis & PDE)**  
**(Common to all Branches)**

I-B.Tech.-II-Sem.

Subject Code: 17CE1201BS

L T P C

4 1 0 4

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO1	PO2	PO12
CO1	solve ODE by using Laplace transforms	3	2	1
CO2	determine vector field, scalar field, gradient, divergence and curl by using vector differentiation	3	2	1
CO3	solve the line, surface and volume integrals by using vector integration	3	2	1
CO4	find periodic functions in terms of Fourier series and non-periodic functions of Fourier transform	3	2	1
CO5	formulate Partial Differential Equation, solve Linear and non-linear Differential Equations and analyze one dimensional heat and wave equation	3	2	1

**Unit - I**

**Laplace Transforms:** Laplace transforms of standard functions–Shifting Theorems, Transforms of derivatives and integrals–Unit step function–Dirac delta function Laplace Transform of Periodic Functions. Inverse Laplace transforms by Partial fractions–Convolution theorem (with proof)-Application of Laplace transforms to ordinary differential equations with constant coefficients

**Unit - II**

**Vector Differentiation:** Scalar and vector point functions, Gradient, Divergence, Curl and their physical and geometrical interpretation, Laplacian operator, Vector identities.

**Unit - III**

**Vector Integration:** Line Integral, Work done, Potential function, area, surface and volume integrals, Vector integral theorems: Greens, Stokes and Gauss divergence theorems (without proof) and related problems

**Unit - IV**

**Fourier Series and Transformations:** Fourier series–even and odd functions–Half-range sine and cosine series, Fourier integral theorem (without proof)–Fourier transforms–sine and cosine transforms–properties–inverse transforms–Finite Fourier transforms  
Fourier Transform of Convolution Products (Without Proof)

**Unit - V**

**Partial Differential Equations and Applications:** Formation of partial differential equations-by elimination of arbitrary constants and arbitrary functions– solutions of first order linear (Lagrange) equations and nonlinear equations (Four standard types)–Method of Separation of Variables-Applications to wave equation, heat conduction equation in one dimension.

**Text Books**

1. B. S. Grewal, Higher Engineering Mathematics, 42<sup>nd</sup> Ed., Khanna Publishers, New Delhi, 2012
2. S. R. K. Iyengar, R. K. Jain, Advanced Engineering Mathematics, 4<sup>th</sup> Ed., Narosa Publishing House, New Delhi, 2014
3. Advanced Engineering Mathematics, V.O. Neil, Cengage Publications

**References**

1. T.K.V. Iyengar, B. Krishna Ghandhi, S. Ranganathan and M.V. S.S.N. Prasad, Engineering Mathematics, 12<sup>th</sup> Ed., Volume–I, S. Chand Publishers, 2014
2. U. M. Swamy, P. VijayaLaxmi, K. L. Sai Prasad and M. Phani Krishna Kishore, A Text Book of Engineering Mathematics–II, Excel Books, New Delhi, 2010

## ENGINEERING PHYSICS

I-B.Tech.-II-Sem

Subject Code: 17CE1202BS

L T P C

4 1 0 4

## Course Outcomes (COs) &amp; CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO12
CO1	compare simple and damped harmonic oscillations	3	2	1
CO2	illustrate the interference and diffraction phenomena of light	3	2	1
CO3	examine the mechanism of various lasers and holography	3	2	1
CO4	demonstrate the propagation of light in optical fiber	3	2	1
CO5	analyze the properties of nanomaterials	3	2	1

## Unit - I

**1. Crystallography and Crystal Structures:** Space Lattice, Unit Cell, Basis, Lattice parameters, Crystal Systems, Bravais Lattices, Atomic Radius, Co-ordination Number and Packing Factor of SC, BCC, FCC, Diamond Structure, Crystal Planes and Directions, Miller Indices, Inter Planar Spacing of Cubic Crystal Systems.

**2. X-ray Diffraction:** Basic Principles of X-ray Diffraction, Bragg's Law, Laue Method, Powder Method, Applications of X-ray Diffraction.

## Unit - II

**3. Acoustics of Buildings:** Basic Requirement of Acoustically Good Hall, Reverberation and Time of Reverberation, Sabine's Formula for Reverberation Time (Qualitative), Measurement of Absorption Coefficient of a material. Factors affecting the Architectural acoustics and their remedies.

**4. Ultrasonics:** Introduction, production of ultrasonic waves, magnetostriction method, piezo electric method, detection of ultrasonic waves, properties of ultrasonic waves, use of ultrasonics for nondestructive testing, applications of ultrasonics.

## Unit - III

**5. Lasers:** Characteristics of Lasers, Spontaneous and stimulated Emission of Radiation, Einstein's Coefficients, Population Inversion, Lasing Action, Ruby Laser, Helium- Neon Laser, Semiconductor Laser and Applications of Lasers.

**6. Fiber Optics:** Basic Principles & construction of an Optical Fiber, Acceptance Angle, Numerical Aperture, Types of Optical Fibers, Losses in Optical Fibers, Application of Optical fibers in communication system.

## Unit IV

**7. Dielectric Properties:** Basic definitions: Electric dipole, Dipole moment, Permittivity, Dielectric constant, Polarizability, Electric susceptibility, Displacement vector; Electronic Polarization, Ionic Polarization and Orientation Polarization (Qualitative), Internal Fields in Solids, Clausius - Mossotti Equation, Piezo electricity, Ferro electricity.

**8. Magnetic Properties:** Basic definitions, Origin of Magnetic moment, Bohr magneton, Classification of Dia, Para and Ferro Magnetic Materials on the basis of Magnetic Moment, Explanation of Hysteresis Curve on the basis of Domain Theory of Ferro magnetism.

## Unit: V

**9. Nanotechnology:** Origin of Nanotechnology, Nano Scale, Surface to Volume Ratio, Quantum Confinement, Bottom-up Fabrication: Sol-Gel, Top-Down Fabrication: Chemical Vapor Deposition, Characterization Techniques (SEM & TEM) and Applications of Nanotechnology.

## Text Books:

1. Engineering Physics by P K.Palanisamy, Scitech Publishers



2. Modern Engineering Physics by Dr.K.Vijay kumar, Dr.S.Chandralingam, S.Chand & Company LTD.
3. Applied Physics by P.K.Mittal, I K International Publishers.
4. Engineering Physics by Dr. M.Armugam , Anuradha Publication.
5. Applied Physics for Engineers by P. Madhusudana Rao, Academic Publishing Company.

**References:**

1. Principles of physics by Halliday, Resnick, Walker, Wiley India Pvt Ltd,9<sup>th</sup>Edition.
2. Introduction to solid state physics by Charles Kittel, Wiley India Pvt Ltd,7<sup>th</sup>Edition
3. Engineering Physics by R. K. GAUR & S.L.GUPTA, Dhanpat Rai Publications.
4. Solid State Physics by AJ Dekker, Macmillan INDIA LTD.

## ENGINEERING CHEMISTRY

I-B.Tech.-II-Sem  
Subject Code: 17CE1203BS

L T P C  
4 1 0 4

## Course Outcomes (COs) &amp; CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO12
CO1	identify the properties of water and various treatment methods	3	2	1
CO2	apply the concepts of electrochemistry and corrosion control	3	2	1
CO3	make use of polymers in domestic and industrial fields	3	2	1
CO4	analyze the quality of fuels used in automobiles, industry and aerospace	3	2	1
CO5	illustrate the properties of various engineering materials	3	2	1

## Unit - I

**Water and its treatment:** Introduction – hardness of water – causes of hardness – types of hardness: temporary and permanent – expression and units of hardness – Estimation of hardness of water by complexometric method. Numerical problems. Boiler troubles: Sludges, scales and Caustic embrittlement. Internal treatment of Boiler feed water – Calgon conditioning – Phosphate conditioning – Colloidal conditioning – Softening of water by ion exchange processes. Potable water and its specification- Steps involved in the treatment of potable water - Disinfection of potable water by chlorination and Ozonization Desalination of water – Reverse osmosis. Defluoridation-Nalgonda technique.

## Unit-II

**Electrochemistry:** Introduction, conductance-specific, equivalent and molar conductance, Electrode-Types of electrodes – Construction and functioning of Standard hydrogen electrode calomel and glass electrode. Nernst equation – electrochemical series and its applications. Electrochemical cells: Daniel cell – cell notation, cell reaction and cell EMF – Numerical problems.

**Batteries:** Cell and battery – Primary battery (dry cell, alkaline and Lithium cell) and Secondary battery (lead acid, Ni-Cd and lithium ion cell),

**Fuel cells:** Hydrogen –oxygen and methanol-oxygen fuel cells – Applications.

**Corrosion and its Prevention:** introduction-theories of corrosion: dry corrosion-wet corrosion- types: galvanic corrosion-concentration cell corrosion-waterline and pitting corrosion-factors influencing rate of corrosion by environment-Corrosion control methods-cathodic protection-metallic coatings: galvanization and tinning.

## Unit - III

**Polymers:** Definition – Classification of polymers with examples – Types of polymerization – addition (free radical mechanism), Co-Polymerization and condensation polymerization with examples.

**Plastics:** Definition and characteristics- thermoplastic and thermosetting plastics, compounding and fabrication of plastics (compression and injection moulding). Preparation, properties and engineering applications of PVC and Bakelite.

**Fibers:** Characteristics of fibers – preparation, properties and applications of Nylon -6, 6 and Dacron. Fiber reinforced plastics (FRP) – Applications.

**Rubbers and Elastomers:** Natural rubber and its vulcanization – compounding of rubber. – Preparation – properties and applications of Buna-S and Thiokol rubber.

**Conducting polymers:** Characteristics and Classification with examples – mechanism of conduction in trans- polyacetylene and applications of conducting polymers.

## Unit-IV

## Energy Sources:

**Fuels:** Classification of fuels: coal – analysis of coal – proximate and ultimate analysis and their significance. Liquid fuels – petroleum and its refining, cracking – moving bed catalytic cracking, Knocking – octane and cetane rating, synthetic petrol-Fischer- Tropsch's process; Gaseous fuels – composition and uses of natural gas, LPG and CNG. Analysis of Flue gas by using Orsat's apparatus.

**Combustion:** Definition, Calorific value of fuel – HCV, LCV; Determination of calorific value of solid fuels by using Bomb Calorimeter.

**Unit-V**

**Engineering Materials:**

**Cement:** Portland cement, its composition, setting and hardening of Portland cement.

**Refractories:** Classification and characteristics of refractories, properties and application of Refractories.

**Lubricants** Classification of lubricants with examples – characteristics of a good lubricants- mechanism of lubrication (thick film, thin film and extreme pressure) –properties of lubricants: viscosity cloud point, pour point, flash point and fire point.

**Nano materials:** Introduction to nano technology, preparation ,properties and applications of carbon nano tubes(CNTs)

**Text Books:**

1. Engineering Chemistry by P.C Jain and M.Jain, Dhanpatrai Publishing Company, New Delhi(2010)
2. Engineering Chemistry by Rama Devi ,Venkata Ramana Reddy and Rath, Cengage learning, New Delhi.(2016)

**Reference Books:**

1. Engineering Chemistry by Shikha Agarwal, Cambridge University Press, Delhi(2015)
2. Engineering Chemisty by Shashi Chawla, Dhanpatrai and Company (P) Lid. Delhi(2011)

## ENGINEERING MECHANICS

I -B.Tech.-II-Sem

Subject Code: 17CE1204ES

L T P C

3 0 0 3

## Course Outcomes (COs) &amp; CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO12
CO1	analyze the resultant of a system of forces using principles of mechanics	3	2	1
CO2	apply the conditions of static equilibrium to particles and rigid bodies	3	2	1
CO3	determine mechanical efficiency of simple lifting machines, centroid and centre of gravity of simple sections	3	2	1
CO4	compute the second moment of inertia of various laminas and bodies	3	2	1
CO5	solve the problems involving kinetics and virtual work of particles	3	2	1

**Unit - I**

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

**Unit - II**

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

**Unit - III**

**Centroid and Center of Gravity:** Introduction – Centroids of Lines – Centroids of area- Centroids of Composite figures- Pappu's theorems –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 Theorem for moment of inertia – Moments of inertia by integration – Moments of Inertia of Composite Figures.

**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**

**Kinetics:** Kinetics of a particle – D'Alemberts principle. Work - energy and power. Principle of conservation of energy- Kinetics of rigid body in translation and rotation- work done – Principle of work – energy.

**Text Books:**

1. Singer's Engineering Mechanics Statics and Dynamics/ K. Vijaya Kumar Reddy, J.Suresh Kumar/ BSP
2. Engineering Mechanics/ Irving Shames, G.Krishna Mohan Rao / Prentice Hall
3. S. Timoshenko, D. H. Young, J V Rao and Sukumar Pati, Engineering Mechanics, 5<sup>th</sup> edition, McGraw Hill Education (India) Private Limited,

**References:**

1. A Text of Engineering Mechanics /YVD Rao/ K.Govinda Rajulu / M. Manzoor Hussain/ Academic Publishing Company
2. Engineering Mechanics: Statics and Dynamics, A.Nelson Mc Graw Hill Education.

## DATA STRUCTURES THROUGH C

I-B.Tech.-II-Sem.

Subject Code: 17CE1205ES

L T P C

3 1 - 3

## Course Outcomes (COs) &amp; CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3	PO12
CO1	classify different data structures to design efficient programs	3	3	2	2
CO2	identify appropriate sorting and searching techniques	3	2	2	2
CO3	illustrate operations and applications of linear data structures	3	3	2	2
CO4	explain various concepts of non-linear data structures	3	3	2	2
CO5	choose an appropriate hashing technique for a given problem	3	3	2	2

## Unit - I

**Introduction to Data Structures, Searching and Sorting:** Basic concepts: Introduction to data structures, classification of data structures, operations on data structures, abstract data type, algorithms, different approaches to design an algorithm, recursive algorithms; Searching techniques: Linear search, binary search and Fibonacci search; Sorting techniques: Bubble sort, selection sort, insertion sort, quick sort, merge sort, and comparison of sorting algorithms.

## Unit – II

**Linear Data Structures:** Primitive operations, implementation of stacks using Arrays, applications of stacks arithmetic expression conversion and evaluation; Queues: Primitive operations; Implementation of queues using Array, applications of linear queue, circular queue and double ended queue (deque).

## Unit – III

**Linked Lists:** Linked lists: Introduction, singly linked list, representation of a linked list in memory, operations on a single linked list; Applications of linked lists: Polynomial representation and sparse matrix manipulation. Types of linked lists: Circular linked lists, doubly linked lists; linked list representation and operations of Stack, linked list representation and operations of queue.

## Unit – IV

**Non Linear Data Structures:** Trees: Basic concept, binary tree, binary tree representation, array and linked representations, binary tree traversal, binary search tree, tree variants, application of trees; Graphs: Basic concept, graph terminology, graph implementation, graph traversals, Application of graphs, Priority Queue.

## Unit – V

**Binary Trees and Hashing:** Binary search trees: Binary search trees, properties and operations; Balanced search trees: AVL trees; Introduction to M-Way search trees, B trees; Hashing and collision: Introduction, hash tables, hash functions, collisions, applications of hashing.

## Text Books:

1. Mark A. Weiss, "Data Structures and Algorithm Analysis in C", Pearson, 2<sup>nd</sup> Edition, 1996.
2. Ellis Horowitz, Satraj Sahni, Susan Anderson Freed, "Fundamentals of Data Structures in C", Universities Press, 2<sup>nd</sup> Edition, 2008.

## Reference Books:

1. Reema Thareja, "Data Structures using C", Oxford University Press, 2nd Edition, 2014.
2. S. Lipschutz, "Data Structures", Tata McGraw Hill Education, 1st Edition, 2008.
3. D. Samanta, "Classic Data Structures", PHI Learning, 2nd Edition, 2004.
4. Tanenbaum, Langsam, Augenstein, "Data Structures Using C", Pearson, 1st Edition, 2003.

**ENGINEERING PHYSICS / ENGINEERING CHEMISTRY LAB**

**I -B.Tech.-II-Sem**

**L T P C**

**Subject Code: 17CE1206BS**

**0 0 3 2**

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO4
CO1	identify modulus of elastic materials , determine the characteristics & applications of LED and SOLAR CELL, find the energy gap of a semiconductor and analyze the wavelength of laser source	3
CO2	demonstrate the resonance of LCR circuit, determine Time Constant of RC circuit & find variation of the magnetic field and determine losses in optical fiber	3
CO3	determine the hardness, viscosity and pH of various samples	3
CO4	synthesize the drug used in pharmaceutical industry	3
CO5	estimate the strength of solutions and amount of coloured solutions	3

**List of Engineering Physics Lab Experiments: (Any 08 experiments compulsory)**

1. To determine the Rigidity modulus of a wire - Torsional pendulum.
2. Study the characteristics of LED and LASER Diode.
3. Verify the characteristics of a Solar Cell.
4. Determination of wavelengths of a LASER source-Diffraction Grating.
5. Bending Losses of Fibers & Evaluation of numerical aperture of given fiber.
6. Energy gap of a semiconductor diode.
7. Determination of Resonance frequency of an LCR circuit.
8. To calculate the Time constant of an R-C Circuit.
9. Determination of frequency of an Electronic Vibrator – Melde’s Exp.
10. Magnetic field along the axis of current carrying coil-Stewart and Gee’s method.
11. Newton’s Rings-Radius of curvature of Plano convex lens.
12. Dispersive power of the material of a prism – Spectrometer.

**Laboratory Manual:**

1. Laboratory Manual of Engineering Physics by Dr.Y.Aparna & Dr.K.Venkateswara Rao (V.G.S Publishers)
2. Solar photo voltaic – Technology Fundamentals system: A manual for Technicians, Trainers & Engineers.

**List of Engineering Chemistry Lab Experiments: (Any 08 experiments compulsory)**

**I) Volumetric Analysis:**

1. Estimation of Ferrous ion by Permanganometry.
2. Estimation of Ferrous and ferric ions in a given mixture by Dichrometry.
3. Estimation of hardness of water by Complexometric method using EDTA
4. Estimation of copper by Iodometry.
5. Estimation of percentage of purity of MnO<sub>2</sub> in pyrolusite.

**II) Instrumental methods of Analysis:**

**Conductometry:**

6. Estimation of HCl by Conductometry.
7. Estimation of HCl and Acetic acid in a given mixture by Conductometry.

**Potentiometry:**

8. Estimation of HCl by potentiometry.

**Colorimetry:**

9. Estimation of manganese in  $\text{KMnO}_4$  by colorimetric method

**p<sup>H</sup> meter:**

10. Estimation of HCl by p<sup>H</sup> meter.

**Physical property:**

11. Determination of viscosity of oil by redwood / Oswald's Viscometer.

**Preparations:**

12. Preparation of Aspirin.

**Laboratory Manual:**

1. Vogel's Text Book of quantitative chemical Analysis, 5<sup>th</sup> Edition (2015) G.H.Jeffery, J.Bassett, J.Mendham and R.C.Denney.
2. A text Book on experiments and calculations in Engineering Chemistry by S.S. Dara S.chand & company Ltd., Delhi (2003).

## DATA STRUCTURES THROUGH C LAB

**I-B.Tech.-II-Sem.**  
**Subject Code: 17CE1207ES**

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

### Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO4
CO1	implement various searching and sorting techniques	3
CO2	demonstrate basic operations of stack and queues using arrays and linked lists	3
CO3	apply stack data structure to solve various computing problems	3
CO4	demonstrate and apply different methods for traversing graphs	3
CO5	construct binary search tree	3

#### Week-1: Searching Techniques

Write C programs for implementing the following searching techniques.

- a. Linear search.
- b. Binary search.
- c. Fibonacci search.

#### Week-2: Sorting Techniques

Write C programs for implementing the following sorting techniques to arrange a list of integers in ascending order.

- a. Bubble sort.
- b. Insertion sort.
- c. Selection sort.

#### Week-3: Sorting Techniques

Write C programs for implementing the following sorting techniques to arrange a list of integers in ascending order.

- a. Quick sort.
- b. Merge sort.

#### Week-4: Implementation of Stack and Queue

Write C programs to

- a. Design and implement Stack and its operations using Arrays.
- b. Design and implement Queue and its operations using Arrays.

#### Week-5: Applications of Stack

Write C programs for the following:

- a. Uses Stack operations to convert infix expression into postfix expression.
- b. Uses Stack operations for evaluating the postfix expression.

#### Week-6: Implementation of Single Linked List

Write a C program that uses functions to perform the following operations on single linked list.

- (i) Creation      (ii) insertion      (iii) deletion      (iv) traversal

#### Week-7: Implementation of Circular Single Linked List

Write a C program that uses functions to perform the following operations on Circular linked list.

- (i) Creation (ii) insertion (iii) deletion (iv) traversal

#### Week-8: Implementation of Double Linked List

Write a C program that uses functions to perform the following operations on double linked list.

- (i) Creation (ii) insertion (iii) deletion (iv) traversal in both ways.



**Week-9: Implementation of Stack Using Linked List**

Write a C program to implement stack using linked list.

**Week-10: Implementation of Queue Using Linked List**

Write a C program to implement queue using linked list.

**Week-11: Graph Traversal Techniques**

Write C programs to implement the following graph traversal algorithms:

- a. Depth first search.
- b. Breadth first search.

**Week-12: Implementation of Binary Search Tree**

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

- a. Create a binary search tree.
- b. Traverse the above binary search tree recursively in pre-order, post-order and in-order.
- c. Count the number of nodes in the binary search tree.

**Reference Books:**

1. Kernighan Brian W, Dennis M. Ritchie, "The C Programming Language", Prentice Hall of India, Re-Print, 2008.
2. Balagurusamy E, "Programming in ANSI C", Tata Mc Graw Hill, 6<sup>th</sup> Edition, 2008.
3. Gottfried Byron, "Schaum's Outline of Programming with C", Tata Mc Graw Hill, 1<sup>st</sup> Edition, 2010.
4. Lipschutz Seymour, "Data Structures Schaum's Outlines Series", Tata Mc Graw Hill, 3<sup>rd</sup> Edition, 2014
5. Horowitz Ellis, Satraj Sahni, Susan Anderson, Freed, "Fundamentals of Data Structures in C", W. H. Freeman Company, 2<sup>nd</sup> Edition, 2011.

**IT & ENGINEERING WORKSHOP**

**I-B.Tech.-II-Sem.**

**Subject Code: 17CE1208ES**

**L T P C**

**0 0 3 2**

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO1	PO5	PO9	PO10
CO1	install and make use of operating systems and MS office tools	3	3	2	2
CO2	configure fire walls and trouble shoot network connections	3	3	2	2
CO3	apply safety norms while handling the workshop equipment	3	1	3	2
CO4	prepare required models using various engineering trades	3	1	3	2
CO5	make use of various power tools	3	1	3	2

**List of Experiments**

**Part A- IT Workshop**

**Week-1: Windows Operating System & Drivers Installation**

Windows 7, Windows 8 and Windows 10. LAN, graphics, audio, video and command prompt, commands.

**Week-2: Network Connections & Troubleshooting**

IP configurations, connecting devices in LAN through bridge, hub, switch; Wi-Fi, Li-Fi and Bluetooth settings; Crimping: Crossover, strait over. Hardware, troubleshoots, software troubleshooting.

**Week-3: Cyber Hygiene:**

Introduction to Virus, worms, threats. Threats on internet, Configure the Systems to be internet safe, Install antivirus, personal firewall, block pop-ups, block active x downloads.

**Week-4: MS WORD**

Prepare the project document and resume.

**Week-5 : MS EXCEL**

Spreadsheet basics, modifying worksheets, formatting cells, formulas and functions, sorting and filtering, charts.

**Week-6: MS POWER POINT**

Power point screen, working with slides, add content, work with text, working with tables, graphics, slide animation, reordering slides, adding sound to a presentation.

**Part B- Engineering Workshop**

**Week-7: HOUSE WIRING**

Power point, light fitting and switches.

**Week-8 & 9: CARPENTRY**

Study of tools and joints; Practice in planning, chiseling, marking and sawing; Joints: Cross joint, T joint, Dove tail joint.

**Week-10,11 &12: FITTING**

Study of tools, practice in filing, cutting, drilling and tapping; Male and female joints, stepped joints.

**Week-13 & 14: Tin Smithy & Black Smithy**

**Tin smithy**:-Preparation of Open scoop, Cylinder, square/rectangular tray, **Black Smithy**:-S-Hook, Square /Hexagonal headed bolt.

**Week 15: Demonstration of Power Tools:**

Bench drilling machine, hand drilling machine, power hacksaw, grinding machine and wood cutting machine.

**Text Books:**

1. Peter Norton, —Introduction to Computers, Tata Mc Graw Hill Publishers, 6th Edition, 2010.
2. Scott Muller, Que,—Upgrading and Repairing, Pearson Education, PC's 18th Edition, 2009.
3. Microsoft Office 2016 Step by Step (Microsoft)
4. H. S. Bawa, —Workshop Practicel, Tata Mc Graw Hill Publishing Company Limited, New Delhi, 2nd Edition, 2007.

**MICRO PROJECT  
(MANDATORY NON-CREDIT COURSE)**

**I-B.Tech.-II-Sem.**  
**Subject Code: 17AC1209MC**

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

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO1 to PO14
CO1	select problem and evaluate	3
CO2	review the literature related to the problem	3
CO3	implement principles of science and Engineering	3
CO4	analyze the problem	3
CO5	present the essence of project work	3

**Evaluation of Micro Project:**

1. The student has to select one suitable topic in consultation with course counselor /advisor and get it approved and register with the Head of the Department.
2. The project is evaluated for 30 marks for internal and 70 marks for external.
3. The students shall be required to submit the rough draft of the project before the commencement of first mid examination.
4. Faculty shall make suggestions for modification in the rough draft.
5. Two copies of the final report should be submitted by the student within a week thereafter.
6. Presentation schedules will be prepared by Department in line with the academic calendar.

Guidelines for preparation and presentation of Micro Project:

The report should be prepared in the prescribed format which is available with concerned course advisor/counselor. Similarly a 15 minutes power point presentation in a prescribed format should be given.

The evaluation of the Micro Project is based upon the following.

S.No	Description	Internal	External
1.	Content Covered	05 Marks	10 Marks
2.	Technicality involved	05 Marks	10 Marks
3.	Report quality	05 Marks	10 Marks
4.	Summary and findings	05 Marks	10 Marks
5.	PPT presentation	10 Marks	30 Marks
	<b>Total</b>	<b>30 Marks</b>	<b>70 Marks</b>

**II-B.TECH.-I-SEMESTER  
SYLLABUS**

STATISTICAL AND NUMERICAL METHODS

II-B.Tech.-I-Sem.

Subject Code: 17CE2101BS

L T P C

4 1 0 4

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO12
CO1	differentiate among random variables involved in the probability models	3	2	1
CO2	test hypothesis for large samples	3	2	1
CO3	test hypothesis for small samples	3	2	1
CO4	solve transcendental, linear and non-linear system of equations using numerical methods	3	2	1
CO5	find the numerical solutions for first order initial value problems and integrals	3	2	1

Unit- I

**Probability, Random variables and Distributions:** Random variables, Discrete random variable, Continuous random variable, Probability distribution function, Probability density function, Expectation, Moment generating function.

Discrete distributions: Binomial and geometric distributions. Continuous distribution: Normal distributions.

Unit – II

**Sampling Theory:** Introduction, Population and samples, Sampling distribution of means and variances

**Test of Hypothesis For Large Samples :** Introduction, Hypothesis, Null and Alternative Hypothesis, Type I and Type II errors, Level of significance, One tail and two-tail tests, Tests concerning one mean and proportion, two means-proportions and their differences- Point estimation, Maximum error of estimate, Interval estimation.

Unit - III

**Test of Hypothesis For small Samples:** Tests concerning small samples- t– Test, F-Test and  $\chi^2$ - Test and their properties, applications. Point estimation, Maximum error of estimate, Interval estimation.

Unit - IV

**Algebraic and transcendental Equations & Curve Fitting:** Introduction, Bisection Method, Method of False position, Iteration methods: fixed point iteration and Newton Raphson methods. Solving linear system of equations by Gauss – Jacobi’s, Gauss-Seidal Methods.

**Curve Fitting:** Fitting a linear, second degree, exponential, power curve by method of least squares.

Unit - V

**Numerical Integration and solution of Ordinary Differential equations:** Trapezoidal rule- Simpson’s 1/3<sup>rd</sup> and 3/8<sup>th</sup> rule-Solution of ordinary differential equations by Taylor’s series, Picard’s method of successive approximations, Euler’s method, Runge-Kutta method (second and fourth order)

Text Books:

1. Probability and statistics for Engineers by Richard Arnold Johnson, Irwin Miller and Jhon E. Freund, New Delhi, Prentice Hall.
2. Probability and Statistics for Engineers and Sciences by Jay L. Devore, Cengage Learning.
3. Numerical Methods for Scientific and Engineering Computation by M. K. Jain, S.R.K. Iyengar and R. K. Jain, New Age International Publishers.

References:

1. Fundamentals Of Mathematical Statistics by S. C. Guptha & V. K. Kapoor, S.Chand.
2. Introductory Methods of Numerical Analysis by S.S. aty, PHI Learning Pvt. Ltd.
3. Mathematics for engineers and scientists by Alan Jeffrey, 6<sup>th</sup> edition, CRC press.

**STRENGTH OF MATERIALS - I**

II-B.Tech.-I-Sem.

L T P C

Subject Code: 17CE2102PC

4 0 0 4

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO1	PO2	PO12	PO13
CO1	determine the stress and strain of various materials	3	3	2	3
CO2	sketch the SFD & BMD for beams of various supports and loads	3	3	2	3
CO3	analyze flexural and shear stresses in a beam	3	3	2	3
CO4	determine the deflections in beams under various loads & support	3	3	2	3
CO5	evaluate principal stresses, strains and various theories of failure	3	3	2	3

**Unit – I**

**Simple Stresses and Strains:** Elasticity and plasticity – Types of stresses and strains – Hooke’s law – stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson’s ratio and volumetric strain – Elastic moduli and the relationship between them – Bars of varying section – composite bars – Temperature stresses. Elastic constants.

**Strain Energy** – Resilience – Gradual, sudden, impact and shock loadings – simple applications.

**Unit – II**

**Shear Force and Bending Moment:** Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilver, simply supported and overhanging beams subjected to point loads, uniformly distributed load, uniformly varying loads and combination of these loads – Point of contraflexure – Relation between S.F., B.M and rate of loading at a section of a beam.

**Unit – III**

**Flexural Stresses:** Theory of simple bending-Assumptions-Derivation of bending equation:  $M/I = f/y = E/R$  - Neutral axis-Determination of bending stresses-Section modulus of rectangular and circular sections (Solid and Hollow), I,T, Angle and Channel sections – Design of simple beam sections.

**Shear Stresses:** Derivation of formula – Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T angle sections.

**Unit – IV**

**Deflection of Beams:** Bending into a circular arc-slope,deflection and radius of curvature- Differential equation for the elastic line of a beam-Double integration and Macaulay’s methods-Determination of slope and deflection for cantilever and simply supported beams subjected to point loads,U.D.L, Uniformly varying load-Mohr’s theorems-Moment area method-application to simple cases including overhanging beams.

**Conjugate Beam Method:** Introduction – Concept of conjugate beam method. Difference between a real beam and a conjugate beam. Deflections of determinate beams with constant and different moments of inertia.

**Unit – V**

**Principal Stresses and Strains:** Introduction – Stresses on an inclined section of a bar under axial loading – compound stresses – Normal and tangential stresses on an inclined plane for biaxial stresses – Two perpendicular normal stresses accompanied by a state of simple shear – Mohr’s circle of stresses – Principal stresses and strains – Analytical and graphical solutions.

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

**Text Books:**

1. Strength of Materials by R.K.Bansal, Lakshmi Publications House Pvt. Ltd.
2. Strength of Materials by R.K Rajput, S.Chand & Company Ltd.

**References:**

1. Strength of Materials by S.S.Bhavikatti, Vikas Publishing House Pvt. Ltd.
2. Mechanics of Structures Vol.I by H.J.Shah and S.B.Junnarkar,Charotar Publishing House Pvt. Ltd.

**BUILDING MATERIALS, CONSTRUCTION AND PLANNING**

**II-B.Tech.-I-Sem.**

**Subject Code: 17CE2103ES**

**L T P C**

**3 0 0 3**

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO1	PO6	PO12	PO13
CO1	explain physical properties of construction materials	3	3	2	3
CO2	demonstrate various building components and services	3	3	2	3
CO3	illustrate brick, stone masonry, finishing and form works	3	3	2	3
CO4	choose different types of constructions for structural components	3	3	2	3
CO5	originate building plan by using rules and bye-laws	3	3	2	3

**Unit – I**

**Stones and Bricks, Tiles:** Building stones-classifications and quarrying-properties-structural requirements-dressing

Bricks-Composition of Brick earth-manufacture and structural requirements.

**Wood, Aluminum, Glass and Paints:** Wood-structure-types and properties-seasoning-defects; alternate materials for wood-GI / fibre-reinforced glass bricks, steel & aluminum.

**Unit - II**

**Cement & Admixtures:** Ingredients of cement-manufacture-Chemical composition –Hydration-field & lab tests

Admixtures-mineral & chemical admixtures-uses.

**Unit - III**

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

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

**Unit -IV**

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

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

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

**Unit –V**

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

**Text Books:**

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

**References:**

1. Building Materials by Duggal, New Age International.
2. Building Materials by P.C.Varghese, PHI.
3. Building Construction by PC Varghese PHI.
4. Construction Technology – Vol – I & II by R. Chuddy, Longman UK.



ENGINEERING GEOLOGY

II-B.Tech.-I-Sem.  
Subject Code: 17CE2104BS

L T P C  
3 1 0 3

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO12
CO1	explain weathering process and mass movement	3	2	3
CO2	classify the different minerals and rocks	3	2	3
CO3	identify the geological structures of the rocks and ground water potential	3	2	2
CO4	adapt geophysical principles for site selection	3	2	3
CO5	assess natural hazards and select sites for mass structures	3	2	2

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, Garnet, Talc, Biotite, Asbestos, Chlorite, Kyanite, Calcite. Study of other common economic minerals such as Pyrite, Hematite, Magnetite, Chromite, Galena, Pyrolusite, Graphite, Magnesite, and Bauxite.

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

Unit - III

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

Unit - IV

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

**Importance of Geophysical Studies: Principles** of geophysical study by Gravity methods. Magnetic methods, Electrical methods. Seismic methods, Radio metric methods and Geothermal method. Special importance of Electrical resistivity methods, and seismic refraction methods. Improvement of competence of sites by grouting etc. Fundamental aspects of Rock mechanics and Environmental Geology.

Unit - V

**Geology of Dams, Reservoirs and Tunnels:** Types of dams and bearing of Geology of site in their selection, Geological Considerations in the selection of a dam site. Analysis of dam failures of the past. Factor's Contributing to the success of a reservoir. Geological factors influencing water Lightness and life of reservoirs - Purposes of tunneling, Effects of Tunneling on the ground Role of Geological Considerations ( ie. Tithological, structural and ground water ) in tunneling over break and lining in tunnels.

**Text Books:**

- 1) Engineering Geology by N.Chennakesavulu, Mc-Millan, India Ltd. 2005
- 2) Engineering Geology for Civil Engineers – P.C. Varghese PHI
- 3) Engineering Geology by Parbin Singh, S.K.Kataria & Sons.
- 4) Principles of Engineering Geology by K.V.G.K. Gokhale – B.S publications

**References:**

1. F.G. Bell, Fundamental of Engineering Geology Butterworths, Publications, New Delhi, 1992.
2. Krynine & Judd, Principles of Engineering Geology & Geotechnics, CBS Publishers & Distribution
- 3) Engineering Geology by Subinoy Gangopadhyay, Oxford university press.

## SURVEYING

II-B.Tech.-I-Sem.

Subject Code: 17CE2105PC

L T P C

4 0 0 4

## Course Outcomes (COs) &amp; CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO12	PO13
CO1	apply the concepts of surveying to measure the distances and directions	3	3	3	3
CO2	identify different methods of leveling to draw levels and contour maps	3	3	3	3
CO3	solve problems on areas and volumes; measure angles by Theodolite	3	3	2	3
CO4	extend methods of trigonometry & tacheometry and design the simple curves	3	3	2	3
CO5	acquaint with EDM, GPS and Total Station	3	3	3	3

## Unit-I

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

**Measurement of Distances and Directions:** Linear distances-Approximate methods, Direct Methods-Chains-Tapes,ranging, Tape corrections, Indirect methods- optical methods- E.D.M. method.

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

## Unit-II

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

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

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

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

## Unit-III

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

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

## Unit-IV

**Tacheometric Surveying:** Principles of Tacheometry, stadia and tangential methods of Tacheometry.

**Curves :**Types of curves and their necessity, elements of simple curve, setting out of simple Curves, Introduction to compound curves.

## Unit-V

**Modern Surveying Methods:** Total Station and Global Positioning System. : Basic principles, classifications, applications, comparison with conventional surveying. Electromagnetic wave theory - electromagnetic distance measuring system - principle of working and EDM instruments, Components of GPS – space segment, control segment and user segment, reference systems, satellite orbits, GPS observations. Applications of GPS.

## Text Books:

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

## References:

1. Surveying (Vol-1,2&3),by B.C.Punmia, Ashok Kumar Jain and A.K Jain-LP(P) ltd., New Delhi
2. Surveying by BHAVIKATTI; Vikas publishing house ltd.

**COMPUTER AIDED BUILDING DRAWING LAB****II-B.Tech.-I-Sem.****Subject Code: 17CE2106ES****L T P C****0 0 3 2****Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

<b>COs</b>	<b>Upon completion of course the students will be able to</b>	<b>PO4</b>	<b>PO5</b>	<b>PO10</b>	<b>PO14</b>
<b>CO1</b>	make use of basic Auto CAD commands for drafting	3	3	3	3
<b>CO2</b>	prepare the plans for single and multistoried buildings	3	3	3	3
<b>CO3</b>	develop sections and elevations for various buildings	3	3	3	3
<b>CO4</b>	draw the detailing of building components	3	3	3	3
<b>CO5</b>	construct the building drawing as per standards	3	3	3	3

**List of Experiments**

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

**Reference:**

1. Computer Aided Civil Engineering Drawing Lab Manual, Department of Civil Engineering, CMRIT, Hyd.

**ENGINEERING GEOLOGY LAB**

**II-B.Tech.-I-Sem.**

**Subject Code: 17CE2107BS**

**L T P C**

**0 0 3 2**

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO4
CO1	analyze the physical properties of minerals	3
CO2	identify the various rocks	3
CO3	examine the various rocks using microscopic study	3
CO4	interpret and draw sections for geological maps	3
CO5	locate ground water table using electrical resistivity meter	3

**Lab Experiments**

1. Study of physical properties and identification of minerals referred under theory.
2. Megascopic description and identification of rocks referred under theory.
3. Microscopic study of rocks.
4. Interpretation and drawing of sections for geological maps showing tilted beds, faults, uniformities etc.
5. Simple Structural Geology problems.
6. Electrical resistivity meter.

**Lab Examination Pattern:**

1. Description and identification of SIX minerals
2. Description and identification of Six (including igneous, sedimentary and metamorphic rocks)
3. Inter pretation of a Geological map along with a geological section.
4. Simple strike and Dip problems.
5. Microscopic identification of rocks.

**Reference:**

1. Engineering Geology Lab Manual, Department of Civil Engineering, CMRIT, Hyd.

**SURVEYING LAB –I**

**II-B.Tech.-I-Sem.**  
**Subject Code: 17CE2108PC**

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

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO4	PO5	PO10	PO14
CO1	find the distances and directions using the concepts of surveying	3	3	3	3
CO2	compare plotted work with the actual features of the area using plane table	3	3	3	3
CO3	identify reduced levels for L.S and C.S of road profiles using dumpy or auto level	3	3	3	3
CO4	measure horizontal and vertical angles by using theodolite	3	3	3	3
CO5	determine the heights and distances using trigonometric and tacheometric surveying	3	3	3	3

**List of Experiments**

1. Surveying of an area by chain survey (closed traverse) & plotting.
2. Chaining across obstacles
3. Determine of distance between two inaccessible points with compass
4. Survey 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. Levelling – Longitudinal and cross-section and plotting
8. Trigonometric leveling using theodolite
9. Height and distances using principles of tacheometric surveying
10. a) Measurement of Horizontal angle & vertical angle.  
 b) Distance between inaccessible point by theodolite

**Reference:**

1. Surveying Lab - I Manual, Department of Civil Engineering, CMRIT, Hyd.

**GENDER SENSITIZATION LAB**  
MANDATORY COURSE (NON-CREDIT)

**II-B.Tech.-I-Sem.**  
**Subject Code: 17HS2109MC**

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

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO9	PO12
CO1	identify gender issues in contemporary India	2	3
CO2	explain gender roles, spectrum, relationships etc	3	2
CO3	analyze gender issues related to sexual harassment and violence	3	3
CO4	assess gender and human rights	3	3
CO5	adapt to the societal need to end prejudices and achieve gender equality	2	3

**Unit - I**

**Understanding Gender: Gender: Why Should We Study It?(Towards a World of Equals: Unit-1)**

**Socialization:** Making Women, Making Men (Towards a World of Equals: Unit -2) Introduction.

Preparing for Womanhood. Growing up Male. First lessons in Caste. Different Masculinities.

**Just Relationships: Being Together as Equals (Towards a World of Equals: Unit -12)**

Mary Kom and onler tiler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers, Further Reading: Rosa Parks-The Brave Heart.

**Unit - II**

**Gender and Biology:** Missing Women: Sex Selection and Its Consequences (Towards a World of Equals: Unit -4) Declining Sex Ratio. Demographic Consequences. Gender Spectrum: Beyond the Binary (Towards a World of Equals: Unit -10) Two or Many? Struggles with Discrimination. Additional Reading: Our Bodies, Our Health (Towards a World of Equals:Unit -13)

**Unit - III**

**Gender and Labour:** Housework: the Invisible Labour (Towards a World of Equals: Unit -3) "My Mother doesn't Work." "Share the Load." Women's Work: Its Politics and Economics (Towards a World of Equals: Unit -7) Fact and Fiction. Unrecognized and Unaccounted work. Further Reading: Wages and Conditions of Work.

**Unit - IV**

**Issues of Violence:** Sexual Harassment: Say Nol (Towards a World of Equals: Unit -6) Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment - Further Reading: "Chupulu". Domestic Violence: Speaking Out (Towards a World of Equals: Unit -8) Is Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Further Reading: New Forums for Justice. Thinking about Sexual Violence (Towards a World of Equals: Unit -11) Blaming the Victim-"I Fought for my Life" - Further Reading: The Caste Face of Violence.

**Unit - V**

**Gender Studies: Knowledge:** Through the Lens of Gender (Towards a World of Equals: Unit -5) Point of View. Gender and the Structure of Knowledge. Further Reading: Unacknowledged Women Artists o Telangana. Whose History? Questions for Historians and Others (Towards a World of Equals: Unit -9) Reclaiming a Past. Writing other Histories. Further Reading: Missing Pages from Modern Telangana History.

**References:**

1. Agnes. Flavia. My Story ... Our Story of Re-building Broken Lives. Delhi: Forum Against Oppression of Women (FAOW), 1988. 2<sup>nd</sup> Edition. Print
2. Brady. Judy 'I want a wife,' Literature for Composition: Essays, Fiction, Poetry and Drama. Ed. Sylvan Barnet. Morton Berman. Willam Burto and Marcia Stubbs. 3<sup>rd</sup> Edition. New York: HarperCollins Customs Books, 1971. Available online at: <http://www.columbia.edu/~sss31/rainbow/wife.html>.Web.

3. NCERT History Textbook for Class IX. Ch 8: Clothing .
4. Roy, Rahul. A Little Book on Men. New Delhi: Yoda Books, 2007
5. Sen. Amartya. " More than One Million Women are Missing." New York Review of Books 37.20 (20 December 1990) . Print
6. Vimala. " Vantillu (The Kitchen). Women Writing in India: 600 BC to the Present. Volume II: The 20<sup>th</sup> Century. Ed. Susie Thanru and K Lalita. Delhi: Oxford University Press. 1995. 599-601. Print.
7. Sen, Arnartya. 'More than One Million Women are Missing.' New York Review of Books 37.20 (20 December 1990). Print. We Were Making History.. ' Life Stories of Women in the Telangana People's Struggle. New Delhi: Kali for Women, 1989.
8. Tripti Lahiri. "By the Numbers: Where Indian Women Work." Women's Studies Journal (14 November 2012) Available online at: [http:// blogs.wsj.com/ India real time/2012/11/14/by - the numbers-where-Indian-women-work/>](http://blogs.wsj.com/India/real-time/2012/11/14/by-the-numbers-where-indian-women-work/)
9. K. Satyanarayana and Susie Tharu (Ed.) Steel Nibs Are Sprouting: New Dalit Writing From South India, Dossier 2: Telugu And Kannada <http://harpercollins.co.in/BookDetail.asp?BookCode=3732>



**VERBAL ABILITY**  
MANDATORY COURSE (NON-CREDIT)

**II-B.Tech.-I-Sem.**  
**Subject Code: 17HS2110MC**

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

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO9	PO10
CO1	recall grammatical and basic sentence structures for communication	3	3
CO2	list out various vocabulary forms and improve verbal ability	3	3
CO3	use sentence structures without errors	3	3
CO4	apply the sentence structure for effective paraphrasing	3	3
CO5	demonstrate effective verbal skills	3	3

**Unit - I**

Grammar Fundamentals  
Basic Sentence Structure  
Parts of Speech

- The Noun
- The Adjective
- Articles
- Pronouns
- The Verb
- The Adverb
- The Preposition
- The Conjunction
- The Interjection

**Unit - II**

Synonyms and Antonyms, Homonyms and Homophones, Word Formation, Idioms and Phrases, Analogy, One-word Substitutes.

**Unit - III**

Integrated Grammar Exercises on Common Errors, Vocabulary Enhancement, Using a dictionary

**Unit - IV**

Paragraph writing, Essay writing, Letter Writing, E-mail Writing, Picture Description

**Unit - V**

Sentence Equivalence, Text Completion, Comparison and Parallelism

**Activities**

1. Regular practice tests.
2. Quiz, Crossword, Word-search and related activities.
3. Picture Description including Description of Photos/Images/Posters/Advertisement Analysis etc.,

**Text Books**

1. Contemporary English Grammar Structure and Composition by David Green.
2. Text for Communication Skills – Current English for Colleges by N Krishnaswamy and T.Sriram..

**References**

1. The Oxford English Grammar by Sidney Greenbaum.
2. English Skills for Technical Students by Amaresh Mukherjee, Sankarnath Ghosh and Prabir Ghosh, Orient Longman Pvt Ltd.
3. Basis of Communication in English by Francis Soundararaj.

**II-B.TECH.-II-SEMESTER  
SYLLABUS**

**STRENGTH OF MATERIALS – II**

II-B.Tech.-II-Sem.

Subject Code: 17CE2201PC

L T P C

4 0 0 4

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO2	PO12	PO13
CO1	determine torsion in springs and shafts	3	3	3
CO2	evaluate crippling load of columns using various end conditions	3	2	3
CO3	analyze direct and bending stresses of various structures	3	2	3
CO4	find the stresses and deformations in thick and thin cylinders	3	2	3
CO5	analyze unsymmetrical bending and find shear centre for various sections	3	3	3

**Unit – I**

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

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

**Unit – II**

**Columns and Struts:** Introduction-Types of columns-Short, medium and long columns-Axially loaded compression members-Crushing load-Euler’s theorem for long columns-assumptions-derivation of Euler’s critical load formulae for various end conditions-Equivalent length of a column-slenderness ratio-Euler’s critical stress-Limitations of Euler’s theory-Rankine -Gordon formula-Long columns subjected to eccentric loading-Secant formula-Empirical formulae-Straight line formula-Prof. Perry’s formula.

**Beam Columns:** Laterally loaded struts, subjected to uniformly distributed and concentrated loads, Maximum B.M. and stress due to transverse and lateral loading.

**Unit – III**

**Direct and Bending Stresses:** Stresses under the combined action of direct loading and bending moment, core of a section- determination of stresses in the case of chimneys, retaining walls and dams -conditions for stability-stresses due to direct loading and bending moment about both axis.

**Beams Curved In Plan:** Introduction-circular beams loaded uniformly and supported on symmetrically placed Columns-Semi-circular beam S.S on three equally spaced supports.

**Unit – IV**

**Thin Cylinders:** Thin seamless cylindrical shells, Derivation of formula for longitudinal and circumferential stresses, hoop, longitudinal and Volumetric strains, changes in 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 – V**

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

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

**Text Books:**

1. Strength of Materials by R.K.Bansal, Lakshmi Publications House Pvt. Ltd.
2. Strength of Materials by S. Ramamrutham, Oxford University Press.

**References:**

1. Fundamentals of Solid Mechancis by M.L.Gambhir, PHI Learning Pvt. Ltd
2. Strength of Materials by S.S.Rattan, Tata McGraw Hill Education Pvt. Ltd.

GEOTECHNICAL ENGINEERING

II-B.Tech.-II-Sem.

Subject Code: 17CE2202PC

L T P C

4 0 0 4

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO12	PO13
CO1	explain engineering properties of soil and their applications	3	3	3	3
CO2	describe permeability and seepage of soils	3	3	2	3
CO3	analyze various theories of stress distribution and compaction mechanism in soils	3	3	2	3
CO4	determine consolidation characteristics of soils	3	3	2	3
CO5	estimate the shear strength of soils under different drainage conditions	3	3	3	3

Unit – I

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

**Index Properties of Soils:** Grain size analysis – Sieve– consistency limits and indices – I.S. Classification of soils.

Unit –II

**Permeability:** Soil water – capillary rise – flow of water through soils – Darcy’s law- permeability – Factors affecting permeability – laboratory determination of coefficient of permeability –Permeability of layered soils – In-situ permeability tests (Pumping in & Pumping out test).

**Effective Stress & Seepage Through Soils:** Total, neutral and effective stress – principle of effective stress - quick sand condition – Seepage through soils – Flownets: Characteristics and Uses.

Unit –III

**Stress Distribution In Soils:** Boussinesq’s and Westergaard’s theories for point load, uniformly loaded circular and rectangular areas, pressure bulb, variation of vertical stress under point load along the vertical and horizontal plane, and Newmark’s influence chart for irregular areas.

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

Unit – IV

**Consolidation:** Types of compressibility – Immediate Settlement, primary consolidation and secondary consolidation - stress history of clay; e-p and e-log(p) curves – normally consolidated soil, over consolidated soil and under consolidated soil - preconsolidation pressure and its determination - Terzaghi’s 1-D consolidation theory – coefficient of consolidation: square root time and logarithm of time fitting methods - computation of total settlement and time rate of settlement.

Unit - V

**Shear Strength Of Soils:** Importance of shear strength – Mohr’s– Coulomb Failure theories – Types of laboratory tests for strength parameters – strength tests based on drainage conditions – strength envelopes – Shear strength of sands - dilatancy – critical void ratio.

Text books:

1. Soil Mechanics and Foundation by by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi Publications Pvt. Ltd., New Delhi.
2. Geotechnical Engineering by C. Venkataramiah, New age International Pvt . Ltd, (2002).

References:

1. Soil Mechanics and Foundation Engineering by VNS Murthy, CBS Publishers and Distributors.
2. Soil Mechanics and Foundation Engg. By K.R. Arora, Standard Book House, Delhi.

STRUCTURAL ANALYSIS – I

II-B.Tech.-II-Sem.

Subject Code: 17CE2203PC

L T P C

4 0 0 4

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO2	PO12	PO13
CO1	evaluate degree of indeterminacy and forces in the frames	3	2	3
CO2	apply the energy theorems for trusses and analyze three hinged arches	3	2	3
CO3	analyze the propped cantilever and fixed beam under various loads	3	2	3
CO4	analyze continuous beams by slope deflection method	3	2	3
CO5	sketch the influence line diagrams for moving loads	3	2	3

Unit – I

**Introduction to structures and indeterminacy:** Equilibrium and compatibility equations - types of supports and reactions, Classification of frames- plane and space frames, pin jointed and rigid jointed frames, Static and kinematic indeterminacies of beams and frames. Effect of force releases like moment hinge, shear releases, link on static indeterminacy, Relative Merits of indeterminate structures over determinate structures.

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

Unit – II

**Energy Theorems:** Introduction-Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear forces - Castigliano’s first theorem-Unit Load Method. Deflections of simple beams and pin- jointed plane trusses. Deflections of statically determinate bent frames.

**Three Hinged Arches:** Introduction – Types of Arches – Comparison between Three hinged and Two hinged Arches. Linear Arch. Eddy’s theorem. Analysis of Three hinged arches. Normal Thrust and radial shear in an arch. Geometrical properties of parabolic and circular arch. Three hinged circular arch at different levels. Absolute maximum bending moment diagram for a three hinged arch.

Unit-III

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

Unit – IV

**Continuous Beams:** Introduction-Continuous beams. Clapeyron’s theorem of three moments-Analysis of continuous beams with constant and variable moments of inertia with one or both ends fixed-continuous beams with overhang. Effects of sinking of supports.

**Slope Deflection Method:** Derivation of slope-deflection equation, application to continuous beams with and without settlement of supports. Determination of static and kinematic indeterminaciesfor frames. Analysis of Single Bay – Single storey Portal Frames by Slope Deflection Method Including Side Sway. Shear force and bending moment diagrams and Elastic curve.

Unit – V

**moving loads and influence lines:** Introduction maximum SF and BM at a given section and absolute maximum S.F. and B.M due to single concentrated load U.D load longer than the span, U.D load

shorter than the span, two point loads with fixed distance between them and several point loads- Equivalent uniformly distributed load-Focal length. Definition of influence line for SF, Influence line for BM- load position for maximum SF at a section-Load position for maximum BM at a section - Point loads, UDL longer than the span, UDL shorter than the span- Influence lines for forces in members of Pratt and Warren trusses. Equivalent uniformly distributed load. Focal length.

**Text Books:**

1. Theory of Structures by S. Ramamrutham and R. Narayan, Dhanpathi Rai Publishing Company.
2. Structural Analysis Vol –I & II by V.N.Vazirani and M.M.Ratwani, Khanna Publishers.

**References:**

1. Structural Analysis Vol I & II by G.S.Pandit and S.P.Gupta, TMH.
2. Basic Structural Analysis by K.U.Muthu *et al.*, I.K.International Publishing House Pvt., Ltd.

## FLUID MECHANICS

II-B.Tech.-II-Sem.  
Subject Code: 17CE2204PC

L T P C  
3 1 0 3

## Course Outcomes (COs) &amp; CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO12	PO13
CO1	identify properties and influences of fluids on motion	3	3	2	3
CO2	derive the stream function from a velocity field	3	3	2	3
CO3	apply the equation of motion in flow measurements	3	3	2	3
CO4	determine energy and losses of closed conduit flow	3	3	2	3
CO5	analyze boundary layer concept on fluid flow	3	3	2	3

## Unit I

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

## Unit – II

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

## Unit – III

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

## Unit – IV

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

## Unit – V

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

## Text Books:

1. Fluid Mechanics by Modi and Seth, Standard book house.
2. Introduction to Fluid Machines by S.K.Som & G.Biswas (Tata Mc.Grawhill publishers Pvt. Ltd.)

## References:

1. Fluid Mechanics by A.K. Mohanty, Prentice Hall of India Pvt. Ltd., New Delhi.
2. Fluid mechanics and hydraulic machines by Dr.R.K.Bansal - Laxmi Pub. (P) Ltd., New Delhi.

**FINANCIAL ANALYSIS, MANAGEMENT & ECONOMICS**

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

**Subject Code: 17CE2205HS**

**L T P C**

**3 0 0 3**

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO11	PO12
CO1	analyze financial performance of an enterprise using final accounts and ratio	3	2
CO2	apply principles of management in professional career	3	2
CO3	make use of principles of economics for decision making	3	2
CO4	identify business environment and laws of demand	2	3
CO5	solve problems in the areas of production, cost, price and markets	3	3

**Unit - I**

**Introduction to Financial Statement Analysis:** Types & Objectives of Business Enterprises, Conventional & Non Conventional Sources of Financing Business Enterprise. Identification of Financial Statement Formats-Manufacturing A/c, Trading A/c, Profit & Loss A/c, Balance Sheet. Techniques of Analysing Financial Statements: Analysis & Interpretation through Liquidity, Leverage, Coverage, Activity, Turnover, Profitability Ratios-Simple Problems on Liquidity, Leverage and Activity Ratios.

**Unit - II**

**Introduction of Management Concepts:** Concept, Origin, Growth, Nature, Characteristics, Scope and Principles of Management. Functions of Management: Planning, Organising, Staffing, Directing, Coordinating, Reporting and Budgeting. Scientific Management- FW Taylor Contributions to Management Modern Management- Henry Fayol Contributions to Management Human Relations Approach to Management: Theories of Motivation and Leadership

**Unit - III**

**Functional areas of Management:** Production Management: Systems of Production, PPC functions & Plant Layout.

Financial Management: Objectives, Goals, & Functions of Financial Management.

Marketing Management: Recent Trends in Marketing & Marketing Mix.

Human Resources Management: Nature, Objectives, Scope & Functions of HR Management.

**Unit - IV**

**Introduction to Managerial Economics & Business Environment:** Definition, Nature, Scope and Functions Managerial Economics, Difference between Micro & Macro Economics- Internal & External Scanning of Business Environment, Importance of National Income, Inflation, Deflation, Stagflation, Business Cycle & Product Life Cycle Concepts. Concept & Law of Demand, Factors Influencing and Limitations. Concept of Elasticity of Demand, Types of Elasticity, Methods of Measuring Elasticity. Introduction to Demand Forecasting, Objectives, Scope, Types and Methods.

**Unit -V**

**Theory of Production, Cost, Price & Markets:** Production Function, Assumptions, Limitations & Types, Cost Concepts, Cost-Output Relationship, Break Even Analysis Assumptions, Limitations & Applications(Simple Problems). Theory of Pricing, Objectives, Situations & Types. Introductions Markets, Demand-Supply Schedule for Equilibrium Price, Nature & Types of Competition.

**Note:** Student also expected to attempt following projects as a part of assignment

**Project-1:** Submission of a report on Recent Economic Policy Reforms in view of demonetization, IT & GST

**Project-2:** Submission of a report on financial performance of any listed public limited company either through its website or through website of nse.org or bse.org

**Project-3:** Submission of a report by visiting any organization to observe how management functions are carried out.



**Text Books:**

1. Varshney, Maheswari (2003), Managerial Economics, Sultan Chand, New Delhi, India.
2. Stoner, Freeman, Gilbert, Management, 6th Ed, Pearson Education, New Delhi.

**References:**

1. L.M. Prasad, Principles and Practices of Management, Revised Edition, S. Chand Publishing.
2. IM Pandey, Financial Management, 12<sup>th</sup> Edition, Vikas, 2017.
3. Philip Kotler, Kevin Lane Keller, Abraham Koshy and Mithleshwar Jha: Marketing Management, 15/e, Pearson Education, 2012.
4. K. Aswathappa, "Human Resource Management, Text and Cases", TMH, 2016.
5. Panneerselvam "Production and Operations Management" PHI, 2017.

**STRENGTH OF MATERIALS LAB**

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

**Subject Code: 17CE2206PC**

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

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO4	PO14
CO1	analyze stress-strain relationship for given material	3	3
CO2	determine shear modulus of shaft and stiffness of spring	3	3
CO3	assess the flexural strength for given member	3	3
CO4	find the hardness and compressive strength of given material	3	3
CO5	measure the strain in material using electrical resistance strain gauge	3	3

**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. Spring testing machine
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.

**Reference:**

1. Strength of Materials Lab Manual, Department of Civil Engineering, CMRIT, Hyd.

**GEO TECHNICAL ENGINEERING LAB**

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

**Subject Code: 17CE2207PC**

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

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO4	PO6	PO14
CO1	determine the index properties of soils	3	3	3
CO2	analyze the grain size of soil	3	3	3
CO3	measure the water flow through soil media	3	3	3
CO4	find the strength properties of soils	3	3	3
CO5	assess the compaction characteristics of soil	3	3	3

**List of Experiments**

1. Atterberg Limits (Liquid Limit, Plastic Limit)
2. a) Field density by core cutter method and  
b) Determination of Specific gravity of soil.
3. Field density by sand replacement method
4. Grain size distribution by sieve analysis
5. Permeability of soil by constant and variable head test methods
6. Standard Proctor's Compaction Test
7. California Bearing Ratio Test (CBR Test)
8. Determination of Coefficient of consolidation (square root time fitting method)
9. Unconfined compression test
10. Direct shear test
11. Vane shear test
12. Differential free swell index (DFSI) test

*Note: Any Ten experiments may be completed.*

**Reference Book**

1. Geotechnical Engineering Lab Manual, Department of Civil Engineering, CMRIT, Hyd.

**SURVEYING LAB –II****II-B.Tech.-II-Sem.**  
**Subject Code: 17CE2208PC****L T P C**  
**0 0 3 2****Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO4	PO5	PO10	PO14
CO1	calculate the area, traverse and contour using total station	3	3	3	3
CO2	determine the elevation and stakeout using total station	3	3	3	3
CO3	measure distance, gradient and height between two inaccessible points using total station	3	3	3	3
CO4	develop curve and resection for various item of work	3	3	3	3
CO5	find the position of stations using GPS	3	3	3	3

**Lab Experiments:**

1. Determine of area using total station
2. Traversing using total station
3. Contouring using total station
4. Determination of remote height using total station
5. Stake out using total station
6. Distance, gradient, differential height between two inaccessible points using total station.
7. Curve settling using total station
8. Resection using total station
9. Setting out works for buildings and pipe lines
10. Finding position of stations using G.P.S

**References:**

1. Surveying Lab-II Manual, Department of Civil Engineering, CMRIT, Hyd.

**ENVIRONMENTAL SCIENCE AND TECHNOLOGY  
MANDATORY COURSE (NON-CREDIT)**

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

**L T P C**

**Subject Code: 17HS2209MC**

**3 0 0 -**

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO1	PO6	PO7	PO12
CO1	identify the role of ecosystem for livelihood	3	3	3	2
CO2	interpret methods to sustain environmental resources	3	3	3	2
CO3	outline bio-diversity and its relevance to ecological balance	3	3	3	2
CO4	explain laws and legislations on environmental protection	3	3	3	3
CO5	evaluate technologies for achieving sustainable development	3	3	3	2

**Unit - I**

**Ecosystem:** Introduction to ecosystem: Definition, Scope and Importance; Classification of ecosystem; Structure and functions of ecosystem food chain, food web, ecological energetic, eco-pyramids, carrying capacity); Biogeochemical cycles (Carbon and Nitrogen Cycles), flow of energy; Institutions (BNHS, BVIEER, ZSI, BSI) Environment movement in India (MedhaPatkar, SundarlalBahuguna, Indira Gandhi, Rachael Carson).

Biotic and abiotic components–Case studies of forest/aquatic/desert ecosystem.

**Unit – II**

**Natural Resources:** renewable and Non-renewable resources–Importance, uses, classification of natural resources(i) forest: deforestation, timber extraction & conservation (ii) water: conflicts over water, dams –benefits & effects; use and over exploitation of water resources , floods, droughts (iii) mineral :use and exploitation, effects on mining, (iv) energy resources: growing needs, renewable and non renewable energy sources, use of alternative energy (v) land resources: land degradation, landslides, soil erosion and desertification; role of an individual in conservation of natural resources and equitable use.

**Unit – III**

**Biodiversity:** Definition and levels of biodiversity, Values of biodiversity Bio– geographical classification of India; hot spots of biodiversity; India as a mega diversity nation; Threats to biodiversity; Endangered and endemic species of India; Conservation of biodiversity: In–situ and Ex–situ conservation; Case studies on conservation of biodiversity. National biodiversity Act.

**Unit – IV**

**Environmental Pollution & Control Technologies:** Types of environmental pollution; **Air pollution:** major air pollutants, sources ,effects, control measures , National Air Quality Standards. Water pollution:, sources, impacts & control technologies- STP, ETP,watershed management,rain water harvesting, Water Quality standards. Soil pollution: sources, causes & impacts on modern agriculture. Noise pollution. Solid waste Management- causes, effects and control measures; E-waste. Disaster management (floods and cyclones); **Global Environmental Issues and Treaties:** Global warming, ozone layer depletion. International protocol: earth summit, Kyoto protocol and Montreal protocol. Population Explosion

**Unit – V**

**Environmental Acts, EIA & Sustainable Development:** Environment Protection Acts: Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act and Forest Conservation Act, Environment (Protection) Act, 1986. Handling rules of biomedical waste, municipal waste & hazardous waste. EIA: conceptual facts, base line data acquisition, EIS, EMP, Technology and Environmental Impact. **Sustainable development**-causes & threats, strategies for achieving sustainable development; Environmental Ethics and economics; CDM and concept of green building, life cycle assessment(LCA); Ecological foot print; low carbon life style;

carbon sequestration; crazy consumerism; urban sprawl. **Role of Information Technology** in Environment- Remote Sensing, GIS, Environmental Modeling

**Textbooks:**

1. Erach Bharucha, textbook of environmental studies for UG, Universities press, Hyderabad.
2. Environmental Science by Y. Anjaneyulu, B S Publications
3. Environmental studies by Rajagopalan R, Oxford University Press, New Delhi.

**References:**

1. Environmental Science and Technology by M. Anji Reddy, B.S Publications,
2. Perspectives in Environmental Science by Anubha Kaushik, New age International Publications
3. Environmental Studies by Anubha Kaushik, New age International Publications

**ANALYTICAL SKILLS  
MANDATORY COURSE (NON-CREDIT)**

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

**Subject Code: 17BS2210MC**

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

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO9	PO10
CO1	apply operations like searching, insertion, deletion, traversing mechanism etc. on various data structures	3	3
CO2	apply measurement techniques to data collection and utilize their innovative thinking skills to project themselves for finding fresh approaches towards tribulations	3	3
CO3	use the skills for effective communication	3	3
CO4	identify different types of arguments as well as their premises and conclusions	3	3
CO5	demonstrate the mathematical reasoning, including the ability to prove simple results and/or make statistical inferences	3	3

**Unit - I**

**Data Interpretation:** Introduction to Data Interpretation, quantitative and qualitative data, Tabular Data, Line Graphs, Bar Chart, Pie Charts, X-Y Charts.

**Unit-II**

**Reasoning:** Number Series, Letter Series, Series completion, Coding and Decoding,

**Unit-III**

**Verbal Analogy:** Classifications, Word analogy-Applied analogy, verbal classification.

**Unit-IV**

**Reasoning Logical Diagrams:** Simple Diagrammatic Relationship, Multi diagrammatic relationship, Venn-diagramms, Analytical reasoning.

**UNIT-V**

**Reasoning Ability:** Blood Relations, Seating arrangements, Directions, Decision making.

**Text books:**

1. GL Barrons, Mc Graw Hills, Thorpe's verbal reasoning, LSAT Materials
2. R S Agarwal, S.Chand, 'A modern approach to Logical reasoning'
3. Verbal and non verbal Reasoning by S.Agarwal
4. Analytical Reasoning by M.K.Pandey

**III-B.TECH.-I-SEMESTER  
SYLLABUS**



**HYDRAULICS & HYDRAULIC MACHINERY**

III -B.Tech-I Sem.

Subject Code: 17CE3101PC

L T P C

4 0 0 4

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO2	PO12	PO13
CO1	explain the concepts of channel flows	3	3	3
CO2	develop empirical relationships of a hydraulic model and prototype	3	3	3
CO3	determine hydrodynamic forces of jets on various vanes	3	2	3
CO4	select suitable turbine for given heads	3	2	3
CO5	estimate the efficiency of centrifugal and reciprocating pumps	3	3	3

**Unit – I**

**Open Channel Flow:** Types of flows - Type of channels – Velocity distribution – Energy and momentum correction factors – Chezy’s, Manning’s; and Bazin’s formulae for uniform flow Stickle’s formula for Mannings ‘n’ – Most Economical sections. Critical flow: Specific energy-critical depth – computation of critical depth – critical sub-critical and super critical flows. Non uniform flow-Dynamic equation for G.V.F., Mild, Critical, Steep, horizontal and adverse slopes-surface profiles-direct step method- for surface profiles -Rapidly varied flow, hydraulic jump, energy dissipation. Surges – Types

**Unit - II**

**Hydraulic Similitude:** Dimensional Analysis-Rayleigh’s method and Buckingham’s pi theorem-study of Hydraulic models – Geometric, kinematic and dynamic similarities, dimensionless numbers – model and prototype relations. Distorted and non-distorted models. Scale Effect.

**Unit – III**

**Basics of Turbo Machinery:** Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes, jet striking centrally and at tip, velocity triangles at inlet and outlet, expressions for work done and efficiency-Angular momentum principle, Applications to radial flow turbines.

**Unit - IV**

**Hydraulic Turbines:** Layout of a typical Hydropower installation – Heads and efficiencies classification of turbines- pelton wheel-Francis turbine-Kaplan turbine-working, working proportions, velocity diagram, work done and efficiency, hydraulic design, draft tube – theory and function efficiency. Governing of turbines-surge tanks-unit and specific turbines-unit speed-unit quantity-unit power-specific speed performance characteristics-geometric similarity-cavitation and preventive measures

**Unit – V**

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

**Reciprocating pump:** Basics, types, air vessels, slip Classification of Hydropower plants – Definition of terms – load factor, utilization factor, capacity factor, estimation of hydropower potential.

**Textbooks:**

1. Fluid Mechanics, Hydraulic and Hydraulic Machines by Modi & Seth, SBH, New Delhi.
2. Fluid Mechanics and Hydraulic Machines by R.K. Bansal, Laxmi Publications, New Delhi.

**References:**

1. Fluid Mechanics by Dr. A. K. Jain Khanna Publishers.
2. Open Channel flow by K. Subramanya, TMH.
3. Fluid Mechanics and Machinery by CSP Ojha, P.N. Chandramouli and R. Berndtsson, OUP.

CONCRETE TECHNOLOGY

III B. Tech. - I Sem.

Subject Code: 17CE3102PC

L T P C

4 0 0 4

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO3	PO8	PO12	PO13
CO1	explain properties of cement and aggregate as per IS codes	2	3	3	3
CO2	determine the properties of fresh concrete	3	3	2	3
CO3	examine hardened concrete properties using various methods	3	3	2	3
CO4	design concrete mix as per standard codes	3	3	2	3
CO5	make use of special concretes	3	2	3	3

Unit-1

**Cement:** Portland cement-chemical composition-Hydration,Setting of cement-structure of hydrated cement tests on physical properties, different grades of cement,significance of grades of cement.

**Admixtures:** Types of admixtures, mineral and chemical and chemical admixtures.Uses of mineral admixtures.

Unit II

**Aggregates:** Classification of aggregates – mechanical properties of aggregate like shape, texture, strength etc..- Specific gravity, Bulk Density, porosity, adsorption and moisture content – 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.

Unit III

**Fresh Concrete:** Workability,Factors affecting workability,Measurement of workability by different tests- setting times of concrete,Effect of time and temperature on workability,Segregation and bleeding of concrete,Steps in manufacture of concrete,Quality of Mixing water.

Unit IV

**Hardened Concrete:** Water/Cement ratio,Abram’s Law,Gelspace ratio,Nature of strength of concrete,Maturity concept,Strength in tension & compression,Factors affecting strength,Relation between compressive & tensile strength,Curing.

**Testing Of Hardened Concrete:** Compression tests,Tension tests,Flexure tests,Splitting tests,Pull-out test, Non-destructive testing methods,codal provisions for NDT.Elasticity,Creep&Shrinkage, Modulus of elasticity,Dynamic modulus of elasticity,Poisson’s ratio,Creep of concrete,Factors influencing creep,Relation between creep & time,Nature of creep,Effects of creep,Shrinkage,types of shrinkage.

Unit-V

**Mix Design:** Factors in the choice of mix proportions Data required for mix design- Durability of concrete,Quality Control of concrete,Statistical methods,Acceptance criteria,Proportioning of concrete mixes by, BIS Method.

**Special Concretes:** Introduction to light weight concrete,Cellular concrete,No-fines concrete,High density concrete,Fibre reinforced concrete,Polymer concrete,High performance concrete,Self compacting concrete- making of SCC,Measuring abilities of SCC.

Textbooks:

1. Properties of Concrete by A. M. Neville Pearson 5th edition Education ltd.
2. Concrete Technology by M. S. Shetty. – S. Chand & Co.

References:

1. Concrete Technology by M.L. Gambhir. – Tata Mc. Graw Hill Publishers, New Delhi.

**ENVIRONMENTAL ENGINEERING**

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

**Subject Code: 17CE3103PC**

**L T P C**

**3 1 0 3**

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO3	PO6	PO7	PO12	PO13
CO1	analyze characteristics of water and water demand	3	3	2	3	3
CO2	explain various stages in water treatment systems	3	3	3	3	3
CO3	make use of various components for water supply systems	3	3	2	3	3
CO4	construct sewerage system	3	3	3	3	3
CO5	identify various waste water treatment techniques	3	3	3	3	3

**Unit – I**

Introduction: Waterborne diseases,protected water supply,Population forecasts,design period, types of water demand,factors affecting,fluctuations,fire demand, water quality and testing,drinking water standards: sources of water,Comparison from quality and quantity and other considerations, intakes, infiltration galleries.

**Unit - II**

Layout and general outline of water treatment units, sedimentation, principles, design factors, Jar test,optimum dosage of coagulant,coagulation-flocculation clarifier design,coagulants,feeding arrangements. Filtration,theory,working of slow and rapid gravity filters,multimedia filters,design of filters, troubles in operation, comparison of filters, disinfection,theory of chlorination, chlorine demand,other disinfection practices, Miscellaneous treatment methods.

**Unit-III**

Distribution systems requirement,method and layouts,Design procedures, Hardy Cross and equivalent pipe methods pipe, joints, valves such as sluice valves, air valves, scour valves and check valves water meters, laying and testing of pipe lines,pump house Conservancy and water carriage systems ,sewage and storm water estimation, time of concentration, storm water overflows combined flow.

**Unit – IV**

Characteristics of sewage,cycles of decay,decomposition of sewage, examination of sewage, B.O.D.Equation,C.O.D. Design of sewers,shapes and materials,sewer appurtenances manholes, inverted siphon,catch basins,flushing tanks,ejectors,pumps and pumphouses,house drainage, components requirements,sanitary fittings-traps, one pipe and two pipe systems of plumbing,ultimate disposal of sewage, sewage farming, dilution.

**Unit – V**

Waste water treatment plant,Flow diagram,primary treatment Design of screens,grit chambers, skimming tanks,sedimentation tanks,principles of design,Biological treatment,trickling filters standard and high rate filters, ASP, 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.

**Textbooks:**

1. Water supply and sanitary Engineering by G.S. Birdi, Dhanpat Rai & Sons Publishers.
2. Water supply and sanitary Engineering by S.C. Rangwala, Charotar Publishing House, Pvt. Ltd.

**References:**

1. Text book of Environmental Engineering by P. Venugopal Rao, PHI.
2. Water Supply & Environmental Engineering by A.K. Chatterjee.
3. Water Supply Engineering, Vol 1, waste water Engineering Vol II, B.C. Punmia, Ashok Jain & Arun Jain, Laxmi Publications Pvt. Ltd, New Delhi.

**DESIGN OF REINFORCED CONCRETE STRUCTURES****III-B.Tech.-I-Sem.****L T P C****Subject Code: 17CE3104PC****4 0 0 4****Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO3	PO8	PO10	PO12	PO14
CO1	explain the various design concepts of RC structures	2	3	2	3	3
CO2	design RC beams using limit state method	3	3	3	3	3
CO3	design various types of RC slabs	3	3	3	3	3
CO4	design various RC Columns based on loading conditions	3	3	3	3	3
CO5	design various RC footings and stair cases	3	3	3	3	3

**Unit – I**

**Concepts of Rc Design:** Limit state method, Material Stress–Strain curves, Safety factors, Characteristic values, Stress block parameters, IS-456:2000, Working stress method.

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

**Unit – II**

**Shear Torsion And Bond:** Limit state analysis and design of section for shear and torsion – concept of bond, anchorage and development length, I.S. code provisions. Design examples in simply supported and continuous beams, detailing Limit state design for serviceability for deflection, cracking and codal provision.

**Unit – III**

**Short And Long Columns:** Axial loads, uni-axial and bi-axial bending I.S. Code provisions

**Unit – IV**

**Slabs:** Design of Two-way Slabs, one-way slabs, Continuous slabs using I.S. coefficients, Cantilever slab, Canopy slab.

**Unit – V**

**Design Of Footings:** Isolated (square, rectangle) and Combined Footings. Design of Stair Case.

**Textbooks:**

1. Design of Reinforced Concrete Structures by S. Ramamrutham, Dhanpath Rai Publishing Co. Pvt. Ltd.
2. Limit state design of reinforced concrete by P. C. Varghese, Prentice Hall of India, New Delhi.

**References:**

1. Fundamentals of reinforced concrete design by M. L. Gambhir, PHI, New Delhi.
2. Reinforced Concrete design by N. Krishna Raju and R. N. Pranesh, New Age International Publishers, New Delhi.
3. Reinforced concrete design by S. Unnikrishna Pillai and Devdas Menon, TMH.

**DISASTER MANAGEMENT**  
(Open Elective - I)

III-B.Tech.-I-Sem.

Subject Code: 17CE3105OE

L T P C  
3 0 0 3

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO2	PO7	PO8	PO12
CO1	analyze impact of disasters	3	2	3	3
CO2	choose suitable disaster management mechanism	3	3	3	3
CO3	make use of appropriate measures for capacity building to reduce risks	2	2	3	2
CO4	develop strategies to cope up with disasters	3	3	3	3
CO5	build disaster management plan	2	3	3	3

**Unit – I**

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

**Unit – II**

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

**Unit – III**

**Endogenous Hazards:** Volcanic eruption - Earthquakes - landslides - Volcanic Hazards / Disasters - Causes and distribution of Volcanoes - Hazardous effects of volcanic eruptions - Environmental impacts of volcanic eruptions - Earthquake Hazards / disasters - Causes of Earthquakes - Distribution of earthquakes - Hazardous effects of - earthquakes - Earthquake Hazards in India - Human adjustment, perception & mitigation of earthquake.

**Unit – IV**

**Exogenous hazards / disasters** - Infrequent events - Cumulative atmospheric hazards / disasters

**Infrequent events:** Cyclones - Lightning - Hailstorms

**Cyclones:** Tropical cyclones & Local storms - Destruction by tropical cyclones & local storms (causes, distribution human adjustment, perception & mitigation) Cumulative atmospheric hazards/ disasters :- Floods - Droughts - Cold waves - Heat waves

**Floods:** Causes of floods - Flood hazards India - Flood control measures (Human adjustment, perception & mitigation)

**Droughts :**Impacts of droughts,Drought hazards in India,Drought control measures,Extra Planetary Hazards / Disasters - man induced Hazards / Disasters, Physical hazards / Disasters, Soil erosion

**Soil Erosion:** Mechanics & forms of Soil Erosion,Factors 7 causes of Soil Erosion,Conservation measures of Soil Erosion.

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

**Biological hazards / disasters:** Population Explosion.

**Unit - V:**

**Emerging approaches in Disaster Management** - Three stages

1. Pre-disaster Stage (preparedness), 2. Emergency Stage, 3. Post Disaster stage - Rehabilitation

**Text books:**

1. Disaster Mitigation: Experiences And Reflections by Pradeep Sahn
2. Natural Hazards & Disasters by Donald Hyndman & David Hyndman - Cengage Learning

**References:**

1. R. B. Singh (Ed) Environmental Geography, Heritage Publishers New Delhi.
2. Savinder Singh Environmental Geography, Prayag Pustak Bhawann.
3. Kates, B. I & White, G. F The Environment as Hazards, oxford, New York.

**OPERATIONS RESEARCH  
(Open Elective - I)**

III B.Tech.-I-Sem.  
Subject Code:17ME3105OE

L T P C  
3 0 0 3

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO1	PO2	PO12
CO1	formulate and solve linear programming problem using various methods	3	2	3
CO2	solve transportation and assignment problems	3	3	3
CO3	compute sequencing and inventory model problems	2	2	2
CO4	analyze waiting lines and game theory problems by applying standard solution methods	3	3	3
CO5	evaluate replacement and dynamic programming problems by applying various methods	2	3	3

**Unit-I**

**Introduction to Operations Research:** Basics definition, scope, objectives, phases, models, applications and limitations of Operations Research.

**Allocation:** Linear Programming Problem Formulation, Graphical solution, Simplex method, Artificial variables techniques: Two-phase method, Big M method.

**Unit-II**

**Transportation Problem:** Formulation, solution, unbalanced Transportation problem. Finding basic feasible solutions – Northwest 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 and assignment problem.

**Unit—III**

**Sequencing:** Introduction, Flow-Shop sequencing, n jobs through two machines, n jobs through three machines, Job shop sequencing, two jobs through m machines.

**Inventory:** Introduction, Single item, Deterministic models - Purchase inventory models with one price break and multiple price breaks -Stochastic models - demand may be discrete variable or continuous variable - Single Period model and no setup cost.

**Unit—IV**

**Theory of Games:** Introduction, Terminology- Solution of games with saddle points and without saddle points- 2 x 2 games, dominance principle, m x 2 & 2 x n games -graphical method.

**Waiting Lines:** Introduction, Terminology-Single Channel-Poisson arrivals and Exponential Service times-with infinite population and finite population models-Multichannel-Poisson arrivals and exponential service times with infinite population.

**Unit—V**

**Replacement:** Introduction, Replacement of items that deteriorate with time, when money value is not counted and counted - Replacement of items that fail completely- Group Replacement.

**Dynamic Programming:** Introduction, Terminology- Bellman’s Principle of Optimality- Applications of dynamic programming- Project network – CPM and PERT networks – Critical path scheduling.

**Text Books:**

1. Operations Research, J.K.Sharma 4<sup>th</sup> Edition, Mac Milan.
2. Introduction to O. RI Hillier & Libermannf, TMH.

**References:**

1. Introduction to O.R, Hamdy A. Taha, PHI.
2. Operations Research, A.M.Natarajan, P. Balasubramaniam, A.Tamilarasi, Pearson Education.
3. Operations Research I Wagner, PHI Publications.

**ELECTRONIC MEASUREMENTS AND INSTRUMENTATION  
(Open Elective-I)**

III Year B.Tech. I-Sem  
Subject Code: 17EC3105OE

L T P C  
3 0 0 0

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO1	PO2	PO12
CO1	apply the fundamental concepts of measuring instruments	3	2	2
CO2	distinguish signal generators and signal analyzers	3	3	2
CO3	make use of oscilloscopes	3	2	2
CO4	identify various transducers	3	3	2
CO5	develop bridges for various measuring parameters	3	2	2

**Unit - I**

**Block Schematics of Measurement:** Performance characteristics, Static characteristics, Accuracy, Precision, Resolution, Types of Errors, Gaussian Error, Root Sum Squares formula, Dynamic Characteristics, Repeatability, Reproducibility, Fidelity, Lag; Measuring Instruments: DC Voltmeters, D' Arsonval Movement, DC Current Meters, AC voltmeters and Current Meters, Ohmmeters, Multimeters. Meter protection, Extension of Range, True RMS Responding voltmeters, Specifications of Instruments.

**Unit - II**

**Signal Analyzers:** AF, HF Wave Analyzers, Harmonic Distortion, Heterodyne wave Analyzers, Power Analyzers, Capacitance-Voltage Meters, Oscillators. Signal Generators, Sweep Frequency Generators: AF, RF Signal Generators, Sweep Frequency Generators, Pulse and Square Wave Generators, Function Generators, Arbitrary Waveform Generator, Video Signal Generators, and Specifications

**Unit - III**

**Oscilloscopes:** CRT, Block Schematic of CRO, Time Base Circuits, Lissajous Figures, CRO Probes, High Frequency CRO Considerations, Delay lines. Applications: Measurement of Time, Period and Frequency Specifications.

**Special Purpose Oscilloscopes:** Dual Trace, Dual Beam CROs, Sampling Oscilloscopes, Storage Oscilloscopes, Digital Storage CROs.

**Unit - IV**

**Transducers:** Classification, Strain Gauges, Bounded, Unbounded; Force and Displacement Transducers, Resistance Thermometers, Hotwire Anemometers, LVDT, Thermocouples, Synchros, Special Resistance Thermometers, Digital Temperature Sensing System, Piezoelectric, Variable Capacitance Transducers, Magneto Strictive Transducers.

**Unit - V**

**Bridges:** Wheat Stone Bridge, Kelvin Bridge, and Maxwell Bridge.

**Measurement of Physical Parameters:** Flow Measurement, Displacement Meters, level of Measurement, Measurement of Humidity and Moisture, Force, Pressure-High pressure, Vacuum level, Temperature Measurements, Data Acquisition Systems.

**Textbooks:**

1. Electronic Instrumentation: H.S.Kalsi-TMH 2<sup>nd</sup> Edition 2004.
2. Modern Electronic Instrumentation & Measurement Techniques: A.D. Helbins, W.D. Cooper: PHI.

**References:**

1. Electronic Instrumentation and Measurements- David A. Bell, Oxford Univ. Press.
2. Electronic Measurements and Instrumentation K. Lal Kishore, Pearson Education .

**JAVA PROGRAMMING**

(Open Elective-I)

III-B.Tech.-I-Sem.

Subject Code: 17CS3105OE

**L T P C**

**3 0 0 3**

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO1	PO2	PO3	PO5	PO12
CO1	write simple java programs using OOP concepts	3	2	2	3	2
CO2	develop programs using inheritance and polymorphism	3	2	3	3	2
CO3	build efficient code using multithreading and exception handling	3	2	3	3	2
CO4	illustrate event handling mechanism	3	2	3	3	2
CO5	make use if applets and swing concepts	3	2	3	3	2

**Unit - I**

**Object-oriented thinking-** Need for OOP paradigm, summary of OOP concepts, coping with complexity, abstraction mechanisms. A way of viewing world, Agents, responsibility, messages, methods.  
**Java Basics-** History of Java, Java buzzwords, data types, variables, scope and life time of variables, arrays, operators, expressions, control statements, type conversion and casting, simple java programs, concepts of classes, objects, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, parameter passing, recursion, exploring String class.

**Unit – II**

**Inheritance-** Hierarchical abstractions, Base class object, subclass, subtype, substitutability, forms of inheritance- specialization, specification, construction, extension, limitation, combination. Benefits of inheritance, costs of inheritance. Member access rules, super uses, using final with inheritance, the Object class and its methods.

**Polymorphism-** method overriding, dynamic binding, abstract classes and methods  
**Packages-** Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages. Exploring java.io.

**Interfaces-** Differences between classes and interfaces, defining an interface, implementing interface, applying interfaces, variables in interface and extending interfaces.

**Unit - III**

**Exception handling-** Concepts of exception handling, benefits of exception handling, Termination or resumptive models, exception hierarchy, usage of try, catch, throw, throws and finally, built in exceptions, creating own exception sub classes.

**Multithreading-** Differences between multi threading and multitasking, thread life cycle, creating threads, thread priorities, synchronizing threads, daemon threads. Enumerations, auto boxing, annotations, generics. Exploring java.util

**Unit – IV**

**Event Handling:** Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes, nested and inner classes. The AWT class hierarchy, user interface components- labels, buttons, canvas, scrollbars, text components, checkbox, checkbox groups, choices, lists panels – scrollpane, dialogs, menubar, graphics, Layout Managers- Flow Layout, Border Layout, Grid Layout, Card Layout, Grid Bag Layout.

**Unit – V**

**Applets –** Concepts of Applets, differences between – applets and applications, life cycle of an applet, types of applets, creating applets, passing parameters to applets.

**Swings –** Introduction, limitations of AWT, MVC architecture, components, containers, exploring swing- JApplet, JFrame and JComponent, ImageIcon, JLabel, JTextfield, JButton, JCheckbox, JList, JRadiobutton, JComboBox, JTabbedPane, JScrollPane, JTree and JTable.

**Textbooks:**

1. Java the complete reference, 8<sup>th</sup> Edition, Herbert Schildt, TMH.
2. Java How to Program, H. M. Dietel and P. J. Dietel, Sixth Edition, Pearson Education, PHI.
3. Introduction to Java programming, Y. Daniel Liang, Pearson Education.



**CONCRETE TECHNOLOGY LAB**

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

**L T P C**

**Subject Code: 17CE3106PC**

**0 0 3 2**

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO4	PO6	PO14
CO1	assess the properties of cement	3	3	3
CO2	analyze properties of aggregates	3	3	3
CO3	examine the properties of fresh concrete	3	3	3
CO4	determine the strength of hardened concrete	3	3	3
CO5	conduct non-destructive tests on concrete elements	3	3	3

**I. Tests on Cement**

1. Normal Consistency and fineness of cement.
2. Initial setting time and final setting time of cement.
3. Specific gravity of cement.
4. Soundness of cement.
5. Compressive strength of cement.

**II. Tests on Aggregate**

1. Sieve Analysis and gradation charts.
2. Bulking of sand.
3. Bulk and compact densities of fine and coarse aggregates.

**III. Tests on Fresh Concrete**

1. Slump test
2. Compaction Factor test
3. Vee-bee Test
4. Flow Table Test

**Self Compacting Concrete**

1. Flow Test
2. V funnel
3. L Box

**IV. Tests on Hardened Concrete**

1. Compression test on cubes
2. Flexure test
3. Splitting Tensile Test
4. Modulus of Elasticity

**V. Non Destructive Test Of Concrete**

1. Rebound hammer
2. Ultrasound pulse Velocity (UPV)

**Reference:**

1. Concrete Technology Lab Manual, Department of Civil Engineering, CMRIT, Hyd.

**FLUID MECHANICS & HYDRAULIC MACHINERY LAB****III-B.Tech.-I-Sem.****Subject Code: 17CE3107PC****L T P C**  
**0 0 3 2****Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO4	PO14
CO1	Describe the Theoretical concepts by conducting experiments	3	3
CO2	identify the causes for the losses in the pipe system	3	3
CO3	discuss the fundamental equations used in open channel measurements	3	3
CO4	estimate the efficiency and performance of the turbine while using characteristics curves	3	3
CO5	estimate the efficiency and performance of the of various pumps and its characteristics	3	3

**List of Experiments:**

1. Calibration of Venturimeter.
2. Calibration of Orifice meter.
3. Determination of Coefficient of Discharge for a small Orifice/Mouthpiece by falling-head method or Constant head method.
4. Verification of Bernoulli's Equation.
5. Determination of friction factor (major loss) for a given pipe line.
6. Determination of Coefficient for sudden contraction/sudden expansion (minor losses) in pipes.
7. Calibration of Contracted Rectangular Notch/Triangular Notch/Cipoletti Notch.
8. Study of Flow in Open Channel (Applying Chezy's and Manning's equations).
9. Study of Hydraulic Jump in open channel.
10. Performance Characteristics of a single stage/multi stage Centrifugal Pump.
11. Performance test on Pelton Wheel turbine.
12. Performance test on Francis turbine.

**Reference:**

1. Fluid Mechanics & Hydraulic Machinery Lab Manual, Department of Civil Engineering, CMRIT, Hyd.

## ENVIRONMENTAL ENGINEERING LAB

III-B.Tech.- I-Sem.

Subject Code: 17CE3108PC

L T P C

0 0 3 2

## Course Outcomes (COs) &amp; CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO4	PO14
CO1	analyze various properties of water and waste water	3	3
CO2	determine optimum dosage of coagulant	3	3
CO3	identify break - point chlorination	3	3
CO4	examine the biological characteristics of water and waste water	3	3
CO5	assess the quality of water and waste water	3	3

## List of Experiments:

1. Determination of P<sup>H</sup> and Turbidity
2. Determination of Conductivity and Total dissolved solids (Organic and Inorganic)
3. Determination of Alkalinity
4. Determination of Acidity
5. Determination of Chlorides
6. Determination of Iron
7. Determination of Dissolved Oxygen
8. Determination of Nitrates
9. Determination of Optimum dose of coagulant
10. Determination of Chlorine demand
11. Determination of total Phosphorous
12. Determination of B.O.D
13. Determination of C.O.D
14. Presumptive Coliform test

**Note:** At least 8 of the above experiments are to be conducted.

## Reference:

1. Environmental Engineering Lab Manual, Department of Civil Engineering, CMRIT, Hyd.

**HUMAN VALUES AND PROFESSIONAL ETHICS**

MANDATORY COURSE (NON-CREDIT)

III-B.Tech.-I-Sem.

Subject Code: 17HS3109MC

L T P C

3 0 0 0

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO6	PO7	PO8	PO12
CO1	apply the importance of human values for personal and societal development	3	3	3	2
CO2	develop ethics and professional attitude	2	2	3	2
CO3	explain ethical standards in a professional environment	3	3	3	2
CO4	distinguish between professional rights and employee rights	3	3	3	2
CO5	identify their role in professional spheres	3	3	3	3

**Unit I**

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

**Unit II**

**Professional Ethics:** Profession- and professionalism - Two models of professionalism –Professional etiquette -Three types of Ethics or morality Responsibility in Engineering – Engineering standards – Engineering Ethics – Positive and Negative Faces. Professional Codes and Code of conduct of Institute of Engineers . Mini-cases .

**Unit III**

**Professional Responsibilities:** Ethical standards Vs Professional Conduct – Zero Tolerance for Culpable Mistakes – Hazards and Risks - congeniality, collegiality and loyalty. Respect for authority – conflicts of interest –Mini-Cases.

**Unit IV**

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

**Unit V**

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

**References:**

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

**SOFT SKILLS**

MANDATORY COURSE (NON-CREDIT)

III-B.Tech- I Sem

Subject Code: 17HS3110MC

L T P C  
0 0 2 0

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO9	PO10
CO1	identify the need for self awareness and exhibit professional attitude	3	3
CO2	interpret and improve in personal and professional communication	3	3
CO3	develop leadership skills and enhance the employability	3	3
CO4	recognize the importance of decision making and change management to improve professional attributes	3	3
CO5	apply interview techniques for overall development	3	3

**Unit - I**

**Awareness & Attitude:** Who am I? – Roles we play in life - Introducing oneself – Plans for future – Strengths & Weaknesses – Hobbies.

Definition of Discipline – Need for Discipline – Analysis of Discipline

Definition of Integrity – Need for Integrity – Role of Integrity in Success – Personal Integrity & Professional Integrity.

Definition – Positive Attitude – Professional Attitude.

**Unit - II**

**People Skills:** Relationships - Personal & Professional Relationships – Rapport Building – Personal Space

Definition of Motivation –Motivation – Self-motivation

**Unit – III**

**Teamwork & Leadership:**Definition of Team and Leadership,Team Dynamics –Specialisation and Teamwork – Rewards of Teamwork - Leading a Team,Leadership Qualities – Leader vs Manager – Leadership Styles.

**Unit IV**

**Decision Making & Change Management:** Definitions –Decision Making – Hurdles in Decision Making , Definition – Change and Adaptability –Change Management

**Unit – V**

**Preparation for Interviews:** Body Language – Posture - Dressing and Grooming – Researching the Industry and the Organization- Types of Interviews – First Impressions – Dos and Don'ts of an Interview

**Activities List:** Regular practice tests

1. Quiz, Crossword, Word-search and related activities
2. 5-minute presentations about concepts learnt
3. JAM and Picture Narration.
4. Mock Interviews.

**Teachers are requested to use Case Study methodology to deliver the course.**

**References:**

1. Soft Skills By Dr K.Alex , Sultan Chand And Co.
2. Practical Personality & Development By Janardana Krishna Pillalamarri, Scitech Publications (India) Pvt Ltd.
3. English Skills For Technical Students By Amaresh Mukherjee, Sankarnath Ghosh And Prabir Ghosh, Orient Longman Pvt Ltd.

**III-B.TECH.-II-SEMESTER  
SYLLABUS**

**WATER RESOURCES ENGINEERING**

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

**Subject Code: 17CE3201PC**

**L T P C**

**4 1 0 4**

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO2	PO3	PO12	PO13
CO1	illustrate the process of hydrological cycle	3	2	3	3
CO2	construct various hydrographs	3	3	2	3
CO3	analyze ground water occurrence and radial flow into wells	3	3	3	3
CO4	describe the irrigation system	3	2	3	3
CO5	design irrigation canals and cross drainage works	3	3	2	3

**Unit-I**

**10 hours**

Introduction to engineering hydrology and its applications, Hydrologic cycle, types and forms of precipitation, rainfall measurement, types of rain gauges, computation of average rainfall over a basin, processing of rainfall data - Adjustment of record - Rainfall Double Mass Curve. Runoff- Factors affecting Runoff – Runoff over a Catchment - Empirical and Rational Formulae. Abstraction from rainfall-evaporation, factors affecting evaporation, measurement of evaporation- Evapotranspiration- Penman and Blaney & Criddle Methods - Infiltration, factors affecting infiltration, measurement of infiltration, infiltration indices.

**Unit-II**

**9 hours**

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

**Unit-III**

**(5 + 5) 10 hours**

**Part A:** Ground water Occurrence, types of aquifers, aquifer parameters, porosity, specific yield, permeability, transmissivity and storage coefficient, Darcy's law

**Part B:** Radial flow to wells in confined and unconfined aquifers. Types of wells - Well Construction.

**Unit-IV**

**10 hours**

Necessity and Importance of Irrigation, advantages and ill effects of Irrigation, types of Irrigation, methods of application of Irrigation water, Indian agricultural soils, methods of improving soil fertility –Crop Rotation, preparation of land for Irrigation, standards of quality for Irrigation water. Soil-water-plant relationship, vertical distribution of soil moisture, soil moisture constants, soil moisture tension, consumptive use, Duty and delta, factors affecting duty- Design discharge for a water course. Depth and frequency of Irrigation, Irrigation Efficiencies-Water Logging.

**Unit-V**

**9 hours**

Classification of canals, Design of Irrigation canals by Kennedy's and Lacey's theories, balancing depth of cutting, IS standards for a canal design canal lining. Design Discharge over a catchment, Computation of design discharge-rational formulae etc., Flood Routing, Flood Forecasting. Cross Drainage works: types, selection of site, design principles of aqueduct, siphon aqueduct and super passage.

**Textbooks:**

1. Engineering Hydrology by K. Subramanya, TMH, 2014.
2. Applied hydrology by V.T. Chow, D.R. Maidment and L. W TMH, 2014
3. Irrigation and Water Resources & Water Power by P. N. Modi, Standard Book House

**References:**

1. Irrigation and water power engineering by Punmia & Lal, Laxmi pub., Pvt. Ltd., New Delhi
2. Engineering Hydrology by Jayarami Reddy, Laxmi publications Pvt. Ltd., New Delhi

STRUCTURAL ANALYSIS – II

III-B.Tech.-II-Sem.  
Subject Code: 17CE3202PC

L T P C  
4 1 0 4

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO2	PO12	PO13
CO1	analyze portal frame using various methods	3	3	3
CO2	analyze two hinged arches	3	3	3
CO3	analyze multi storey frames using various approximate methods	3	3	3
CO4	analyze the continuous beams and frames using matrix method	3	3	3
CO5	construct influence lines for beams and analyze trusses	3	3	3

Unit - I

**Moment Distribution Method:** Analysis of Single Bay Single Storey Portal Frames including side Sway. Analysis of inclined frames

**Kani's Method:** Analysis of Continuous Beams including settlement of Supports. Analysis of Single Bay Single Storey and Single Bay two Storey Frames by Kani's Method including side Sway. Shear force and bending moment diagrams. Elastic Curve.

Unit - II

**Slope Deflection Method:** Analysis of Single Bay Single Storey Portal Frames by Slope Deflection Method including side Sway. Shear force and bending moment diagrams. Elastic curve.

**Two Hinged Arches:** Introduction — Classification of Two hinged Arches — Analysis of two hinged parabolic arches — Secondary stresses in two hinged arches due to temperature and elastic shortening of rib.

UNIT - III

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

Unit - IV

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

Unit- V

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

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

Textbooks:

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

References:

1. Basic Structural Analysis by C.S.Reddy, TMH.
2. Matrix Analysis of Structures by Pundit and Gupta, TMH.
3. Advanced Structural Analysis by A.K.Jain, Nem Chand Bros.



TRANSPORTATION ENGINEERING

III-B.Tech.-II-Sem.

Subject Code: 17CE3203PC

L T P C

4 0 0 4

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO2	PO3	PO12	PO13
CO1	develop the plan and alignment of highway networks	3	3	2	3
CO2	design highway geometrics	3	3	3	3
CO3	apply the traffic rules & regulations for free flow of traffic	3	3	3	3
CO4	explain various types of intersections and its limitations	3	2	2	3
CO5	select suitable materials for construction & maintenance of highways	3	3	2	3

Unit-I

9 hours

**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 & Reports, Highway Project.

Unit-II

10 hours

**Highway Geometric Design:** Importance of Geometric Design, Design controls and Criteria, Highway Cross Section Elements, Sight Distance Elements, Stopping Sight Distance, Overtaking Sight Distance and Intermediate Sight Distance, Design of Horizontal Alignment, Design of Super elevation and Extra widening, Design of Transition Curves-Design of Vertical Alignment, Gradients, vertical curves.

Unit-III

(5 + 5) 10 hours

**Part-A: Traffic Engineering & Regulations:** Basic Parameters of Traffic-Volume, Speed and Density, Traffic Volume Studies, Data Collection and Presentation, Speed studies, Data Collection and Presentation, Origin & Destination studies, Parking Studies, On street & Off street Parking.

**Part-B:** Road Accidents, Causes and Preventive Measures, Accident Data Recording, Condition diagram and Collision diagrams, Traffic Signs, Types and Specifications, Road Markings, Need for Road Markings, Types of Road Markings, Design of Traffic Signals, Webster Method.

Unit-IV

9 hours

**Intersection Design:** Types of Intersections, Conflicts at Intersections, Requirements of At-Grade Intersections, Types of At-Grade Intersections, Channelized and Unchannelized Intersections, Traffic Islands, Types of Grade Separated Intersections, Rotary Intersection, Concept of Rotary, Design Factors of Rotary, Advantages and Limitations of Rotary Intersections.

Unit-V

10 hours

**Highway Material, Construction & Maintenance:** Highway Material Characterization: Subgrade Soil, Stone Aggregates, Bitumen Materials, Construction of Gravel Roads, Construction of water bound macadam roads, Construction of bituminous pavements: Surface dressing, bitumen bound macadam, Bituminous concrete, Construction of cement concrete pavements, Construction of joints in cement Concrete pavements, joint filler & seal, Pavement failures, Maintenance of highways, Highway drainage.

Text books:

1. Highway Engineering – S.K.Khanna & C.E.G.Justo, Nemchand & Bros., 7<sup>th</sup> Edition, 2000.
2. Traffic Engineering & Transportation Planning–Dr.L.R.Kadyali, Khanna Publications, 6<sup>th</sup> Edn.

References:

1. Principles of Traffic and Highway Engineering –Garber & Hoel, Cengage Learning.
2. Principles and Practices of Highway Engineering – Dr.L.R.Kadiyali & Dr.N.B.Lal– Khanna Pub

**GLOBAL WARMING & CLIMATE CHANGE**  
(Open Elective – II)

III-B.Tech.-II-Sem.

Subject Code: 17CE3204OE

L T P C

3 0 0 3

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO2	PO6	PO7	PO8	PO12
CO1	describe the various consequences of climate change	3	3	3	3	2
CO2	illustrate the methods of measurement of climate change	3	3	3	3	2
CO3	analyze the causes for climate change and its impacts	3	3	3	3	2
CO4	evaluate the impact of global warming and climate change	3	3	3	3	2
CO5	explain various mitigation techniques	3	3	3	3	2

**Unit – I**

Global warming and Greenhouse gases – GHGs trend, Global temperature trend, Global distribution of emissions, IPCC Sources of CO<sub>2</sub> in the Land, Ocean and atmosphere. The Climate system – Sun, Atmosphere, Ocean, Ice and energy balance of the earth. History of climate change – glacial cycle, interglacial, interstadial events, year to decadal

Global Warming Potential: Introduction to the calculation of GWP, carbon emissions from fossil fuels and global carbon cycle, carbon intensity of fossil fuels, Effects of energy efficiency on carbon intensity, target CO<sub>2</sub> levels.

**Unit – II**

The Kyoto Protocol, Climate change –Extreme weather events, The Measurement of Climate Change, Global warming and the hydrological cycle, Climate change impact on ecosystems, Agriculture, Possible remedies of global warming – Reducing Carbon Emissions, Energy use and Emission trading, Future Emissions and Energy Resources, Current and Future sources of Methane, Biological sources of Nitrous oxide, Role of Scientist and Human being.

**Unit – III**

The history of climate and the human species, human-caused climate change, Impacts Of Climate Change: Impacts of Climate Change on various sectors – Agriculture, Forestry and Ecosystem – Water Resources – Human Health – Industry, Settlement and Society – Methods and Scenarios – Projected Impacts for Different Regions– Uncertainties in the Projected Impacts of Climate Change – Risk of Irreversible Changes.

**Unit – IV**

Weather and Climate – Climatic zones, continental & maritime climates; Climate change and variability – Natural changes and anthropogenic causes of climate change, Climate feedbacks – Ice-albedo, cloud - albedo and CO<sub>2</sub> feedbacks; Present day Climate variability – El Nino and ENSO events. Climate Change Adaptation And Mitigation Measures: Adaptation Strategy/Options in various sectors – Water – Agriculture – Infrastructure and Settlement including coastal zones – Human Health – Tourism – Transport – Energy – Key

**Unit –V**

Mitigation Technologies and Practices – Energy Supply – Transport – Buildings – Industry – Agriculture – Forestry - Carbon sequestration – Carbon capture and storage (CCS)- Waste (MSW & Bio waste, Biomedical, Industrial waste – International and Regional cooperation. Clean Technology And Energy: Clean Development Mechanism –Carbon Trading examples of future Clean Technology- Biodiesel – Natural Compost – Eco- Friendly Plastic – Alternate Energy – Hydrogen – Bio-fuels – Solar Energy – Wind – Hydroelectric Power – Mitigation Efforts in India and Adaptation funding.

**Textbooks:**

1. Dash Sushil Kumar, “Climate Change – An Indian Perspective”, Cambridge University Press India Pvt. Ltd, 2007.
2. Kuhn, T.S., 1962 and updates. The Structure of Scientific Revolutions

3. Contemporary Climatology, by Peter J. Robinson and Ann Henderson-Sellers.
4. Climate Change: A Multidisciplinary Approach, by William James Burroughs
5. Current trends in Global Environment by A.L. Bhatia (2005)

**References:**

1. Global Warming: A Very Short Introduction by Mark Maslin
2. Global Warming The Complete Briefing by John T Houghton
3. Intergovernmental Panel on Climate Change, (Cambridge University 2007)
4. Ruddiman, William F.2001. Earth's Climate: Past and Future
5. Henderson-Sellers, A., and P.J. Robinson, 1999. Contemporary Climatology (second edition). Prentice-Hall.
6. Houghton, J.T., 2001, (ed). Climate Change 2001, The Scientific Basis. 881pp.

**FUNDAMENTALS OF ROBOTICS**  
(Open Elective – II)

III-B.Tech-II-Sem  
Subject Code: 17ME3204OE

L T P C  
3 0 0 3

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO1	PO2	PO5	PO12
CO1	illustrate principles and functioning of the robot	3	2	2	2
CO2	perform kinematic analysis for end-effector positioning	3	3	3	2
CO3	integrate sensors for robot	3	3	3	2
CO4	design control laws for a robot	3	3	2	2
CO5	develop robot programming for various applications	3	3	3	2

**Unit-I**

**Introduction to Robotics:** Types and components of a robot, Classification of robots, classification with respect to geometrical configuration (anatomy), closed-loop and open- loop control systems. Social issues and safety.

**Unit-II**

**Robot Kinematics:** Kinematics systems, Definition of mechanisms and manipulators, Kinematic Modelling: Translation and Rotation Representation, Coordinate transformation, Homogeneous Coordinate representation, DH parameters.

**Unit-III**

**Sensors and Vision System:** Sensor: Contact and Proximity, Position, Velocity, Force, Tactile etc., Introduction to Cameras, Camera calibration, Geometry of Image formation, Euclidean / Similarity / Affine / Projective transformations Vision applications in robotics.

**Robot Actuation Systems:** Actuators: Electric, Hydraulic and Pneumatic; Transmission: Gears, Timing Belts and Bearings, Parameters for selection of actuators.

**Unit –IV**

**Robot Control:** Basics of control: Transfer functions, Control laws: P, PD, PID, Non-linear and advanced controls.

**Unit-V**

**Control Hardware and Interfacing:** Embedded systems: Architecture and integration with sensors, actuators, components, Programming for Robot Applications.

**Textbooks:**

1. Niku Saeed B., “Introduction to Robotics: Analysis, Systems, Applications”, PHI, New Delhi.
2. Mittal R.K. and Nagrath I.J., “Robotics and Control”, Tata McGraw Hill.

**References:**

1. Saha, S.K., “Introduction to Robotics, 2<sup>nd</sup> Edition, McGraw-Hill Higher Education, 2014.
2. Ghosal, A., “Robotics”, Oxford, New Delhi, 2006.

**PRINCIPLES OF COMMUNICATION SYSTEMS**  
(Open Elective – II)

III -B.Tech.-II-Sem  
Subject Code: 17EC3204OE

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

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO1	PO2	PO3	PO12
CO1	outline the fundamentals of communication systems	3	2	2	2
CO2	analyze various analog modulation and demodulation schemes	3	3	3	2
CO3	explain sampling theorem, pulse modulation and multiplexing techniques	3	3	3	2
CO4	illustrate digital modulation schemes	3	3	2	2
CO5	develop source and channel coding techniques	3	3	3	2

**Unit-I**

**Fundamentals of communication systems:** Block diagram of communication system; types of communications-analog and digital; Noise–types of noise, sources of noise, calculation of noise in linear systems, and noise figure.

**Unit-II**

**Methods of Modulation:** Need for modulation; Types of modulation, generation and detection of AM, DSB-SC, SSB-SC. Angle modulation: frequency & phase modulations, Narrow band and Wide band FM, comparison of AM, FM & PM.

**Unit-III**

**Pulse Modulations:** Sampling theorem, Nyquist criteria, introduction to PAM, PWM and PPM.  
**Multiplexing techniques:** TDM, FDM, asynchronous multiplexing.

**Unit-IV**

**Digital Communication:** Advantages; Working principle of PCM; comparison of PCM, DM, ADM, ADPCM; introduction to digital modulation techniques-ASK, FSK, PSK, DPSK, QPSK.

**Unit-V**

**Information Theory:** Concept of information; rate of information and entropy; Coding efficiency-Shanon-Fano and Huffman coding; introduction to error detection and correction codes.

**Textbooks:**

1. Communication Systems Analog and Digital – R.P. Singh & SD Sapre, TMH, 20th reprint, 2004.
2. Principles of Communications – H. Taub and D. Schilling, TMH, 2003.

**References:**

1. Electronic Communication Systems – Kennedy and Davis, TMH, 4th edition, 2004.
2. Communication Systems Engineering – John. G. Proakis and Masoud Salehi, PHI, 2<sup>nd</sup> Ed. 2004.

**DATABASE MANAGEMENT SYSTEMS**  
(Open Elective – II)

III-B.Tech- II Sem  
Subject Code: 17CS3204OE

L T P C  
3 0 0 3

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO1	PO2	PO3	PO5	PO12
CO1	design databases using E-R model	3	3	3	3	2
CO2	construct database using relational model	3	3	3	3	2
CO3	formulate SQL queries to interact with database	3	3	3	3	2
CO4	make use of transaction control commands	3	3	3	3	2
CO5	apply normalization on database to eliminate redundancy	3	3	3	3	2

### Unit-I

**Introduction to Database Systems:** Introduction and applications of DBMS, Purpose of data base, History of database, Database architecture - Abstraction Levels, Data Independence, Database Languages, Database users and DBA.

**Introduction to Database Design:** Database Design Process, Data Models, ER Diagrams - Entities, Attributes, Relationships, Constraints, keys, Generalization, Specialization, Aggregation, Conceptual design with the E-R model for large Enterprise.

### Unit-II

**Relational Model:** Introduction to the relational model, Integrity constraints over relations, Enforcing integrity constraints, Querying relational data, Logical database design: E-R to relational, Introduction to views, Destroying/altering tables and views.

### Unit-III

**Part-A: SQL Basics:** DDL, DML, DCL, structure – creation, alteration, defining constraints – Primary key, foreign key, unique, not null, check, in operator.

**Part-B: Functions:** Aggregate functions, Built-in functions - numeric, date, string functions, set operations.

### Unit-IV

**Sub-queries:** Introduction, correlated sub-queries, use of group by, having, order by, join and its types, Exist, Any, All, view and its types.

**Transaction control commands:** ACID properties, concurrency control, Commit, Rollback, save point, cursors, stored procedures, Triggers.

### Unit-V

**Normalization:** Introduction, Normal forms - 1NF, 2NF, 3NF, BCNF, 4NF and 5NF, concept of Denormalization and practical problems based on these forms.

### Textbooks:

1. Raghurama Krishnan, Johannes Gehrke, Database Management Systems, 3<sup>rd</sup> Edition, TMH.
2. Abraham Silberschatz, Henry F.Korth, S.Sudarshan, Database System Concepts, 6<sup>th</sup> Edn, TMH.

**CONSTRUCTION TECHNOLOGY AND MANAGEMENT  
(Professional Elective – I)**

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

**Subject Code: 17CE3205PE**

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

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO11	PO12	PO14
CO1	explain the fundamentals of CTPM	3	3	3
CO2	plan earthwork and construction facilities	3	3	3
CO3	make use of project management and control techniques	3	3	3
CO4	illustrate model BIM and safety in construction	3	3	3
CO5	originate and negotiate contracts and tenders using codes	3	3	3

**Unit - I**

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

**Unit - II**

Classification of Construction projects, Construction stages, Resources- Functions of Construction Management and its Applications .Preliminary Planning- Collection of Data-Contract Planning — Scientific Methods of Management: Network Techniques in construction management – Bar chart, Gant chart, CPM, PERT- Cost & Time optimization.

**Unit - III**

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

**Unit - IV**

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

**Unit - V**

Management Information System – Labour Regulations: Social Security – welfare Legislation – Laws relating to Wages, Bonus and Industrial disputes, Labour Administration – Insurance and Safety Regulations – Workmen’s Compensation Act -other labour Laws – Safety in construction : legal and financial aspects of accidents in construction . occupational and safety hazard assessment. Human factors in safety. legal and financial aspects of accidents in construction . occupational and safety hazard assessment

**Text Books:**

1. Ghalot, P.S., Dhir,D.M., Construction Planning and Management, Wiley Eastern Limited,1992.
2. Chitkara,K.K., Construction Project Management, Tata McGraw Hill Publishing Co, Ltd., New Delhi, 1998.
3. Punmia,B,C., Project Planning and Control with PERT and CPM, Laxmi Publications, new delhi,1987.

**Reference:**

1. Construction Management And Planning by: sengupta, b. /guha, h. tata mcgraw-hill publications.

**BRIDGE ENGINEERING**  
(Professional Elective – I)

III-B.Tech.-II-Sem.

Subject Code: 17CE3206PE

L T P C

3 0 0 3

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO2	PO3	PO5	PO6	PO7	PO12	PO13
CO1	illustrate the classification of Bridges	3	3	3	3	3	2	3
CO2	identify the types of load acting as per IRC Loading	3	3	3	3	3	2	3
CO3	analyse the Solid Slab of Bridge	3	3	3	3	3	2	3
CO4	explain the Design theory of Girder Bridge	3	3	3	3	3	2	3
CO5	formulate the Bearings	3	3	3	3	3	2	3

**Unit - I**

**Introduction:** Classification of bridges, site selection, geometric and hydraulic design consideration, loading standards for highway and railway bridges, general design consideration, optimum spans.

**Unit - II**

**Concrete Bridges:** Introduction-Types of Bridges-Economic span length-Types of loading, Dead load-live load-Impact Effect-Centrifugal force-wind loads-Lateral loads-Longitudinal forces-Seismic loads - Discussion of IRC Loadings - Frictional resistance of expansion bearings-Secondary Stresses-Temperature Effect-Erection Forces and effects-Width of roadway and footway-General Design Requirements.

**Unit - III**

**Solid Slab Bridges:** Introduction-Method of Analysis and Design.

**Unit - IV**

**Girder Bridges:** Introduction-Method of Analysis and Design-Courbon's Theory, Grillage analogy.

**Unit - V**

**Design of Bearings:** Sub-structure of bridges: Substructure- Beds block-Piers- Pier Dimensions- Design loads for piers- Abutments- Design loads for Abutments.

**References:**

1. Essentials of Bridge Engineering by D.Johnson Victor, Oxford and IBH Publishing Co. Pvt. Ltd
2. Design of Concrete Bridges by M.G.Aswani, V.N.Vazirani and M.M.Ratwani. Khanna Publications 2004
3. Concrete Bridge Design and Practice by V.K.Raina Tata Mc Graw Hill Publishing co
4. Bridge Engineering by Ponnusamy Tata Mc Graw Hill Publishing co
5. Design of Bridges by N.Krishna Raju, Oxford and IBH Publishing Co. Pvt. Ltd
6. Bridge Engineering by V.V.Sastry, DhanPat Rai & Co.



**GEO ENVIRONMENTAL ENGINEERING  
(Professional Elective – I)**

**III-B.Tech.-II-Sem.**  
**Subject Code: 17CE3207PE**

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

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO2	PO3	PO6	PO7	PO12	PO13
CO1	classify various sources of contamination of sites and its characterization methods	3	3	3	3	2	3
CO2	identify the impact of waste materials on environment and its management strategies	3	3	3	3	2	3
CO3	examine the transport of contaminant in subsurface environment	3	3	3	3	2	3
CO4	interpret various remediation methods in dealing with contaminants	3	3	3	3	2	3
CO5	construct different types of landfills and its system with suitable site selection	3	3	3	3	2	3

**Unit - I**

**Sources and Site Characterization:** Scope of Geo-environmental Engineering, Various Sources of Contaminations, Need for contaminated site characterization; and Characterization methods.

**Unit - II**

**Solid and Hazardous Waste Management:** Classification of waste, Characterization solid wastes, Environmental Concerns with waste, waste management strategies.

**Unit - III**

**Contaminant Transport:** Transport process, Mass-transfer process, Modeling, NAPL

**Unit - IV**

**Remediation Techniques:** Objectives of site remediation, various active and passive methods, Bioremediation, Phytoremediation, Remediation of NAPL sites.

**Unit - V**

**Landfills:** Types of landfills, Site Selection, Waste Containment Liners, Leachate collection system, Cover system, Gas collection system.

**Text Books**

1. Phillip B. Bedient, Refai, H. S. & Newell C. J. – Ground Water Contamination – Prentice Hall Publications, 4th Edition, 2008.
2. Sharma, H. D. and Reddy, K. R. – Geoenvironmental Engineering, John Wiley & Sons (2004).

**References**

1. Rowe, R. K. Geotechnical & Geoenvironmental Engineering Handbook, Kluwer Academic, 2001.
2. Reddi, L. N. and Inyang, H. I. – Geoenvironmental Engineering Principles and Applications, Marcel. Dekker, Inc., New York (2000).

**ELEMENTS OF EARTHQUAKE ENGINEERING**  
(Professional Elective – I)

III-B.Tech.-II-Sem.

Subject Code: 17CE3208PE

L T P C

3 0 0 3

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO2	PO3	PO6	PO8	PO12	PO13
CO1	define fundamentals of Earthquake Engineering and SDOFS	3	3	3	3	2	3
CO2	explain the concept of Earth quake resistant Building	3	3	3	3	2	3
CO3	outline the Reinforced Concrete Building models	3	3	3	3	2	3
CO4	analyse behavior the Masonry Building	3	3	3	3	2	3
CO5	apply the Ductile Detailing for both structural and Non structural elements	3	3	3	3	2	3

**Unit – I**

**Engineering Seismology:** Earthquake phenomenon cause of earthquakes- Faults- Plate tectonics- Seismic waves- Terms associated with earthquakes- Magnitude/Intensity of an earthquake-scales- Energy released-Earthquake measuring instruments-Seismologic, Seismograph, accelerator graph-strong ground motions- Seismic zones of India. Theory of Vibrations: Elements of a vibratory system-Degrees of Freedom- Continuous system-Lumped mass idealisation-Oscillatory motion-Simple Harmonic Motion-Free vibration of single degree of freedom (SDOF) system- unhampered and damped-critical damping-Logarithmic decrements-Forced vibrations-Harmonic excitation-Dynamic magnification factor-Excitation by rigid based translation for SDOF system-Earthquake ground motion.

**Unit – II**

**Conceptual design:** Introduction-Functional planning-Continuous load path- Overall form-simplicity and symmetry-elongated shapes-stiffness and strength-Horizontal and Vertical members-Twisting of buildings-Ductility- definition-ductility relationships-flexible buildings-framing systems-choice of construction materials-unconfined concrete-confined concrete-masonry- reinforcing steel. Introduction to earthquake resistant design: Seismic design requirements-regular and irregular configurations-basic assumptions-design earthquake loads-basic load combinations-permissible stresses-seismic methods of analysis-factors in seismic analysis-equivalent lateral force method.

**Unit – III**

**Reinforced Concrete Buildings:** Principles of earthquake resistant deign of RC members- Structural models for frame buildings- Seismic methods of analysis- Seismic deign methods- IS code based methods for seismic design-Seismic evaluation and retrofitting- Vertical irregularities- Plan configuration problems- Lateral load resisting systems- Determination of design lateral forces-Equivalent lateral force procedure- Lateral distribution of base shear.

**Unit – IV**

**Masonry Buildings:** Introduction- Elastic properties of masonry assemblage- Categories of masonry buildings- Behaviour of un reinforced and reinforced masonry walls- Behaviour of walls- Box action and bands- Behaviour of infill walls- Improving seismic behaviour of masonry buildings- Load combinations and permissible stresses- Seismic design requirements- Lateral load analysis of masonry buildings.

**Unit – V**

**Structural Walls and Non-Structural Elements:** Strategies in the location of structural walls-sectional shapes- variations in elevation- cantilever walls without openings — Failure mechanism of non-structures- Effects of non- structural elements on structural system- Analysis of non-structural

elements- Prevention of non-structural damage- Isolation of non-structures. Ductility Considerations in Earthquake Resistant Design of RC Buildings: Introduction- Impact of Ductility- Requirements for Ductility- Assessment of Ductility-Factors affecting Ductility- Ductile detailing considerations as per IS 13920. Behaviour of beams, columns and joints in RC buildings during earthquakes- Vulnerability of open ground storey and short columns during earthquakes

### **Text Books :**

1. Earthquake Resistant Design of structures — S. K. Duggal, Oxford University Press.
2. Earthquake Resistant Design of structures — Pankaj Agarwal and Manish Shrikhande, Prentice Hall of India Pvt. Ltd.

### **References**

1. Seismic Design of Reinforced Concrete and Masonry Building — T.Paulay and M\_J.N. Priestly, JohnWiley&Sons.
2. Earthquake Resistant Design of Building structures by Vinod Hosur, Wiley India Pvt. Ltd.
3. Elements of Mechanical Vibration by R.N.lyengar, I.K.International Publishing House Pvt. Ltd.
4. Malory and Timber structures including earthquake Resistant Design —Anand S.Arya, Nemchand & Bros.
5. Earthquake Tips — Learning Earthquake Design and Construction C.V.R. Murthy.

**TRANSPORTATION ENGINEERING LAB**

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

**Subject Code: 17CE3209PC**

**L T P C**

**0 0 3 2**

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO4	PO7	PO14
<b>CO1</b>	determine various properties of aggregates	3	3	3
<b>CO2</b>	find various properties of bitumen	3	3	3
<b>CO3</b>	test strength of bitumen using marshal stability apparatus	3	3	3
<b>CO4</b>	estimate the traffic volume count at mid blocks and junctions	3	3	3
<b>CO5</b>	measure the speed of vehicles and area for parking	3	3	3

**List of Experiments:**

- Experiment 1: Determination of Aggregate Crushing value
- Experiment 2: Determination of Aggregate Impact Value
- Experiment 3: Determination of Specific Gravity and water absorption.
- Experiment 4: Determination of Aggregate Attrition Value.
- Experiment 5: Determination of Aggregate Abrasion Value
- Experiment 6: Determination of Flakiness Index and Elongation Index of Coarse Aggregates.
- Experiment 7: Soundness Test on Aggregates.
- Experiment 8: Penetration Test on Bitumen.
- Experiment 9: Ductility Test on Bitumen
- Experiment 10: Softening point of Bitumen.
- Experiment 11: Flash and Fire Point Tests on Bitumen.
- Experiment 12: Specific Gravity Test on Bitumen.
- Experiment 13: Marshal Stability Test and Mix Design.

**Note:** At least 12 of the above experiments are to be conducted.

**Reference:**

1. Transportation Engineering Lab Manual, Department of Civil Engineering, CMRIT, Hyd.

**SOFTWARE APPLICATION IN CONSTRUCTION MANAGEMENT LAB****III-B.Tech.-II-Sem.****Subject Code: 17CE3210ES****L T P C****0 0 3 2****Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO4	PO5	PO14
CO1	explain various concepts of software	3	3	3
CO2	creating the Projects, activities, WBS & EPS	3	3	3
CO3	summarize the activity type & relations	3	3	3
CO4	design of networks for various type of Projects	3	3	3
CO5	choosing the type of network to be adapted for the project	3	3	3

**List of Experiments**

1. Create Project, activities, work breakdown structure(WBS)
2. Managing Calendars, resource allocation, Organization breakdown structure (OBS)
3. Activity type and relations, Enterprise project structure
4. Scheduling project, total & free float Cost analysis
5. Quantity takeoff, Preparation and delivery of the bid or proposal of an engineering construction project.
6. Design of a simple equipment information system for a construction project.
7. Scheduling of a small construction project including reports and tracking.
8. Simulation models for project risk analysis.

**Reference:**

1. Software Application in Construction Management Lab Manual, Department of Civil Engineering, CMRIT, Hyd.

**ADVANCED ENGLISH COMMUNICATION SKILLS (AECS) LAB**

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

**Subject Code: 17CE3211HS**

**L T P C**

**0 0 3 2**

**Pre Requisites:** English

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO5	PO10
CO1	assess and utilize vocabulary in an effective way	3	3
CO2	interpret interpersonal relationships	3	3
CO3	elaborate academic reading and writing skills	3	3
CO4	formulate appropriate communication techniques in various contexts	3	3
CO5	adapt to different work-place and socio-cultural scenarios	3	3

**Syllabus:** The following course activities will be conducted as part of the Advanced Communication Skills (ACS) Lab:

**Unit I: Inter-personal Communication and Building Vocabulary – (3 Weeks)**

Starting a Conversation – Responding Appropriately and Relevantly – Using Appropriate Body Language – Role Play in Different Situations - Synonyms and Antonyms, One-word Substitutes, Prefixes and Suffixes, Idioms and Phrases and Collocations.

**Unit II: Reading Comprehension – (3 Weeks)**

General Vs Local Comprehension, Reading for Facts, Guessing Meanings from context, Skimming, Scanning, Inferring Meaning.

**Unit III: Writing Skills – (3 Weeks)**

Structure and Presentation of Different Types of Writing - Letter Writing/ Resume Writing/ E-correspondence/ Technical Report Writing.

**Unit IV: Presentation Skills – (4 Weeks)**

Oral Presentations (individual or group) through JAM Sessions/Seminars/PPTs and Written Presentations through Posters/Projects/Reports/ e-mails/Assignments... etc.

**Unit V: Group Discussion and Interview Skills – (3Weeks)**

Dynamics of Group Discussion, Intervention, Summarizing, Modulation of Voice, Body Language, Relevance, Fluency and Organization of Ideas and Rubrics of Evaluation- Concept and Process, Pre-interview Planning, Opening Strategies, Answering Strategies, Interview through Tele-conference & Video-conference and Mock Interviews.

**Reference:**

1. Advanced English Communication Skills Lab Manual, FED, CMRIT, Hyd.

**QUANTITATIVE APTITUDE**  
**Mandatory Course (Non-Credit)**

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

**Subject Code: 17BS3212MC**

**L T P C**

**0 0 2 0**

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO9	PO10
CO1	Recall the basics of number systems and apply them accordingly	3	3
CO2	Apply the concepts of percentages, profit and loss, & Interests in real life situations	3	3
CO3	demonstrate various principles related to Distance ,speed ,time and work in solving mathematical problems	3	3
CO4	distinguish between permutations and combinations ,clocks and calendars for solving problems	3	3
CO5	apply principles of geometry and mensuration to achieve qualitative results at workplace	3	3

**Unit - I**

**Number Systems :**Basic Concepts, Number Systems:Natural numbers, whole numbers, integers, fractions(proper,improper,mixed,split),Rational Numbers,Irrational Numbers, Real Numbers.  
**Divisibility Rules, Logic Equations,Two digit numbers,three digit numbers, successive divisions, basic operations(addition,subtraction,multiplication,division)**  
**Averages:** Basic Concepts,combined mean,average principles, wrong values taken, number added or deleted,average speed.  
**Progressions & Inequalities:** Basic Concepts, Types: arithmetic, geometric, harmonic progression and applications.

**Unit - II**

**Percentages :**Basic Concepts, conversions, finding percentages from given numbers, quantity increases or decreases by given percentage, population increase by given percentage, comparisons, consumption when a commodity price increase or decrease and applications  
**Profit and Loss:**Basic Concepts, discounts, marked price and list price,dishonest shopkeeper with manipulated weights, successive discounts etc.  
**Interest (Simple and Compound):**Basic Concepts, Yearly, Half-yearly, and quarterly calculations , multiples, differences between simple and compound interest.  
**Ratio and Proportion:**Basic Concepts of ratio and proportion, continued or equal proportions, mean proportions, invest proportion, alternative proportion, division proportion, compound proportion, duplication of ratio, finding values, coins and currencies ,etc

**Unit - III**

**Speed, Time and Distance:** Basic Concepts, Single train problems,two train problems:some point same side, some point opposite sides, relative speed, different points meeting at common points, different points same side(different timings vs. same timings), ratios, number of stoppages, average speed, etc.,Time and Work.Basic Concepts, comparative work, mixed work, alternative work ,middle leave and middle join,ratio efficiency.

**Unit - IV**

**Permutations and combinations:** Basic Concepts, differences between permutations and combinations,always together-never together, alternative arrangement, fixed positions,double fixations, items drawing from a single group, items drawing from a multiple group, total ways of arrangement with repetitions and without repetitions,dictionary, handshakes or line joining between two points or number of matches , sides and diagonals,etc.  
**Clocks and Calendars** Basic Concepts, Angle between minute hand and hour hand,reflex angle,hours

hand angle,time gap between minute hand and hour hand ,relative time : coincide ,opposite sides and right angle ,mirror images,faulty clock(slow/fast),miscellaneous, calender.

**Unit - V**

**Geometry and Mensuration:** Basic concepts, types of angles.

Plane figures: rectangles, squares, triangles, quadrilateral,areas,perimeters,etc.

Solid figures:cubes,cuboids,spheres,cylinders-area(total ot lateral surface area),volumes, perimeters.

Others: Parallelogram, Rhombus, Trapezium, Circle, Sector, ,Segment, Cone,Sphere, Hemisphere, Ellipse, Starprism etc

**Text Books :**

- 1 .GL Barrons, Mc Graw Hills, Thorpe's verbal reasoning, LSAT Materials
2. R S Agarwal, S.Chand , 'A modern approach to Logical reasoning'
3. R S Agarwal, S Chand, 'Quantitative Aptitude'
4. Quantitative Aptitude - G. L BARRONS
5. Quantitative Aptitude - Abhijit Guha Mc Graw Hills



**IV-B.TECH.-I-SEMESTER  
SYLLABUS**

**DESIGN & DRAWING OF STEEL STRUCTURES**

**IV-B.Tech.-I-Sem.**

**L T P C**

**Subject Code: 17CE4101PC**

**4 1 0 4**

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO3	PO8	PO10	PO12	PO14
CO1	explain the properties of structural steel and calculate the strength of various joints	3	3	3	2	3
CO2	design the members subjected to tension and compression	3	3	3	2	3
CO3	design the members subjected to flexure	3	3	3	2	3
CO4	design various eccentric connections	3	3	3	2	3
CO5	design plate girder and roof truss elements	3	3	3	2	3

**Unit-I**

**Materials:** Making of iron and steel, Types of structural steel, Mechanical properties of structural steel, Concept of plasticity, yield strength- loads and load combinations, wind loads on roof truss, local buckling, Concept of limit state design, different limit states as per IS 800-2007, Deflection limits, serviceability, Bolted connections, welded connections, design strength, Efficiency of joint.

**Unit-II**

**Design of Tension members:** Design of Tension Members, design strength of members.

**Compression Members:** Design of compression members, buckling class, Slenderness ratio, strength design, laced, battened columns, Column base, slab base.

**Unit-III**

**Design of beams:** Plastic moment, bending and shear strength, laterally supported beams design. Built up sections, large plates, web buckling, crippling, deflection of beams.

**Unit-IV**

**Eccentric connections:** Design of eccentric connections with brackets, beam end connections, web angle, Un-stiffened and stiffened seated connections bolted and welded types.

**Unit-V**

**Plate girder:** Components of plate girder, optimum depth, design of main section, design of end bearing and intermediate stiffeners, connection between flange and web, design of flange splices and web splices.

**Roof Truss:** Parts of a truss - Design of purlin- Design of truss joints.

**Textbooks:**

1. Design of steel structures: N. Subramanian, Oxford university Press
2. Limit state Design of steel structures, S. K. Duggal, Tata McGrawHill

**References:**

1. Design of steel structures by K.S. Sai Ram, Pearson Education.
2. Design of steel structures by Ramchandra 1&2, Scientific Publishers Journals Dept
3. Design of steel structures S. S. Bhavikatti, IK int Publication House, New Delhi.

**FOUNDATION ENGINEERING**

**IV-B.Tech.-I-Sem.**

**Subject Code: 17CE4102PC**

**L T P C**

**4 1 0 4**

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO2	PO3	PO8	PO12	PO14
CO1	explain the various processes of soil exploration and its bearing capacity	3	3	3	2	3
CO2	determine the slope failures using various methods	3	3	3	2	3
CO3	analyze earth retaining structures using various theories	3	3	3	2	3
CO4	illustrate various types foundations	3	3	3	2	3
CO5	make use of well foundation based on site requirements	3	3	3	2	3

**Unit-I**

**9 hours**

**Soil Exploration:** Need-Methods of soil exploration–Boring and Sampling methods–Penetration Tests–Plate Load Tests–Pressure meter–Planning of Program and preparation of soil investigation report.

**Unit-II**

**10 hours**

**Slope Stability:** Infinite and finite slopes – types of failures – factors of safety of finite slopes - stability analysis by Swedish arc method, standard method of slices, Bishop’s Simplified method – Taylor’s Stability Number – Stability of earth dams under different conditions.

**Unit-III**

**(5 + 5) 10 hours**

**Part-A: Earth Pressure Theories:** Rankine’s theory of earth pressure- earth pressure in layered soils – Coloumb’s earth pressure theory - Coloumb’s graphical method.

**Part-B: Retaining Walls:** Types of retaining walls – stability of retaining walls against overturning, bearing capacity and drainage from backfill.

**Unit-IV**

**11 hours**

**Shallow Foundations - Strength Criteria:** Types – choice of foundation – Location of depth – Safe bearing capacity – Terzaghi, Meyerhof, Skempton and IS Methods.

**Shallow Foundations - Settlement Criteria:** Safe bearing pressure based on N value - allowable bearing pressure; safe bearing capacity – plate load test– allowable settlements of structures.

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

**Unit-V**

**8 hours**

**Well Foundations:** Types – Different shapes – Components of wells – functions and Design Criteria – Sinking of wells – Tilts and shifts.

**Text Books:**

1. Basic and Applied Soil Mechanics by GopalRanjan & ASR Rao, New Age International Pvt. Ltd.
2. Geotechnical Engineering: Principles and Practices of Soil Mechanics and Foundation Engineering by V.N.S. Murthy, Taylor and Francis Group.

**References:**

1. Analysis and Design of Substructures–Swami Saran, Oxford and IBH Publishing Company Ltd.
2. Geotechnical Engineering by S.K.Gulhati & Manoj Datta – TMH.

**ESTIMATION, QUANTITY SURVEY & VALUATION**

**IV-B.Tech.-I-Sem.**

**Subject Code: 17CE4103PC**

**L T P C**

**4 1 0 4**

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO11	PO12	PO14
CO1	find the various quantities of building items	3	2	3
CO2	estimate earthwork for roads and canals	3	2	3
CO3	analyze the cost for various civil work items	3	2	3
CO4	determine the quantity of reinforcement and classify the contracts	3	2	3
CO5	evaluate the cost of buildings using NBC	3	2	3

**Unit-I**

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

**Unit-II**

Earthwork for roads and canals.

**Unit-III**

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

**Unit –IV**

Reinforcement bar bending and bar requirement schedules. Contracts – Types of contracts –Contract Documents – Conditions of contract.

**Unit-V**

Valuation of buildings. Standard specifications for different items of building construction.

**Textbooks:**

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

**References:**

1. Standard Schedule of rates and standard data book by public works department.
2. I.S. 1200 (Parts I to XXV – 1974/ method of measurement of building and Civil Engineering work – B.I.S)
3. Estimation, Costing and Specifications by M.Chakraborti; Laxmi publications.
4. National Building Code.

**ENVIRONMENTAL IMPACT ASSESSMENT**  
(Open Elective – III)

**IV-B.Tech.-I-Sem.**

**Subject Code: 17CE4104OE**

**L T P C**

**3 0 0 3**

**Pre Requisites:** Environmental Science

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO6	PO7	PO10	PO12
CO1	identify the attributes to be considered for EIA	3	3	3	3
CO2	assess impact of deforestation	3	3	3	3
CO3	interpret impact prediction, significance of soil quality and mitigation	3	3	2	3
CO4	conduct environmental audit and prepare reports	3	3	2	3
CO5	illustrate environmental policies and provisions	3	3	3	3

**Unit-I**

**Basic concept of EIA:** Initial environmental Examination, Elements of EIA, factors affecting E-I-A Impact evaluation and analysis, preparation of Environmental Base map, Classification of environmental parameters. E I A Methodologies: introduction, Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method, overlay methods, cost/benefit Analysis.

**Unit-II**

Assessment of impact of development activities on vegetation and wildlife, environmental Impact of Deforestation – Causes and effects of deforestation.

**Unit-III**

Procurement of relevant soil quality, impact prediction, assessment of impact significance. Identification and incorporation of mitigation measures for enhancement of soil quality.

**Unit-IV**

Environmental Audit & 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**

The Environmental Protection Act, The water Act, The Air (Prevention & Control of pollution Act.), Motor Act, Wild life Act. Case studies and preparation of Environmental Impact assessment statement for various Industries.

**Textbooks:**

1. Environmental Pollution by R.K. Khitoliya S. Chand.
2. Environmental Impact Assessment, Barthwal, R. R. New Age International Publications.

**References:**

1. Larry Canter – Environmental Impact Assessment, TMH.
2. Suresh K. Dhaneja - Environmental Science and Engineering, S.K. Kataria & Sons Publication.
3. Bhatia, H. S. - Environmental Pollution and Control, Galgotia Publication, Pvt., Ltd., Delhi.

**PRINCIPLES OF ENTREPRENEURSHIP**  
(Open Elective – III)

IV-B.Tech. I-Sem.

Subject Code: 17ME4104OE

L T P C

3 0 0 3

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO7	PO8	PO9	PO11	PO12
CO1	illustrate concept & types of entrepreneurship	3	3	2	3	2
CO2	distinguish individual and corporate entrepreneurship	3	3	3	3	2
CO3	identify the process of launching new ventures	3	3	3	3	3
CO4	assess legal challenges of entrepreneurship	3	3	3	3	3
CO5	build entrepreneurial strategies	3	3	3	3	3

**Unit-I: Entrepreneurship**

The revolution impact of entrepreneurship- The evolution of entrepreneurship - Approaches to entrepreneurship- Process approach- Twenty first century trends in entrepreneurship.

Case: From candle seller to CEO (Arya Kumar P.No. 48).

**Unit-II: Individual and corporate entrepreneurship**

The entrepreneurial journey - Stress and the entrepreneur- the entrepreneurial ego- Entrepreneurial motivations - Corporate Entrepreneurial Mindset the nature of corporate entrepreneur.

Case: Globalizing Local Talent, (B. Janakiram, M. Rizwana, page 228).

**Unit-III: Launching Entrepreneurial Ventures**

Opportunities identification - entrepreneurial Imagination and Creativity - the nature of the creativity Process - Innovation and Entrepreneurship - Methods to initiate Ventures. Creating New Ventures - Acquiring an established entrepreneurial venture – Franchising - hybrid disadvantage of Franchising.

Case: creativity in start-ups (Arya Kumar Page 166).

**Unit-IV: Legal challenges of Entrepreneurship**

Intellectual Property Protection-Patents, Copyrights, Trademarks and Trade Secrets-Avoiding Pitfalls- Formulation of the entrepreneurial Plan- The challenges of new venture start-ups.

Case: Tata Motors – Nano (Arya Kumar P.No. 279).

**Unit-V: Strategic perspectives in entrepreneurship**

Strategic Planning-Strategic actions-strategic positioning-Business stabilization-Building the adaptive firms-understanding the growth stage-unique managerial concern of growing ventures.

Case: To Lease or Not: A Cash flow Question (David H.Holt, Page 452).

**References:**

1. Arya Kumar “Entrepreneurship- creating and leading an entrepreneurial org” Pearson 2012.
2. ‘Entrepreneurship: New Venture Creation’ David H Holt PHI, 2013.
3. [Entrepreneurship: Text and Cases](#) P. Narayana Reddy, Cengage, 2010.

**PRINCIPLES OF EMBEDDED SYSTEMS**  
(Open Elective – III)

IV -B.Tech.-I-Sem

Subject Code: 17EC4104OE

L T P C

3 - - 3

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO1	PO2	PO3	PO12
CO1	outline the basic concepts of embedded computing	3	3	2	2
CO2	illustrate the architecture of 8051 microcontroller	3	3	3	2
CO3	develop embedded programs using 8051 microcontroller	3	3	3	2
CO4	demonstrate 8051 microcontroller interface with peripherals	3	3	3	2
CO5	explain real time operating system concepts	3	3	3	3

**Unit-I**

**Embedded computing:** Introduction, complex systems and microprocessor, the embedded system design process, formalisms for system design, design examples.

**Unit-II**

**The 8051 architecture:** Introduction, 8051 micro controller hardware, input / output ports and circuits, external memory, counter and timers, serial data input / output, interrupts.

**Unit-III**

**Basic assembly language programming concepts:** The assembly language programming process, programming tools and techniques, programming the 8051.

**Instructions set:** Data transfer and logical instructions, arithmetic operations, decimal arithmetic. Jump and call instructions.

**Unit – IV**

**Applications:** Interfacing with keyboards, displays, D/A and A/D conversions, multiple interrupts, serial data communication.

**Unit – V**

**Introduction to real - time operating systems:** Tasks and task states, tasks and data, semaphores, and shared data; message queues, mailboxes and pipes, timer functions, events, memory management, interrupt routines in an RTOS environment.

**Textbooks:**

1. Computers as Components - Principles of Embedded Computer System Design, Wayne Wolf, Elsevier.
2. The 8051 Microcontroller, Third Edition, Kenneth J. Ayala, Thomson.

**References:**

1. Microcontrollers, Raj kamal, Pearson Education.
2. An Embedded Software Primer, David E. Simon, Pearson Education.

## WEB TECHNOLOGIES (Open Elective – III)

IV – B.Tech. – I - Semester  
Subject Code: 17CS4104OE

L T P C  
3 0 0 3

### Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO2	PO3	PO5	PO6	PO12
CO1	design web pages using HTML and JavaScript	3	3	3	3	3
CO2	develop web applications using PHP	3	3	3	2	3
CO3	make use of XML and DTD for web design	3	3	3	2	2
CO4	build web applications using servlets and session tracking	3	3	3	2	2
CO5	establish database connectivity using JSP and JDBC	3	3	3	2	2

#### Unit-I

**Web:** Introduction, Internet and web, web browsers, web servers, protocols.

**HTML:** Basics, elements, attributes, tags- list, tables, images, forms, frames, cascading style sheets.

**Java Script:** Introduction to scripting, control structures, conditional statements, arrays, functions, objects.

#### Unit-II

**PHP:** Declaring variables, data types, arrays, strings, operators, expressions, control structures, functions, Reading data from web form controls, handling file uploads, connecting to database, executing simple queries, handling sessions and cookies, file handling.

#### Unit-III

**XML:** Basics of XML, Elements, Attributes, Name space, **Parsing:** DOM and SAX Parsers.

**Introduction to DTD:** internal and external DTD, Elements of DTD, DTD Limitations, XML Schema, Schema structure, XHTML.

#### Unit-IV

**Servlets:** Introduction, Lifecycle, Generic and HTTP servlet, passing parameters to servlet, HTTP servlet Request & Response interfaces, Deploying web Applications,

**Session Tracking:** Hidden form fields, cookies, URL- Rewriting, session.

#### Unit-V

**JSP:** Introduction, Difference Between servlets & JSP, Anatomy of JSP page, JSP elements: Directives, comments, Expressions, scriptlets, Declaration, Implicit JSP objects, using Action elements.

**JDBC:** Introduction, JDBC Drivers, Loading Driver, establishing connection, Executing SQL statement in JSP pages, MVC architecture

#### Text Books:

1. Web Technologies, Uttam K Roy, Oxford University Press.
2. The Complete Reference PHP- Steven Hozner, TMH.

#### References:

1. Java Server Pages-Hans Bergsten, SPD O'Reilly.
2. JavaScript, D. Flanagan O'Reilly, SPD.
3. Beginning Web Programming-Jon Dckett WROX.



**FEM FOR CIVIL ENGINEERING  
(Professional Elective – II)**

**IV-B.Tech.-I-Sem.**

**Subject Code: 17CE4105PE**

**L T P C**

**3 0 0 3**

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO2	PO3	PO4	PO12	PO14
CO1	explain the fundamentals of FEA	3	3	3	2	3
CO2	formulate the stiffness matrix for 1-D element	3	3	3	2	3
CO3	compute the stiffness matrix for 2-D and 3-D element	3	3	3	2	3
CO4	analyze the plate using FEA	3	3	3	2	3
CO5	explain the non-linear finite element analysis and its applications	3	3	3	2	3

**Unit - I**

Introduction: Concepts of FEM - steps involved - merits and demerits - energy principles – Discretization - Raleigh - Ritz method of functional approximation. Principles of Elasticity: Stress equations - strain displacement relationships in matrix form plane stress, plane strain and axi-symmetric bodies of revolution with axi-symmetric loading.

**Unit - II**

One dimensional FEM: Stiffness matrix for beam and bar elements - shape functions for 1-D elements. Two dimensional FEM: Different types of elements for plane stress and plane strain analysis - displacement models - generalized coordinates - shape functions - convergent and compatibility requirements - geometric invariance - natural coordinate system - area and volume coordinates - generation of element stiffness and nodal load matrices

**Unit - III**

Isoparametric formulation: Concept - different isoparametric elements for 2D analysis - formulation of 4-noded and 8-noded isoparametric quadrilateral elements - Lagrange elements - serendipity elements. Axi Symmetric Analysis: bodies of revolution - axi symmetric modeling - strain displacement relationship - formulation of axi symmetric elements. Three dimensional FEM: Different 3-D elements-strain-displacement relationship – formulation of hexahedral and isoparametric solid element.

**Unit - IV**

Introduction to Finite Element Analysis of Plates: Basic theory of plate bending - thin plate theory - stress resultants - Mindlin's approximations - formulation of 4-noded isoperimetric quadrilateral plate element – Shell Element.

**Unit - V**

Introduction to non – linear finite analysis – basic methods – application to Special structures.

**Text Books:**

1. A First Course in a Finite Element by Daryl L .Logan, CL Engineers.
2. Concepts and Applications of Finite Element Analysis by Robert D. Cook, David S. Malkus and Michael E. Plesha, John Wiley & Sons.

**References:**

1. Introduction to Finite element Method by Tirupathi Chandra Patla and Belugunudu
2. Finite element Methods by OC Zienkiewicz
3. Finite element analysis, theory and programming by GS Krishna Murthy.
4. Introduction to Finite element Method by JN Reddy

**AIR POLLUTION AND CONTROL  
(Professional Elective – II)**

**IV-B.Tech.-I-Sem.**

**Subject Code: 17CE4106PE**

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

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO2	PO6	PO7	PO8	PO12	PO13
CO1	identify the major sources, classification, causes, current issues of air pollution	3	3	3	3	2	3
CO2	explain the properties of atmosphere plume behavior and metrological phenomena	3	3	3	3	2	3
CO3	design the equipment related to control of particulate caused due to air pollution	3	3	3	3	2	3
CO4	recommend control measures related to gaseous emissions	3	3	3	3	2	3
CO5	describe air quality management measures and control systems	3	3	3	3	2	3

**Unit - I**

Air Pollution – Definitions, Scope, Significance and Episodes, Air Pollutants – Classifications – Natural and Artificial – Primary and Secondary air pollutants, 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 effev, Heat Island, Acid rains,Ozone Holes etc.

**Unit - II**

Meteorology and plume Dispersion; Properties of atmosphere; Heat, Pressure System, Winds and moisture, plume behaviour and plume Rise Models; Gaussian Modeal for Plume Dispersion.

**Unit - III**

Control of particulates – Control at Sources, Process Changes, Equipment modifications, Design and operation of control.Equipment’s – setting chambers, cyclone separators, filters, Dry and Wet scrubbers, Electrostatic precipators.

**Unit - IV**

Control of gaseous emissions – General Methods of control of NOx and SOx emissions – In plant Control Measures, process changes, dry and wet methods of removal and recycling – Adsorption – Absorption – Combustion.

**Unit - V**

Air Quality Management – Monitoring of SPM, SOx; NOx and CO Emission standards – Air sampling – Sampling Techniques – High volume air sampler – stack sampling – Analysis of Air pollutants- Air quality standards – Air pollution control act.

**Text Books:**

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

**Reference Books:**

1. An introduction to Air pollution by R.K Trivedy and P.K Goel, B.S.

**PRESTRESSED CONCRETE**  
(Professional Elective – II)

IV-B.Tech.-I-Sem.

Subject Code: 17CE4107PE

L T P C

3 0 0 3

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO2	PO3	PO8	PO12	PO14
CO1	illustrate concepts of pre-stressed concrete	3	3	3	2	3
CO2	determine losses of pre-stressed concrete	3	3	3	2	3
CO3	analyze PSC members for flexure and shear	3	3	3	2	3
CO4	identify transmission of pre-stressing force in pre-tensioned members	3	3	3	2	3
CO5	analyze composite members and calculate the deflection	3	3	3	2	3

**Unit - I**

**Introduction:** Historic development- General principles of pre-stressing pre-tensioning and post tensioning- Advantages and limitations of Prestressed concrete- General principles of PSC- Classification and types of pre-stressing Materials- high strength concrete and high tensile steel their characteristics.

**Methods and Systems of pre-stressing:** Pre-tensioning and Post-tensioning methods and systems of pre-stressing like Hoyer system, Magnel Blaton system, Freyssinet system and Gifford- Udall System- Lee McCall system.

**Unit – II**

**Losses of Pre-stress:** 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 stress in steel, slip in anchorage, frictional losses.

**Unit – III**

**Flexure:** Analysis of sections for flexure- beams pre-stressed with straight, concentric, eccentric, bent and parabolic tendons- stress diagrams- Elastic design of PSC beams of rectangular and I Sections- Kern line — Cable profile and cable layout.

**Shear:** General Considerations- Principal tension and compression- Improving shear resistance of concrete by horizontal and vertical pre-stressing and by using inclined or parabolic cables- Analysis of rectangular and I beam for shear — Design of shear reinforcements- Bureau of Indian Standards (BIS) Code provisions.

**Unit – IV**

**Transfer of Pre-stress in Pre-Tensioned Members:** Transmission of pre-stressing force by bond — Transmission length — Flexural bond stresses — IS code provisions — Anchorage zone stresses in post tensioned members — stress distribution in End block — Analysis by Guyon, Magnel, Zielinski and Rowe’s methods — Anchorage zone reinforcement- BIS Provisions.

**Unit – V**

**Composite Beams:** Different Types- Propped and Unpropped- stress distribution- Differential shrinkage- Analysis of composite beams- General design considerations.

**Deflections:** Importance of control of deflections- Factors influencing deflections — short term deflections of uncracked beams- prediction of long time deflections- BIS code requirements.

**Textbooks:**

1. Pre-stressed concrete by N. Krishna Raju, 5 th Edition, Tata McGraw Hill Book Education P. Ltd.

**References:**

1. Design of pre-stress concrete structures by T.Y. Lin and Burn, John Wiley, New York1
2. Prestressed concrete by S. Ramarnrutham, Dhanpat Rai & Sons, Delhi.

3. Prestressed Concrete by N. Rajagopalan, Narosa Publishing House

**GROUND WATER DEVELOPMENT & MANAGEMENT**  
(Professional Elective – II)

**IV-B.Tech.-I-Sem.**

**Subject Code: 17CE4108PE**

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

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO2	PO12	PO13
CO1	analyse radial flow towards wells in confined and unconfined aquifers	3	2	3
CO2	design wells and understand the construction practices	3	2	3
CO3	interpret geophysical exploration data for scientific source finding of aquifers	3	2	3
CO4	determine the process of artificial recharge for increasing groundwater potential	3	2	3
CO5	take effective measures for controlling saline water intrusion	3	2	3

**Unit - I**

Introduction Groundwater in the hydrologic cycle, groundwater occurrence, aquifer parameters and their determination, general groundwater flow equation. Well Hydraulics Steady radial flow and unsteady radial flow to a well in confined and unconfined aquifers, Theis solution, Jacob and Chow's methods, Leaky aquifers.

**Unit - II**

Well Design Water well design-well diameter, well depth, well screen-screen length, slot size, screen diameter and screen selection, design of collector wells, infiltration gallery.

**Unit - III**

Well Construction and Development Water wells, drilling methods-rotary drilling, percussion drilling, well construction-installation of well screens-pull-back method, open-hole, bail-down and wash-down methods, well development-mechanical surging using compressed air, high velocity jetting of water, over pumping and back washing, well completion, well disinfection, well maintenance.

**Unit - IV**

Artificial Recharge Concept of artificial recharge of groundwater, recharge methods-basin, stream-channel, ditch and furrow, flooding and recharge well methods, recharge mounds and induced recharge. Saline Water Intrusion Occurrence of saline water intrusion, Ghyben- Herzberg relation, Shape of interface, control of saline water intrusion.

**Unit - V**

Geophysics Surface methods of exploration of groundwater – Electrical resistivity and Seismic refraction methods, Sub-surface methods – Geophysical logging and resistivity logging. Aerial Photogrammetry applications. Groundwater Modelling and Management Basic principles of groundwater modelling- Analog models-viscous fluid models and membrane models, digital models-Finite difference and finite element models, Concepts of groundwater management, basin management by conjunctive use-case studies.

**Text Books:**

1. Groundwater by Raghunath H M, New Age International Publishers.
2. Groundwater Hydrology by Todd D.K., Wiley India Pvt Ltd.
3. Groundwater Hydrology by Todd D K and L W Mays, CBS Publications.

**References:**

1. Groundwater Assessment and Management by Karanth K R, Tata McGraw Hill Publishing Co.
2. Groundwater Hydrology by Bouwer H, McGraw Hill Book Company.
3. Groundwater Systems Planning and Management by Willis R and W.W.G. Yeh, Prentice Hall Inc.

**COMPUTER AIDED DESIGN LAB  
(By Using Staad., Pro)****IV-B.Tech.-I-Sem.****Subject Code: 17CE4109PC****L T P C****0 0 3 2****Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

<b>COs</b>	<b>Upon completion of course the students will be able to</b>	<b>PO4</b>	<b>PO5</b>	<b>PO10</b>	<b>PO14</b>
<b>CO1</b>	make use of STAAD Pro software for analysis and design	3	3	3	3
<b>CO2</b>	design various components of building	3	3	3	3
<b>CO3</b>	design the single and multi-storeyed building	3	3	3	3
<b>CO4</b>	design the over head tank of various shapes	3	3	3	3
<b>CO5</b>	analyze and design trusses and plane frames	3	3	3	3

**List of Experiments:**

1. Introduction to Software (Staad. Pro)
2. Design of beams for various supports and loads
3. Design of single storey building with various/fixed supports and loads
4. Design of multi-storied building with various/fixed supports and loads
5. Design of RCC Rectangular Over Head Tank
6. Design of RCC Circular Over Head Tank
7. Analysis of truss (using Staad. Pro)
8. Analysis of Plane frames (using Staad. Pro)

**Reference:**

1. Computer Aided Design Lab Manual, Department of Civil Engineering, CMRIT, Hyd.

**ADVANCED CONCRETE LAB**

**IV B. Tech. - I Sem.**  
**Subject Code: 17CE4110PC**

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

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO4	PO6	PO14
CO1	test the suitability of super plasticizer with cement	3	3	3
CO2	assess the properties of fresh concrete	3	3	3
CO3	assess the properties of fresh concrete	3	3	3
CO4	determine the strength of hardened concrete	3	3	3
CO5	conduct non-destructive tests on concrete elements	3	3	3

**I. Test on Cement**

1. Determination of optimum super plasticizer dosage of cement

**II. Test on Fresh Concrete**

1. Determination of air content in fresh concrete.
2. Influence of w/c ratio on strength of concrete.
3. Influence of Aggregate/cement ratio on strength of concrete
4. Influence of chemical admixtures on concrete

**III. Tests on Self Compacting Concrete**

1. Flow Test
2. V funnel
3. L Box
4. J Ring

**IV. Tests on Hardened Concrete**

1. Modulus of Elasticity
2. Accelerated curing of concrete.

**V. Non Destructive Test of Concrete**

1. Rebound hammer
2. Ultrasound pulse Velocity (UPV)

**Reference:**

1. Advanced Concrete Lab Manual, Department of Civil Engineering, CMRIT, Hyd.

**FOREIGN LANGUAGE: FRENCH  
MANDATORY COURSE (NON-CREDIT)**

**IV-B.Tech.-I-Sem.**

**Subject Code: 17HS4112MC**

**L T P C**

**3 0 0 0**

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO9	PO10
CO1	identify the basic structure of French language, spelling and pronunciation	3	3
CO2	reproduce the grammatical structure for basic communication	3	3
CO3	recognize and use the grammatical structures for general comprehension	3	3
CO4	use the grammatical and lexical notions in formal and informal situations	3	3
CO5	apply the language skills in communicating effectively at a global platform	3	3

**Unit-I: Introduction**

At the airport: Savoir– faire: exchanging greetings, self introduction, introducing another, welcoming someone, identifying someone - Grammar: verbs to be, to call oneself, subject pronouns, interrogation.

**Unit-II: Grammar**

At the University: Savoir-faire: enquiring after one’s welfare, taking leave, expressing appreciation - Grammar: definite & indefinite articles, gender of nouns, adjectives, present tense of regular verbs, to have, to learn, negation, irregular verbs

**Unit-III: Conversation**

At the café: Savoir –faire: speaking about one’s likes, giving information, expressing admiration, asking information about someone - Grammar: Interrogative adjectives, irregular verbs, possessive and interrogative adjectives

**Unit-IV: Proposal Writing & Formal Letters**

At the beach: Savoir faire: proposing an outing, accepting/ refusing the proposal - Grammar: singular & plural, indefinite pronoun, demonstrative adjectives, negation, irregular verbs  
A concert: Savoir –faire: inviting, accepting, expressing one’s inability to accept an invitation

**Unit- V: Regular & Irregular Verbs**

Grammar: Present tense of more irregular verbs, contracted articles, future tense, interrogative adverbs, At Nalli’s Savoir- faire: asking the price of an article, protesting against the price, Grammar: possessive adjectives, Exclamative adjectives, imperative tense

**Reference:**

1. Course Material: Synchronie I –Méthode de Français, Madanagobalane -Samita Publications, Chennai, 2007

**FOREIGN LANGUAGE: GERMAN  
MANDATORY COURSE (NON-CREDIT)**

**IV-B.Tech.-I-Sem.**

**Subject Code: 17HS4113MC**

**L T P C**

**3 0 0 0**

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO9	PO10
CO1	identify the basic structure of German language, spelling and pronunciation	3	3
CO2	reproduce the grammatical structure for self introduction	3	3
CO3	recognize and use the grammatical article structures for basic conversation	3	3
CO4	use the grammatical and verb structure for formal and informal situations	3	3
CO5	apply the language skills in communicating effectively at a global platform	3	3

**Course structure:**

- A. German Language (speaking, reading, writing, grammar and test)
- B. Life in Germany (shopping, restaurant, doctor, government, bank, post)
- C. The German Way (introduction, doing business, conversation, meetings, dining)
- D. Germany (Culture, Climate)

**Unit-I: Pronunciation**

Welcome: Introduction to the Language, Spelling and Pronunciation (The alphabets and numbers)  
Greetings, ordering, requesting, saying thank you - Grammar – **the article “the”, conjugation** of verbs

**Unit-II: Self Introduction**

Shopping - Grammar – adjectives, endings before nouns, practice. Self introduction

**Unit-III: Training**

Addresses, Occupations, Studies – Grammar - „to be’, **the definite/indefinite** articles, individual Training

**Unit-IV: Oral**

Leisure Time, Sports, Hobbies - Grammar – position of a verb in a main clause , oral practice

**Unit-V: Narration**

At a Restaurant, Food and Drink - Grammar – the personal pronoun in the Nominative and Accusative, Narrating an event

**Resources:**

1. Sprachkurs Deutsch 1 ( Verlag Diesterweg), New Delhi Learning Centre



**IV-B.TECH.-II-SEMESTER  
SYLLABUS**

REMOTE SENSING AND GIS

IV-B.Tech.-II-Sem.  
Subject Code: 17CE4201PC

L T P C  
4 1 0 4

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO2	PO5	PO7	PO12	PO14
CO1	illustrate the principles of photogrammetry	2	3	2	3	3
CO2	make use of remote sensing process	3	3	2	3	3
CO3	utilize GIS principles in real life	3	3	2	3	3
CO4	explain the concepts of topology, OBVDM and tomography	3	3	2	3	3
CO5	develop the geospatial data model with various file formats	3	3	3	3	3

Unit - I

**Introduction to Photogrammetry:** Principles & types of aerial photograph, geometry of vertical aerial photograph, Scale & Height measurement to single vertical aerial photograph, Height measurement based on relief displacement, Fundamentals of stereoscopy, fiducial points, parallax measurement using fiducial line.

Unit - II

**Remote Sensing:** Basic concept of Remote sensing, Data and Information, Remote sensing data collection, Remote sensing advantages & Limitations, Remote Sensing process. Electromagnetic Spectrum, Energy interactions with atmosphere and with earth surface features (soil, water, vegetation), Indian Satellites and Sensors characteristics, Resolution, Map and Image and False color composite, introduction to digital data, elements of visual interpretation techniques.

Unit - III

**Geographic Information system:** Introduction to GIS; components of a GIS; Geo spatial Data: Spatial Data- Attribute data-Joining Spatial and attribute data; GIS Operations: Spatial Data Input – Attribute data Management -Data display Data Exploration – Data Analysis.

**Coordinate Systems:** Geographic coordinate System: approximation of the Earth, Datum; Map Projections: Types of Map Projections – Map projection parameters – Commonly used Map Projections- Projected coordinate Systems.

Unit - IV

**Vector Data Model:** Representation of simple features – Topology and its importance; coverage and its data structure, Shape file; Data models for composite feature Object Based Vector Data Model; Classes and their Relationship; The geobase data model; Geometric representation of Spatial Feature and data structure, Tomography rules.

Unit - V

**Raster Data Modern:** Elements of the Raster data model, Types of Raster Data, Raster Data Structure, Data conversion, Integration of Raster and Vector data.

**Data Input:** Metadata, on version of Existing data, creating new data; remote sensing data, filed data.

Text Books:

1. Remote sensing of the environment – An earth resources perspective – 2nd edition – by John R.Jensen, Pearson Education.
2. Introduction to Geographic information system – Kang – Tsurug Churg. Tata McGraw Hill Education Private Limited.

Reference Books:

1. Concepts & Techniques of GIS by C.P.Lo Albert, K.W Young, prentice Hall (India) publication.
2. Remote sensing and Geograperhical information system by M. Anji Reddy JNTUH, B.S. Publications.

**DESIGN OF HYDRAULICS STRUCTURES  
(Professional Elective - III)**

**IV-B.Tech.-II-Sem.**

**Subject Code: 17CE4202PE**

**L T P C**

**3 0 0 3**

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO2	PO3	PO5	PO12	PO13
CO1	selection and design of site for Dam and Reservoir	3	3	3	2	3
CO2	design of Gravity Dams with their profiles	3	3	3	2	3
CO3	design of Earth Dams and Types of spillways with design principles	3	3	3	2	3
CO4	design of Diversion head works on permeable foundation	3	3	3	2	3
CO5	design of Cross Drainage works and Canal regulation works	3	3	3	2	3

**Unit - I**

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, Concepts and criteria; 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.

**Unit - III**

Earth dams: types of Earth dams, causes of failure of earth dam, criteria for safe design of earth dam, seepage through earth dam-graphical method, measures for control of seepage. Spillways: types of spillways, design principles of Ogee spillways, types of spillway gates - cavitations on spillway – design feature- design principles and design of spillways – Chute spillways –Energy dissipation – stilling basins –

**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**

Cross Drainage works: types, selection of site, design principles of aqueduct, siphon aqueduct and super passage. 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.

**Text Books:**

1. Irrigation engineering and hydraulic structures by S.K Garg, Khanna publishers.
2. Irrigation, Water Power and Water Resources Engineering by Arora, K.R., Standard Publishers Distributors, Delhi
3. Irrigation Engineering by R.K. Sharma and T.K. Sharma, S. Chand Publishers
4. Modi, P.N., Introduction to Water Resources and Waterpower Engineering, Standard Publication, Delhi

**References:**

1. Irrigation and water resources engineering by G.L. Asawa, New Age International Publishers

**MODERN TRANSPORTATION ENGINEERING**  
(Professional Elective - III)

IV-B.Tech.-II-Sem.

Subject Code: 17CE4203PE

L T P C

3 0 0 3

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO2	PO3	PO7	PO12	PO13
CO1	illustrate classification of highway system	3	3	3	2	3
CO2	outline the features of port and harbour engineering	3	3	3	2	3
CO3	make use of GIS applications in transportation engineering	3	3	3	2	3
CO4	develop an effective railway transportation system	3	3	3	2	3
CO5	adapt airport engineering techniques	3	3	3	2	3

**Unit -I**

**Functional Classification of Highway System:** Design Controls – Topography, Driver characteristics, Vehicle Characteristics, Traffic, Capacity and Level of Service, Design Speed. Objectives of Geometric Design, Cross Section Elements: Design specifications; Pavement Surface characteristics – Skid Resistance, Road Roughness; Camber, Objectives, design standards. Specifications for hill roads.

**Unit - II**

**Port and Harbour Engineering:** Requirements Of Port And Harbor, Classification Of Port & Harbor, Features Of A Harbor, Planning Of Harbor, Breakwaters, Dry Docks, Jetties, Aprons, Transit Shed And Warehouses, Navigational Aids, Maintenance Of Port And Harbours, Inland Water Transport.

**Unit - III**

**Application of GIS in Transportation Engineering:** Intelligent information system for road accessibility study, GIS data base design for physical facility planning, Decision support systems for land use planning.

**Unit - IV**

**Railway Engineering:** Introduction Role of railways in transportation; Comparison of railway and highway transportation; Development of railway systems with particular reference to India; Classification of railways Permanent way – Components and their functions – Rail joints – Welding of Rails – Creep of Rails – Rail fixtures & Fastenings. 6. Track Geometric design – Points & Crossings – Track drainage –Layout of Railway stations and yards – Signals – Interlocking – Track circuiting – Track Maintenance.

**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 – Runway Lighting system.

**References**

1. Rangwala, Airport Engineering, Charotar Publishing House, 1996.
2. Principles and Practice of Highway Engineering, L.R.Kadiyali and N.B.Lal, Khanna, 2007.
3. Traffic Engineering and Transportation Planning, L.R.Kadiyali, Khanna Publications, 2007. Highway Engineering, C.E.G.Justo and S.K.Khanna, Nem Chand and Brothers.
4. IRC Codes for Signs, Markings and Mixed Traffic Control in Urban Areas.

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

IV-B.Tech.-II-Sem.

Subject Code: 17CE4204PE

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

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO3	PO5	PO6	PO12	PO13
CO1	illustrate the problems associated with single degree freedom system and resonance	3	3	3	2	3
CO2	apply the concept of pressure bulb and wave propagation theory in soil media	3	3	3	2	3
CO3	determine the dynamic properties of soil using various methods	3	3	3	2	3
CO4	analyze the foundations for machineries under different modes of vibrations	3	3	3	2	3
CO5	design the principles of foundations, base isolation methods and its material properties	3	3	3	2	3

**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

**Unit --II**

**Natural frequency of foundation:** Soil system: Barkan’s and IS methods – pressure bulb concept – Pauw’s Analogy. Wave propagation: Elastic waves in Rods – Waves in elastic Half space.

**Unit - III**

**Dynamic Soil Properties:** Field and Laboratory methods of determination – Uphole, Down hole and cross hole methods – Cyclic plate load test – Block vibration test – Determination of Damping factor.

**Unit - IV**

**Machine Foundations:** Types, Design criteria, permissible amplitudes and bearing pressure. Block foundation: Degrees of freedom - analysis under different modes of vibration

**Unit - V**

**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.

**Vibration Isolation:** Types and methods – Isolating materials and their properties

**Text Books:**

1. Handbook of Machine Foundations by P.Srinivasulu and G.V.Vaidyanathan, Tata McGraw Hill
2. Soil Dynamics by Shamsheer Prakash

**Reference Books:**

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

**REPAIR AND REHABILITATION OF STRUCTURES**  
(Professional Elective - III)

**IV-B.Tech.-II-Sem.**

**Subject Code: 17CE4205PE**

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

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO2	PO4	PO7	PO12	PO14
CO1	identify the preventive measures against damages of structures	3	3	3	3	3
CO2	assess steel-reinforcement behaviour subject to corrosion & fire	3	3	3	3	3
CO3	predict damages and distress using NDT techniques	3	3	3	3	3
CO4	use repairing and strengthening techniques for structures	3	3	3	3	3
CO5	adapt health monitoring techniques for various structures	3	3	3	3	3

**Unit - I**

Introduction — Deterioration of Structures — Distress in Structures — Causes and Prevention. Mechanism of Damage — 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**

Inspection and Testing — Symptoms and Diagnosis of Distress — Damage assessment — NDT

**Unit – IV**

Repair of Structure — Common Types of Repairs — Repair in Concrete Structures — Repairs in Under Water Structures — Guniting — Shot Create Underpinning. Strengthening of Structures — Strengthening Methods Retrofitting — Jacketing.

**Unit – V**

Health Monitoring of Structures — Definition & motivation for SHM, SHM - a way for smart materials and structures, SHM and bio mimetic - analog between the nervous system of a man and a structure with SHM, SHM as a part of system management, Passive and Active SHM, NDE, SHM and NDECS, basic components of SHM, materials for sensor design.

**Text Books:**

1. Maintenance and Repair of Civil Structures, B.L. Gupta and Amit Gupta, Standard Publications.
2. Concrete Technology by A.R. Santakumar, Oxford University press.

**Reference Books:**

1. Defects and Deterioration in Buildings, EF & N Spon, London.
2. Non-Destructive Evaluation of Concrete Structures by Bungey – Surrey University Press.
3. Concrete Repair and Maintenance Illustrated, RS Means Company Inc W.H. Ranso.
4. Building Failures: Diagnosis and Avoidance, EF & N Spon, London, B.A. Richardson.

**ARCHITECTURAL ENGINEERING**  
**(Professional Elective - IV)**

**IV-B.Tech.-II-Sem.**

**Subject Code: 17CE4206PE**

**L T P C**

**3 0 0 3**

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO1	PO2	PO12	PO13
CO1	analyze the ancient architecture	3	3	3	3
CO2	identify the architectural characteristics on West Asia Architecture and Egypt	3	3	3	3
CO3	distingwish the spatial and stylistic qualities associated with church architecture	3	3	3	3
CO4	develop the Gothic Architecture	3	3	3	3
CO5	identify the new beginning of Architecture	3	3	3	3

**Unit - I**

**West Asia Architecture and Egypt:** Factors influencing Egyptian Architecture, Outline of Architectural Character – Examples - Great Pyramid of Cheops, Gizeh & Great Temple of Ammon, Karnak.

**Unit - II**

**Greek and Roman Architecture:** Factors influencing the development of Hellenic & Hellenistic Art, Sculpture and Architecture - Outline of architectural character – Orders in Greek architecture – Doric, Ionic and Corinthian. – Examples - Parthenon, Athens , Theatre of Epidaurus, Agora Evolution of Republican states in Rome – Masonry & vaulting – Outline of architectural character – Examples - Pantheon, Rome, Colosseum, Rome, Thermae of Caraculla’ Rome.

**Unit – III**

**Early Christian, Romanesque & Byzantine :** Evolution of church forms, Outline of architectural character,Example, St.Clemente,Rome, Development of the dome, Example,St.Sophia, Constantinople .Formation of guilds,Factors influencing Romanesque architecture,Outline of architecture character in Italy,France and England,Examples: Pisa group, Italy; Abbaye aux Hommes, Caen

**Unit - IV**

**Gothic Architecture:** French gothic - Religious and social influences - Evolution of vaulting and development of structural systems -Outline of Architectural character - Examples: Notre Dame, Paris.Development of English gothic vaulting - Outline of Architectural character in England and Italy - Examples:Westminster Abbey, Milan Cathedral.

**Unit - V**

**Architecture of Renaissance:** Italian Renaissance,Architecture during the early Renaissance, High Renaissance and Baroque Periods,Features of a typical Renaissance palace, eg. Palazzo Ricardi, Study of the contribution of the following architects:Brunelleschi, Michaelangelo,Andrea Palladio, Example,St. Peter Rome,Villa capra in Vicenza,French and English Renaissance,Example,Chateau de Chambord, Louvre,Paris,Study of the works Sir Christopher Wren,& Inigo Jones, Example,St. Paul’s Cathedral, London

**Text Books:**

1. Sir Banister Fletcher, A History of Architecture, University of London, The Antholone Press.
2. G.K.Hiraskar, Great Ages of World Architecture, Dhanpat Rai & Sons, Delhi.

**Reference:**

1. Pier Liugi Nervi, General Editor, History of World Architecture, Series, Harry N.Abrams, Inc. Pub, New York.
2. S.Lloyd and H.W.Muller, History of World Architecture Series, Faber and Faber Ltd., London.
3. Spiro Kostof – History of Architecture – Setting and Rituals, Oxford University Press, London.

**WASTE MANAGEMENT  
(Professional Elective - IV)**

IV-B.Tech.-II-Sem.

Subject Code: 17CE4207PE

L T P C

3 0 0 3

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO2	PO3	PO6	PO7	PO12	PO13
CO1	explain the sources of solid waste and its impact	3	2	3	3	3	3
CO2	describe the process of solid waste and its management	3	3	3	3	3	3
CO3	illustrate the process of handling hazardous wastes	3	3	3	3	3	3
CO4	classify various biomedical waste management systems	3	3	3	3	3	3
CO5	apply e-waste management techniques	3	3	3	3	3	3

**Unit - I**

**Solid Waste and their Handling:** Definition of solid wastes — types of solid wastes — Sources – Industrial, mining, agricultural and domestic — Characteristics. Solid waste Problems – impact on environmental health

**Unit - II**

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

**Unit - III**

**Hazardous Waste and Management:** Hazardous waste definition. Physical and biological routes of transport of hazardous substances — sources and characterization. Sampling and analysis of hazardous wastes —proximate analysis — survey analysis — directed analysis,handling, collection, storage and transport. Hazardous waste treatment technologies TSDF concept – Physical, chemical and thermal treatment of hazardous waste: solidification, chemical fixation, encapsulation, pyrolysis and incineration. Hazardous waste land fills – Site selections, design and operation. HW reduction, recycling and reuse, Regulatory aspects of HWM/HWM rules.

**Unit - IV**

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

**Unit - V**

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

**Text Books**

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

**References**

1. Hazardous waste management by Prof. Anjaneyulu.



**PAVEMENT DESIGN**  
**(Professional Elective - IV)**

IV-B.Tech.-II-Sem.

Subject Code: 17CE4208PE

L T P C  
3 0 0 3

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO3	PO6	PO8	PO12	PO14
CO1	identify various factors affecting the pavement design	2	3	3	3	3
CO2	analyze the stresses in pavements	3	3	3	3	3
CO3	design the flexible and rigid pavements using various methods	3	3	3	2	3
CO4	determine the characteristics of materials for pavement design	2	2	3	3	3
CO5	design pavement for low volume roads and over lays	3	3	3	3	3

**Unit - I**

**Factors Affecting Pavement Design:** Variables Considered in Pavement Design, Types of Pavements, Functions of Individual Layers, Classification of Axle Types of Rigid Chassis and Articulated Commercial Vehicles, Legal Axle and Gross Weights on Single and Multiple Units, Tire Pressure, Contact Pressure, EAL and ESWL Concepts, Traffic Analysis: ADT, AADT, Truck Factor, Growth Factor, Lane, Directional Distributions & Vehicle Damage Factors, Effect of Transient & Moving Loads.

**Unit - II**

**Stresses In Pavements:** Vehicle-Pavement Interaction: Transient, Random & Damping Vibrations, Steady State of Vibration, Experiments on Vibration, Stress Inducing Factors in Flexible and Rigid pavements

**Stresses In Flexible Pavements :**Visco-Elastic Theory and Assumptions, Layered Systems Concepts, Stress Solutions for One, Two and Three Layered Systems, Fundamental Design Concepts

**Stresses In Rigid Pavements:**Westergaard's Theory and Assumptions, Stresses due to Curling, Stresses and Deflections due to Loading, Frictional Stresses, Stresses in Dowel Bars & Tie Bars.

**Unit - III**

**Design Of Flexible Pavements:**Flexible Pavement Design Concepts, Asphalt Institute's Methods with HMA and other Base Combinations, AASHTO, IRC Methods,

**Design Of Rigid Pavements:**Calibrated Mechanistic Design Process, PCA, AASHTO & IRC Specifications, Introduction to Prestressed and Continuously Reinforced Cement Concrete Pavement Design.

**Unit - IV**

**Material Characteristics:**CBR and Modulus of Subgrade Reaction of Soil, Mineral aggregates – Blending of aggregates, binders, polymer and rubber modified bitumen, Resilient, Diametral Resilient and Complex [Dynamic] Moduli of Bituminous Mixes, Permanent Deformation Parameters and other Properties, Effects and Methods of Stabilisation and Use of Geo Synthetics.

**Unit - V**

**Design Of Pavement For Low Volume Roads:**Pavement design for low volume roads, Rural road designs – code of practices .

**Design Of Over Lays:**Types of Overlays, Suitability, Design of Overlays.

**Textbooks:**

1. Highway Engineering, S.K.Khanna, Justo and Veeraragavan. A, Nem Chand and Brothers.
2. Pavement Design, R. Srinivasa Kumar, Universities Press.

**References:**

1. Principles and Practice of Highway Engineering, L.R. Kadiyali and N.B.Lal, Khanna Publ..
2. IRC: 37 & 58 Codes for Flexible and Rigid Pavements Design.
3. IRC: SP: 72 & 62 Codes for Design of Low volume Flexible and Rigid Pavements.

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

IV-B.Tech.-II-Sem.

Subject Code: 17CE4209PE

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3 0 0 3

**Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)**

COs	Upon completion of course the students will be able to	PO2	PO12	PO13
CO1	explain various methods of dewatering	2	3	3
CO2	identify suitable densification methods for various soils	3	3	3
CO3	improve the soil strength using grouting and stabilization methods	3	2	3
CO4	propose suitable techniques to strengthen the expansive soil	2	3	3
CO5	classify geo-synthetics and their field applications	3	3	3

**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**

**In-Situ Densification Methods in Cohesion less and Cohesive Soils:** Vibration at the ground surface, Impact at the Ground Surface, Vibration at depth, Impact at depth. Preloading or dewatering, Vertical drains - Sand Drains, Sand wick geo-drains - Stone and lime columns - thermal methods

**Unit-III**

**Grouting:** Objectives of grouting- grouts and their properties- grouting methods - ascending, descending and stage grouting- hydraulic fracturing in soils and rocks- post grout test.

**Stabilization:** Methods of stabilization mechanical cement lime bituminous - chemical stabilization with calcium chloride sodium silicate and gypsum

**Unit-IV**

**Expansive Soils:** Problems of expansive soils - tests for identification - methods of determination of swell pressure - Improvement of expansive soils. Foundation techniques in expansive soils - under reamed piles.

**Unit-V**

**Geosynthetics and Reinforced Earth:** Geo-textiles - Types, Functions and applications – geo-grids and geo-membranes - functions and applications. Reinforced Earth: Principles - Components of reinforced earth - factors governing design of reinforced earth walls - design principles of reinforced earth walls.

**Textbooks:**

1. Engineering Principles of Ground Modification, Hausmann M.R. , MGH, International Edn.
2. Ground Improvement Techniques, Purushotham Raj, Laxmi Publications, New Delhi.