

# **ACADEMIC REGULATIONS, COURSE STRUCTURE and DETAILED SYLLABUS**

**CHOICE BASED CREDIT SYSTEM**

**R21**

## **B.Tech – Civil Engineering**

**B.Tech - Regular Four Year Degree Programme  
(For batches admitted from the academic year 2021 - 2022)**



**Holy Mary Institute of Technology & Science**

**Bogaram (V), Keesara (M), Medchal (Dist) - 501 301**

## **FOREWORD**

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

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

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

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

**PRINCIPAL**

# **ACADEMIC REGULATIONS**

**B. Tech. - Regular Four Year Degree Programme**  
**(For batches admitted from the academic year 2021-22)**  
**&**  
**B. Tech. - Lateral Entry Scheme**  
**(For batches admitted from the academic year 2022-23)**

For pursuing four year Under Graduate Degree Programme of study in Engineering & Technology (UGP in E&T) offered by Holy Mary Institute of Technology & Science under Autonomous status is herein referred to as HITS (Autonomous):

All the rules specified herein approved by the Academic Council will be in force and applicable to students admitted from the Academic Year 2021-22 onwards. Any reference to “Institute” or “College” in these rules and regulations shall stand for Holy Mary Institute of Technology & Science (Autonomous).

All the rules and regulations, specified hereafter shall 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, Holy Mary Institute of Technology & Science shall be the chairman Academic Council.

## **1. ADMISSION**

### **1.1. Admission into first year of four year B. Tech. degree programmes of study in Engineering**

#### **1.1.1. Eligibility:**

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

- (i) Passed either Intermediate Public Examination (I.P.E) 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 in the relevant branch 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 EAMCET examination conducted by TSCHE for allotment of a seat by the Convener, EAMCET, for admission.

#### **1.1.2. Admission Procedure:**

Admissions are made into the first year of four year B. Tech. Degree Programmes as per the stipulations of the TSCHE.

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

**1.2 Admission into the second year of four year B. Tech. degree Program in Engineering****1.2.1 Eligibility:**

A candidate seeking admission under lateral entry into the II year I Semester B. Tech. degree Programmes should have passed the qualifying exam (B.Sc. Mathematics or Diploma in concerned course) and based on the rank secured by the candidate at Engineering Common Entrance Test ECET (FDH) in accordance with the instructions received from the Convener, ECET and Government of Telangana.

**1.2.2 Admission Procedure:**

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

**2. PROGRAMMES OFFERED**

**Holy Mary Institute of Technology & Science**, an autonomous college affiliated to JNTUH, offers the following B.Tech Programmes of study leading to the award of B. Tech degree under the autonomous scheme.

- 1) B.Tech. - Civil Engineering
- 2) B.Tech. - Computer Science and Engineering
- 3) B.Tech. – Computer Science and Engineering (Artificial Intelligence & Machine Learning)
- 4) B.Tech – Computer Science and Engineering (Data Science)
- 5) B.Tech – Computer Science and Engineering (IoT)
- 6) B.Tech – Computer Engineering (Software Engineering)
- 7) B.Tech. - Electronics and Communication Engineering
- 8) B.Tech - Electrical & Electronics Engineering
- 9) B.Tech. - Mechanical Engineering

The medium of instructions for the entire under graduate programme in Engineering & Technology will be English only.

**3. DURATION OF THE PROGRAMMES****3.1 Normal Duration**

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

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

**3.2 Maximum Duration**

3.2.1 The maximum period within which a student must complete a full-time academic programme is 8 years for B. Tech. If a student fails to complete the academic programme within the maximum duration as specified above, he shall forfeit the seat in B.Tech and his admission shall stand cancelled.

3.2.2 For students admitted under lateral entry scheme in B. Tech. degree programme, the maximum period within which a student must complete a full-time academic programme is 6 years. If a student fails to complete the academic programme within the maximum duration as specified above, he shall forfeit the seat in B.Tech and his admission shall stand cancelled.

- 3.2.3 The period is reckoned from the academic year in which the student is admitted first time into the degree Programme.

#### **4. AWARD OF B.Tech DEGREE**

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

- 4.1 The candidate shall pursue a course of study as specified in section 3.1 and 3.2.
- 4.2 The candidate shall register for 160 credits and secure 160 credits (Excluding Mandatory Courses).

#### **5. PROGRAMME STRUCTURE**

- 5.1 UGC/AICTE specified Definitions/ Descriptions are adopted appropriately for various terms and abbreviations used in these Academic Regulations/ Norms, which are listed below.

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

Each UGP is of 4 Academic Years (8 Semesters), each year divided into two Semesters of 22 weeks (  $\geq 90$  working days), each Semester having - ‘Continuous Internal Evaluation (CIE)’ and ‘Semester End Examination (SEE)’ under Choice Based Credit System (CBCS) and Credit Based Semester System (CBSS) as denoted by UGC, and Curriculum/Course Structure as suggested by AICTE are followed.

- 5.1.1 The B.Tech. Programme of Holy Mary Institute of Technology & Science is Semester pattern, with 8 Semesters constituting 4 Academic Years, each Academic Year having TWO Semesters (First/Odd and Second/Even Semesters). Each Semester shall be of 16-18 Weeks duration with a minimum of 90 Instructional Days per Semester.

- 5.1.2 Credit Courses:

a) All 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) / Tutorial(T) Courses; and
- One Credit - for Two hours/Week/Semester for Laboratory/Practical (P) Courses, Mini Project...
- Mandatory Courses Credits shall not be counted for credit requirements for award of degree. However all the mandatory courses have to be passed by the student.

- 5.1.3 **Course Classification:**

All Courses offered for the UGP are broadly classified as:

- **Basic Science Courses (BSC):** Includes Mathematics, Physics, Chemistry, Biology etc.
- **Engineering Science Courses (ESC):** Courses include Materials, Workshop, Basics of Electrical/Electronics/ Mechanical/Computer Science & Engineering, Engineering Graphics, Instrumentation, Engineering Mechanics, Instrumentation etc.
- **Humanities and Social Science including Management Courses (HSMC):** Courses include English, Communication skills, Management etc.
- **Professional Core Courses (PCC):** Relevant to the chosen specialization/branch.
- **Professional Elective Courses (PEC):** Relevant to the chosen specialization/ branch offered as electives.
- **Open Elective Courses (OEC):** Other technical and/or emerging subject areas offered in the College by the Departments of Engineering, Science and Humanities.

- **Mandatory Course:** Course work on peripheral subjects in a programme, wherein familiarity considered mandatory. To be included as non-Credit, Mandatory Courses, with only a pass in each required to qualify for the award of degree from the concerned institution.
- **Project Work:** and/or internship in industry or elsewhere, seminar.
- **MOOCS** – Massive Open Online Courses in a variety of disciplines available at both introductory and advanced levels, accessible from e-resources in India and abroad.

**5.1.4 Course Nomenclature:**

The Curriculum Nomenclature or Course-Structure Grouping for the each of the UGP E&T (B.Tech Degree Programme), is as listed below.

<b>S. No</b>	<b>Broad Course Classification</b>	<b>Course Group/ Category</b>	<b>Course Description</b>	<b>Credits</b>
1)	BSC,ESC & HSMC	BSC – Basic Sciences Courses	Includes - Mathematics, Physics and Chemistry Subjects	25
2)		ESC - Engineering Sciences Courses	Includes fundamental engineering subjects.	24
3)		HSMC – Humanities and Social Sciences including Management	Includes subjects related to Humanities, Social Sciences and Management.	12
4)	PCC	PCC – Professional Core Courses	Includes core subjects related to the Parent Discipline/ Department/ Branch of Engg.	57
5)	PEC	PEC– Professional Elective Courses	Includes Elective subjects related to the Parent Discipline / Department / Branch of Engg.	18
6)	OEC	OEC – Open Elective Courses	Elective subjects which include inter-disciplinary subjects or subjects in an area outside the Parent Discipline/ Department / Branch of Engg.	09
7)	PWC	Project Work	Major Project.	15
8)		Industrial Training/ Mini- Project	Industrial Training/ Internship/ Mini-Project.	
9)		Seminar	Seminar / Colloquium based on core contents related to Parent Discipline/ Department/ Branch of Engg.	
10)	MC	Mandatory Courses	Mandatory Courses (non-credit)	--
<b>Total Credits for UGP (B. Tech.)Programme</b>				<b>160</b>

- Minor variations as per AICTE / UGC guidelines

**6. COURSE REGISTRATION**

- 6.1 A 'Faculty Advisor or Counsellor' shall be assigned to each student, who advises him/her about the UGP, its Course Structure and Curriculum, Choice/Option for Subjects/Courses, based on his/her competence, progress, pre-requisites and interest.
- 6.2 Academic Section of the College invites 'Registration Forms' from students prior (before the beginning of the Semester), ensuring 'DATE and TIME Stamping'. The Registration Requests for any 'CURRENT SEMESTER' shall be completed BEFORE the commencement of SEEs (Semester End Examinations) of the 'PRECEDING SEMESTER'.
- 6.3 A Student can apply for Registration, which includes approval from his faculty advisor, and then should be submitted to the College Academic Section through the Head of Department (a copy of the same being retained with Head of Department, Faculty Advisor and the Student).
- 6.4 A student may be permitted to register for his/her course of CHOICE with a Total of prescribed credits per Semester (permitted deviation being  $\pm 12\%$ ), based on his PROGRESS and SGPA/CGPA, and completion of the 'PRE-REQUISITES' as indicated for various courses in the Department Course Structure and Syllabus contents.
- 6.5 Choice for 'additional Courses' must be clearly indicated, which needs the specific approval and signature of the Faculty Advisor/Counsellor.
- 6.6 If the Student submits ambiguous choices or multiple options or erroneous (incorrect) entries during Registration for the Course(s) under a given/specified Course Group/ Category as listed in the Course Structure, only the first mentioned Course in that Category will be taken into consideration.
- 6.7 Dropping of Courses or changing of options may be permitted, ONLY AFTER obtaining prior approval from the Faculty Advisor, 'within 15 Days of Time' from the commencement of that Semester. Course Options exercised through Registration are final and CAN NOT be changed, and CAN NOT be inter-changed; further, alternate choices will also not be considered. However, if the Course that has already been listed for Registration (by the Head of 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.

**7. COURSES TO BE OFFERED**

- 7.1 A typical section (or class) strength for each semester shall be 60.
- 7.2 Courses may be offered to the Students, only if minimum of 20 students ( $1/3^{\text{rd}}$  of the section strength) opt for it.
- 7.3 More than ONE TEACHER 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 - 'CGPA Basis Criterion' (i.e., the first focus shall be on early Registration in that Semester, and the second focus, if needed, will be on CGPA of the student).
- 7.4 If more entries for Registration of a Subject come into picture, then the concerned Head of the Department shall take necessary decision, whether to offer such a Subject/Course for TWO (or multiple) SECTIONS or NOT.
- 7.5 OPEN ELECTIVES will be offered by a department to the students of other departments.



**8. B.Tech (Honours) DEGREE**

A new academic programme B.Tech (Hons.) is introduced in order to facilitate the students to choose additionally the specialized courses of their choice and build their competence in a specialized area.

- 8.1 B.Tech students in regular stream can opt for B.Tech (Hons.), provided they have a CGPA of 8.0 and above up to the end of IV-Semester without any history of arrears and attempting of betterment.
- 8.2 For B. Tech (Honours), a student needs to earn additional 20 credits (over and above the required 160 credits for B. Tech degree). Student to opt for the courses from NPTEL/SWAYAM/Coursera/other MOOC platform as recommended by concern BOS relevant to her/his discipline through MOOCs as recommended by the BOS.
- 8.3 If the credits of NPTEL/ SWAYAM/ Coursera /other MOOC platform courses do not match with the existing subject the BOS will take appropriate decision.
- 8.4 After registering for the B.Tech (Honours) programme, if a student fails in any course he/she will not be eligible for B.Tech (Honours).
- 8.5 Students who have obtained “C grade” or “reappear” or “Repeat Course” / “Re Admitted” or “Detained” category in any course, including the MOOCs courses, are not eligible for B.Tech (Hons.) degree. Up to 8 semesters without any history of arrears and attempting of betterment is not eligible to get B.Tech (Hons.).
- 8.6 Those who opted for B. Tech (Honours) but unable to earn the required additional credits in 8 semesters or whose final CGPA is less than 8 shall automatically fall back to the B.Tech programme. However, additional course credits and the grades thus far earned by them will be shown in the grade card but not included for the CGPA.
- 8.7 The students have to pay the requisite fee for the additional courses.

**Table: Assigned Credits**

Hour/Week	Online Course Duration	Assigned Credits
2 hours / week	04 Weeks	01 Credit
3 hours / week	08 Weeks	03 Credits
3 hours / week	12 Weeks	04 Credits

**9. B.Tech (Minor) DEGREE**

This concept is introduced in the curriculum of all conventional B. Tech. programmes offering a major degree. The main objective of Minor in a discipline is to provide additional learning opportunities for academically motivated students and it is an optional feature of the B. Tech. programme. In order to earn a Minor in a discipline a student has to earn 20 extra credits by studying any five theory subjects from the programme core & professional elective courses of the minor discipline or equivalent MOOC courses available under SWAYAM platform. The list of courses to be studied either in MOOCs or conventional type will be decided by the department at the time of registration for Minor degree.

- a. B.Tech students in regular stream can opt for B.Tech (Minor.), provided they have a CGPA of 8.0 and above up to the end of IV-Semester without any history of arrears and attempting of betterment.
- b. Students aspiring for a Minor must register from V-Semester onwards and must opt for a Minor in a discipline other than the discipline he/she is registered in. However, Minor discipline registrations are not allowed before V-Semester and after VI-Semester.

- c. Students will not be allowed to register and pursue more than extra two subjects in any semester.
- d. Completion of a Minor discipline programme requires no addition of time to the regular Four year Bachelors' programme. i.e. Minor discipline programme should be completed by the end of final year B. Tech. program along with the major discipline.
- e. A student registered for Minor in a discipline shall pass in all subjects that constitute the requirement for the Minor degree programme. No class/division (i.e., second class, first class and distinction, etc.) shall be awarded for Minor degree programme.

## **10. ATTENDANCE REQUIREMENTS**

- a. A student will be eligible to appear for the End Semester Examinations, if he acquires a minimum of 75% of attendance in aggregate of all the Subjects/Courses (excluding Mandatory or Non-Credit Courses) for that Semester.
- b. 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 by following the govt. rules in vogue.
- c. A stipulated fee shall be payable towards condoning of shortage of attendance.
- d. Shortage of Attendance below 65% in aggregate shall in No case be condoned.
- e. A student shall not be promoted to the next Semester unless he/she satisfies the attendance requirements of the current Semester. The student may seek readmission for the Semester when offered next. He / She shall not be allowed to register for the subjects of the Semester while he/she is in detention. A student detained due to shortage of attendance, will have to repeat that Semester when offered next. The academic regulations under which the student has been readmitted shall be applicable.
- f. Students whose attendance is less than 75% are not entitled to get the scholarship / fee reimbursement in any case as per the TS Govt. Rules in force.

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

- 11.1 A student shall be deemed to have satisfied the Academic Requirements and earned the Credits allotted to each Course, if he secures not less than 35% marks in the End Semester Examination, and a minimum of 40% of marks in the sum Total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together; in terms of Letter Grades, this implies securing P Grade or above in that Course.
- 11.2 A Student will not be promoted from I Year to II Year, unless he/she fulfils the Attendance and Academic Requirements and secure a Total 40% of Credits up to I Year II Semester from all the relevant regular and supplementary examinations.
- 11.3 A Student will not be promoted from II Year to III Year, unless he/she fulfils the Attendance and Academic Requirements and secure a Total 50% of Credits up to II Year II Semester from all the relevant regular and supplementary examinations.
- 11.4 A Student will not be promoted from III Year to IV Year, unless he/she fulfils the attendance and Academic Requirements and secure a Total 60% of Credits up to III Year II Semester, from all the regular and supplementary examinations.
- 11.5 After securing the necessary 160 Credits as specified for the successful completion of the entire UGP, resulting in 160 Credits for UGP performance evaluation, i.e., the performance of

the Student in these 160 Credits shall alone be taken into account for the calculation of the final CGPA.

If a Student registers for some more 'extra courses' (in the parent Department or other Departments/Branches of Engg.) other than those listed courses Totalling to 160 Credits as specified in the Course Structure of his/her Department, the performances in those 'extra courses' (although evaluated and graded using the same procedure as that of the required 160 Credits) will not be taken into account while calculating the SGPA and CGPA. For such 'extra courses' registered, % 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 items 8 and 9.1-9.5.

11.6 Students who fail to earn minimum of 160 Credits as per the Course Structure, and as indicated above, within 8 Academic Years from the Date of Commencement of their I Year shall forfeit their seats in B.Tech Programme and their admissions shall stand cancelled.

**When a Student is detained due to shortage of attendance/lack of credits in any Semester, he may be re-admitted into that Semester, as and when offered. However the regulations at the time of admissions hold good.**

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

12.1 The performance of a student in each Semester shall be evaluated Course-wise (irrespective of Credits assigned) with a maximum of 100 marks for Theory. The B.Tech Project Work (Major Project) will be evaluated for 100 marks in Phase-I and 100 Marks in Phase-II.

12.2 For all Theory Courses as mentioned above, the distribution shall be 30 marks for CIE, and 70 marks for the SEE.

12.3

a) For Theory Subjects (inclusive of Minor Courses), during the semester, there shall be two Continues Internal Evaluations (CIE) examinations for **30 marks** each. Each CIE examination consists of one subjective paper for **25 marks**, and assignment for **5 marks** for each subject. Question paper contains Two Parts (Part-A &Part-B) the distribution of marks for PART-A and PART-B will be 10 marks & 15 marks respectively for UG programme. Average of two CIE examinations will be taken as part of external assessment.

Pattern of the question paper is as follows:

### **PART-A**

Consists of **one compulsory question** with five sub questions each carrying two mark. For the I-Mid examinations the sub question would be from first 2 ½ units and for the II-Mid examination the sub question would be from the remaining 2 ½ units.

### **PART-B**

Consists of five questions (out of which students have to answer three questions) carrying five marks each. Each question there will be an "either" "or" choice (that means there will be two questions from each unit and the student should answer any one question). The questions can consist of sub questions also.

b) 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.

- c) 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.
  - d) If any candidate is absent for the CIE examinations or those who want to improve their internal marks in any subject can opt for improvement exam as and when offered. The improvement exam is a 45 minutes duration and consisting of 30 objective questions from the entire syllabus of the subject. Best marks are considered as final marks from the average of two mid examinations or improvement examination marks. The improvement can be taken after the payment of prescribed fee. There is no Internal Improvement for the courses Machine Drawing, Production Drawing, Engineering Drawing, Engineering Graphics and practical, mandatory courses.
- 12.4 For Practical Courses, there shall be a Continuous Internal Evaluation (CIE) during the Semester for 30 internal marks, and 70 marks are assigned for Lab/Practical End Semester Examination (SEE). Out of the 30 marks for internals, day-to-day work in the laboratory shall be evaluated for 20 marks; and for the remaining 10 marks - two internal practical tests (each of 10 marks) shall be conducted by the concerned laboratory teacher and the average of the two tests is taken into account. The SEE for Practical's shall be conducted at the end of the Semester by Two Examiners appointed by the Chief Controller of Examinations in consultation with the Head of the Department.
- 12.5 For the Subjects having Design and/or Drawing, (such as Engineering Graphics, Engineering Drawing, Machine Drawing, Production Drawing Practice, and Estimation), the distribution shall be 30 marks for CIE (10 marks for day-to-day work and 20 marks for internal tests) and 70 marks for SEE. There shall be two internal tests in a semester and the average of the two shall be considered for the award of marks for internal tests.
- 12.6 Open Elective Course: Students can choose one open elective course (OE-I) during III-B.Tech I-semester, one (OE-II) during III-B.Tech II-semester, one (OE-III) in IV-B.Tech I-semester, and one (OE-IV) in IV-B.Tech II-semester from the list of open elective courses given. However, students cannot opt for an open elective courses offered by their own (parent) department, if it is already listed under any category of the subjects offered by parent department in any Semester.
- 12.7 There shall be an Industrial Oriented Mini Project/Summer Internship, in collaboration with an industry of their specialization. Students will register for this immediately after II year II semester examinations and pursue it during summer vacation. Industrial Oriented Mini Project/Summer Internship shall be submitted in a report form and presented before the committee in III year I semester. It shall be evaluated for 100 external marks. The committee consists of an external examiner, Head of the Department, Supervisor of the Industrial Orientated Mini Project/Summer Internship and a senior faculty member of the department. There shall be no internal marks for Industrial Orientated Mini Project/Summer Internship.
- 12.8 There shall be a Comprehensive Viva (Independent Study) in III-B.Tech II-Semester and will be conducted SEE through a test or a committee consisting of One External Examiner, Head of the Department and two senior faculty members of the Department. The independent study is intended to assess the student's understanding of the subjects he/she studied during the B.Tech course of study and evaluated for 100 marks. There shall be no CIE for Comprehensive Viva.

12.9.

- a) UG project work shall be carried out in two stages: Project Stage – I during IV Year I Semester, Project Stage – II during IV Year II Semester. Each stage will be evaluated for 100 marks. Student has to submit project work report at the end of each semester. First report includes project work carried out in IV Year I semester and second report includes project work carried out in IV Year I & II Semesters. SEE for both project stages shall be completed before the commencement of SEE Theory examinations.
- b) For Project Stage – I, the departmental committee consisting of Head of the Department, project supervisor and a senior faculty member shall evaluate the project work and project supervisor shall evaluate for 100 marks. The student is deemed to have failed, if he (i) does not submit a report on Project Stage - I or does not make a presentation of the same before the evaluation committee as per schedule, or (ii) secures less than 40% marks in the total of the CIE.

A student who has failed may reappear once for the above evaluation, when it is scheduled again; if he fails in such 'one reappearance' evaluation also, he has to reappear for the same in the next subsequent semester, as and when it is scheduled.

- c) For Project Stage – II, the external examiner shall evaluate the project work for 70 marks and the project supervisor shall evaluate it for 30 marks. The topics for industrial oriented mini project and Project Stage – I shall be different from one another. The student is deemed to have failed, if he (i) does not submit a report on Project Stage - II, or does not make a presentation of the same before the external examiner as per schedule, or (ii) secures less than 40% marks in the sum total of the CIE and SEE taken together.

For conducting viva-voce of project stage – II, Chief Controller of Examinations selects an external examiner from the list of experts in the relevant branch submitted by the department HODs of the College.

A student who has failed may reappear once for the above evaluation, when it is scheduled again; if student fails in such 'one reappearance' evaluation also, he has to reappear for the same in the next subsequent semester, as and when it is scheduled.

**12.10. Semester End Examination:**

- a) Question paper contains 2 Parts (Part-A and Part-B) having the questions distributed equally among all units.
- b) The distribution of marks for i) PART-A for 20 marks ii) PART-B for 50 marks. Pattern of the question paper is as follows:

**PART-A**

Consists of one question which is compulsory. The question consists of ten sub-questions one from each unit and carry 2 marks each.

**PART-B**

Consists of 5 questions carrying 10 marks each. Each of these questions is from one unit and may contain sub questions. Each question there will be an "either" "or" choice (that means there will be two questions from each unit and the student should answer any one question).

- 12.11. For Mandatory Non-Credit Courses offered in a Semester, after securing  $\geq 65\%$  attendance and has secured not less than 35% marks in the SEE, and a minimum of 40% of marks in the sum Total of the CIE and SEE taken together in such a course, then the student is **PASS** and will be qualified for the award of the degree. No marks or Letter Grade shall be allotted for this courses/activities. However, for non credit courses '**Satisfactory**' or "**Unsatisfactory**'

shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA.

- 12.12. SWAYAM: College intends to encourage the students to do a minimum of one MOOC in discipline and open elective during third year. The respective departments shall give a list of standard MOOCs providers including SWAYAM whose credentials are endorsed by the BoS. In general, MOOCs providers provide the result in percentage. In such case, specified by the college shall follow the grade table mentioned in 14.2. The Credits for MOOC(s) shall be transferred same as given for the respective discipline or open electives. In case a student fails to complete the MOOCs he/she shall re-register for the same with any of the providers from the list provided by the department. The equivalence of the courses shall be established by the department committee. Still if a student fails to clear the course/s, or in case a provider fails to offer a MOOC in any semester, then in all such cases the college shall conduct the end semester examinations for the same as per the college end semester examination pattern. The syllabi for the supplementary examinations shall be same as that of MOOCs. There shall be no internal assessment however the marks obtained out of 70 shall be scaled up to 100 marks and the respective letter grade shall be allotted. The details of MOOC(s) shall be displayed in Memorandum of Grades of a student, provided he/she submits the proof of completion of it or them to the examination branch through the Coordinator/Mentor, before the end semester examination of the particular semester.

### **13. AWARD OF DEGREE**

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

Table: **Declaration of Class based on CGPA (Cumulative Grade Point Average)**

<b>Class Awarded</b>	<b>Grade to be Secured</b>
First Class with Distinction	<b>CGPA <math>\geq</math> 8.00</b>
First Class	$\geq 6.50$ to $< 8.00$ CGPA
Second Class	$\geq 5.50$ to $< 6.50$ CGPA
Pass Class	$\geq 5.00$ to $< 5.50$ CGPA
FAIL	CGPA $< 5$

### **14. LETTER GRADE AND GRADE POINT**

- 14.1 Marks will be awarded to indicate the performance of each student in each Theory Subject, or Lab/Practical's, or Seminar, or Project, or Internship\*/Mini-Project, Minor Course etc., based on the %marks obtained in CIE+SEE (Continuous Internal Evaluation + Semester End Examination, both taken together), and a corresponding Letter Grade shall be given.
- 14.2 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...



% of Marks Secured (Class Intervals)	Letter Grade (UGC Guidelines)	Grade Points
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

- 14.3 A student obtaining F Grade in any Subject shall be considered ‘failed’ and will be required to reappear as ‘Supplementary Candidate’ 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.
- 14.4 A Letter Grade does not imply any specific % of Marks.
- 14.5 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, when he is detained.
- 14.6 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.

**Credit Points (CP) = Grade Point (GP) x Credits .... For a Course**

- 14.7 The Student passes the Subject/Course only when he gets  $GP \geq 4$  (P Grade or above).
- 14.8 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

$$SGPA = \{ \sum_{i=1}^N C_i G_i \} / \{ \sum_{i=1}^N C_i \} \dots \text{For each Semester,}$$

where ‘i’ is the Subject indicator index (takes into account all Subjects in a Semester), ‘N’ is the no. of Subjects ‘REGISTERED’ for the Semester (as specifically required and listed under the Course Structure of the parent Department),  $C_i$  is the no. of Credits allotted to that ix Subject, and  $G_i$  represents the Grade Points (GP) corresponding to the Letter Grade awarded for that i Subject.

**Illustration of Computation of SGPA Computation**

Course	Credit	Grade Letter	Grade Point	Credit Point (Credit x Grade)
Course1	3	A	8	3 x 8 = 24
Course2	4	B+	7	4 x 7 = 28
Course3	3	B	6	3 x 6 = 18
Course4	3	O	10	3 x 10 = 30
Course5	3	C	5	3 x 5 = 15
Course6	4	B	6	4 x 6 = 24

Thus, **SGPA = 139/20 = 6.95**

- 14.9 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

$$\text{CGPA} = \{ \sum_{j=1}^M C_j G_j \} / \{ \sum_{j=1}^M C_j \} \dots \text{for all S Semesters registered (i.e., up to and inclusive of S Semesters, } S \geq 2),$$

where 'M' is the TOTAL no. of Subjects (as specifically required and listed under the Course Structure of the parent Department) the Student has 'REGISTERED' from the 1<sup>st</sup> Semester onwards up to and inclusive of the Semester S (obviously  $M > N$ ), 'j' is the Subject indicator index (takes into account all Subjects from 1 to S Semesters),  $C_j$  is the no. of Credits allotted to the jth Subject, and  $G_j$  represents the Grade Points (GP) corresponding to the Letter Grade awarded for that jth Subject. After registration and completion of I Year I Semester however, the SGPA of that Semester itself may be taken as the CGPA, as there are no cumulative effects.

**For CGPA Computation**

Semester 1	Semester 2	Semester 3	Semester 4	Semester 5	Semester 6	Semester 7	Semester 8
Credits : 19.5	Credits : 20.5	Credits : 18.0	Credits : 19.0	Credits : 21.5	Credits : 21.5	Credits : 23	Credits : 17
SGPA : 6.9	SGPA : 7.8	SGPA : 5.6	SGPA : 6.0	SGPA : 6.3	SGPA : 8.0	SGPA : 8.0	SGPA : 8.0

$$\text{Thus, CGPA} = \frac{19.5 \times 6.9 + 20.5 \times 7.8 + 18.0 \times 5.6 + 19.0 \times 6.0 + 21.5 \times 6.3 + 21.5 \times 8.0 + 23 \times 8.0 + 17 \times 8.0}{160} = 7.10$$

- 14.10 For Merit Ranking or Comparison Purposes or any other listing, ONLY the 'ROUNDED OFF' values of the CGPAs will be used.
- 14.11 For Calculations listed in Item 12.6–12.10, 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.
- 14.12 Conversion formula for the conversion of GPA into indicative percentage is  
 % of marks scored = (final CGPA - 0.50) x 10



**15. DECLARATION OF RESULTS**

Computation of SGPA and CGPA are done using the procedure listed in 12.6– 12.10.

No SGPA/CGPA is declared, if a candidate is failed in any one of the courses of a given Semester.

**16. WITH HOLDING OF RESULTS**

If the student has not paid fees to College at any stage, or has pending dues against his name due to any reason what so ever, or if any case of indiscipline is pending against him, the result of such student may be withheld, and he will not be allowed to go into the next higher Semester. The Award or issue of the Degree may also be withheld in such cases.

**17. REVALUATION**

Students shall be permitted for revaluation after the declaration of end Semester examination results within due dates by paying prescribed fee. After revaluation if there is any betterment in the grade, then improved grade will be considered. Otherwise old grade shall be retained.

**18. SUPPLEMENTARY EXAMINATIONS**

Supplementary examinations for the odd Semester shall be conducted with the regular examinations of even Semester and vice versa, for those who appeared and failed or absent in regular examinations. Such candidates writing supplementary examinations may have to write sometimes one or two examinations per day.

**ADVANCED SUPPLEMENTARY EXAMINATION**

Advanced supplementary examinations will be conducted for IV year II Semester after announcement of regular results.

**19. 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 PC, CMM & Transcripts will also be issued if required after the payment of requisite fee and also as per norms in vogue.

**20. RULES OF DISCIPLINE**

- 20.1 Any attempt by any student to influence the teachers, Examiners, faculty and staff of controller of Examination for undue favours in the exams, and bribing them either for marks or attendance will be treated as malpractice cases and the student can be debarred from the college.
- 20.2 When the student absents himself, he is treated as to have appeared and obtained zero marks in that course(s) and grading is done accordingly.
- 20.3 When the performance of the student in any subject(s) is cancelled as a punishment for indiscipline, he is awarded zero marks in that subject(s).
- 20.4 When the student's answer book is confiscated for any kind of attempted or suspected malpractice the decision of the Examiner is final.

**21. MALPRACTICE PREVENTION COMMITTEE**

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

- a) Controller of examinations - Chairman
- b) Addl. Controller of examinations.- Member Convenor
- c) Subject expert - member
- d) Head of the department of which the student belongs to. - Member
- e) The invigilator concerned - member

The committee shall conduct the meeting after taking explanation of the student and punishment will be awarded by following the malpractice rules meticulously.

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

## **22. TRANSITORY REGULATIONS**

Student who has discontinued for any reason, or has been detained for want of attendance or lack of required credits as specified, or who has failed after having undergone the Degree Programme, may be considered eligible for readmission to the same Subjects/Courses (or equivalent Subjects/Courses, as the case may be), and same Professional Electives/Open Electives (or from set/category of Electives or equivalents suggested, as the case may be) as and when they are offered (within the time-frame of 8 years from the Date of Commencement of his I Year I Semester).

## **23. AMENDMENTS TO REGULATIONS**

The Academic Council of Holy Mary Institute of Technology & Science reserves the right to revise, amend, or change the regulations, scheme of examinations, and / or syllabi or any other policy relevant to the needs of the society or industrial requirements etc., without prior notice.

There shall be no Branch transfers after the completion of Admission Process. Transfer of student is permitted subjected to the rules and regulations of TSCHE (TE Department) and JNTUH in vogue.

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

Institute will award Medals to the outstanding students who complete the entire course in the first attempt within the stipulated time.

- i) Where the words “he”, “him”, “his”, occur in the write-up of regulations, they include “she”, “her”.
- ii) Where the words “Subject” or “Subjects”, occur in these regulations, they also imply “Course” or “Courses”.
- iii) The Academic Regulations should be read as a whole, for the purpose of any interpretation.
- iv) 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.

**Academic Regulations for B. Tech. (Lateral Entry Scheme)**  
**(Effective for the students getting admitted into II year**  
**from the Academic Year 2022-2023 on wards)**

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1. The Students have to acquire 120 credits from II to IV year of B.Tech Programme (Regular) for the award of the degree.
2. Students, who fail to fulfil the requirement for the award of the degree in 6 consecutive academic years from the year of admission, shall forfeit their seat.
3. The same attendance regulations are to be adopted as that of B. Tech. (Regular)

**Promotion Rule:**

A Student will not be promoted from III Year to IV Year, unless he/she fulfils the Attendance and Academic Requirements and (i) secures a Total of 60% Credits up to III Year II Semester, from all the regular and supplementary examinations.

**Award of Class:**

After the student has satisfied the requirements prescribed for the completion of the programme and is eligible for the award of B. Tech. Degree, he/she shall be placed in one of the following four classes: The marks obtained for 120 credits will be considered for the calculation of CGPA and award of class shall be shown separately.

**Table:** Declaration of Class based on CGPA (Cumulative Grade Point Average)

<b>Class Awarded</b>	<b>Grade to be Secured</b>
First Class with Distinction	CGPA $\geq$ 8.00
First Class	$\geq$ 6.50 to $<$ 8.00 CGPA
Second Class	$\geq$ 5.50 to $<$ 6.50 CGPA
Pass Class	$\geq$ 5.00 to $<$ 5.50 CGPA
FAIL	CGPA $<$ 5

All other regulations as applicable for B. Tech. Four-year degree programme (Regular) will hold good for B.Tech (Lateral Entry Scheme).

**MALPRACTICES RULES - DISCIPLINARY ACTION FOR  
/IMPROPER CONDUCT IN EXAMINATIONS**

<b>S. No</b>	<b>Nature of Malpractices / Improper Conduct</b>	<b>Punishment</b>
1 (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled and sent to the 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.	

# **COURSE STRUCTURE**

**Dept. of Civil Engineering**

<b>I B.Tech.- I-Semester</b>									
<b>Course Code</b>	<b>Course Title</b>	<b>Course Area</b>	<b>Hours per Week</b>			<b>Credits</b>	<b>Scheme of Examination Maximum Marks</b>		
			<b>L</b>	<b>T</b>	<b>P</b>		<b>Internal (CIE)</b>	<b>External (SEE)</b>	<b>Total</b>
A1MA101BS	Linear Algebra and Calculus	BSC	3	1	0	4	30	70	100
A1CH102BS	Engineering Chemistry	BSC	3	1	0	4	30	70	100
A1CS106ES	Programming for Problem Solving	ESC	3	0	0	3	30	70	100
A1EN105HS	English for Effective Communication	HSMC	2	0	0	2	30	70	100
A1CS114ES	Programming for Problem Solving Lab	ESC	0	0	4	2	30	70	100
A1CH110BS	Engineering Chemistry Lab	BSC	0	0	3	1.5	30	70	100
A1EN113HS	English Language and Communication Skills Lab	HSMC	0	0	3	1.5	30	70	100
A1CE117ES	Social Innovation	ESC	0	0	3	1.5	30	70	100
<b>Total</b>			<b>11</b>	<b>2</b>	<b>13</b>	<b>19.5</b>	<b>240</b>	<b>560</b>	<b>800</b>
<b>Mandatory Course (Non-Credit)</b>									
A1CE101MC	Technical Seminar - I	MC	0	0	2	0	100	0	100

<b>I B.Tech.- II-Semester</b>									
<b>Course Code</b>	<b>Course Title</b>	<b>Course Area</b>	<b>Hours per Week</b>			<b>Credits</b>	<b>Scheme of Examination Maximum Marks</b>		
			<b>L</b>	<b>T</b>	<b>P</b>		<b>Internal (CIE)</b>	<b>External (SEE)</b>	<b>Total</b>
A1MA201BS	Ordinary Differential Equations and Advanced Calculus	BSC	3	1	0	4	30	70	100
A1PH203BS	Engineering Physics	BSC	3	1	0	4	30	70	100
A1ME209ES	Engineering Mechanics	ESC	3	1	0	4	30	70	100
A1ME208ES	Engineering Graphics	ESC	1	0	4	3	30	70	100
A1PH212BS	Engineering Physics Lab	BSC	0	0	3	1.5	30	70	100
A1ME216ES	Workshop Manufacturing Practices	ESC	1	0	4	3	30	70	100
A1CE201PW	Engineering Exploration	PWC	0	0	2	1	30	70	100
<b>Total</b>			<b>11</b>	<b>3</b>	<b>13</b>	<b>20.5</b>	<b>210</b>	<b>490</b>	<b>700</b>
<b>Mandatory Course (Non-Credit)</b>									
A1CE202MC	Technical Seminar - II	MC	0	0	2	0	100	0	100



<b>II-B.Tech I Semester</b>									
Course Code	Course Title	Course Area	Hours per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
A1CE301PC	Surveying And Geomatics	PCC	3	0	0	3	30	70	100
A1CE302PC	Strength Of Materials-I	PCC	3	0	0	3	30	70	100
A1CE303PC	Fluid Mechanics	PCC	3	0	0	3	30	70	100
A1CE304PC	Engineering Geology	PCC	2	0	0	2	30	70	100
A1EE307ES	Basic Electrical and Electronics Engineering	ESC	3	0	0	3	30	70	100
A1CE305PC	Surveying Lab -I	PCC	0	0	3	1.5	30	70	100
A1CE306PC	Engineering Geology Lab	PCC	0	0	2	1	30	70	100
A1EE315ES	Basic Electrical and Electronics Engineering Lab	ESC	0	0	3	1.5	30	70	100
<b>Total</b>			<b>14</b>	<b>0</b>	<b>8</b>	<b>18</b>	<b>240</b>	<b>560</b>	<b>800</b>
<b>Mandatory Course (Non-Credit)</b>									
A1CE303MC	Gender Sensitization	MC	0	0	2	0	100	0	100

<b>II-B.Tech II Semester</b>									
Course Code	Course Title	Course Area	Hours per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
A1CE401PC	Strength Of Materials-II	PCC	3	0	0	3	30	70	100
A1MA402BS	Probability and Statistics & Numerical Methods	BSC	3	1	0	4	30	70	100
A1CE403PC	Hydraulics And Hydraulic Machinery	PCC	3	0	0	3	30	70	100
A1CE404PC	Building Materials and Construction Planning	PCC	3	0	0	3	30	70	100
A1CE405PC	Structural Analysis-I	PCC	3	0	0	3	30	70	100
A1CE406PC	Surveying Lab -II	PCC	0	0	2	1	30	70	100
A1CE407ES	Computer Aided Drawing Lab	ESC	0	0	2	1	30	70	100
A1CE408PC	Strength Of Materials Lab	PCC	0	0	2	1	30	70	100
<b>Total</b>			<b>15</b>	<b>1</b>	<b>6</b>	<b>19</b>	<b>240</b>	<b>560</b>	<b>800</b>
<b>Mandatory Course (Non-Credit)</b>									
A1CE404MC	Environmental Studies	MC	3	0	0	0	100	0	100
A1CE405MC	Human Values & Professional Ethics	MC	3	0	0	0	100	0	100

<b>III-B.Tech I-Semester</b>									
Course Code	Course Title	Course Area	Hours per Week			Credits	Scheme of Examination		
			L	T	P		Internal (CIE)	External (SEE)	Total
A1CE501PC	Structural Analysis-II	PCC	3	0	0	3	30	70	100
A1CE502PC	Design Of Reinforced Concrete Structures	PCC	3	1	0	4	30	70	100
A1CE503PC	Hydrology and Water Resource Engineering	PCC	3	0	0	3	30	70	100
	Professional Elective-I	PEC	3	0	0	3	30	70	100
A1CE505HS	Business Economics And Financial Analysis	HSMC	3	0	0	3	30	70	100
A1CE506PC	Concrete Technology Lab	PCC	0	0	3	1.5	30	70	100
A1CE507ES	Computer Aided Engineering Drafting	ESC	0	0	2	1	30	70	100
A1CE508PC	Fluid Mechanics and Hydraulics Machinery Lab	PCC	0	0	2	1	30	70	100
A1CE502PW	Internship/Mini Project	PWC	0	0	0	2	-	100	100
<b>Total</b>			<b>15</b>	<b>1</b>	<b>7</b>	<b>21.5</b>	<b>240</b>	<b>660</b>	<b>900</b>
MOOC's (B. Tech Hon's Degree)									
<b>Mandatory Course (Non-Credit)</b>									
A1CE506MC	Essence of Indian Traditional Knowledge	MC	2	0	0	0	100	0	100

<b>III-B.Tech II-Semester</b>									
Course Code	Course Title	Course Area	Hours per Week			Credits	Scheme of Examination		
			L	T	P		Internal (CIE)	External (SEE)	Total
A1CE601PC	Design Of Steel Structures	PCC	3	1	0	4	30	70	100
A1CE602PC	Geotechnical Engineering	PCC	3	1	0	4	30	70	100
	Professional Elective-II	PEC	3	0	0	3	30	70	100
	Professional Elective-III	PEC	3	0	0	3	30	70	100
	Open Elective - I	OEC	3	0	0	3	30	70	100
A1CE603PC	Geotechnical Engineering Lab	PCC	0	0	2	1	30	70	100
A1CE604PC	Structural Analysis And Design Lab	PCC	0	0	3	1.5	30	70	100
A1EN603HS	Advanced English Communications Skills Lab	HSMC	0	0	2	1	30	70	100
A1CE603PW	Comprehensive Viva	PWC	0	0	0	1	0	100	100
<b>Total</b>			<b>15</b>	<b>2</b>	<b>7</b>	<b>21.5</b>	<b>240</b>	<b>660</b>	<b>900</b>
MOOC's (B. Tech Hon's Degree)									
<b>Mandatory Course (Non-Credit)</b>									
A1CE606MC	Constitution of India	MC	3	0	0	0	100	0	100

<b>IV-B.Tech I-Semester</b>									
Course Code	Course Title	Course Area	Hours per Week			Credits	Scheme of Examination		
			L	T	P		Internal (CIE)	External (SEE)	Total
A1CE701PC	Environmental Engineering	PCC	3	1	0	4	30	70	100
A1CE702PC	Pre Stressed Concrete	PCC	3	1	0	4	30	70	100
	Professional Elective- IV	PEC	3	1	0	4	30	70	100
	Open Elective-II	OEC	3	0	0	3	30	70	100
A1CE703PC	Environmental Engineering Lab	PCC	0	0	4	2	30	70	100
A1CE704PC	Pavement Material Testing Lab	PCC	0	0	4	2	30	70	100
A1CE704PW	Project Work (Phase-I)	PWC	0	0	8	4	100	0	100
MOOC's (B. Tech Hon's Degree)									
<b>Total</b>			<b>12</b>	<b>3</b>	<b>16</b>	<b>23</b>	<b>280</b>	<b>420</b>	<b>700</b>

<b>IV-B.Tech II-Semester</b>									
Course Code	Course Title	Course Area	Hours per Week			Credits	Scheme of Examination		
			L	T	P		Internal (CIE)	External (SEE)	Total
A1CE801PC	Green Building Technologies	PCC	3	0	0	3	30	70	100
	Professional Elective-V	PEC	3	0	0	3	30	70	100
	Open Elective-III	OEC	3	0	0	3	30	70	100
A1CE805PW	Project Work (Phase-II)	PWC	0	0	16	8	30	70	100
MOOC's (B. Tech Hon's Degree)									
<b>Total</b>			<b>9</b>	<b>0</b>	<b>16</b>	<b>17</b>	<b>120</b>	<b>280</b>	<b>400</b>

**Total Credits = 160**

<b>PROFESSIONAL ELECTIVES</b>			
<b>PE-I</b>		<b>PE-II</b>	
A1CE501PE	Concrete Technology	A1CE604PE	Transportation Engineering
A1CE502E	Remote sensing and GIS	A1CE605PE	Engineering Materials For Sustainability
A1CE503PE	Construction Engineering And Management	A1CE606PE	Earth and Rock Fill Dams & Slope Stability
<b>PE-III</b>		<b>PE-IV</b>	
A1CE607PE	Foundation Engineering	A1CE710PE	Earthquake Engineering
A1CE608PE	Irrigation And Hydraulic Structures	A1CE711PE	Pavement Design
A1CE609PE	Ground Improvement Techniques	A1CE712PE	Repairs And Rehabilitation Of Structures
<b>PE-V</b>			
A1CE813PE	Construction Cost Analysis		
A1CE814PE	Industrial Waste Treatment And Disposal		
A1CE815PE	Pollution Control And Monitoring		

<b>OPEN ELECTIVES</b>				
<b>S. No.</b>	<b>Name of the Department Offering Open Electives</b>	<b>Open Elective – I (Semester – VI)</b>	<b>Open Elective – II (Semester – VII)</b>	<b>Open Elective – III (Semester – VIII)</b>
1	Civil Engg.	<b>A1CE601OE</b>	<b>A1CE703OE</b>	<b>A1CE805OE</b>
		Engineering Materials For Sustainability	Environmental Engineering	Green Building Technologies
		<b>A1CE602OE</b>	<b>A1CE704OE</b>	<b>A1CE806OE</b>
		Disaster Preparedness & Planning Management	Construction Engineering And Management	Air Pollution and Control
2	Computer Science and Engg.	<b>A1CS601OE</b>	<b>A1CS703OE</b>	<b>A1CS805OE</b>
		Java Programming	Operating Systems	Linux Programming
		<b>A1CS602OE</b>	<b>A1CS704OE</b>	<b>A1CS806OE</b>
		Database Management Systems	Cyber Security	R Programming
3	Electrical and Electronics Engg.	<b>A1EE601OE</b>	<b>A1EE703OE</b>	<b>A1EE805OE</b>
		Energy Storage Systems	Electrical Safety Practices for Industry	Modern Trends in Electrical Energy
		<b>A1EE602OE</b>	<b>A1EE704OE</b>	<b>A1EE806OE</b>
		Renewable Energy Sources	Basics of Power Plant Engineering	Energy from Waste
4	Electronics and Communication Engg.	<b>A1EC601OE</b>	<b>A1EC703OE</b>	<b>A1EC805OE</b>
		Principles of Communications	Fiber Optic Communications	Embedded Networking
		<b>A1EC602OE</b>	<b>A1EC704OE</b>	<b>A1EC806OE</b>
		Electronic Measuring Instruments	Mobile Communication and Networks	Satellite Communication
5	Mechanical Engg.	<b>A1ME601OE</b>	<b>A1ME703OE</b>	<b>A1ME805OE</b>
		Mechatronics	Composite Materials	Total Quality Management
		<b>A1ME602OE</b>	<b>A1ME704OE</b>	<b>A1ME806OE</b>
		Additive Manufacturing	Industrial Robotics	Renewable Energy Sources
6	CSE(Artificial Intelligence and Machine Learning)	<b>A1AM601OE</b>	<b>A1AM703OE</b>	<b>A1AM805OE</b>
		Computational Complexity	Introduction To Machine Learning	Cognitive Computing
		<b>A1AM602OE</b>	<b>A1AM704OE</b>	<b>A1AM806OE</b>
		Computer Networks	Green Computing	Software Process and Project Management
7	CSE(Data Science)	<b>A1DS601OE</b>	<b>A1DS703OE</b>	<b>A1DS805OE</b>
		Data Warehousing and Data Mining	Python Programming	Image Analytics
		<b>A1DS602OE</b>	<b>A1DS704OE</b>	<b>A1DS806OE</b>
		Artificial Intelligence	Text Analytics and Natural Language Processing	Data Science Ethics

8	CSE(IoT)	<b>A1IO601OE</b>	<b>A1IO703OE</b>	<b>A1IO805OE</b>
		Sensor and Devices	IoT for Architects	IoT System Design
		<b>A1IO602OE</b>	<b>A1IO704OE</b>	<b>A1IO806OE</b>
		IoT Sensor and Technologies	Python for IoT	Internet of Medical Things
9	CSE(Software Engineering) Civil Engg.	<b>A1SE601OE</b>	<b>A1SE703OE</b>	<b>A1SE805OE</b>
		Introduction to C++	JAVA Programming	Scripting Language
		<b>A1SE602OE</b>	<b>A1SE704OE</b>	<b>A1SE806OE</b>
		Principles of Software Engineering	Software Testing Methodology	Software Quality Management

**\*Open Elective** – Students should take Open Electives from List of Open Electives Offered by Other Departments / Branches Only

**Ex: -** A Student of Civil Engineering can take Open Electives from all other departments/branches except Open Electives offered by Civil Engineering Dept.

# **DETAILED SYLLABUS**

# **I-YEAR (I-SEMESTER)**

## **LINEAR ALGEBRA AND CALCULUS**

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

**Course Code: A1MA101BS**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>

### **COURSE OBJECTIVES:**

To learn

1. Concept of a rank of the matrix and applying this concept to know the consistency and solving the system of linear equations.
2. Concept of Eigen values and eigenvectors and to reduce the quadratic form to canonical form.
3. Methods of solving the differential equations of first order.
4. Evaluation of improper integrals using Beta and Gamma functions.
5. Partial differentiation and finding maxima and minima of function of two and three variables.

### **COURSE OUTCOMES:**

Upon the successful completion of this course, the students will be able to:

1. Write the matrix representation of a set of linear equations and to analyze the solution of the system of equations.
2. Find the Eigen values and Eigen vectors and reduce the quadratic form to canonical form using orthogonal transformations.
3. Identify whether the given differential equation of first order is exact or not.
4. Solve the applications on the mean value theorems and evaluate the improper integrals using Beta and Gamma functions.
5. Find the extreme values of functions of two variables with/ without constraints.

### **UNIT-I MATRICES**

Matrices: Types of Matrices, Symmetric; Hermitian; Skew-symmetric; Skew-Hermitian; Orthogonal matrices; Unitary Matrices; Rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method; System of linear equations; Solving system of Homogeneous and Non-Homogeneous equations. Gauss elimination method; Gauss Seidel Iteration Method.

### **UNIT –II EIGEN VALUES AND EIGEN VECTORS**

Linear Transformation and Orthogonal Transformation: Eigen values and Eigenvectors and their properties: Diagonalization of a matrix; Cayley-Hamilton Theorem (without proof); Finding inverse and power of a matrix by Cayley-Hamilton Theorem; Quadratic forms and Nature of the Quadratic Forms; Reduction of Quadratic form to Canonical forms by Orthogonal Transformation.

### **UNIT-III FIRST ORDER ORDINARY DIFFERENTIAL EQUATION**

Exact, linear and Bernoulli's equations: Orthogonal Trajectories (in Cartesian and polar coordinates) Newton's law of cooling, Law of natural growth and decay, Equations not of first degree: Equations solvable for p, Equations solvable for y, Equations solvable for x and Clairaut's type.

### **UNIT –IV CALCULUS**

Mean value theorems: Rolle's Theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem. Taylor's Series . Definition of Improper Integral: Beta and Gamma functions and their applications.

### **UNIT-V MULTIVARIABLE CALCULUS**

Definitions of Limit and continuity. Partial Differentiation; Euler's Theorem; Total derivative; Jacobian; Functional dependence & independence, Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.



**TEXT BOOKS:**

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.

**REFERENCE BOOKS:**

1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
2. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11thReprint, 2010

## ENGINEERING CHEMISTRY

### I-B.TECH I-SEMESTER

Course Code: A1CH102BS

L	T	P	C
3	1	0	4

### COURSE OBJECTIVES:

1. To impart the basic knowledge of atomic, molecular and electronic modifications which makes the student to understand & remember the technology based on them.
2. Able to understand the concepts of hardness & analyze hardness of water.
3. To acquire the knowledge of electrochemistry & corrosion
4. To acquire the skills pertaining to spectroscopy and able to evaluate the structure of organic compounds.
5. To impart the knowledge of stereochemistry and synthesis of Aspirin & Paracetamol

### COURSE OUTCOMES: Student must be able to

1. Evaluate the MOELD of N<sub>2</sub>, O<sub>2</sub> & F<sub>2</sub>.
2. Analyze hardness of water.
3. Apply electrochemistry concepts to solve the problem of corrosion.
4. Evaluate the structure of Organic compounds by using spectroscopy.
5. Synthesize Organic medicines like Paracetamol & Aspirin & predict the structure based on stereochemistry.

### UNIT - I: MOLECULAR STRUCTURE AND THEORIES OF BONDING

Atomic and Molecular orbitals, Linear Combination of Atomic orbitals (LCAO), molecular orbitals of diatomic molecules, molecular orbital energy level diagrams (MOELD) of N<sub>2</sub>, O<sub>2</sub> and F<sub>2</sub> molecules. Crystal Field Theory (CFT): Salient Features of CFT – Crystal Field Splitting of transition metal ion d-orbitals in Tetrahedral, Octahedral and square planar geometries, Band structure of solids and effect of doping on conductance.

### UNIT - II: 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 complex metric method, Potable water and its specifications, Steps involved in treatment of water – Disinfection of water by chlorination and ozonisation.

Boiler Troubles-Priming and Foaming, Caustic Embrittlement, Boiler Corrosion, Sludge and Scale formation  
Boiler feed water and its treatment – Calgon conditioning, Phosphate conditioning and Colloidal conditioning,  
External treatment of water – Ion exchange process, Desalination of water – Reverse osmosis, Numerical problems.

### UNIT - III: ELECTROCHEMISTRY AND CORROSION

Electro chemical cells – electrode potential, standard electrode potential, Types of electrodes – Calomel, Quinhydrone and glass electrode, Determination of pH of a solution by using quinhydrone and glass electrode. Measurement of emf of a cell (solution), Electrochemical series and its applications. Numerical problems. Potentiometric titrations, Batteries – Primary (Lithium cell) and secondary batteries (Lead – acid storage battery, Lithium ion battery) & Fuel cells-Hydrogen-Oxygen fuel cell. Corrosion: Causes and effects of corrosion

Theories of chemical and electrochemical corrosion – mechanism of electrochemical corrosion, Types of corrosion: Galvanic, water-line and pitting corrosion. Factors affecting rate of corrosion. Corrosion control methods- Cathodic protection – Sacrificial anode and impressed current cathodic methods. Surface coatings – metallic coatings – methods of application. Electroless plating of Nickel.

#### **UNIT - IV: STEREOCHEMISTRY, REACTION MECHANISM AND SYNTHESIS OF DRUG MOLECULES**

Introduction to representation of 3-dimensional structures, Structural and stereoisomers, configurations, symmetry and chirality. Enantiomers, diastereomers, optical activity and Absolute configuration. Conformation analysis of n- butane. Organic reactions: Types of Fissions, Types of reagents & types of reactions Substitution reactions: Nucleophilic substitution reactions: Mechanism of SN1, SN2 reactions. Addition reactions: Electrophilic and nucleophilic addition reactions: Addition of HBr to propene. Markownikoff and anti Markownikoff's additions. Grignard additions on carbonyl compounds. Elimination reactions: Dehydro halogenation of alkyl halides. Saytzeff rule. Oxidation reactions: Oxidation of alcohols using KMnO<sub>4</sub> and chromic acid. Reduction reactions: Reduction of carbonyl compounds using LiAlH<sub>4</sub> & NaBH<sub>4</sub>. Hydroboration of olefins. Structure, synthesis and pharmaceutical applications of Paracetamol and Aspirin.

#### **UNIT - V: INTRODUCTION OF SPECTROSCOPY, SPECTROSCOPIC TECHNIQUES AND APPLICATIONS**

Principles of spectroscopy, Classification of spectra (UV-VIS, IR, NMR, Raman spectra, etc), Selection rules and applications of electronic spectroscopy. Vibrational and rotational spectroscopy. Basic concepts of Nuclear magnetic resonance Spectroscopy, chemical shift. Introduction to Magnetic resonance imaging.

#### **TEXT BOOKS:**

1. Physical Chemistry, by P.W. Atkins
2. Engineering Chemistry by P.C.Jain & M.Jain; Dhanpat Rai Publishing Company (P) Ltd., New Delhi.
3. Fundamentals of Molecular Spectroscopy, by C.N. Banwell
4. Organic Chemistry: Structure and Function by K.P.C. Volhardt and N.E.Schore, 5th Edition.
5. University Chemistry, by B.M. Mahan, Pearson IV Edition.
6. Engineering Chemistry (NPTEL Web-book), by B.L. Tembe, Kamaluddin and M.S. Krishnan

#### **REFERENCE BOOKS:**

1. Organic chemistry by Morryson and Boyd
2. Organic Chemistry by Y.R. Sharma.

## **PROGRAMMING FOR PROBLEM SOLVING**

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

**Course Code: A1CS106ES**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **COURSE OBJECTIVES**

1. To impart knowledge about problem solving and algorithmic thinking.
2. To familiarize with the syntax and semantics of C programming language.
3. To learn the usage of structured programming approach in solving problems.
4. To use arrays, pointers, strings and structures in solving problems.
5. To understand how to solve problems related to matrices, Searching and sorting.

### **COURSE OUTCOMES**

1. At the end of the course, student will be able to:
2. Apply algorithmic thinking to understand, define and solve problems
3. Develop computer programs using programming constructs and control structures
4. Decompose a problem into functions to develop modular reusable code.
5. Use arrays, pointers, strings and structures to formulate algorithms and programs.
6. Use files to perform read and write operations.

### **UNIT – I: INTRODUCTION - PROBLEM SOLVING AND ALGORITHMIC THINKING**

Introduction to Computer System, Types of memories, Application and System Software, Problem Solving and Algorithmic Thinking Overview – Problem Definition, logical reasoning, Algorithm definition, practical examples, properties, representation, flowchart, algorithms vs programs.

Algorithmic Thinking – Constituents of algorithms - Sequence, Selection and Repetition, input- output; Computation – expressions, logic; Problem Understanding and Analysis – problem definition, variables, name binding, data organization: lists, arrays etc. algorithms to programs.

### **UNIT – II: OPERATORS, EXPRESSIONS AND CONTROL STRUCTURES**

Introduction to C language: Structure of C programs, C tokens, data types, data inputs, output statements, Operators, precedence and associativity, evaluation of expressions, type conversions in expressions.

Control structures: Decision statements; if and switch statement; Loop control statements: while, for and do while loops, jump statements, break, continue, goto statements.

### **UNIT - III: ARRAYS AND FUNCTIONS**

**Arrays:** Concepts, one dimensional array, declaration and initialization of one-dimensional arrays, two dimensional arrays, initialization and accessing, multi-dimensional arrays, Basic Searching Algorithms: Linear and Binary search

**Functions:** User defined and built-in Functions, storage classes, Parameter passing in functions, call by value, call by reference, passing arrays to functions, Recursion as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Towers of Hanoi etc.

### **UNIT - IV: STRINGS AND POINTERS**

**Strings:** Arrays of characters, variable length character strings, inputting character strings, character library functions, string handling functions.

**Pointers:** Pointer basics, pointer arithmetic, pointers to pointers, generic pointers, array of pointers, functions returning pointers, Dynamic memory allocation.

**UNIT – V: STRUCTURES AND FILE HANDLING**

**Structures and unions:** Structure definition, initialization, accessing structures, nested structures, arrays of structures, structures and functions, self-referential structures, unions, typedef, enumerations.

File handling: command line arguments, File modes, basic file operations read, write and append, example programs.

**TEXT BOOKS:**

1. Riley DD, Hunt K.A. Computational Thinking for the Modern Problem Solver. CRC press, 2014 Mar 27.
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)
3. Byron Gottfried, “Programming with C”, Schaum's Outlines Series, McGraw Hill Education, 3rd edition, 2017.

**REFERENCE BOOKS:**

1. W. Kernighan Brian, Dennis M. Ritchie, “The C Programming Language”, PHI Learning, 2nd Edition, 1988.
2. Yashavant Kanetkar, “Exploring C”, BPB Publishers, 2nd Edition, 2003.
3. Schildt Herbert, “C: The Complete Reference”, Tata McGraw Hill Education, 4th Edition, 2014.
4. R. S. Bichkar, “Programming with C”, Universities Press, 2nd Edition, 2012.
5. Dey Pradeep, Manas Ghosh, “Computer Fundamentals and Programming in C”, Oxford University Press, 2nd Edition, 2006.
6. Stephen G. Kochan, “Programming in C”, Addison-Wesley Professional, 4th Edition, 2014.

**WEB REFERENCES:**

1. [https://en.wikipedia.org/wiki/Computational\\_thinking](https://en.wikipedia.org/wiki/Computational_thinking)
2. <https://nptel.ac.in/courses/106/104/106104128/>
3. <https://en.cppreference.com/w/c/language>
4. <https://www.learn-c.org/>

**E-TEXT BOOKS:**

1. [https://slidelegend.com/queue/computational-thinking-for-the-modern-problem-solver\\_59d6f01e1723ddb0c7a0df47.html](https://slidelegend.com/queue/computational-thinking-for-the-modern-problem-solver_59d6f01e1723ddb0c7a0df47.html)
2. [http://flowgorithm.altervista.org/#elf\\_11\\_Lw](http://flowgorithm.altervista.org/#elf_11_Lw)
3. <http://www.freebookcentre.net/Language/Free-C-Programming-Books-Download.htm>

**MOOC COURSE:**

1. <https://www.coursera.org/learn/computational-thinking-problem-solving>
2. [https://onlinecourses.nptel.ac.in/noc18\\_cs33/preview](https://onlinecourses.nptel.ac.in/noc18_cs33/preview)
3. <https://www.alison.com/courses/Introduction-to-Programming-in-c>
4. <http://www.ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-s096-effective-programming-in-c-and-c-january-iap-2014/index.htm>

## **ENGLISH FOR EFFECTIVE COMMUNICATION**

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

**Course Code: A1EN105HS**

**L T P C**

**2 0 0 2**

### **INTRODUCTION:**

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training students to acquire language skills, the syllabus of English has been designed to develop linguistic, communicative and critical thinking competencies of Engineering students. In English classes, the focus should be on the skills development in the areas of vocabulary, grammar, reading and writing. For this, the teachers should use the prescribed text for detailed study. The students should be encouraged to read the texts leading to reading comprehension and different passages may be given for practice in the class. The time should be utilized for working out the exercises given after each excerpt, and also for supplementing the exercises with authentic materials of a similar kind, for example, newspaper articles, advertisements, promotional material etc. The focus in this syllabus is on skill development, fostering ideas and practice of language skills in various contexts and cultures.

### **COURSE OBJECTIVES:**

1. Improve language proficiency with emphasis on Vocabulary, Grammar, Reading and Writing skills.
2. Apply the theoretical and practical components of English syllabus to study academic subjects more effectively and critically.
3. Analyze a variety of texts and interpret them to demonstrate in writing or speech.
4. Write clearly and creatively, and adjust writing style appropriately to the content, the context, and nature of the subject.
5. Develop language components to communicate effectively in formal and informal situations.

### **COURSE OUTCOMES:** Students should be able to:

1. Use English Language effectively in spoken and written forms.
2. Comprehend the given texts and respond appropriately.
3. Communicate confidently in various contexts and different cultures.
4. Acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.
5. Generate dialogues for various situations.

### **UNIT –I: ‘THE RAMAN EFFECT’ FROM THE PRESCRIBED TEXTBOOK ‘ENGLISH FOR ENGINEERS’ PUBLISHED BY CAMBRIDGE UNIVERSITY PRESS.**

**Vocabulary:** The Concept of Word Formation --The Use of Prefixes and Suffixes.

**Grammar:** Identifying Common Errors in Writing with Reference to Articles and Prepositions.

**Reading:** Reading and Its Importance- Techniques for Effective Reading.

**Writing:** Sentence Structures -Use of Phrases and Clauses in Sentences- Importance of Proper Punctuation- Techniques for writing precisely – Paragraph writing – Types, Structures and Features of a Paragraph – Creating Coherence-Organizing Principles of Paragraphs in documents.

**UNIT –II: ‘ANCIENT ARCHITECTURE IN INDIA’ FROM THE  
PRESCRIBED TEXTBOOK ‘ENGLISH FOR ENGINEERS’  
PUBLISHED BY CAMBRIDGE UNIVERSITY PRESS.**

**Vocabulary:** Synonyms and Antonyms.

**Grammar:** Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.

**Reading:** Improving Comprehension Skills – Techniques for Good Comprehension

**Writing:** Format of a Formal Letter-Writing Formal Letters, E.g. Letter of Complaint, Letter of Requisition, and Job Application with Resume.

**UNIT –III: ‘ENERGY: ALTERNATIVE SOURCES’ FROM THE PRESCRIBED  
TEXT BOOK ‘ENGLISH FOR ENGINEERS AND  
TECHNOLOGISTS’ TEXT BOOK- ORIENT BLACK SWAN.**

**Vocabulary:** Acquaintance with Prefixes and Suffixes from Foreign Languages in English to form Derivatives- Words from Foreign Languages and their Use in English

**Grammar:** Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses.

**Reading:** Sub-skills of Reading-Skimming and Scanning

**Writing:** Nature and Style of Sensible Writing- Defining- Describing Objects, Places and Events – Classifying- Providing Examples or Evidence.

**UNIT –IV: ‘WHAT SHOULD YOU BE EATING’ FROM THE PRESCRIBED  
TEXTBOOK ‘ENGLISH FOR ENGINEERS’ PUBLISHED BY  
CAMBRIDGE UNIVERSITY PRESS.**

**Vocabulary:** Standard Abbreviations in English

**Grammar:** Redundancies and Clichés in Oral and Written Communication.

**Reading:** Comprehension- Intensive Reading and Extensive Reading

**Writing:** Writing Practices--Writing Introduction and Conclusion - Essay Writing-Précis Writing.

**UNIT –V: ‘GOOD MANNERS’ BY J C HILLS FROM FLUENCY IN ENGLISH  
– A COURSE BOOK FOR ENGINEERING STUDENTS**

**Vocabulary:** Technical Vocabulary and their usage

**Grammar:** Common Errors in English

**Reading:** Reading Comprehension-Exercises for Practice.

**Writing:** Technical Reports- Introduction – Characteristics of a Report – Categories of Reports Formats- Structure of Reports (Manuscript Format) -Types of Reports -Writing a Report.

**TEXT BOOKS:**

1. Sudarshana, N.P. and Savitha, C. (2018). English for Engineers Cambridge University Press
2. Department of Humanities and Sciences, (2016) – Anna University - English for Engineers and Technologists –Orient BlackSwan
3. J.C.Hill, (2016) Fluency in English- A Course book for Engineering students- Orient BlackSwan

**REFERENCE BOOKS:**

1. Swan, M. (2016). Practical English Usage Oxford University Press
2. Kumar, S and Lata, P.(2018). Communication Skills Oxford University Press
3. Wood, F.T. (2007).Remedial English Grammar. Macmillan.
4. Zinsser, William. (2001). On Writing Well Harper Resource Book
5. Hamp-Lyons, L. (2006).Study Writing. Cambridge University Press
6. Exercises in Spoken English. Parts I –III CIEFL, Hyderabad. Oxford University Press

## **PROGRAMMING FOR PROBLEM SOLVING LAB**

### **I-B.TECH I-SEMESTER**

**Course Code: A1CS114ES**

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

### **COURSE OBJECTIVES**

1. To be familiarize with flowgorithm to solve simple problems
2. To develop programs to solve basic problems by understanding basic concepts in C like operators, control statements etc.
3. To develop modular, reusable and readable C Programs using the concepts like functions, arrays, strings pointers and structures.

### **COURSE OUTCOMES**

1. At the end of the course, student will be able to
2. Solve simple mathematical problems using Flowgorithm.
3. Correct syntax errors as reported by the compilers and logical errors encountered at run time
4. Develop programs by using decision making and looping constructs.
5. Implement real time applications using the concept of array, pointers, functions and structures.
6. Solve real world problems using matrices, searching and sorting

### **WEEK – 1:**

- a) Installation and working of Flowgorithm Software.
- b) Write and implement basic arithmetic operations using Flowgorithm – sum, average, product, difference, quotient and remainder of given numbers etc.

### **WEEK – 2:**

- a) Draw a flowchart to calculate area of Shapes (Square, Rectangle, Circle and Triangle).
- b) Draw a flowchart to find the sum of individual digits of a 3 digit number.
- c) Draw a flowchart to convert days into years, weeks and days.
- d) Draw a flowchart to read input name, marks of 5 subjects of a student and display the name of the student, the total marks scored, percentage scored.

### **WEEK – 3:**

- a) Draw a flowchart to find roots of a quadratic equation.
- b) Draw a flowchart to find the largest and smallest among three entered numbers and also display whether the identified largest/smallest number is even or odd
- c) Draw a flowchart to check whether the triangle is equilateral, isosceles or scalene triangle

### **WEEK – 4:**

- a) Write a C program to swap values of two variables with and without using third variable.
- b) Write a C program to enter temperature in Celsius and convert it into Fahrenheit.
- c) Write a C program to calculate Simple and Compound Interest.
- d) Write a C program to calculate  $s = ut + (1/2)at^2$  where u and a are the initial velocity in m/sec (= 0) and acceleration in m/sec<sup>2</sup> (= 9.8 m/s<sup>2</sup>)).

### **WEEK – 5:**

- a) Write a C program to find largest and smallest of given numbers.
- b) Write a C program which takes two integer operands and one operator from the user(+,-,\*,/,% use switch)



- c) Write a program to compute grade of students using if else ladder. The grades are assigned as followed:

marks<50	F
50≤marks< 60	C
60≤marks<70	B
70≤marks	B+
80≤marks<90	A
90≤marks≤ 100	A+

### **WEEK – 6:**

- a) Write a C program to find Sum of individual digits of given integer
- b) Write a C program to generate first n terms of Fibonacci series
- c) Write a C program to generate prime numbers between 1 and n
- d) Write a C Program to find the Sum of Series  $SUM=1-x^2/2! +x^4/4!-x^6/6!+x^8/8!-x^{10}/10!$
- e) Write a C program to generate Pascal's triangle.
- f) Write a C program to generate pyramid of numbers.

```
1
1    3    1
1    3    5    3    1
```

### **WEEK – 7:**

- a) Write a C Program to implement following searching methods
  - I. Binary Search
  - II. Linear Search
- b) Write a C program to find largest and smallest number in a list of integers
- c) Write a C program
  - I. To add two matrices
  - II. To multiply two matrices
- d) Write a C program to find Transpose of a given matrix

### **WEEK – 8:**

- a) Write a C program to find the factorial of a given integer using functions
- b) Write a C program to find GCD of given integers using functions
- c) Write a C Program to find the power of a given number using functions

### **WEEK – 9:**

- a) Write a C Program to find binary equivalent of a given decimal number using recursive functions.
- b) Write a C Program to print Fibonacci sequence using recursive functions.
- c) Write a C Program to find LCM of 3 given numbers using recursive functions

### **WEEK – 10:**

- a) Write a C program using functions to
- b) Insert a sub string into a given main string from a given position
- c) Delete n characters from a given position in a string
- d) Write a C program to determine if given string is palindrome or not

### **WEEK – 11:**

- a) Write a C program to print 2-D array using pointers
- b) Write a C program to allocate memory dynamically using memory allocation functions (malloc, calloc, realloc, free)

**WEEK – 12:**

- I. Write a C Program using functions to
  - a) Reading a complex number
  - b) Writing a complex number
  - c) Add two complex numbers
  - d) Multiply two complex numbers
  - e) Note: represent complex number using structure
  
- II. Write a C program to read employee details employee number, employee name, basic salary, hra and da of n employees using structures and print employee number, employee name and gross salary of n employees.

**TEXT BOOKS:**

1. Riley DD, Hunt K.A. Computational Thinking for the Modern Problem Solver. CRC press, 2014 Mar 27.
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)
3. Yashavant Kanetkar, “Let Us C”, BPB Publications, New Delhi, 13th Edition, 2012.

**REFERENCE BOOKS:**

1. Ferragina P, Luccio F. Computational Thinking: First Algorithms, Then Code. Springer; 2018
2. King KN, “C Programming: A Modern Approach”, Atlantic Publishers, 2nd Edition, 2015.
3. Kochan Stephen G, “Programming in C: A Complete Introduction to the C Programming Language”, Sam’s Publishers, 3rd Edition, 2004.
4. Linden Peter V, “Expert C Programming: Deep C Secrets”, Pearson India, 1st Edition, 1994.

**WEB REFERENCES:**

1. <http://www.flowgorithm.org/documentation/>
2. <http://www.sanfoundry.com/c-programming-examples>
3. <http://www.geeksforgeeks.org/c>
4. <http://www.cprogramming.com/tutorial/c>

## **ENGINEERING CHEMISTRY LAB**

### **I-B.TECH I-SEMESTER**

**Course Code: A1CH110BS**

**L T P C**

**0 0 3 1.5**

### **COURSE OBJECTIVES:**

The course consists of experiments related to the principles of chemistry required for engineering student. The student will learn:

1. Estimation of hardness and chloride content in water to check its suitability for drinking purpose.
2. To determine the rate of corrosion of different metals
3. The measurement of physical properties like adsorption and viscosity.
4. To synthesize the drug molecules and check the purity of organic molecules by thin layer chromatographic (TLC) technique.
5. To determine the acid content by Potentiometry.

**COURSE OUTCOMES:** The experiments will make the student must able to:

1. Analyze the hardness and chloride content in water.
2. Estimate rate corrosion of different metals.
3. Determine physical properties like adsorption and viscosity.
4. Calculate R<sub>f</sub> values of some organic molecules by TLC technique.
5. Determine the acid content in the given sample by using potentiometer.

### **LIST OF EXPERIMENTS:**

#### **I. Conductometry**

1. Estimation of an HCl by Conductometric titrations
2. Estimation of Acetic acid by Conductometric titrations

#### **II. Potentiometry:**

3. Estimation of HCl by Potentiometric titrations
4. Estimation of Fe<sup>2+</sup> by Potentiometry using KMnO<sub>4</sub>

#### **III. Complexometry:**

5. Determination of total hardness of water by complexometric method using EDTA

#### **IV. Argentometry:**

6. Determination of chloride content of water by Argentometry

#### **V. Rate of corrosion:**

7. Measurement of rate of acid corrosion of different metals

#### **VI. Water Quality Parameters (Analytical Chemistry):**

8. Determination of BOD & COD

#### **VII. Saponification**

9. Determination of acid value of coconut oil

#### **VIII. Partition Coefficient:**

10. Determination of partition coefficient of acetic acid between n-butanol and water.

#### **IX. Chromatography**

11. Thin layer chromatography calculation of R<sub>f</sub> values. eg separation of ortho and para nitro phenols

**X. Colligative properties**

12. Determination of viscosity of castor oil and ground nut oil by using Ostwald's viscometer.
13. Determination of surface tension of a give liquid using stalagmeter.

**XI. Synthesis**

14. Synthesis of Aspirin and Paracetamol.

**REFERENCE BOOKS:**

1. Senior practical physical chemistry, B.D. Khosla, A. Gulati and V. Garg (R. Chand & Co., Delhi)
2. An introduction to practical chemistry, K.K. Sharma and D. S. Sharma (Vikas publishing, N. Delhi)
3. Vogel's text book of practical organic chemistry 5th edition
4. Text book on Experiments and calculations in Engineering chemistry – S.S. Dara

## **ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB**

### **I-B.TECH I-SEMESTER**

**Course Code: A1EN113HS**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>

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

### **COURSE OBJECTIVES:**

1. Facilitate computer-assisted multi-media instruction enabling individualized and independent language learning.
2. Enhance English language skills, communication skills and to practice soft skills.
3. Improve fluency and pronunciation intelligibility by providing an opportunity for practice in speaking.
4. Train students in different interview and public speaking skills such as JAM, debate, role play, group discussion etc.
5. Instill confidence and make them competent enough to express fluently and neutralize their mother tongue influence.

### **COURSE OUTCOMES:** Students will be able to

1. Recognize differences among various accents and speak with neutralized accent.
2. Neutralization of accent for intelligibility
3. Take part in group activities.
4. Speaking skills with clarity and confidence which in turn enhances their employability
5. Generate dialogues for various situations.

### **English Language and Communication Skills Lab (ELCS) shall have two parts:**

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

### **LISTENING SKILLS**

#### **Objectives**

1. To enable students develop their listening skills so that they may appreciate its role in the LSRW skills approach to language and improve their pronunciation.
2. To equip students with necessary training in listening so that they can comprehend the speech of people of different backgrounds and regions.

Students should be given practice in listening to the sounds of the language, to be able to recognize them and find the distinction between different sounds, to be able to mark stress and recognize and use the right intonation in sentences.

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

### **SPEAKING SKILLS**

#### **Objectives**

1. To involve students in speaking activities in various contexts
2. To enable students express themselves fluently and appropriately in social and professional contexts
  - Oral practice: Just A Minute (JAM) Sessions
  - Describing objects/situations/people
  - Role play – Individual/Group activities

### **Exercise – I**

#### **CALL Lab:**

*Understand:* Listening Skill- Its importance – Purpose- Process- Types- Barriers of Listening.

*Practice:* Introduction to Phonetics – Speech Sounds – Vowels and Consonants.

#### **ICS Lab:**

*Understand:* Communication at Work Place- Spoken vs. Written language.

*Practice:* Ice-Breaking Activity and JAM Session- Situational Dialogues – Greetings – Taking Leave – Introducing Oneself and Others.

### **Exercise – II**

#### **CALL Lab:**

*Understand:* Structure of Syllables – Word Stress and Rhythm– Weak Forms and Strong Forms in Context.

*Practice:* Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms in Context.

#### **ICS Lab:**

*Understand:* Features of Good Conversation – Non-verbal Communication.

*Practice:* Situational Dialogues – Role-Play- Expressions in Various Situations –Making Requests and Seeking Permissions - Telephone Etiquette.

### **Exercise - III**

#### **CALL Lab:**

*Understand:* Intonation-Errors in Pronunciation-the Influence of Mother Tongue (MTI).

*Practice:* Common Indian Variants in Pronunciation – Differences in British and American Pronunciation.

#### **ICS Lab:**

*Understand:* How to make Formal Presentations.

*Practice:* Formal Presentations.

### **Exercise – IV**

#### **CALL Lab:**

*Understand:* Listening for General Details.

*Practice:* Listening Comprehension Tests.

#### **ICS Lab:**

*Understand:* Public Speaking – Exposure to Structured Talks.

*Practice:* Making a Short Speech – Extempore.

### **Exercise – V**

#### **CALL Lab:**

*Understand:* Listening for Specific Details.

*Practice:* Listening Comprehension Tests.

#### **ICS Lab:**

*Understand:* Interview Skills.

*Practice:* Mock Interviews.

## **SOCIAL INNOVATION**

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

**Course Code: A1CE117ES**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>

### **COURSE DESCRIPTION:**

#### **Course Overview:**

Social Innovation is an open-ended course to develop social connectedness in engineering students through social awareness and social consciousness. This can be done through live field exposure along with faculty led conceptual presentations, real case reviews, self-study assignments, literature and field survey. Through this course, the students are expected to use their engineering knowledge to provide innovative solutions to existing social problems. This course also develops critical thinking ability among the students to develop sustainable solutions.

### **COURSE OUTCOMES:**

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

1. Develop awareness on social issues faced by local regions.
2. Identify the mind set of human Race and interpret the societal issues as simple, complicated, and complex problems.
3. Identify the need statement along with its main causes and effects.
4. Develop an innovative and sustainable solution for social issues by thinking critically and creatively.

### **COURSE SYLLABUS**

#### **MODULE-1**

Introduction to Social Innovation: Core definitions, core elements and common features of social innovation, a typology of social innovation, awakening social consciousness.

#### **MODULE-2**

Create Mindsets and Wicked Problems: Seven mindsets – Empathy, Optimism, Iteration, Creative confidence, making it, embracing ambiguity, learning from failures. Distinguish between simple, complicated, and complex problems; describe the characteristics of wicked problems, breakdown a given problem by unpacking its complexity.

#### **MODULE-3**

Critical and Creative Thinking for Social Innovation: Definition, engineering thinking and learning, distinguish between creativity and innovation. Models of Creative thinking. [Appreciative Inquiry (AI), Asset Based Community Development (ABCD) and Concept of Bricolage.]

#### **MODULE-4**

Process of Social Innovation: Community study, develop questionnaire, identifying the causes of a particular problem.

#### **MODULE-5**

Process of Social Innovation: Identify needs, record your learning's.

#### **MODULE-6**

Process of Social Innovation: Generate ideas, select promising ideas, prototyping, and testing.

**MODULE-7**

Social Innovation across Four Sectors - The non-profit sector, public sector, the private sector, the informal sector, links between and cross sectors.

**MODULE-8**

Stages of Innovation: Social organizations and enterprises, social movements, social software and open source methods, common patterns of success and failure.

**TEXT BOOKS:**

1. Robin Murray, Julie Caulier-Grice, Geoff Mulgan, “The open book of social innovation: Ways to Design, Develop and Grow Social Innovation”, The Young Foundation, 2010.
2. Julie Caulier-Grice, Anna Davies, Robert Patrick & Will Norman, The Young Foundation (2012) Social Innovation Overview: A deliverable of the project: “The theoretical, empirical and policy foundations for building social innovation in Europe” (TEPSIE), European Commission – 7th Framework Programme, Brussels: European Commission, DG Research.

**REFERENCE BOOKS:**

1. Geoff Mulgan, “Social Innovation: What it is, Why it matters and How it can be accelerated”, The Young Foundation, 2007.
2. Asset Based Community Development (ABCD) Model – <http://www.nurtureddevelopment.org/asset-based-community-development/>
3. Diana Whitney & Amanda Trosten-Bloom, “The Power of Appreciative inquiry – A Practical Guide to Positive Change”, 2nd Edition, Berrett-Koehler Publishers, Inc, 2010.



# **I-YEAR (II-SEMESTER)**

## **ORDINARY DIFFERENTIAL EQUATIONS & ADVANCED CALCULUS**

**I-B.TECH II-SEMESTER**  
**Course Code: A1MA201BS**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>

### **COURSE OBJECTIVES:**

The students would be able to learn

1. Different methods of solving the differential equations of higher order.
2. Concept, properties of Laplace transforms and Solving ordinary differential equations using Laplace transforms techniques.
3. Evaluation of multiple integrals and their applications.
4. The physical quantities involved in engineering field related to vector valued functions.
5. The basic properties of vector valued functions and their applications to line, surface and volume integrals.

### **COURSE OUTCOMES:**

Upon the successful completion of this course, the students will be able to:

1. Solve higher differential equation and apply the concept of differential equation to real world problems.
2. Use the Laplace Transform techniques for solving ODE's.
3. Evaluate the multiple integrals and apply the concept to find areas, volumes.
4. Evaluate the line, surface and volume integrals and converting them from one to another.
5. Apply Green, Gauss, and Stokes theorem to the integrals.

### **UNIT –I      ORDINARY DIFFERENTIAL EQUATIONS OF HIGHER ORDER**

Second order linear differential equations with constant coefficients: Non-Homogeneous terms of the type  $e^{ax}$ ,  $\sin ax$ ,  $\cos ax$ , polynomials in  $x$ ,  $e^{ax}(x)$  and  $x V(x)$ ; method of Variation of parameters; Equations reducible to linear ODE with constant coefficients: Legendre's equation, Cauchy-Euler equation .Application to Electrical circuits.

### **UNIT –II      LAPLACE TRANSFORMS**

Laplace Transform of standard functions; first shifting theorem, Second shifting theorem: Laplace transforms of functions when they are multiplied and divided by  $t$ . Laplace transforms of derivatives and integrals of function; Evaluation of integrals by Laplace transforms; Laplace transforms of Specific functions (Unit step function, Unit impulsive function); Laplace transform of Periodic functions.

Inverse Laplace transform by different methods, Convolution theorem (without Proof), Solving ODEs by Laplace Transform method.

### **UNIT –III      MULTIVARIABLE CALCULUS (INTEGRATION)**

Evaluation of Double Integrals (Cartesian and polar coordinates); Change of order of integration (only Cartesian form); Evaluation of Triple Integrals: Change of variables (Cartesian to polar) for double and (Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals.

Applications: Areas (by double integrals) and Volumes (by double integrals and triple integrals).

### **UNIT –IV      VECTOR DIFFERENTIATION**

Vector point functions and Scalar point functions. Gradient, Divergence and Curl. Directional derivatives, Tangent plane and normal line. Vector Identities. Scalar potential functions. Solenoidal and Irrotational vectors.

## **UNIT-V      VECTOR INTEGRATION**

Line, Surface and Volume Integrals, Theorems of Green, Gauss and Stokes theorems (statement & their verification)

### **TEXT BOOKS:**

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006
3. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint,

### **REFERENCE BOOKS:**

1. Paras Ram, Engineering Mathematics, 2nd Edition, CBS Publishes
2. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.
3. Advance engineering mathematics by RK Jain & S.R.K. Iyengar 3<sup>rd</sup> edition Narosa publishing house Delhi.

## **ENGINEERING PHYSICS**

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

**Course Code: A1PH203BS**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>

### **COURSE OBJECTIVES:**

1. The course aims at making students to understand the concepts in Mechanics and explaining the Newton's laws in different coordinate systems.
2. Students will be able to distinguish the various types of Harmonic Oscillations and can correlate the fundamental properties of the waves in one dimension.
3. To make the students to widen the conceptual understanding of the fundamental principles of optics like interference and diffraction.
4. To impart the knowledge of Lasers and optical fibers along with their applications.
5. To make the students acquire the knowledge of Nanoscience and synthesis of nanomaterials.

### **COURSE OUTCOMES:** Upon graduation, the students will have:

1. Knowledge in the concepts of mechanics and Newton's laws in different coordinate systems relevant to engineering and converting ideas into technology.
2. Understand the concepts of simple, damped and forced harmonic oscillators and compare the different types of harmonic oscillations.
3. Understand the various properties of optics and analyze the optical Phenomena's like interference and diffraction.
4. Compare different kinds of lasers and optical fibers for various applications such as communication, manufacturing and so on.
5. Knowledge of Nanotechnology which eventually lead to new innovations and improvements

### **UNIT-I: INTRODUCTION TO MECHANICS**

Transformation of scalars and vectors under Rotation transformation, Forces in Nature, Newton's laws and its completeness in describing particle motion, Form invariance of Newton's second law, Solving Newton's equations of motion in polar coordinates, cylindrical and spherical coordinates, concepts on constraints and friction including problems.

### **UNIT-II: WAVES AND HARMONIC OSCILLATIONS**

Simple harmonic oscillators, phasor representation, Damped harmonic oscillator: heavy, critical and light damping, Energy decay in a damped harmonic oscillator, Quality factor, Steady state motion of forced harmonic oscillator, Electrical and mechanical analogy for simple harmonic oscillator, The transverse wave equation of a vibrating string, Harmonic waves, Reflection and transmission of waves at a boundary, Impedance matching, Standing waves and their Eigen frequencies, Acoustic waves.

### **UNIT-III: WAVE OPTICS**

Huygen's principle, Superposition of waves, Interference of light by division of wave front and division of amplitude, Young's double slit experiment, Newton's rings, Michelson's interferometer, Diffraction of light, Fraunhofer diffraction from a single slit and circular aperture, Diffraction grating and its resolving power.

### **UNIT-IV: LASERS AND FIBRE OPTICS**

Introduction to interaction of radiation with matter, Coherence, Characteristics of LASER, Principle and working of Laser, Einstein coefficients, Population inversion, Pumping, Types of Lasers: Ruby laser, Carbon dioxide (CO<sub>2</sub>) laser, He-Ne laser, Applications of laser. Fibre Optics: Introduction, Optical fibre as a dielectric wave guide, Total internal reflection, Acceptance angle, Acceptance cone and Numerical aperture, Step and Graded index fibres, Losses associated with optical fibres, Applications of optical fibres.

**UNIT-V: NANO TECHNOLOGY**

Introduction to Nanoscience, Nanoscale, Nanobehavior, Properties and Types of nano materials, Synthesis of nanomaterials by Top-down method and Bottom-up method, Ball milling method, Physical vapour deposition method (PVD), Sol-gel synthesis, Chemical vapor deposition method, X-Ray diffraction (XRD), Scanning Electron Microscopy (SEM), Transmission Electron microscopy (TEM), Carbon nanotubes, Applications of nanomaterials in industry.

**TEXT BOOKS:**

1. Engineering Mechanics, 2nd ed.- MK Harbola, Cengage Learning
2. I. G. Main, "Vibrations and waves in physics", 3rd Edn, Cambridge University Press, 2018.
4. Ajoy Ghatak, "Optics", McGraw Hill Education, 2012
5. Engineering Physics by D.R. Joshi, McGraw Hill
6. Fundamentals of Acoustics, Kinster and Frey, John Wiley and Sons.
7. Nanomaterials, nanotechnologies and design, Michael F. Ashby

**REFERENCE BOOKS:**

1. H. J. Pain, "The physics of vibrations and waves", Wiley, 2006
2. O. Svelto, "Principles of Lasers"
3. "Introduction to Mechanics", M.K.Verma, Universities Press
4. Engineering Physics, Dr.M.N. Avadhanulu, Dr.P.G.K. Shirsagar –S Chand
5. Nanotechnology, Er. Rakesh Rathi, S. Chand Publications
6. Nanotechnology, Rishabh Anand

## **ENGINEERING MECHANICS**

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

**Course Code: A1ME209ES**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>

### **COURSE OBJECTIVES**

To learn

1. Explain the resolution of a system of forces, compute their resultant and solve problems using equations of equilibrium
2. Perform analysis of bodies lying on rough surfaces.
3. Locate the centroid of a body and compute the area moment of inertia and mass moment of inertia of standard and composite sections
4. Explain kinetics and kinematics of particles, projectiles, curvilinear motion, centroidal motion and plane motion of rigid bodies.
5. Explain the concepts of work-energy method and its applications to translation, rotation and plane motion and the concept of vibrations

### **COURSE OUTCOMES**

Upon the successful completion of this course, the students will be able to:

1. Determine resultant of forces acting on a body and analyze equilibrium of a body subjected to a system of forces.
2. Solve problem of bodies subjected to friction.
3. Find the location of centroid and calculate moment of inertia of a given section.
4. Understand the kinetics and kinematics of a body undergoing rectilinear, curvilinear, rotatory motion and rigid body motion.
5. Solve problems using work energy equations for translation, fixed axis rotation and plane motion and solve problems of vibration.

### **UNIT-I INTRODUCTION TO ENGINEERING MECHANICS - FORCE SYSTEMS**

Basic concepts, Particle equilibrium in 2-D & 3-D; Rigid Body equilibrium; System of Forces, Coplanar Concurrent Forces, Components in Space – Resultant- Moment of Forces and its Application; Couples and Resultant of Force System, Equilibrium of System of Forces, Free body diagrams, Equations of Equilibrium of Coplanar Systems and Spatial Systems; Static Indeterminacy

### **UNIT -II FRICTION**

Types of friction, Limiting friction, Laws of Friction, Static and Dynamic Friction; Motion of Bodies, wedge friction, screw jack & differential screw jack;

Centroid and Centre of Gravity -Centroid of Lines, Areas and Volumes from first principle, centroid of composite sections; Centre of Gravity and its implications

### **UNIT -III MOMENT OF INERTIA**

Area moment of inertia Definition, Moment of inertia of plane sections from first principles, Theorems of moment of inertia, Moment of inertia of standard sections and composite sections; Product of Inertia, Parallel Axis Theorem, Perpendicular Axis Theorem

Mass Moment of Inertia: Moment of Inertia of Masses - Transfer Formula for Mass Moments of Inertia – Mass moment of inertia of composite bodies

## **UNIT -IV      DYNAMICS**

Review of particle dynamics-Rectilinear motion; Plane curvilinear motion (rectangular, path, and polar coordinates). 3-D curvilinear motion; Relative and constrained motion; Newton's 2nd law (rectangular, path, and polar coordinates). Work-kinetic energy, power, potential energy. Impulse-momentum (linear, angular); Impact (Direct and oblique).

## **UNIT-V      KINETICS OF RIGID BODIES**

Kinetics of Rigid Bodies -Basic terms, general principles in dynamics; Types of motion, Instantaneous centre of rotation in plane motion and simple problems; D'Alembert's principle and its applications in plane motion and connected bodies; Work Energy principle and its application in plane motion of connected bodies; Kinetics of rigid body rotation

## **TEXT BOOKS**

1. Shames and Rao (2006), Engineering Mechanics, Pearson Education
2. Reddy Vijay Kumar K. and. Suresh Kumar (2010), Singer's Engineering Mechanics – Statics & Dynamics

## **REFERENCE BOOKS**

1. Timoshenko S.P and Young D.H., "Engineering Mechanics", McGraw Hill International Edition, 1983.
2. Andrew Pytel, Jaan Kiusalaas, "Engineering Mechanics", Cengage Learning, 2014.
3. Beer F.P & Johnston E.R Jr. Vector, "Mechanics for Engineers", TMH, 2004.
4. Hibbeler R.C & Ashok Gupta, "Engineering Mechanics", Pearson Education, 2010.
5. Tayal A.K., "Engineering Mechanics – Statics & Dynamics", Umesh Publications, 2011.
6. Basudeb Bhattacharyya, "Engineering Mechanics", Oxford University Press, 2008.
7. Meriam. J. L., "Engineering Mechanics", Volume-II Dynamics, John Wiley & Sons, 2008

## **ENGINEERING GRAPHICS**

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

**Course Code: A1ME208ES**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>1</b>	<b>0</b>	<b>4</b>	<b>3</b>

### **COURSE OBJECTIVES**

To learn

1. To provide basic concepts in engineering drawing.
2. To impart knowledge about standard principles of orthographic projection of objects.
3. To draw sectional views and pictorial views of solids.

### **COURSE OUTCOMES**

Upon the successful completion of this course, the students will be able to:

1. Preparing working drawings to communicate the ideas and information.
2. Read, understand and interpret engineering drawings.

### **UNIT-I INTRODUCTION**

Introduction to Engineering Drawing: Principles of Engineering Graphics and their Significance, Conic Sections including the Rectangular Hyperbola – General method only. Cycloid, Epicycloid and Hypocycloid, Scales –Plain & Diagonal

### **UNIT -II PROJECTIONS**

Projections of Points, Lines and Planes: Principles of Orthographic Projections –Conventions – Projections of Points and Lines, Projections of Plane regular geometric figures. —Auxiliary Planes.

### **UNIT -III PROJECTION OF SOLIDS**

Projection of Solids and Sectioned Solids:Projections of Regular Solids – Auxiliary Views - Sections or Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views – Sections of Sphere

### **UNIT -IV DEVELOPMENT OF LATERAL SURFACES**

Development of Lateral Surfaces: Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone

### **UNIT-V ISOMETRIC PROJECTIONS**

Isometric Projections: Principles of Isometric Projection – Isometric Scale – Isometric Views –Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts. Conversion of Isometric Views to Orthographic Views and Vice-versa – Conventions

Introduction to CAD: For Internal Evaluation Weightage only):

Introduction to CAD Software Package Commands. - Free Hand Sketches of 2D- Creation of 2D Sketches by CAD Package

### **TEXT BOOKS**

1. Engineering Drawing N.D. Bhatt / Charotar
2. Engineering Drawing / N. S. Parthasarathy and Vela Murali/ Oxford



**REFERENCE BOOKS**

1. Engineering Drawing / Basant Agrawal and McGraw/ McGraw Hill
2. Engineering Drawing/ M. B. Shah, B.C. Rane / Pearson.
3. Computer Aided Engineering Drawing – K Balaveera Reddy et al – CBS Publishers

## ENGINEERING PHYSICS LAB

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

**Course Code: A1PH212BS**

L	T	P	C
0	0	3	1.5

### COURSE OBJECTIVES:

1. To generate stationary waves using Melde's apparatus and determine the rigidity modulus of the given wire.
2. To determine the spring constant by understanding the oscillations of the coupled oscillator.
3. To discuss the various properties of light like interference and diffraction and determine the related parameters of light by using different optical experiments.
4. To develop skills to impart practical knowledge in real time solution of various optoelectronic devices like LED and LASER.
5. To explain about the electrical resonance by using the LCR circuit.

### COURSE OUTCOMES:

 After completion of the course, the students will be able to

1. Recall the different types of waves and observe their propagation and determine the rigidity modulus of the given wire.
2. Estimate the strength of materials and choose the appropriate material.
3. Analyze the various properties of light and determine the related parameters of light.
4. Compare the bending losses of optical fibers at various working areas and recall the applications of optical fibers.
5. Discuss the working of electronic components and built the circuits by selecting the appropriate components.

### LIST OF EXPERIMENTS:

1. **Melde's experiment:** To determine the frequency of a vibrating bar or tuning fork using Melde's arrangement.
2. **Torsional pendulum:** To determine the rigidity modulus of the material of the given wire using torsional pendulum.
3. **Coupled Oscillator:** To determine the spring constant by single coupled oscillator.
4. **Newton's rings:** To determine the radius of curvature of the lens by forming Newton's rings.
5. **Diffraction grating:** To determine the number of lines per inch of the grating.
6. **Dispersive power:** To determine the dispersive power of prism by using spectrometer.
7. **Laser:** To study the characteristics of LASER sources.
8. **Optical fibre:** To determine the bending losses of Optical fibres.
9. **Optical fibre:** To determine the Numerical aperture of a given fibre.
10. **LCR Circuit:** To determine quality factor and resonant frequency of LCR circuit.

**Note:** Any 8 experiments are to be performed

### REFERENCE BOOKS:

1. Engineering Physics Lab Manual by Dr.Y. Aparna&Dr.K.Venkateswarao (V.G.S.Book links).
2. Physics practical manual, Lorven Publications.

## **WORKSHOP MANUFACTURING PRACTICES**

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

**Course Code: A1ME216ES**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>1</b>	<b>0</b>	<b>4</b>	<b>3</b>

### **COURSE OBJECTIVES:**

**The course should enable the students to:**

1. To Study of different hand operated power tools, uses and their demonstration.
2. To gain a good basic working knowledge required for the production of various engineering products.
3. To provide hands on experience about use of different engineering materials, tools, equipment and processes those are common in the engineering field.
4. To develop a right attitude, team working, precision and safety at work place.
5. It explains the construction, function, use and application of different working tools, equipment and machines.
6. To study commonly used carpentry joints.
7. To have practical exposure to various welding and joining processes.
8. Identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances.

### **COURSE OUTCOMES:**

**By the end of the course students will be able:**

1. Study and practice on machine tools and their operations
2. Practice on manufacturing of components using workshop trades including plumbing, fitting, carpentry, foundry, house wiring and welding.
3. Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiseling.
4. Apply basic electrical engineering knowledge for house wiring practice.

### **LIST OF EXPERIMENTS**

#### **I. TRADES FOR EXERCISES:**

**At least two exercises from each trade:**

<b>Experiment-1</b>	Carpentry – (T-Lap Joint, Dovetail Joint, Mortise & Tenon Joint)
<b>Experiment-2</b>	Fitting – (V-Fit, Dovetail Fit & Semi-circular fit)
<b>Experiment-3</b>	Tin-Smithy – (Square Tin, Rectangular Tray & Conical Funnel)
<b>Experiment-4</b>	Foundry – (Preparation of Green Sand Mould using Single Piece and Split Pattern)
<b>Experiment-5</b>	Welding Practice – (Arc Welding & Gas Welding)
<b>Experiment-6</b>	House-wiring – (Parallel & Series, Two-way Switch and Tube Light)
<b>Experiment-7</b>	Black Smithy – (Round to Square, Fan Hook and S-Hook)

#### **II. TRADES FOR DEMONSTRATION & EXPOSURE:**

<b>Experiment-1</b>	Plumbing, Machine Shop, Metal Cutting
<b>Experiment-2</b>	Power tools in construction and Wood Working

### **REFERENCE BOOKS:**

1. Workshop Practice /B. L. Juneja /Cengage
2. Workshop Manual / K. Venugopal /Anuradha.
3. Work shop Manual - P. Kannaiah/ K. L. Narayana/SciTech
4. Workshop Manual / Venkat Reddy/BSP

## ENGINEERING EXPLORATION

### I-B.TECH II-SEMESTER

**Course Code:** A1CE201PW

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

### COURSE DESCRIPTION:

#### Course Overview:

This Course provides an opportunity for freshman students to learn in new ecosystem and is one of the unique outcomes of innovative education ecosystem in digital era of our nation. The focus of this course is on Engineering Design Process, Problem Solving, and Multi-disciplinary skills, Ethics and Data Acquisition and Analysis. This course is co-designed and co-taught by faculty members drawn from multiple engineering disciplines; it follows Project Based Learning (PBL) pedagogy with need statements covering broad themes of environmental, educational, smart appliances, smart agriculture, industrial needs etc. are used by students to carve out problem definitions by linking Sustainable Development Goals defined by United Nation. Students work in teams to solve identified problems and serves as a platform for peer learning and push students in Multi-disciplinary design thinking in first year itself.

### COURSE OUTCOMES:

#### By the end of the course students will be able to:

1. Compare and contrast the contributions of different types of engineers in the development of a product, process, or system.
2. Apply the common engineering design process to solve complex problems and arrive at viable solution.
3. Explore various contemporary software and hardware tools to provide solutions for the problems.
4. Apply skills needed for successful teamwork including the basics of project management and written and oral communication.
5. Identify the key elements of professional codes of ethics as well as the ethical and societal issues related to the disciplines and their impact on society and the world.

### LIST OF ACTIVITIES

#### Week-1

**Introduction to Engineering and Engineering Study:** Difference between science and engineering, scientist and engineer needs and wants, various disciplines of engineering, some misconceptions of engineering, Expectation for the 21st century engineer and Graduate Attributes.

#### Week-2

**Engineering Design Process:** Design Cycle, Multidisciplinary facet of design, Importance of analysis in engineering design, general analysis procedure, generation of multiple solution, decision matrix, Concepts of reverse engineering and general mechatronics system.

#### Week-3

**Introduction to Open-source platforms:** Open-source hardware & software tools, Development (Arduino) of Programming (Tinker CAD Tools) and its Essentials, Introduction to Sensors, Transducers and Actuators and its interfacing with Open-Source H/W & S/W tools.

#### Week-4

**Engineering Ethics:** Identifying Engineering as a Profession, Significance of Professional Ethics, Code of Conduct for Engineers.

**Week-5**

**Sustainability:** Introduction to sustainability, Sustainability leadership, Life cycle assessment.

**Week-6**

**Project Management& Tools:** Introduction, Significance of teamwork, Importance of communication in engineering profession, Checklist, Timeline, Gantt Chart, Significance of documentation.

**LABORATORY EQUIPMENT/SOFTWARE/TOOLS REQUIRED**

1. Open-source Hardware: Microchip ATmega328P (UNO/NANO/MEGA).
2. I/O Peripherals: LCD, Keypad, DC/Servo Motor, Switch, 7-Segment LED modules, GSM, GPS etc.
3. Sensor Tool Kit: Digital RED/WHITE/GREEN/BLUE Light Module, IR, Analog Sound, Soil Moisture, LM35 Analog Linear Temperature, MQ7 Analog Carbon Monoxide etc.
4. Open-source Software: Arduino IDE Version 1.8.5.

**TEXT BOOKS:**

1. Philip Kosky, Robert T. Balmer, William D. Keat, George Wise, Exploring Engineering: An Introduction to Engineering and Design, Academic Press, 3rd edition, 2012.
2. Byron Francis, Arduino: The Complete Beginner's Guide, Create space Independent Publishers, 2016.
3. M. Govindarajan, S. Natarajan& V. S. Senthil Kumar, Engineering Ethics, 1st Edition, Phi Learning, 2009.

**REFERENCE BOOKS:**

1. NeerparajRai, Arduino Projects for Engineers, 1st edition, BPB Publications, 2016.
2. Simon Monk, Programming Arduino: Getting Started with Sketches, 2nd Edition, McGraw-Hill Education, 2016.
3. W. Richard Bowen, Engineering Ethics – Outline of an aspirational approach, Springer London.

## **II-YEAR (I-SEMESTER)**

## **SURVEYING AND GEOMATICS**

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

**Course Code: A1CE301PC**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **COURSE OBJECTIVES**

1. Understand the basics of Surveying
2. Know and read the topo sheets.
3. Use the topo sheets for taking appropriate decisions.
4. Expose to various Surveying instruments.
5. Develop the maps required for various applications accurately.

### **COURSE OUTCOMES**

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

1. Know the estimation of various parameters required for execution of a project.
2. Be in a position to choose appropriate instruments for carrying Surveying.
3. Can identify the data required for preparation of topo sheets.
4. Acquiring the data accurately and quickly with proper checks.
5. Knows the way of transferring data from topo sheets to ground and vice versa

### **UNIT-I INTRODUCTION**

Introduction to Surveying :Principles and objectives of surveying, Linear, angular and graphical methods, concept of Survey stations, Survey lines- ranging, brief introduction to offsets-types and uses; Bearing of survey lines using prismatic compass, concepts of whole circle bearing system and quadrantal bearing system.

### **UNIT –II LEVELING**

Principles, terms used in leveling, bench marks and types, booking and reduction of levels, types of leveling; contouring: Contours- definition, contour interval, characteristics, methods of contouring and interpolation and uses of contours,

Estimation of areas and volumes using Trapezoidal and Simpson's method

### **UNIT-III TACHEOMETRY**

Theodolite survey: Instruments, Measurement of horizontal and vertical angle; Trigonometric leveling - Axis signal correction. Tachometric Surveying: Principles of Tachometry, stadia and tangential methods of Tachometry. Curves: Elements of simple and compound curves – Method of setting out, Elements of Reverse curve Transition curve – length of curve – Elements of transition curve, Vertical curves-types, setting out of vertical curves.

### **UNIT-IV MODERN SURVEYING**

Introduction, Electromagnetic Distance Measurement, Electronics Theodolite, Total station, Site square, Penta Graph, Auto set Level, Transit level, Special Compasses, Brunton Universal Pocket Transit, Mountain Compass Transit

### **UNIT -V PHOTOGRAMMETRY SURVEYING**

Photogrammetric Surveying: Introduction, Basic concepts, perspective geometry of aerial photograph, relief and tilt displacements, terrestrial Photogrammetric, flight planning; Stereoscopy, ground control extension for photographic mapping- aerial triangulation, radial triangulation, methods; photographic mapping- mapping using paper prints, mapping using stereo plotting instruments, mosaics, map substitutes.

**TEXT BOOKS:**

1. A M Chandra, “Plane Surveying and Higher Surveying”, New age International Pvt. Ltd., Publishers, New Delhi.
2. S K Duggal, “Surveying (Vol – 1 & 2), Tata McGraw Hill Publishing Co. Ltd. New Delhi.
3. Satheesh Gopi and R. Sathikumar, “Advanced Surveying: Total Station, GIS and Remote Sensing”, Pearson India, 2006.

**REFERENCE BOOKS:**

1. Arthur R Benton and Philip J Taety, Elements of Plane Surveying, McGraw Hill.
2. Surveying and levelling by R. Subramanian, Oxford university press, New Delhi
3. K R Arora “Surveying Vol 1, 2 & 3), Standard Book House, Delhi.

**WEB REFERENCES:**

1. <https://earthdata.nasa.gov/learn/backgrounders/remote-sensing>
2. [https://www.rtu.ac.in/expert/app/documents/prateek.sharma@gitjaipur.com\\_22029102020014534pm.pdf](https://www.rtu.ac.in/expert/app/documents/prateek.sharma@gitjaipur.com_22029102020014534pm.pdf)
3. <https://theconstructor.org/surveying/modern-surveying-instruments-uses/16/>
4. <https://www.britannica.com/technology/theodolite>

**E-TEXT BOOKS:**

1. <https://www.e-booksdirectory.com/details.php?ebook=10166>

**MOOCS COURSE:**

1. <https://swayam.gov.in/>
2. <https://onlinecourses.nptel.ac.in/>



## **STRENGTH OF MATERIALS-I**

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

**Course Code: A1CE302PC**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **COURSE OBJECTIVES**

1. To understand the nature of stresses developed in simple geometries such as bars, cantilevers and beams for various types of simple loads
2. To understand the shear force and bending moments in the various types of beams.
3. To calculate the elastic deformation occurring in simple members for different types of loading.
4. To show the plane stress transformation with a particular coordinate system for different orientation of the plane.
5. To know different failure theories adopted in designing of structural members

### **COURSE OUTCOMES**

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

1. Describe the concepts and principles, understand the theory of elasticity including strain/displacement and Hooke's law relationships; and perform calculations, related to the strength of structural and mechanical components.
2. Recognize various types loads applied on structural components of simple framing geometries and understand the nature of internal stresses that will develop within the components.
3. To evaluate the strains and deformation that will result due to the elastic stresses developed within the materials for simple types of loading
4. Analyze various situations involving structural members subjected to plane stresses by application of Mohr's circle of stress;
5. Frame an idea to design a system, component and process

### **UNIT-I SIMPLE STRESSES AND STRAINS**

Concept of stress and strain- St. Venant's Principle-Stress and Strain Diagram - 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 – Pure shear and Complementary shear - Elastic moduli, Elastic constants and the relationship between them – Bars of varying section – composite bars – Temperature stresses. Strain energy – Resilience – Gradual, sudden, and impact loadings – simple applications.

### **UNIT -II SHEAR FORCE AND BENDING MOMENT**

Types of beams and loads – Basics of shear force and bending moment – Shear force diagram and Bending moment diagram for cantilever, simply supported and overhanging beams subjected to different type of loads, couple and combination of these loads – Point of contra flexure – Relation between rate of loading, Shear force and Bending moment at a section.

### **UNIT –III FLEXURAL STRESSES AND SHEAR STRESSES**

Theory of simple bending – Assumptions – Derivation of bending equation- Section Modulus Determination of flexural/bending stresses of rectangular and circular sections (Solid and Hollow), I,T, Angle and Channel sections – Design of simple beam sections.

Derivation of formula for shear stress distribution – Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T angle and channel sections.

## **UNIT -IV      DEFLECTION OF BEAMS**

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 various types of load and couple -Mohr's theorems – Moment area method – Application to simple cases. Introduction of Conjugate beam method – 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**

Introduction – Stresses on an oblique plane 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 –Principal stresses – Mohr's circle of stresses – ellipse of stress - Analytical and graphical solutions. Introduction of theories of failure – Various theories of failure - Maximum Principal Stress Theory, Maximum Principal Strain Theory, Maximum shear stress theory- Strain Energy and Shear Strain Energy Theory.

## **TEXT BOOKS**

1. Strength of Materials by R. K Rajput, S. Chand & Company Ltd.
2. Strength of material by Dr.R.K.Bansal Laxmi Publications, New Delhi..
3. Strength of Materials by R. Subramanian, Oxford University Press
4. Mechanics of Materials by Dr. B.C Punmia, Dr. Ashok Kumar Jain and Dr. Arun Kumar Jain

## **REFERENCE BOOKS**

1. Mechanics of material by R.C. Hibbeler, Prentice Hall publications
2. Strength of Materials by T.D.Gunneswara Rao and M.Andal, Cambridge Publishers
3. Engineering Mechanics of Solids by Egor P. Popov, Prentice Hall publications
4. Strength of Materials by B.S.Basavarajaiah and P. Mahadevappa, 3<sup>rd</sup> Edition, Universities Presss

## **WEB REFERENCES**

1. <https://easyengineering.net/a-textbook-of-strength-of-materials/>
2. <https://civilenggforall.com/strength-of-materials-textbook-free-download-pdf-civilenggforall/>

## **E-TEXT BOOKS**

1. [https://books.google.co.in/books?id=2IHEqp8dNWwC&printsec=frontcover&redir\\_esc=y#v=onepage&q&f=false](https://books.google.co.in/books?id=2IHEqp8dNWwC&printsec=frontcover&redir_esc=y#v=onepage&q&f=false)

## **MOOCS COURSE**

1. <https://swayam.gov.in/>
2. <https://onlinecourses.nptel.ac.in/>

## **FLUID MECHANICS**

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

**Course Code: A1CE303PC**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **COURSE OBJECTIVES**

To study basics of Fluid Mechanics, Fluid properties and concept of submerged &

1. Floating structure in a static fluid.
2. To make use of principles of continuity, momentum, and energy as applied to fluid Motions.
3. To apply fundamental principles of fluid mechanics for the solution of practical civil Engineering problems.
4. To know the Principles of Kinematics and Dynamics.
5. To design the pipes to carry particular amount of discharge

### **COURSE OUTCOMES**

On completion of the course, learners will be able to:

1. Use fluid properties, dimensional analysis for solving problems of fluid flow.
2. Solve fluid statics problems.
3. Measure fluid pressure.
4. Calibrate discharge measuring instrument like venturi meter, orifice meter.
5. Distinguish between various types of fluid flows and find the fluid velocity using

### **UNIT – I PROPERTIES OF FLUID AND FLUID STATICS**

Distinction between a fluid and a solid; Density, Specific weight, Specific gravity, Kinematic and dynamic viscosity; variation of viscosity with temperature, Newton law of viscosity; vapour pressure, boiling point, cavitation; surface tension, capillarity, Bulk modulus of elasticity, compressibility.

Fluid Statics-Fluid Pressure: Pressure at a point, Pascal's law, pressure variation with temperature, density and altitude. Piezometer, U-Tube Manometer, Single Column Manometer, U-Tube Differential Manometer, Micromanometers. pressure gauges. Hydrostatic pressure and force: horizontal, vertical and inclined surfaces. Buoyancy and stability of floating bodies.

### **UNIT – II FLUID KINEMATICS AND FLUID DYNAMICS**

Classification of fluid flow: steady and unsteady flow; uniform and non-uniform flow; laminar and turbulent flow; rotational and irrotational flow; compressible and incompressible flow; ideal and real fluid flow; one, two- and three-dimensional flows; Stream line, path line, streak line and stream tube; stream function, velocity potential function. One, two- and three-dimensional continuity equations in Cartesian coordinates. Fluid Dynamics-Surface and Body forces -Euler's and Bernoulli's equation; Energy correction factor; Momentum equation. Vortex flow – Free and Forced. Bernoulli's equation to real fluid flows.

### **UNIT – III FLOW MEASUREMENTS**

Practical applications of Bernoulli's equation: Venturimeter, Orifice meter and Pitot tube; Momentum principle; Forces exerted by fluid flow on pipe bend. Flow Over Notches & Weirs-Flow through rectangular; triangular and trapezoidal notches and weirs; End contractions; Velocity of approach. Broad crested weir.

### **UNIT – IV FLOW THROUGH PIPES**

Reynolds experiment, Reynolds number, Loss of head through pipes, Darcy-Wiesbatch equation, minor losses, total energy line, hydraulic grade line, Pipes in series, equivalent pipes, pipes in parallel, siphon, branching of pipes, three reservoir problem, power transmission through pipes. Analysis of pipe networks: Hardy Cross method, water hammer in pipes and control measures.

Laminar flow through: circular pipes, annulus and parallel plates.

## **UNIT – V      BOUNDARY LAYER CONCEPTS**

Boundary Layer Concepts-Boundary Layer Analysis-Assumption and concept of boundary layer theory. Boundary-layer thickness, displacement, momentum & energy thickness, laminar and Turbulent boundary layers on a flat plate; Laminar sub-layer, smooth and rough boundaries. Local and average friction coefficients. Separation and Control. Definition of Drag and Lift and types drag, Magnus effect.

### **TEXT BOOKS:**

1. Fluid Mechanics and Fluid Machines by R. K. Bansal, Laxmi Publications.
2. Hydraulics and Fluid Mechanics Including Hydraulics Machines by dr. P.N. Modi, S.M. Seth
3. Streeter, Victor, L, and Benjamin., “Fluid Mechanics”, McGraw-Hill Ltd., 1998
4. Natarajan M.K. “Principles of Fluid Mechanics”, Agencies, Vidyal Karuppur, Kumbakonam, 1995.
5. Fox Robert W. and McDonald. Man T., Introduction Fluid Mechanics”, John Wiley & Sons,1995.
- Streeter, Victor, L, and Benjamin., “Fluid Mechanics”, McGraw-Hill Ltd., 1998

### **REFERENCE BOOKS:**

1. Fluid Mechanics by Yunus Cengel, Jhon Cimbala, Tata Macgraw Hill, New Delhi.
2. Fluid Mechanics by R. J. Garde, A.J Mirajgaonkar, SCITECH Publication.
3. Fluid Mechanics by Streeter & Wylie, Tata McGraw Hill.
4. Fluid Mechanics by Dr. A. K. Jain, Khanna Publishers.
5. Fluid Mechanics by K. Subramanya, McGraw Hill.
6. Fluid Mechanics by Frank White, McGraw Hill.

### **WEB REFERENCES:**

1. [http://civilcafe.weebly.com/uploads/2/8/9/8/28985467/fluid\\_mechanics.pdf](http://civilcafe.weebly.com/uploads/2/8/9/8/28985467/fluid_mechanics.pdf)
2. <http://fma.if.usp.br/~eabdalla/exacta/000m1.pdf>
3. [https://ahsheikh.github.io/Courses/NumMod/FM\\_RobertFox.pdf](https://ahsheikh.github.io/Courses/NumMod/FM_RobertFox.pdf)

### **E-TEXT BOOKS:**

1. <http://www.musaliarcollege.com/e-Books/ME/Fluid%20Mechanics%20&%20Hydraulic%20Machines.pdf>

### **MOOCS COURSE:**

1. <http://http://nptel.ac.in/courses/105/101/105101082/s://nptel>
2. <https://onlinecourses.nptel.ac.in/>

## **ENGINEERING GEOLOGY**

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

**Course Code: A1CE304PC**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>

### **COURSE OBJECTIVES**

1. To introduce the engineering geology as a subject in civil engineering.
2. To enable the student to use subject in civil engineering applications.
3. To know the geological history of India.
4. To Analyses the ground conditions through geophysical surveys
5. To Test the geological material and ground to check the suitability of civil engineering project construction

### **COURSE OUTCOMES**

Upon the successful completion of this course, the students will be able to:

1. Identify and classify the geological minerals
2. Measure the rock strengths of various rocks
3. Classify and measure the earthquake prone areas to practice the hazard zonation
4. Classify, monitor and measure the Landslides and subsidence
5. Prepares, analyses and interpret the Engineering Geologic maps

### **UNIT-I INTRODUCTION**

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

Weathering of Rocks: Its effect over the properties of rocks importance of weathering with reference to dams, reservoirs and tunnels weathering of common rock like “Granite”

### **UNIT – II MINERALOGY AND PETROLOGY**

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: Feldsper, Quartz, Flint, Jasper, Olivine, Augite, Hornblende, Muscovite, Biotite, Asbestos, Chlorite, Kyanite, Garnet, Talc, Calcite. Study of other common economics minerals such as Pyrite, Hematite, Magnetite, Chlorite, Galena, Pyrolusite, Graphite, Magnesite, and Bauxite.

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

### **UNIT – III STRUCTURAL GEOLOGY**

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

### **UNIT – IV GEOPHYSICAL STUDIES**

Earth Quakes: Causes and effects, shield areas and seismic belts. Seismic waves, Richter scale, precautions to be taken for building construction in seismic areas. Landslides, their causes and effect; measures to be taken to prevent their occurrence.

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**

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. Factors 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 (i.e. Tithological, structural and ground water) in tunneling over break and lining in tunnels.

### **TEXT BOOKS**

1. Engineering Geology by N. Chennakesavulu, McMillan, India Ltd. 2005
2. Engineering Methods by D. Venkat Reddy; Vikas Publishers 2015.
3. Engineering Geology by S K Duggal, H K Pandey Mc Graw Hill Education Pvt Ltd 2014
4. Principles of Engineering Geology by K.V.G.K. Gokhale – B.S publications

### **REFERENCE BOOKS**

1. Engineering Geology, Vasudev Kanithi, University Press.
2. Engineering Geology for Civil Engineers P. C. Varghese, PHI learning pvt. Ltd.
3. G Fundamentals of Engineering Geology' P.G. Bell, B. S. P. Publications, 2012
4. Geology for Engineers and Environmental Society, Alan E Kehew, person publications, 3<sup>rd</sup> edition.
5. Engineer's Geology by S. K. Duggal, H.K. Pandey, N. Rawd, McGraw Hill education.
6. Engineering Geology, K. S. Valdiya, McGraw Hill.Environmental Geology, K. S Valdiya, Mcgraw Hill Publications, 2<sup>nd</sup> Edition

### **WEB REFERENCES**

1. <https://www.journals.elsevier.com/engineering-geologyc>
2. <https://app.knovel.com/web/toc.v/cid:kpEG000002/viewerType:toc/>

### **E-TEXT BOOKS**

1. <https://easyengineering.net/engineering-geology-books-collection/>
2. <https://geomuseu.ist.utl.pt/SEMINAR2012/Livros/EngenhariaGeologica.pdf>

### **MOOCS COURSE**

1. <https://nptel.ac.in/courses/105/105/105105106/>
2. [https://onlinecourses.nptel.ac.in/noc20\\_ce33/preview](https://onlinecourses.nptel.ac.in/noc20_ce33/preview)

## **BASIC ELECTRICAL & ELECTRONICS ENGINEERING**

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

**Course Code: A1EE307ES**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**PRE-REQUISITES: Nil**

### **COURSE OBJECTIVES:**

The course should enable the students to:

1. Develop fundamentals, including Ohm's law, Kirchhoff's laws and be able to solve for currents, voltages and power in electrical circuits.
2. Develop EMF equation and analyze the operation of DC Machines.
3. Analyze the working principle of Transformer.
4. Discuss the operation of AC Machines.
5. Analyze the operation of PN junction diode and rectifiers.
6. Discuss the operation and characteristics of Transistors

### **COURSE OUTCOMES:**

Upon graduation:

1. Analyze and solve for current values in resistive circuits with independent sources.
2. Analyze the working of DC machines and solve the numerical problems
3. Analyze the working of AC electrical machines and solve the numerical problems.
4. Analyze the V-I characteristics of PN – junction diode and describe the operation Of rectifiers.
5. Analyze the different configurations of Transistors and obtain its characteristics

### **UNIT I ELECTRICAL CIRCUITS**

Basic definitions-Ohm's Law, types of elements, types of sources, Kirchhoff's Laws – simple problems. Series & parallel resistive networks with DC excitation star to delta and delta to star transformations. Norton's, Thevenin's theorems

### **UNIT II D.C. MACHINES**

Principle of Operation of DC Motor, types of DC motor, Torque equation & Losses and problems. DC Generator construction and working Principle, EMF Equation types of generators and problems.

### **UNIT III A.C. MACHINES**

Working principle and Construction of transformer, Emf Equation & problems, Principle operation of 3-phase induction motor, slip and torque Equation, Torque –slip Characteristics & problems, principle Operation of 3-phase Alternator, Emf Equation of Alternator & problems.

### **UNIT IV DIODE AND ITS CHARACTERISTICS**

PN JUNCTION DIODE: Operation of PN junction Diode: forward bias and reverse bias, Characteristics of PN Junction Diode – Zener Effect – Zener Diode and its Characteristics. Rectifiers, Half wave, Full wave and bridge Rectifiers –capacitor filters, inductor filters.

### **UNIT V TRANSISTORS**

Bipolar Junction Transistor and its types, Transistor as an Amplifier CB, CE, CC Configurations comparison of transistor configurations, the operating point FETs: J-FET, MOSFET,V-I characterises, MOSFET as a switch

**TEXT BOOKS:**

1. Basic Electrical Engineering by M.S.Naidu and S.Kamakshaiah TMH.
2. Electronic Devices and circuits by J.Millman, C.C.Halkias and SatyabrataJit 2ed.,
3. Engineering circuit analysis- by William Hayt and Jack E. Kemmerly, McGraw Hill Company, 6th Edition

**REFERENCE BOOKS:**

1. Electronic Devices and Circuits – R. L. Boylestead and Louis Nashelsky, PEI/PHI, 9<sup>th</sup> Ed, 2006.
2. Millman's Electronic Devices and Circuits – J. Millman and C. C. Halkias, Satyabrata Jit, TMH, 2/e, 1998.
3. Engineering circuit analysis- by William Hayt and Jack E. Kemmerly, McGraw Hill Company, 6<sup>th</sup> edition.
4. 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.
5. Network Theory by N. C. Jagan& C. Lakshminarayana, B.S. Publications.
6. Network Theory by Sudhakar, Shyam Mohan Palli, TMH.
7. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
8. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
9. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.



## **SURVEYING LAB -I**

### **II B. TECH I SEMESTER**

**Course Code: A1CE305PC**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>

### **COURSE OBJECTIVES:**

To impart the practical knowledge in the field, it is essential to introduce in curriculum. Drawing of Plans and Maps and determining the area are pre requisites before taking up any Civil Engineering works.

### **COURSE OUTCOMES:**

At the end of the course, the student will be able to: Practically able to draw plans & maps to determine the areas before taking up any civil engineering works.

### **LIST OF EXPERIMENTS**

- Experiment-1.** Surveying of an area by chain survey (closed traverse) & plotting.
- Experiment-2.** Chaining across obstacles
- Experiment-3.** Determine of distance between two inaccessible points with compass
- Experiment-4.** Survey of a given area by prismatic compass (closed traverse) and plotting after adjustment.
- Experiment-5.** Radiation method, intersection methods by plane table survey.
- Experiment-6.** Two point and three point problems in plane table survey.
- Experiment-7.** Levelling – Longitudinal and cross-section and plotting
- Experiment-8.** Trigonometric leveling using theodolite
- Experiment-9.** Height and distances using principles of tacheometric surveying
- Experiment-10.** a) Measurement of Horizontal angle & vertical angle.  
b) Distance between inaccessible point by theodolite

### **TEXT BOOKS:**

1. Arthur R Benton and Philip J Taety, Elements of Plane Surveying, McGraw Hill.
2. S K Duggal, “Surveying (Vol – 1 & 2)”, Tata McGraw Hill Publishing Co. Ltd. New Delhi.

### **REFERENCE BOOKS:**

1. Surveying and levelling by R. Subramanian, Oxford university press, New Delhi
2. Arora K R “Surveying Vol 1, 2 & 3), Standard Book House, Delhi.

### **WEB REFERENCES:**

1. <https://earthdata.nasa.gov/learn/backgrounders/remote-sensing>
2. <https://theconstructor.org/surveying/modern-surveying-instruments-uses/16/>
3. <https://www.britannica.com/technology/theodolite>

### **E-TEXT BOOKS:**

1. <https://www.e-booksdirectory.com/details.php?ebook=10166>

### **MOOCS COURSE:**

1. <https://swayam.gov.in/>
2. <https://onlinecourses.nptel.ac.in/>

## **ENGINEERING GEOLOGY LAB**

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

**Course Code: A1CE306PC**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

### **COURSE OBJECTIVES:**

**The course should enable the students to:**

1. To identify the mega-scopic types of ore minerals & rock forming minerals.
2. To identify the mega-scopic types of igneous, sedimentary, metamorphic rocks.
3. To identify the topography of the site.
4. Material selection course outcomes: upon the successful completion of this course
5. Identify mega-scopic minerals

### **COURSE OUTCOMES:**

**By the end of the course students will be able:**

1. To identify the mega-scopic types of ore minerals & rock forming minerals.
2. To identify the mega-scopic types of igneous, sedimentary, metamorphic rocks.
3. To identify the topography of the site.
4. Material selection course outcomes: upon the successful completion of this course
5. Identify mega-scopic minerals

### **LIST OF EXPERIMENTS**

- Experiment-1** Study of physical properties of minerals.
- Experiment-2** Study of different group of minerals
- Experiment-3** Study of Crystal and Crystal system.
- Experiment-4** Identification of minerals: Silica group: Quartz, Amethyst, Opal; Feldspar group: Orthoclase, Plagioclase; Cryptocrystalline group: Jasper; Carbonate group: Calcite; Element group: Graphite; Pyroxene group: Talc; Mica group: Muscovite; Amphibole group: Asbestos, Olivine, Hornblende, Magnetite, Hematite, Corundum, Kyanite, Garnet, Galena, Gypsum.
- Experiment-5** Identification of rocks (Igneous Petrology): Acidic Igneous rock: Granite and its varieties, Syenite, Rhyolite, Pumice, Obsidian, Scoria, Pegmatite, Volcanic Tuff. Basic rock: Gabbro, Dolerite, Basalt and its varieties, Trachyte.
- Experiment-6** Identification of rocks (Sedimentary Petrology): Conglomerate, Breccia, Sandstone and its varieties, Laterite, Limestone and its varieties, Shales and its varieties.
- Experiment-7** Identification of rocks (Metamorphic Petrology): Marble, slate, Gneiss and its varieties, Schist and its varieties. Quartzite, Phyllite.
- Experiment-8** Study of topographical features from Geological maps. Identification of symbols in maps.
- Experiment-9** Simple structural Geology Problems (Folds, Faults & Unconformities)

### **TEXT BOOKS:**

1. Engineering Geology, N. Chenna Kesavulu, Laxmi Publications, 2<sup>nd</sup> Edition, 2014.
2. Engineering Geology, Subinoy Gangopadhyay, Oxford University press.

### **REFERENCE BOOKS:**

1. Applied engineering geology practical, M. T. Maruthesha reddy, new age international publishers
2. Foundations of engineering geology' by Tony Waltham, spon press, 3rd edition, 2009

**WEB REFERENCES:**

1. <https://nptel.ac.in/courses/105/105/105105108>

**MOOCS COURSE**

1. <https://nptel.ac.in/courses/105/105/105105106/>
2. [https://onlinecourses.nptel.ac.in/noc20\\_ce33/preview](https://onlinecourses.nptel.ac.in/noc20_ce33/preview)

## **BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB**

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

**Course Code: A1EE315ES**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>

**PRE-REQUISITES:** No

### **COURSE OBJECTIVES:**

The course should enable the students to:

1. Develop fundamentals, including Ohm's law, Kirchhoff's laws and be able to solve for currents, voltages and power in electrical circuits.
2. Develop EMF equation and analyze the operation of DC Machines.
3. Analyze the working principle of Transformer.
4. Discuss the operation of AC Machines.
5. Analyze the operation of PN junction diode and rectifiers.
6. Discuss the operation and characteristics of Transistors

### **COURSE OUTCOMES:**

By the end of the course students will be able:

1. Analyze and solve for current values in resistive circuits with independent sources.
2. Analyze the working of DC machines and solve the numerical problems.
3. Analyze the working of AC electrical machines and solve the numerical problems.
4. Analyze the V-I characteristics of PN – junction diode and describe the operation of rectifiers
5. Analyze the different configurations of Transistors and obtain its characteristics

### **LIST OF EXPERIMENTS**

#### **PART-A (Electrical Engineering):**

- |                     |   |
|---------------------|---|
| <b>Experiment-1</b> | Verification of Norton's, Thevenin's theorems   |
| <b>Experiment-2</b> | Verification of KVL and KCL   |
| <b>Experiment-3</b> | Brake test on DC shunt motor.   |
| <b>Experiment-4</b> | Swinburne's test on D.C. Shunt machine (predetermination of efficiency of a given D.C. machine working as motor and generator). |
| <b>Experiment-5</b> | O.C and S.C test on single phase transformer (predetermination of Efficiency and regulation at given power factor)              |
| <b>Experiment-6</b> | Brake test on 3- phase induction motor (determination of performance Characteristics).  |
| <b>Experiment-7</b> | No-Load Characteristics of a Three-phase Alternator   |

#### **PART-B (Electronics Engineering)**

- |                      |  |
|----------------------|--|
| <b>Experiment-8</b>  | Study and operation of (i) Multi-meters (ii) Function Generator (iii) Regulated Power Supplies (iv) CRO. |
| <b>Experiment-9</b>  | PN Junction diode characteristics  |
| <b>Experiment-10</b> | Zener diode characteristics and Zener as voltage Regulator   |
| <b>Experiment-11</b> | Input & Output characteristics of Transistor in CB, CE & CC configuration                                |
| <b>Experiment-12</b> | Full Wave Rectifier with & without filters   |

### **TEXT BOOKS:**

1. Basic Electrical Engineering by M.S.Naidu and S.Kamakshaiah TMH.
2. Electronic Devices and circuits by J.Millman, C.C.Halkias and SatyabrataJit 2ed.,
3. Engineering circuit analysis- by William Hayt and Jack E. Kemmerly, McGraw Hill Company, 6<sup>th</sup> Edition

**REFERENCE BOOKS:**

1. Electronic Devices and Circuits – R. L. Boylestead and Louis Nashelsky, PEI/PHI, 9<sup>th</sup> Ed, 2006.
2. Millman's Electronic Devices and Circuits – J. Millman and C. C. Halkias, Satyabrata Jit, TMH, 2/e, 1998.
3. Engineering circuit analysis- by William Hayt and Jack E. Kemmerly, McGraw Hill Company, 6<sup>th</sup> edition.
4. 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.
5. Network Theory by N. C. Jagan& C. Lakshminarayana, B.S. Publications.
6. Network Theory by Sudhakar, Shyam Mohan Palli, TMH.
7. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
8. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
9. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

## GENDER SENSITIZATION

### II-B.TECH I-SEMESTER

Course Code: A1CE303MC

L	T	P	C
0	0	2	0

### COURSE OBJECTIVES

1. To provide a critical perspective on the socialization of men and women.
2. To introduce students to information about some key biological aspects of genders.
3. To expose the students to debates on the politics and economics of work.
4. To help students reflect critically on gender violence.
5. To expose students to more egalitarian interactions between men and women.

### COURSE OUTCOMES:

1. Students will have developed a better understanding of important issues related to gender in contemporary india.
2. Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
3. Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
4. Students will acquire insight into the gendered division of labour and its relation to politics and economics.
5. Men and women students and professionals will be better equipped to work and live together as equals

### UNIT-I UNDERSTANDING GENDER

**Gender:** why should we study it? **Socialization:** making women, making men introduction. Preparing for womanhood. Growing up male. First lessons in caste. Different masculinities.

### UNIT-II GENDER AND BIOLOGY

**Missing women:** sex selection and its consequences declining sex ratio. Demographic consequences. **Gender spectrum:** beyond the binary two or many? Struggles with discrimination.

### UNIT-III GENDER AND LABOUR

**Housework:** the invisible labour “My mother does not work” “share the load” its politics and economics Fact and fiction. Unrecognized and unaccounted work. Additional reading: wages and conditions of work.

### UNIT-IV ISSUES OF VIOLENCE

**Sexual Harassment:** Say No! Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading “chuplu”.

**Domestic Violence:** Speaking Out Is Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Additional Reading: New Forums for Justice. Thinking about Sexual Violence Blaming the Victim - “I Fought for my Life...” Additional Reading: The Caste Violence.

### UNIT-V GENDER: CO - EXISTENCE

**Just Relationships:** Being Together as Equals Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers Additional Reading: Rosa Parks-The Brave Heart.

**TEXT BOOKS:**

1. Towards a world of equal: A bilingual textbook on gender written by a. Suneetha, uma bhrugubanda, duggirala vasanta, rama melkote, vasudha nagaraj, asma rasheed, gogu shyamala, deepa sreenivas and susie tharu and published by telugu akademi, hyderabad, telangana state in the year 2015.

**WEB REFERENCES:**

1. <http://www.thealternative.in/lifestyle/i-fought-for-my-lifeand-won-sohaila-abdul/>

**Note:** Since it is Interdisciplinary Course, Resource Persons can be drawn from the fields of English Literature or Sociology or Political Science or any other qualified faculty who has expertise in this field from engineering departments.

- Classes will consist of a combination of activities: dialogue-based lectures, discussions, collaborative learning activities, group work and in-class assignments. Apart from the above prescribed book, Teachers can make use of any authentic materials related to the topics given in the syllabus on “Gender”.
- ESSENTIAL READING: The Textbook, “Towards a World of Equals: A Bilingual Textbook on Gender” written by A.Suneetha, Uma Bhrugubanda, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu published by Telugu Akademi, Telangana Government in 2015.

**ASSESSMENT AND GRADING:**

- Discussion & Classroom Participation: 20%
- Project/Assignment: 30%
- End Term Exam: 50%

## **II-YEAR (II-SEMESTER)**



## **STRENGTH OF MATERIALS - II**

### **II-B.TECH II-SEMESTER**

**Course Code: A1CE401PC**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **COURSE OBJECTIVES**

1. To understand the nature of stresses developed in simple geometries shafts, springs, columns & cylindrical and spherical shells for various types of simple loads
2. To calculate the stability and elastic deformation occurring in various simple geometries for different types of loading.
3. To understand the unsymmetrical bending and shear center importance for equilibrium conditions in a structural member of having different axis of symmetry.

### **COURSE OUTCOMES**

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

1. Describe the concepts and principles, understand the theory of elasticity, and perform calculations, relative to the strength of structures and mechanical components in particular to torsion and direct compression;
2. To evaluate the strains and deformation that will result due to the elastic stresses developed within the materials for simple types of loading
3. Analyze strength and stability of structural members subjected to Direct, and Direct and Bending stresses;
4. Understand and evaluate the shear center and unsymmetrical bending.
5. Frame an idea to design a system, component, or process

### **UNIT – I      TORSION OF CIRCULAR SHAFTS**

Theory of pure torsion – Derivation of Torsion equation - Assumptions made in the theory of pure torsion – Polar section modulus – Power transmitted by shafts-Combined bending and torsion – 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.

### **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– Long columns subjected to eccentric loading – Secant formula – Empirical formulae — Rankine – Gordon formula- Straight line formula – Prof. Perry's formula.

Beam columns- Laterally loaded struts – subjected to uniformly distributed and concentrated loads.

### **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 retaining walls, chimneys and dams – conditions for stability-Overturning and sliding – stresses due to direct loading and bending moment about both axis.

### **UNIT – IV      THIN CYLINDERS AND THICK 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 shell

Introduction of Thick Cylinders - 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.

## **UNIT – V      UNSYMMETRICAL BENDING**

Introduction – Centroidal principal axes of section –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.

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

### **TEXT BOOKS**

1. Strength of Materials by R.K Rajput, S. Chand & Company Ltd.
2. Mechanics of Materials by Dr. B. C Punmia, Dr. Ashok Kumar Jain and Dr. Arun Kumar Jain
3. Strength of Materials by R. Subramanian, Oxford University Press.

### **REFERENCE BOOKS**

1. Mechanics of Materials by R.C. Hibbeler, Pearson Education
2. Engineering Mechanics of Solids by Popov E.P. Prentice-Hall Ltd
3. Strength of Materials by T.D.Gunneswara Rao and M.Andal, Cambridge Publishers
4. Strength of Materials by R. K. Bansal, Lakshmi Publications House Pvt. Ltd.
5. Fundamentals of Solid Mechanics by M. L. Gambhir, PHI Learning Pvt. Ltd

### **WEB REFERENCES**

1. <https://easyengineering.net/a-textbook-of-strength-of-materials/>
2. <https://civilenggforall.com/theory-of-structures-textbook-free-download-pdf-civilenggforall/>

### **E-TEXT BOOKS**

1. <https://www.ebooknetworking.net/ebooks/theory-of-structures-by-s-ramamrutham.html>

### **MOOCS COURSE**

1. <https://swayam.gov.in/>
2. <https://onlinecourses.nptel.ac.in/>

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**PROBABILITY AND STATISTICS & NUMERICAL METHODS**

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**II-B.TECH II-SEMESTER****Course Code: A1MA402BS**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>

**PRE-REQUISITES:** Mathematical Knowledge at pre-university level**COURSE OBJECTIVES:**

To learn

1. The basic ideas of probability and random variables.
2. Discuss various discrete and continuous probability distributions and their properties.
3. The statistical methods of studying data samples.
4. Various methods to find roots of an equation. Concept of finite differences and to estimate the value for the given data using interpolation.
5. Evaluation of integrals using numerical techniques and solving ordinary differential equations using numerical techniques.

**COURSE OUTCOMES:**

After learning the contents of this paper the student must be able to

1. Formulate and solve problems involving random variables and apply statistical methods for analyzing experimental data.
2. Understand the concept of discrete and continuous probability distributions.
3. Analyze the Testing of hypothesis.
4. Find the root of a given equation and estimate the value for the given data using interpolation.
5. Find the numerical solutions for a given ODE's and evaluation of integrals by Numerical techniques.

**UNIT - I: BASIC PROBABILITY**

Probability, Sample space, Probability of an Event, Conditional probability, Multiplicative theorem(without proof), Independent events and Bayes' theorem.

Random variables: Discrete random variable, Probability distribution function, Continuous random variable, Probability density function, Expectation and Variance of Random Variables.

**UNIT - II: PROBABILITY DISTRIBUTIONS**

Binomial distribution, Poisson distribution, Evaluation of Statistical parameters for these distributions, Poisson approximation to the binomial distribution. Fitting of Binomial and Poisson distributions. Normal distribution, Properties and Evaluation of statistical parameters for Normal distribution.

**UNIT - III: TESTING OF HYPOTHESIS**

Test of significance: Basic of testing of Hypothesis. Null and alternate Hypothesis, Types of errors, Level of significance, Critical region.

Large sample test for Single proportion, Difference of proportions, Single mean, Difference of means; Small sample tests: Test for single mean, Difference of means and test for ratio of variances.

**UNIT – IV NUMERICAL METHODS – I**

Solution of polynomial and transcendental equations – Bisection method, Iteration Method, Newton-Raphson method and Regula -Falsi method. Finite differences- forward differences- backward differences- central differences-symbolic relations and separation of symbols; Interpolation using Newton's forward and backward difference formulae. Central difference interpolation: Gauss's forward and backward formulae; Lagrange's method of interpolation.

**UNIT – V      NUMERICAL METHODS – II**

Numerical integration: Trapezoidal rule and Simpson's 1/3rd and 3/8 rules. Ordinary differential equations: Taylor's series; Picard's method; Euler and modified Euler's methods; Runge-Kutta method of fourth order.

**TEXT BOOKS:**

1. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, keying Ye, Probability and statistics for engineers and scientists, 9<sup>th</sup> Edition, Pearson Publications.
2. S.S. Sastry, Introductory methods of numerical analysis, PHI, 4th Edition, 2005.
3. Fundamentals of Mathematical Statistics, Khanna Publications, S. C. Gupta and V. K. Kapoor.

**REFERENCE BOOKS:**

1. Miller and Freund's, Probability and Statistics for Engineers, 8<sup>th</sup> Edition, Pearson Educations
2. S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.

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**HYDRAULICS AND HYDRAULIC MACHINERY**

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**II-B.TECH II-SEMESTER****Course Code: A1CE403PC**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**COURSE OBJECTIVES:**

1. The course deals with basic concepts of flow in open channel and working principles of different types of turbines
2. The objective of this course is to provide knowledge regarding uniform and non-uniform flows in open channels, impact of jet, study of different types of turbines and working of centrifugal and reciprocating pumps.
3. To know the , momentum principle applied to open channel flow
4. To analysis to pipe Friction
5. To know the working principle of the Centrifugal pump

**COURSE OUTCOME:**

The students will be able to:

1. Understand and analyse uniform, gradually and rapidly varied flows in an open channel.
2. Prepare and analyse models using concepts of similitude.
3. Understand working principles of turbines and pumps and their analysis and design.
4. Understand dimensional analysis to pipe Friction problems
5. Understand impact of a jet on a flat or a curved vane, moving and stationary vane, flow over radial vanes.

**UNIT-I OPEN CHANNEL FLOW- I**

Open Channel Flow – I: Introduction to Open channel flow-Comparison between open channel flow and pipe flow, Classification of open channels, Classification of open channel flows, Velocity distribution. Uniform flow – Characteristics of uniform flow, Chezy's, Manning's and Bazin formulae for uniform flow – Factors affecting Manning's Roughness Coefficient "n". Most economical sections. Computation of Uniform flow, Normal depth. Critical Flow: Specific energy – critical depth - computation of critical depth – critical, sub critical and super critical flows-Channel transitions.

**UNIT –II OPEN CHANNEL FLOW II:**

Open Channel Flow – II: Non-uniform flow – Gradually Varied Flow - Dynamic equation for G.V.F; Classification of channel bottom slopes – Classification and characteristics of Surface profiles – Computation of water surface profiles by Numerical and Analytical approaches. Direct step method. Rapidly varied flow: Elements and characteristics (Length and Height) of Hydraulic jump in rectangular channel– Types, applications and location of hydraulic jump, Energy dissipation and other uses – Positive and Negative Surges (Theory only).

**UNIT –III DIMENSIONAL ANALYSIS AND SIMILITUDE**

Dimensional Analysis and Hydraulic Similitude: Dimensional homogeneity – Rayleigh's method and Buckingham's pi methods – Dimensionless groups. Similitude, Model studies, Types of models. Application of dimensional analysis and model studies to fluid flow problems. Distorted models. 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

## **UNIT -IV      HYDRAULIC TURBINES**

Hydraulic Turbines – I: Elements 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 – Classification, functions and efficiency.

Hydraulic Turbines – II: Governing of turbines – Surge tanks – Unit and specific turbines – Unit speed – Unit quantity – Unit power – Specific speed – Performance characteristics – Geometric similarity – Cavitation. Selection of turbines.

## **UNIT-V      CENTRIFUGAL PUMPS**

Centrifugal Pumps: Pump installation details – classification – work done – Manometric head – minimum starting speed – losses and efficiencies – specific speed. Multistage pumps – pumps in parallel – performance of pumps – characteristic curves – NPSH – Cavitation.

Hydropower Engineering: Classification of Hydropower plants – Definition of terms – load factor, utilization factor, capacity factor, estimation of hydropower potential.

### **TEXT BOOKS:**

1. Fluid Mechanics, Hydraulic and Hydraulic Machines by Modi & Seth, Standard book house.
2. A text of Fluid mechanics and hydraulic machines by Dr.R.K.Bansal – Laxmi Publications (P) Ltd., New Delhi.
3. Fluid Mechanics and Hydraulic machines by Manish Kumar Goyal, PHI learning Private Limited, 2015
4. Fluid mechanics & Hydraulic Machines, Domkundwar & Domkundwar Dhanpat Rai &Co

### **REFERENCE BOOKS:**

1. V.T. Chow, “Open Channel hydraulics” McGraw Hill Publication
2. K. Subramanya,, Flow through Open Channels, TMH, New Delhi
3. K.G. Ranga Raju , Flow through open channels, T.M.H. New Delhi
4. Rajesh Srivastava, Flow through Open Channels , Oxford University Press
5. V.L. Streeter, & White E.B., ”Fluid Mechanics” McGraw Hill Publication
6. Modi & Seth “Hydraulics & Fluid Mechanics” Standard Publications.
7. RK Bansal “Fluid Mechanics and Hydraulic Machines” Laxmi Publication
8. AK Jain “Fluid Mechanics” Khanna Publication.
9. Houghtalen, “Fundamentals of Hydraulics Engineering Systems” 4/e Pearson Education, Noida

### **WEB REFERENCES:**

1. <https://www.kopykitab.com/Hydraulics-And-Hydraulic-Machines-by-Bhargab-Mohan-Das>
2. <http://nepad.org/scientificconference/images/Textbook-Of-Hydraulics-Fluid-Mechanics-And-Hydraulic-Machines.pdf>
3. <https://www.smartworld.com/notes/hydraulics-hydraulic-machines-notes-pdf-hhm-notes-pdf/>

### **E-TEXT BOOKS:**

1. [https://www.researchgate.net/publication/340999230\\_Hydraulics\\_Fluid\\_Mechanics\\_and\\_Hydraulic\\_Machines](https://www.researchgate.net/publication/340999230_Hydraulics_Fluid_Mechanics_and_Hydraulic_Machines)

### **MOOCS COURSE:**

1. [https://onlinecourses.nptel.ac.in/noc19\\_me55/preview](https://onlinecourses.nptel.ac.in/noc19_me55/preview)
2. <https://onlinecourses.nptel.ac.in/>

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**BUILDING MATERIALS AND CONSTRUCTION PLANNING**

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**II-B.TECH II-SEMESTER****Course Code: A1CE404PC**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**COURSE OBJECTIVES**

1. Initiating the student with the knowledge of basic building materials and their Properties
2. Imparting the knowledge of course pattern in masonry construction and flat
3. Roofs and techniques of forming foundation, columns, beams, walls, sloped and flat roofs.
4. Types of paints and varnishes. Imparting the students with the techniques of formwork
5. The students should be exposed to classification of aggregates.

**COURSE OUTCOMES****At the end of the course, student will be able to:**

1. The student should be able to identify different building materials and their Importance in building construction.
2. The student is expected to differentiate brick mass Construction and use of lime and cement in various constructions.
3. The student should able to learn the Finishing's.
4. The student is expected to know the classification of aggregates
5. Moisture content usually required in building construction.

**UNIT-I STONES, BRICKS AND TILES**

Properties of building stones – relation to their structural requirements, classification of stones – stone quarrying – precautions in blasting, dressing of stone, composition of good brick earth, various methods of manufacturing of bricks. Characteristics of good tile - manufacturing methods, types of tiles. Uses of materials like Aluminum, Gypsum, Glass and Bituminous materials.

**UNIT –II CEMENT & ADMIXTURES**

Ingredients of cement – manufacturing of cement – Chemical composition – Hydration - field & lab tests on cement.

Admixtures – mineral & chemical admixtures – uses

**UNIT -III BUILDING COMPONENTS AND SERVICES**

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

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

**UNIT -IV MASONRY & FORM WORK**

Mortars, Masonry and Finishing's Mortars: Lime and Cement Mortars 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: Types- 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, S. S. Bhavikatti, Vices publications House private ltd.
2. Building Construction, S. S. Bhavikatti, Vices publications House private ltd.
3. Building Materials, B. C. Punmia, Laxmi Publications private ltd.
4. Building Construction, B.C. Punmia, Laxmi Publications (p) ltd.

### **REFERENCE BOOKS**

1. Building Materials, S. K. Duggal, New Age International Publications.
2. Building Materials, P. C. Verghese, PHI learning (P) ltd.
3. Building Materials, M. L. Gambhir, Tata McGraw Hill Publishing Co. Ltd.
4. Building construction, P. C. Verghese, PHI Learning (P) Ltd.
5. Building Materials, Construction and Planning, S. Mahaboob Basha.

### **WEB REFERENCES**

1. <https://easyengineering.net/a-textbook-of-strength-of-materials/>
2. <https://civilenggforall.com/theory-of-structures-textbook-free-download-pdf-civilenggforall/>

### **E-TEXT BOOKS**

1. <https://www.ebooknetworking.net/ebooks/theory-of-structures-by-s-ramamrutham.html>

### **MOOCS COURSE**

1. <https://swayam.gov.in/>
2. <https://onlinecourses.nptel.ac.in>



## **STRUCTURAL ANALYSIS-I**

### **II-B.TECH II-SEMESTER**

**Course Code: A1CE405PC**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **COURSE OBJECTIVES**

**The course should enable the students to:**

1. To understand the nature of stresses developed in perfect frames and three hinged arches for various types of simple loads.
2. Analyse the statically indeterminate members such as fixed bars, continuous beams and for various types of loading.
3. Understand the energy methods used to derive the equations to solve engineering problems
4. Evaluate the Influence on a beam for different static & moving loading positions

### **COURSE OUTCOMES:**

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

1. Determine deflections of beams and trusses using energy methods
2. Analyse three and two hinged of circular and parabolic arches
3. Understand the indeterminacy aspects to consider for a total structural system
4. **Identify, formulate**, and solve engineering problems with real time loading.

### **UNIT – I ANALYSIS OF PERFECT FRAMES**

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

### **UNIT – II ENERGY THEOREMS AND THREE HINGED ARCHES**

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

Introduction of Three hinged arches – 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 and bending moment - Geometrical properties of parabolic and circular arches - Threehinged parabolic circular arches having supports at different levels.

### **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 - point loads - uniformly varying load, couple and combination of loads - Shear force, Bending moment diagrams and elastic curve 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

Effect of Sinking of Supports - Slope deflection method- Derivation of slope-deflection equation, application to continuous beams with and without sinking of supports - Determination of static and kinematic indeterminacies for frames - Analysis of Single Bay, Single storey Portal Frames by Slope Deflection Method including Side Sway - Shear force and bending moment diagrams and Elastic curve.

**UNIT – V      MOVING LOADS AND INFLUENCE LINES**

Introduction, maximum SF and BM at a given section and absolute maximum shear force and bending moment due to single concentrated load, uniformly distributed load longer than the span, uniformly distributed 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 shear force and bending moment - load position for maximum shear force and maximum bending Moment at a section - Point loads, uniformly distributed load longer than the span, uniformly distributed load shorter than the span-Influence lines for forces in members of Pratt and Warren trusses - Equivalent uniformly distributed load - Focal length

**TEXT BOOKS:**

1. Structural Analysis Vol –I & II by V.N. Vazirani and M.M. Ratwani, Khanna Publishers.
2. Structural Analysis Vol I & II by G.S.Pandit and S.P. Gupta, Tata McGraw Hill Education Pvt.Ltd.
3. Structural analysis T. S Thandavamoorthy, Oxford university Press

**REFERENCE BOOKS:**

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

**WEB REFERENCES:**

1. <https://ascelibrary.org/doi/10.1061/%28ASCE%29EE.1943-7870.0001734>
2. [https://www.hrpub.org/journals/jour\\_info.php?id=45](https://www.hrpub.org/journals/jour_info.php?id=45)

**E-TEXT BOOKS:**

1. <https://www.mdpi.com/2071-1050/12/18/7239/pdf>
2. [https://easyengineering.net/environmental-engineering-books\\_18/](https://easyengineering.net/environmental-engineering-books_18/)

**MOOCS COURSE:**

1. <https://nptel.ac.in/noc/courses/noc19/SEM2/noc19-ge22/>
2. <https://nptel.ac.in/courses/108/108/108108076/>
3. <https://nptel.ac.in/courses/108/105/108105053/>

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**SURVEYING LAB -II**

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**II B. TECH II SEMESTER****Course Code: A1CE406PC**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

**COURSE OBJECTIVES:**

To impart the practical knowledge in the field to set out any Civil Engineering work

**COURSE OUTCOMES:****Student should be able to:**

Perform surveying on any civil engineering work

**LIST OF EXPERIMENTS**

- Experiment-1** Setting out curve by offset or ordinate from long chord method by using chain or tape  
**Experiment-2** Setting out curve by offsets produced from chord produced by using chain or tape  
**Experiment-3** Setting out curve by Rankine's method by using Theodolite  
**Experiment-4** Setting out curve by Two Theodolite method  
**Experiment-5** Determine of area using total station  
**Experiment-6** Traversing using total station  
**Experiment-7** Determination of remote height using total station  
**Experiment-8** Distance, gradient, differential height between two inaccessible points using total station.  
**Experiment-9** Curve settling using total station  
**Experiment-10** Finding position of stations using G.P.S

**TEXT BOOKS:**

1. R Benton and Philip J Taaty, Elements of Plane Surveying, McGraw Hill.
2. S K Duggal, "Surveying (Vol – 1 & 2)", Tata McGraw Hill Publishing Co. Ltd. New Delhi.

**REFERENCE BOOKS:**

1. R. Subramanian, Surveying and levelling, Oxford university press, New Delhi
2. K L Arora "Surveying Vol 1, 2 & 3), Standard Book House, Delhi.

**WEB REFERENCES:**

1. <https://earthdata.nasa.gov/learn/backgrounders/remote-sensing>
2. [https://www.rtu.ac.in/expert/app/documents/prateek.sharma@gitjaipur.com\\_22029102020014534pm.pdf](https://www.rtu.ac.in/expert/app/documents/prateek.sharma@gitjaipur.com_22029102020014534pm.pdf)
3. <https://theconstructor.org/surveying/modern-surveying-instruments-uses/16/>
4. <https://www.britannica.com/technology/theodolite>

**E-TEXT BOOKS:**

1. <https://www.e-booksdirectory.com/details.php?ebook=10166>

**MOOCS COURSE:**

1. <https://swayam.gov.in/>
2. <https://onlinecourses.nptel.ac.in/>

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**COMPUTER AIDED DRAWING LAB**

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**II-B.TECH II-SEMESTER****Course Code: A1CE407ES**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

**COURSE OBJECTIVES:**

The objective of this lab is to teach the student basic drawing fundamentals in various civil engineering applications, specially in building drawing.

**COURSE OUTCOMES:**

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

Master the usage of Autocad commands for drawing 2D & 3D building drawings required for different civil engg applications.

**LIST OF EXEPERMENTS:**

- Experiment-1** Introduction to computer aided drafting
- Experiment-2** Software for CAD – Introduction to different softwares
- Experiment-3** Practice exercises on CAD software
- Experiment-4** Drawing of Single storied building plans of buildings using software
- Experiment-5** Drawing of multi storied building plans of buildings using software
- Experiment-6** Developing sections and elevations for multi storied buildings
- Experiment-7** Developing sections and elevations for Single storied buildings
- Experiment-8** Detailing of building components like Doors, Windows etc. using CAD
- Experiment-9** Detailing of Roof Trusses etc. using CAD

**TEXT BOOKS:**

1. Computer Aided Design Laboratory by Dr. M. N. Sesha Prakash & Dr. G. S. Suresh – Laxmi Publications.

**REFERENCE BOOKS:**

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

**WEB REFERENCES:**

1. <https://nptel.ac.in/courses/105/104/105104148/>
2. <https://open.umn.edu/opentextbooks/textbooks/70>
3. <https://lecturenotes.in/download/material/41267-notes-of-autocad-civil-engineering-by-durgesh-pathak>

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**STRENGTH OF MATERIALS LAB**

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**II-B.TECH II-SEMESTER****Course Code: A1CE408PC**

L	T	P	C
0	0	2	1

**COURSE OBJECTIVES:**

The course should enable the students to:

1. Understanding the effect of tension in mild steel bars under tensile loading.
2. Skill to examine the mechanical properties of various materials
3. Knowledge of pure bending theory and evaluate the Young's modulus of materials.
4. Visualizations of the importance of Reciprocal theorem.

**COURSE OUTCOMES:**

By the end of the course students will be able:

1. Determine the important mechanical properties of materials
2. Analyze stress-strain relationship for given material
3. Determine torsion and stiffness of shaft and spring
4. Evaluate the Reciprocal Theorem
5. Measure any substance's resistance in compression, Flexure, impact etc., and hardness

**LIST OF EXPERIMENTS**

<b>Experiment-1</b>	Tension test on Mild steel bar
<b>Experiment-2</b>	Bending test on (Steel / Wood) Cantilever beam
<b>Experiment-3</b>	Bending test on simply supported beam.
<b>Experiment-4</b>	Compression test on wood or concrete
<b>Experiment-5</b>	Impact test (Charpy and Izod impact test)
<b>Experiment-6</b>	Spring test
<b>Experiment-7</b>	Torsion test
<b>Experiment-8</b>	Hardness test
<b>Experiment-9</b>	Shear test
<b>Experiment-10</b>	Verification of Maxwell's Reciprocal theorem on beams

**REFERENCE BOOKS:**

1. Strength of Materials by Dr.R.K.Bansal Laxmi Publications, New Delhi..
2. Strength of Materials by R. Subramanian, Oxford University Press

**WEB REFERENCES:**

1. <https://nptel.ac.in/courses/105/105/105105108/>
2. <https://open.umn.edu/opentextbooks/textbooks/70>

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**ENVIRONMENTAL STUDIES**

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**II-B.TECH II-SEMESTER****Course Code: A1CE404MC**

L	T	P	C
3	0	0	0

**COURSE OBJECTIVES:**

1. Understanding the importance of ecological balance for sustainable development.
2. Acquire the knowledge of importance of natural resources & apply conservation techniques.
3. Analyzing the importance of Biodiversity.
4. Estimate the impacts of Environmental pollution, developmental activities and mitigation measures.
5. Evaluation of the environmental policies and regulations.

**COURSE OUTCOMES:**

1. Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles.
2. Able to apply the conservation methods of natural resources.
3. Able to analyze the conservation techniques of biodiversity.
4. Able to apply pollution control methods.
5. Able to understand and apply environmental regulations which in turn helps in sustainable development.

**UNIT-I: ECOSYSTEMS**

Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Bio-magnification.

**UNIT-II: NATURAL RESOURCES: CLASSIFICATION OF RESOURCES**

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

**UNIT-III: BIODIVERSITY AND BIOTIC RESOURCES**

Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and optional values. Hot spots of biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

**UNIT-IV ENVIRONMENTAL POLLUTION AND CONTROL TECHNOLOGIES**

Environmental Pollution: Classification of pollution, Air Pollution: Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. Soil Pollution: Sources and types, Impacts of modern agriculture, degradation of soil. Noise Pollution: Sources and Health hazards, standards, Solid waste: Municipal Solid Waste management, composition and characteristics of e-Waste and its management. Pollution control technologies: Wastewater Treatment methods: Primary, secondary and Tertiary. Concepts of bioremediation.

Global Environmental Issues and Global Efforts: Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS).Deforestation and desertification. International conventions /Protocols: Earth summit, Kyoto protocol, and Montréal Protocol.

**UNIT-V ENVIRONMENTAL POLICY, LEGISLATION & EIA**

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

**TEXT BOOKS:**

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

**REFERENCE BOOKS:**

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

## **HUMAN VALUES & PROFESSIONAL ETHICS**

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

**Course Code: A1CE405MC**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>

### **COURSE OBJECTIVES**

1. To give basic insights and inputs to the student to inculcate human values.
2. Professional ethics instills the student to maintain ethical conduct and discharge.
3. It gives a comprehensive understanding of a variety of issues that are encountered.
4. Professional in discharging professional duties.
5. It provides the student the sensitivity and global outlook in the contemporary.

### **COURSE OUTCOMES**

1. To give basic insights and inputs to the student to inculcate human values.
2. Professional ethics instills the student to maintain ethical conduct and discharge.
3. It gives a comprehensive understanding of a variety of issues that are encountered.
4. Professional in discharging professional duties.
5. It provides the student the sensitivity and global outlook in the contemporary.

### **UNIT-I INTRODUCTION**

Need, Basic Guidelines, Content and Process for Value Education: Understanding the need, basic guidelines, content and process for Value Education. Self Exploration–what is it? - its content and process; ‘Natural Acceptance’ and Experiential Validation- as the mechanism for self exploration. Continuous Happiness and Prosperity- A look at basic Human Aspirations. Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario. Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

### **UNIT -II UNDERSTANDING HARMONY IN THE HUMAN BEING**

Harmony in Myself! : Understanding human being as a co-existence of the sentient ‘I’ and the material ‘Body’. Understanding the needs of Self (‘I’) and ‘Body’ - Sukh and Suvidha. Understanding the Body as an instrument of ‘I’ (I being the doer, seer and enjoyer). Understanding the characteristics and activities of ‘I’ and harmony in ‘I’. Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail. Programs to ensure Sanyam and Swasthya.

### **UNIT -III UNDERSTANDING HARMONY IN THE FAMILY AND SOCIETY**

Harmony in Human- Human Relationship : Understanding harmony in the Family- the basic unit of human interaction. Understanding values in human-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship. Understanding the meaning of Vishwas; Difference between intention and competence. Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship. Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals. Visualizing a universal harmonious order in society- Undivided Society (Akhand Samaj), Universal Order (Sarvabhaum Vyawastha )- from family to world family!



**UNIT –IV UNDERSTANDING HARMONY IN THE NATURE AND EXISTENCE**

Whole existence as Co-existence : Understanding the harmony in the Nature. Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature. Understanding Existence as Co-existence (Sahastitva) of mutually interacting units in all-pervasive space. Holistic perception of harmony at all levels of existence.

**UNIT-V IMPLICATIONS OF THE ABOVE HOLISTIC UNDERSTANDING OF HARMONY ON PROFESSIONAL ETHICS**

Natural acceptance of human values. Definitiveness of Ethical Human Conduct. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order. Competence in professional ethics:

- a) Ability to utilize the professional competence for augmenting universal human order,
- b) Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems,
- c) Ability to identify and develop appropriate technologies and management patterns for above production systems.

Case studies of typical holistic technologies, management models and production systems. Strategy for transition from the present state to Universal Human Order:

- a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers
- b) At the level of society: as mutually enriching institutions and organizations

**TEXT BOOKS**

1. Professional ethics, r. Subramaniam – oxford publications, New Delhi.
2. Ethics in engineering, mike w. Martin and roland schinzinger - tata mcgrawhill – 2003.
3. Professional ethics and morals, a. R. Aryasri, dharanikota suyodhana - maruthi publications.

**REFERENCE BOOKS**

1. Engineering ethics, harris, pritchard and rabins, cengage learning, new delhi.
2. Human values & professional ethics, s. B. Gogate, vikas publishing house pvt. Ltd., noida

**WEB REFERENCES**

1. <https://easyengineering.net/a-textbook-of-strength-of-materials/>
2. <https://civilenggforall.com/theory-of-structures-textbook-free-download-pdf-civilenggforall/>

**E-TEXT BOOKS**

1. <https://www.ebooknetworking.net/ebooks/theory-of-structures-by-s-ramamrutham.html>

**MOOCS COURSE**

1. <https://swayam.gov.in/>
2. <https://onlinecourses.nptel.ac.in/>

## **III-YEAR (I-SEMESTER)**

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**STRUCTURAL ANALYSIS-II****III-B.TECH I-SEMESTER****Course Code: A1CE501PC**

L	T	P	C
3	0	0	3

**COURSE OBJECTIVES****To learn**

1. Identify the various actions in arches.
2. Understand classical methods of analysis for statically indeterminate structures.
3. Differentiate the approximate and numerical methods of analysis for indeterminate structures.
4. Find the degree of static and kinematic indeterminacies of the structures.
5. Plot the variation of S.F and B.M when a moving load passes on indeterminate structure

**COURSE OUTCOMES****At the end of the course, student will be able to:**

1. Analyze the two hinged arches.
2. Solve statically indeterminate beams and portal frames using classical methods
3. Sketch the shear force and bending moment diagrams for indeterminate structures.
4. Formulate the stiffness matrix and analyze the beams by matrix methods

**UNIT – I TWO HINGED ARCHES, CABLES AND SUSPENSION BRIDGES**

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. cables and suspension bridges: Equilibrium of a Suspension Cable subjected to concentrated loads and uniformly distributed loads - Length of a cable - Cable with different support levels - Suspension cable supports - Suspension Bridges - Analysis of Three Hinged Stiffening Girder Suspension Bridges.

**UNIT – II MOMENT DISTRIBUTION METHOD AND KANI'S METHOD**

Moment Distribution Method - Analysis of continuous beams with and without settlement of supports - Analysis of Single Bay Single Storey Portal Frames including side Sway - Analysis of inclined frames - Shear force and Bending moment diagrams, Elastic curve.

Kani's Method: Analysis of continuous beams including settlement of supports - Analysis of single bay single storey and single bay two Storey Frames including Side Sway using Kani's Method - Shear force and bending moment diagrams - Elastic curve.

**UNIT – III APPROXIMATE METHODS OF ANALYSIS**

Introduction – Analysis of multi-storey frames for lateral loads: Portal Method, Cantilever method and Factor method - Analysis of multi-storey frames for gravity loads - Substitute Frame method - Analysis of Mill bents.

**UNIT – IV MATRIX METHODS OF ANALYSIS**

Introduction to Flexibility and Stiffness matrix methods of analysis using 'system approach' upto three degree of indeterminacy– Analysis of continuous beams including settlement of supports using flexibility and stiffness methods -Analysis of pin-jointed determinate plane frames using flexibility and stiffness methods- Analysis of single bay single storey portal frames using stiffness method - Shear force and bending moment diagrams - Elastic curve.

**UNIT- V INFLUENCE LINES FOR INDETERMINATE BEAMS**

Introduction – influence line diagram for shear force and bending moment for two span continuous beam with constant and different moments of inertia - influence line diagram for shear force and bending moment for propped cantilever beams.

### **TEXT BOOKS**

1. Structural Analysis Vol –I &II by Vazarani and Ratwani, Khanna Publishers.
2. Structural Analysis Vol I & II by G.S. Pandit S.P. Gupta Tata McGraw Hill Education Pvt. Ltd.
3. Indeterminate Structural Analysis by K.U. Muthu et al., I.K. International Publishing House Pvt. Ltd

### **REFERENCE BOOKS**

1. Structural analysis by T. S Thandavamoorthy, Oxford university Press
2. Mechanics of Structures Vol –II by H.J. Shah and S.B. Junnarkar, Charotar Publishing House Pvt. Ltd.
3. Basic Structural Analysis by C.S.Reddy., Tata McGraw Hill Publishers.
4. Examples in Structural Analysis by William M.C. McKenzie, Taylor & Francis.
5. Structural Analysis by R. C. Hibbeler, Pearson Education
6. Structural Analysis by Devdas Menon, Narosa Publishing House.
7. Advanced Structural Analysis by A.K. Jain, Nem Chand & Bros.

### **WEB REFERENCES**

1. <https://civilenglineering.files.wordpress.com/2014/10/advance-method-of-structural-analysis-book.pdf>
2. <https://civilenggforall.com/structural-analysis-textbook-by-civilenggforall-free-download-pdf/>

### **E-TEXT BOOKS**

1. <https://www.freebookcentre.net/civil-books-download/Advanced-Structural-Analysis.html>

### **MOOCS COURSE**

1. <https://swayam.gov.in/>
2. <https://onlinecourses.nptel.ac.in/>

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**DESIGN OF REINFORCED CEMENT CONCRETE STRUCTURES**

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**III-B.TECH I-SEMESTER****Course Code: A1CE502PC**

L	T	P	C
3	1	0	4

**COURSE OBJECTIVES**

The course should enable the students to:

1. Identify the basic components of any structural system and the standard loading for the RC structure
2. Identify and tell the various codal provisions given in IS. 456
3. Describe the salient feature of limit state method, compare with other methods and
4. Describe the concepts of limit state of collapse and limit state of serviceability
5. Evaluate the behavior of RC member under flexure, shear and compression, torsion and bond.

**COURSE OUTCOMES:**

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

1. Compare and Design the singly reinforced, doubly reinforced and flanged sections.
2. Design the axially loaded, uniaxial and biaxial bending columns.
3. Classify the footings and Design the isolated square, rectangular and circular footings
4. Distinguish and Design the one-way and two-way slabs
5. Design of stair case

**UNIT-I INTRODUCTION TO CONCRETE STRUCTURES**

**Introduction:** Structure - Components of structure - Different types of structures. Concepts of RC Design - Limit State method - Material Stress - Strain Curves - Safety factors - Characteristic values. Stress Block parameters - IS - 456 - 2000 - Working Stress Method.

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

**UNIT -II DESIGN OF BOND, SHEAR&TORSION**

Design for Shear, Bond and Torsion - Mechanism of shear and bond failure - Design of shear using limit state concept – Design for Bond –Anchorage and Development length of bars - Design of sections for torsion - Detailing of reinforcement.

**UNIT -III DESIGN OF SLABS**

Design of one way slab and two- way slabs, continuous slab Using I S Coefficients, Cantilever slab / Canopy slab, problems on one way slab, two way slab and continuous slab.

**UNIT -IV DESIGN OF COMPRESSION MEMBERS**

Design of compression members - Short Column - Columns with axial loads, uni-axial and bi-axial bending – Use of design charts- Long column – Design of long columns - I S Code provisions.

**UNIT-V DESIGN OF FOOTINGS & STAIRCASE**

Different types of footings – Design of flat isolated square, rectangular, circular footings and combined footings for two columns, design of stair case.

**TEXT BOOKS:**

1. Limit state design of reinforced concrete – P.C. Varghese, PHI Learning Pvt. Ltd.
2. Reinforced concrete design by S. Unnikrishna Pillai & Devdas Menon, Tata McGraw Hill.
3. Reinforced concrete design by N. Krishna Raju and R.N. Pranesh, New age International Publishers.

**REFERENCE BOOKS:**

1. Reinforced concrete structures, Vol. 1, by B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd.
2. Fundamentals of Reinforced concrete design by M. L. Gambhir, Prentice Hall of India Pvt. Ltd.,
3. Design of Reinforced Concrete Structures by N. Subramanian, Oxford University Press
4. Design of concrete structures by J.N. Bandhyopadhyay PHI Learning Private Limited.
5. Design of Reinforced Concrete Structures by I. C. Syal and A. K. Goel, S. Chand & company.
6. Design of Reinforced Concrete Foundations – P.C. Varghese Prentice Hall of India.

**WEB REFERENCES:**

1. <http://kgr.ac.in/wp-content/uploads/2019/12/DRCS-course-file.pdf>
2. <https://cbic-gst.gov.in/pdf/Advisory/DSR/DRC-03-04-05-User-Manual-Final.pdf>

**E-TEXT BOOKS:**

1. <https://civildatas.com/download/design-of-reinforced-concrete-structures-by-ramamrutham>
2. [https://easyengineering.net/design-of-reinforced-concrete-structures-by-subramanian/?cf\\_chl\\_captchtk\\_\\_=fef2495833aff5f39ce44f93bf8b4e3f2471d04d-1615800536-0AaRxzNUJOkRa3T9zwkXcMEZqa4GHHNgUGxrmLAinp0\\_io0eDXq2v9AHJ5g\\_pAmUbP0dN0aEj-SdPLdH](https://easyengineering.net/design-of-reinforced-concrete-structures-by-subramanian/?cf_chl_captchtk__=fef2495833aff5f39ce44f93bf8b4e3f2471d04d-1615800536-0AaRxzNUJOkRa3T9zwkXcMEZqa4GHHNgUGxrmLAinp0_io0eDXq2v9AHJ5g_pAmUbP0dN0aEj-SdPLdH)

**MOOCS COURSE**

1. <https://nptel.ac.in/courses/105/105/105105105/>
2. <https://nptel.ac.in/courses/105/105/105105105/>
3. [https://onlinecourses.nptel.ac.in/noc20\\_ce39/preview](https://onlinecourses.nptel.ac.in/noc20_ce39/preview)

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**HYDROLOGY AND WATER RESOURCES ENGINEERING**

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**III-B.TECH I-SEMESTER****Course Code: A1CE503PC**

L	T	P	C
3	0	0	3

**COURSE OBJECTIVES:**

1. This course provides the description of hydrological cycle and derive various formulas used in estimation of different basic components of surface and Ground water cycle
2. It will explain the water requirement for irrigation and connectivity of hydrology to the field requirement.
3. This course provides actual evapotranspiration, , interception, depression storage, infiltration
4. This course provides Hydrograph Analysis Flood Hydrograph
5. This course provides measurement of infiltration, modelling infiltration capacity, classification of infiltration capacities, infiltration indices.

**COURSE OUTCOMES**

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

1. Understand the different concepts and terms used in engineering hydrology
2. To identify and explain various formulae used in estimation of surface and Ground water hydrology components
3. Demonstrate their knowledge to connect hydrology to the field requirement
4. Understand the Components of Runoff, Factors affecting runoff, Basin yield, SCS-CN method of estimating runoff, Flow duration curves, Mass curve of runoff – Analysis.
5. Understand the Occurrence, movement and distribution of groundwater, aquifers

**UNIT-I PRECIPITATION**

Introduction: Concepts of Hydrologic cycle, Forms of precipitation, characteristics of precipitation in India, measurement of precipitation: Recording and non-recording types, density of rain gauge network: mean precipitation over an area: Arithmetic, Thiessen's and Isohyetal methods, Missing Rainfall Data – Estimation, Consistency of Rainfall records, depth area-duration relationships, maximum intensity/depth-duration-frequency relationship, Probable Maximum Precipitation (PMP), rainfall data in India.

**UNIT -II ABSTRACTIONS FROM PRECIPITATION**

Evaporation: Evaporation process, evaporimeters, analytical methods of evaporation estimation, reservoir evaporation and methods for its reduction, evapotranspiration, measurement of evapotranspiration, Evapotranspiration: Evapotranspiration equations: Penman and Blaney & Criddle Methods, potential evapotranspiration over India, actual evapotranspiration, , interception, depression storage, infiltration: infiltration capacity, measurement of infiltration, modelling infiltration capacity, classification of infiltration capacities, infiltration indices. Runoff: Components of Runoff, Factors affecting runoff, Basin yield, SCS-CN method of estimating runoff, Flow duration curves, Mass curve of runoff – Analysis.

**UNIT-III HYDROGRAPH**

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

**UNIT-IV GROUNDWATER HYDROLOGY**

Occurrence, movement and distribution of groundwater, aquifers – types, Specific Yield, Permeability, Storage coefficient, Transmissibility, Darcy's Law. Well Hydraulics - Steady radial flow into well for confined and unconfined aquifers, Recuperation tests. Well constants.

**UNIT-V CROP WATER REQUIREMENTS**

Water requirement of crops-Crops and crop seasons in India, cropping pattern, duty and delta; Quality of irrigation water; Soil-water relationships, root zone soil water infiltration, consumptive use, irrigation requirement, frequency of irrigation; Methods of applying water to the fields: surface, sub-surface, sprinkler and trickle / drip irrigation.

**TEXT BOOKS:**

1. Hydrology by K. Subramanya (Tata McGraw-Hill)
2. Irrigation Engineering and Hydraulic structures by Santhosh kumar Garg Khanna publishers
3. Irrigation Engineering by G L Asawa, Wiley Eastern

**REFERENCE BOOKS:**

1. Elements of Engineering Hydrology by V.P. Singh (Tata McGraw-Hill)
2. Engineering Hydrology by Jaya Rami Reddy (Laxmi Publications)
3. Ground water Hydrology by David Keith Todd, John Wiley & Son, New York.
4. Elements of Water Resources Engineering by K.N.Duggal and J.P.Soni (New Age International)
5. Irrigation and water power engineering by Dr.B.C.Punmia(Laxmi publications)

**WEB REFERENCES:**

- 1 <https://www.mdpi.com/journal/hydrology>

**E-TEXT BOOKS:**

- 1 [https://drive.google.com/file/d/10yr-QALqgghZqZ5Si7KZ6Lbw\\_QYmzlaG/view](https://drive.google.com/file/d/10yr-QALqgghZqZ5Si7KZ6Lbw_QYmzlaG/view)
- 2 [https://www.academia.edu/42009173/Irrigation\\_and\\_Water\\_Resources\\_Engineering\\_G\\_L\\_Asaw](https://www.academia.edu/42009173/Irrigation_and_Water_Resources_Engineering_G_L_Asaw)

**MOOC COURSE**

- 1 <https://nptel.ac.in/courses/105/104/105104103/>



## **CONCRETE TECHNOLOGY (PROFESSIONAL ELECTIVE-I)**

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

**Course Code: A1CE501PE**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **COURSE OBJECTIVES:**

The course should enable the students to:

1. Know different types of cement as per their properties for different field applications.
2. Know the Indian standard tests on aggregate
3. Understand Design economic concrete mix proportion for different exposure conditions and intended purposes.
4. Know field and laboratory tests on concrete in plastic and hardened stage.
5. Know the various types of special concrete

### **COURSE OUTCOMES**

The end of the course the student should be able to:

1. Determine the properties of concrete ingredients i.e. cement, sand, coarse aggregate by conducting different tests. Recognize the effects of the rheology and early age properties of concrete on its long-term behavior.
2. Apply the use of various chemical admixtures and mineral additives to design cement-based materials with tailor-made properties
3. Use advanced laboratory techniques to characterize cement-based materials.
4. Perform mix design and engineering properties of special concretes such as high-performance concrete, self-compacting concrete, and fiber reinforced concrete.
5. Perform fresh SCC(self-compaction concrete) tests

### **UNIT-I CEMENT AND ADMIXTURES**

Cement: Portland cement – chemical composition – Hydration-Heat of hydration, setting of cement – Structure of hydrated cement – Tests on physical properties – Different grades of cement.

Admixtures: Types of admixtures – mineral and chemical admixtures.

### **UNIT -II AGGREGATES**

Classification of aggregate – Particle shape & texture – Bond, strength & other mechanical properties of aggregate – Specific gravity, Bulk density, porosity, adsorption & moisture content of aggregate – Bulking of sand – Deleterious substance in aggregate – Soundness of aggregate – Alkali aggregate reaction – Thermal properties – Sieve analysis – Fineness modulus – Grading curves – Grading of fine, Manufactured sand and coarse Aggregates – Gap graded aggregate – Maximum aggregate size- Properties Recycled 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 & bleeding – Mixing, vibration and revibration of concrete – Steps in manufacture of concrete – Quality of mixing water.

Water / Cement ratio – Abram's Law – Gel/space ratio – Gain of strength of concrete – Maturity concept– Factors affecting strength – Relation between compression and tensile strength - Curing.

## **UNIT -IV    HARDENED CONCRETE**

Testing of Hardened Concrete: Compression tests – Tension tests — Flexure tests – Splitting tests. 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 AND SPECIAL CONCRETES**

Mix Design: Factors in the choice of mix proportions – Durability of concrete – Quality Control of concrete – Statistical methods – Acceptance criteria – Proportioning of concrete mixes by various methods – BIS method of mix design.

Special Concretes: Introduction to light weight concrete- Cellular concrete – No-fines concrete – High density concrete – Fiber reinforced concrete – Bacterial concrete – High performance concrete – Self compacting concrete-workability tests on fresh SCC.

### **TEXT BOOKS:**

1. Concrete Technology by M.S. Shetty. – S. Chand & Co.; 2004
2. Concrete Technology by M. L. Gambhir. – Tata Mc. Graw Hill Publishers, New Delhi
3. Concrete Technology by A.R. Santhakumar, 2<sup>nd</sup> Edition, Oxford university Press, New Delhi

### **REFERENCE BOOKS:**

1. Concrete: Micro structure, Properties and Materials – P.K. Mehta and J.M. Monteiro, Mc- Graw Hill Publishers
2. Concrete Technology by A.M.Neville, J.J.Brookes, 5th Edition, Pearson Education, 2009.

### **IS Codes:**

- IS 383
- IS 516
- IS 10262 - 2009
- IS 456-2000

### **WEB REFERENCES:**

1. <https://www.cement.org/learn/concrete-technology>
2. <https://lecturenotes.in/notes/2676-notes-for-concrete-technology-ct-by-madhusmita-mishra>
3. <http://site.iugaza.edu.ps/izreid/files/2010/03/cement-concrete-technology.pdf>

### **E-TEXT BOOKS:**

1. [https://eg4.nic.in/govpoly/DFILES/EBOOKS/IR/ebook\\_Concrete\\_technology\\_Shetty.pdf](https://eg4.nic.in/govpoly/DFILES/EBOOKS/IR/ebook_Concrete_technology_Shetty.pdf)

### **MOOCS COURSE**

1. <https://nptel.ac.in/courses/105/102/105102012/>

**REMOTE SENSING AND GIS  
(PROFESSIONAL ELECTIVE-I)**

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

**Course Code: A1CE502PE**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**COURSE OBJECTIVES:**

**The course should enable the students to:**

1. Know the concepts of Remote Sensing, its interpreting Techniques and concepts of Digital images
2. Know the concept of Geographical Information System (GIS), coordinate system
3. Know the GIS Data and its types
4. Understand the students managing the spatial Data Using GIS.
5. Understand Implementation of GIS interface for practical usage.

**COURSE OUTCOMES:**

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

1. Retrieve the information content of remotely sensed data
2. Analyze the energy interactions in the atmosphere and earth surface features
3. Interpret the images for preparation of thematic maps
4. Apply problem specific remote sensing data for engineering applications
5. Analyze spatial and attribute data for solving spatial problems
6. Create GIS and cartographic outputs for presentation

**UNIT – I INTRODUCTION TO PHOTOGRAMMETRY**

Principles & types of aerial photograph, geometry of vertical aerial photograph, Scale & Height measurement on single vertical aerial photograph, Height measurement based on relief displacement, Fundamentals of stereoscopy, fiducial points, parallax measurement using 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. Electro-magnetic Spectrum, Energy interactions with atmosphere and with earth surface features (soil, water, vegetation), Indian Satellites and Sensors characteristics, Resolution, Map and Image and False color composite, introduction to digital data, elements of visual interpretation techniques.

**UNIT – III GEOGRAPHIC INFORMATION SYSTEMS**

Introduction to GIS; Components of a GIS; Geospatial Data: Spatial Data-Attribute data – Joining Spatial and Attribute data; GIS Operations: Spatial Data Input- Attribute data Management –Data display- Data Exploration- Data Analysis. COORDINATE SYSTEMS: Geographic Coordinate System: Approximation of 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 features Object Based Vector Data Model; Classes and their Relationship; The geobase data model; Geometric representation of Spatial Feature and data structure, Topology rules

## **UNIT – V     RASTER DATA MODEL**

Elements of the Raster data model, Types of Raster Data, Raster Data Structure, Data Conversion, Integration of Raster and Vector data.

Data Input: Metadata, Conversion of Existing data, creating new data; Remote Sensing data, Field data, Text data, Digitizing, Scanning, on screen digitizing, importance of source map, Data Editing

### **TEXT BOOKS:**

1. Remote Sensing and GIS Lillesand and Kiefer, John Wiley 2008.
2. Remote Sensing and GIS B. Bhatta by Oxford Publishers 2015.
3. Introduction to Geographic Information System – Kang-Tsung Chang, McGraw-Hill 2015

### **REFERENCES:**

1. Concepts & Techniques of GIS by C. P. Lo Albert, K.W. Yonng, Prentice Hall (India) Publications.
2. Principals of Geo physical Information Systems – Peter A Burragh and Rachael A. Mc Donnell, Oxford Publishers 2004.
3. Basics of Remote sensing & GIS by S. Kumar, Laxmi Publications.

### **WEB REFERENCES:**

1. <https://uark.libguides.com/c.php?g=79160&p=510895>
2. <https://web.nmsu.edu/~dwdubois/gis.html>

### **E-TEXT BOOKS:**

1. <https://www.gislounge.com/free-gis-books/>
2. <https://www.esri.com/en-us/news-publications/ebooks>

### **MOOCS COURSE**

1. <https://nptel.ac.in/courses/105/102/105102015/>
2. [https://onlinecourses.nptel.ac.in/noc20\\_de04/preview](https://onlinecourses.nptel.ac.in/noc20_de04/preview)

**CONSTRUCTION ENGINEERING AND MANAGEMENT  
(PROFESSIONAL ELECTIVE-I)**

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

**Course Code: A1CE503PE**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**COURSE OBJECTIVES:**

**The course should enable the students to:**

1. This subject deals with overall planning, coordination and control of project.
2. This course gives the students scientific principles involved in construction.
3. Understand the behavior of construction materials.
4. Know the fundamentals of structural mechanics.
5. Know the equipment used in construction

**COURSE OUTCOMES:**

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

1. Understand the roles and responsibilities of a project manager
2. Prepare schedule of activities in a construction project
3. Identify the equipment used in construction
4. Understand safety practices in construction industry
5. Prepare tender and contract document for a construction project

**UNIT-I FUNDAMENTALS OF CONSTRUCTION PROJECT MANAGEMENT**

Management -Fundamentals of construction project management: Introduction, Project Initiation and Planning. Coordination –scheduling – monitoring – bar charts – milestone charts – critical path method

**UNIT -II CONSTRUCTION METHODS**

Construction methods – earthwork – piling – placing of concrete – form work – fabrication and erection – quality control and safety engineering– decision making, Cement concrete construction- Construction of Piles - Construction of Cofferdams - Construction of Tunnels.

**UNIT -III PROJECT ACTIVITY NETWORKS**

Development of project activity networks, Precedence Diagram Method, Critical Path Method (CPM), Program Evaluation and Review Technique (PERT), Line Balance Methods in scheduling, Time Value of Money, Investment Analysis, Cost-Benefit Analysis.

**UNIT -IV BUILDING INFORMATION MODELLING (BIM)**

Introduction to Building Information Modelling (BIM), Lean construction, and Integrated Project Delivery in construction, Crashing of project, Cost Optimization, Invoicing, Preparation of RA bill, Safety in construction, Estimation

**UNIT-V CONTRACTS IN CONSTRUCTION**

Contracts: Contracts in construction, fundamentals of delay analysis and claims; Advances in construction management, tender and tender document - Deposits by the contractor - Arbitration. Negotiation - M. Book - Muster roll –stores.

**TEXT BOOKS:**

1. R.L. Peurifoy, W.B Ledbetter and schexnayder, C, construction planning and equipment methods, 5th Edition, McGraw Hill, Singapore, 1995.
2. Sharma S.C. Construction equipment and management, Khanna publishers, New Delhi, 2011.
3. M.R.S. Murthy, Cost Analysis for Management Decisions, Tata McGraw-Hill Publishing Company Ltd.,1988.

**REFERENCE BOOKS:**

1. James, J.O Brain, construction inspection handbook-quality assurance, and quality control, Van Nostrand, New York, 1989.
2. Kwaku A., Tenah and jose M. Guevera, fundamental of construction management and organization, PHI, 1995.

**WEB REFERENCES:**

1. <https://pgcm.xime.org/>
2. <https://ascelibrary.org/journal/jcemd4>

**E-TEXT BOOKS:**

1. <https://www.amazon.in/Construction-Engineering-Management-Seetharaman/dp/9382533095>
2. <https://easyengineering.net/civildatas.com/download/construction-engineering-and-management-by-seetharaman>

**MOOCS COURSE**

1. <https://nptel.ac.in/courses/105/107/105107123/>

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**BUSINESS ECONOMICS AND FINANCIAL ANALYSIS**

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**III-B.TECH I-SEMESTER****Course Code: A1CE505HS**

L	T	P	C
3	0	0	3

**COURSE OBJECTIVES**

The course should enable the students to

1. Understand the market dynamics namely demand elasticity of demand
2. Understand the pricing in different market structures.
3. Analyze how capital budgeting decisions are carried out for selecting the best investment proposal.
4. Learn how organizations make important investment and financing decisions.
5. Analyze a company's financial statements and come to a reasoned conclusion about the financial situation of the company.

**COURSE OUTCOMES**

1. Understand microeconomic factors in related to demand analysis and its forecasting.
2. Apply the theory of production function and Cost concepts to determine the Break Even Analysis.
3. Remember different market structures, pricing strategies and different forms business organization.
4. Determine the investment decisions of organizations by applying capital budgeting methods and Strategies.
5. Interpret the financial statement by using Fundamental accounting concepts and Ratio analysis.

**UNIT-I INTRODUCTION AND DEMAND ANALYSIS**

Definition, nature and scope of business economics; Demand analysis; Demand determinants, law of demand and its exceptions; Elasticity of demand: Definition, types, measurement and significance of elasticity of demand, demand forecasting, factors governing demand forecasting.

**UNIT -II PRODUCTION AND COST ANALYSES**

Combination of Inputs, Cobb-Douglas Production function, Laws of Returns, Internal and External Economies of Scale. Cost Analysis: Cost concepts, Opportunity cost, Fixed vs. Variable costs, Explicit costs vs. Implicit costs, out of pocket costs vs. Imputed costs, Break-even analysis, Determination of Break – Even point (Simple Problems) , Managerial Significance of BEA.

**UNIT -III MARKETS & NEW ECONOMIC ENVIRONMENT**

Market structures: Types of competition, Features of perfect competition, Monopoly and monopolistic competition. Price determination& Price Statistics: Price Output determination in case of perfect competition and monopoly. Features and evaluation of different forms of Business organization: Sole proprietorship, partnership, Joint Stock Company, public enterprises and their types..

**UNIT -IV CAPITAL BUDGETING**

Capital and its significance, types of capital, estimation of fixed and working capital requirements, methods and sources of raising capital- Trading Forecast, Capital budget, Cash Budget. Features of capital budgeting proposals, methods of capital budgeting – payback method, Accounting rate of return (ARR), Net Present Value Method (simple problems).

## **UNIT-V INTRODUCTION TO FINANCIAL ACCOUNTING AND FINANCIAL ANALYSIS**

Accounting Concepts and Conventions, Introduction to IFRS– Double – Entry Book keeping, Journal, Ledger, Trial balance, Final accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments.) Financial Analysis through Ratios: Significance, limitations of Ratio Analysis and Ratios Computation, Analysis and Interpretation of Liquidity Ratios (Current Ratio and quick ratio).

### **TEXT BOOKS:**

1. Aryasri, “Managerial Economics and Financial Analysis”, TMH publications, 4th Edition, 2012.
2. M. Kasi Reddy, Saraswathi, “Managerial Economics and Financial Analysis”, PHI Publications, New Delhi, 2nd Edition, 2012.
3. Varshney, Maheswari, “Managerial Economics”, Sultan Chand Publications, 11th Edition, 2009.

### **REFERENCE BOOKS:**

1. Dwivedi, “Managerial Economics”, Vikas Publication House Pvt.Ltd, 2nd Edition, 2012.
2. S.N. Maheshwari & S.K.Maheshwari, “Financial Accounting”, Vikas Publication House Pvt.Ltd, 4th Edition, 2012.
3. R.Narayana Swamy, “Financial Accounting- A managerial Perspective”, Pearson publications, 1st Indian Reprint Edition, 2012.
4. J.V.Prabhakar Rao & P.V.Rao, “Managerial Economics & Financial Analysis”, Maruthi Publishers, 1<sup>st</sup> Revised Edition, 2011.
5. Kasi Reddy & Saraswathi, “Managerial Economics and Financial Analysis”, PHI Publications, New Delhi, 10th Revised Edition, 2012.
6. Varshney & Maheswari, “Managerial Economics”, Sulthan Chand Publishers, 1st Revised Edition, 2009

### **WEB REFERENCES:**

1. [https:// www.slideshare.net/glory1988/managerial-economics-and- financial analysis.](https://www.slideshare.net/glory1988/managerial-economics-and-financial-analysis)
2. [https:// thenthata.web4kurd.net/mypdf/managerial-economics-and- financial analysis.](https://thenthata.web4kurd.net/mypdf/managerial-economics-and-financial-analysis)
3. [https:// bookshallcold.link/pdfread/managerial-economics-and-financial analysis.](https://bookshallcold.link/pdfread/managerial-economics-and-financial-analysis)
4. [https:// www.gvpce.ac.in/syllabi/Managerial Economics and financial analysis.](https://www.gvpce.ac.in/syllabi/Managerial Economics and financial analysis)

### **E-TEXT BOOKS:**

1. [https:// books.google.co.in/books/about/Managerial economics and financial analysis.](https://books.google.co.in/books/about/Managerial_economics_and_financial_analysis)
2. [http://www. eBook take. in /pdf/title/managerial-economics-and-financial analysis.](http://www.eBook take.in/pdf/title/managerial-economics-and-financial-analysis)
3. [http://all4you.blogspot.in/2012/06/mefa-managerial-economics and financial analysis.](http://all4you.blogspot.in/2012/06/mefa-managerial-economics-and-financial-analysis)
4. [http://books.google.com/books/about/Managerial economics and financial analysis.](http://books.google.com/books/about/Managerial_economics_and_financial_analysis)
5. [http://www.scribd.com/doc/37684926.](http://www.scribd.com/doc/37684926)

### **MOOCS COURSE**

1. <https://nptel.ac.in/courses/110/101/110101005/>
2. [https://www.coursera.org/specializations/managerial-economics-business-analysis.](https://www.coursera.org/specializations/managerial-economics-business-analysis)
3. [https://onlinecourses.swayam2.ac.in/cec20\\_mg02/preview](https://onlinecourses.swayam2.ac.in/cec20_mg02/preview)



**CONCRETE TECHNOLOGY LAB****III-B.TECH I-SEMESTER****Course Code: A1CE506PC**

L	T	P	C
0	0	3	1.5

**COURSE OBJECTIVES:**

The objectives of the course are

1. To learn laboratory tests and their procedures of cement and fine aggregate
2. To laboratory tests and their procedures of coarse aggregates
3. To Evaluate fresh concrete properties
4. To Understand the test procedures for characterization of Concrete
5. To know the workability properties of the self-compacting concrete.

**COURSE OUTCOMES:**

Student shall be able

1. Categorize the test on materials used Civil Engineering Building & Pavement constructions
2. To perform the tests on concrete for its characterization.
3. To Design Concrete Mix Proportioning by Using Indian Standard Method.
4. To prepare a laboratory report
5. To perform the tests on SSC

**LIST OF EXPERIMENTS****Experiment-1** Test on Cement

- a. Normal Consistency and fineness of cement.
- b. Initial setting time and final setting time of cement.
- c. Specific gravity of cement
- d. Soundness of cement
- e. Compressive strength of cement

**Experiment-2** Test on Coarse Aggregates

- a. Specific gravity (wire basket)
- b. Shape (Flakiness and elongation indices)
- c. Impact and abrasion value tests
- d. Crushing resistance on coarse aggregates
- e. Sieve Analysis and gradation charts for coarse Aggregates

**Experiment-3** Test on Fine Aggregates

- a. Sieve Analysis and gradation charts Fine Aggregates
- b. Bulking of sand

**Experiment-4** Test on Fresh Concrete

- a. Slump test
- b. CF (compact factor stress)
- c. Vee-bee Test

**Experiment-5** Test on hardened concrete

- a. Compression test on cubes
- b. Flexure test
- c. Split Tension Test

**Experiment-6** Tests on Fresh SCC (Self-Compacting Concrete)

- a. Slump flow test
- b. J-Ring test
- c. V-Funnel test
- d. L-box test

**REFERENCE BOOKS:**

1. Concrete Manual by M.L. Gambhir, Dhanpat Rai & Sons
2. Concrete Technology by M.S. Shetty. – S. Chand & Co.; 2004
3. Concrete Technology by A.R. Santhakumar, 2<sup>nd</sup> Edition, Oxford university Press, New Delhi
4. Concrete Technology by M. L. Gambhir. – Tata Mc. Graw Hill Publishers, New Delhi
5. IS 10262 :2009 “Concrete Mix Proportioning – Guidelines”
6. IS 516:2006 “Methods of Tests on Strength of Concrete”
7. IS 383 :1993 “Specification For Coarse And Fine Aggregates From Natural Sources For Concrete”.

**WEB REFERENCES:**

1. <http://www.arxiv.org/pdf/1510.00032>
2. <http://www.nptel.ac.in/courses/122103010/>

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**COMPUTER AIDED ENGINEERING DRAFTING LAB**

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**III-B.TECH I-SEMESTER****Course Code: A1CE507ES**

L	T	P	C
0	0	2	1

**COURSE OBJECTIVES:**

The course should enable the students to:

To make students understand detailing of all kinds of structures such as reinforced concrete, plain concrete structures.

**COURSE OUTCOMES:**

By the end of the course students will be able:

At the end of the course, the student will be able to draft various structures

**LIST OF EXPERIMENTS**

- Experiment-1** Exercises on development of drawings of Single storied buildings
- Experiment-2** Exercises on development of drawings of multi storied buildings
- Experiment-3** Exercises on development of drawings of Warehouse.
- Experiment-4** Detailing of reinforcement in Cantilever, Simply supported For Singly Reinforcement.
- Experiment-5** Detailing of reinforcement in Cantilever, Simply supported For Doubly Reinforcement.
- Experiment-6** Detailing of reinforcement in Singly Reinforced Continuous Beams.
- Experiment-7** Detailing of reinforcement in Doubly Reinforced Continuous Beams.
- Experiment-8** Detailing of reinforcement in RC isolated footings.
- Experiment-9** Detailing of reinforcement in RC Combined footings.
- Experiment-10** Detailing of reinforcement in RC Slab.

**REFERENCE BOOKS:**

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

**WEB REFERENCES:**

1. <https://nptel.ac.in/courses/105/104/105104148/>
2. <https://open.umn.edu/opentextbooks/textbooks/70>
3. <https://lecturenotes.in/download/material/41267-notes-of-autocad-civil-engineering-by-durgesh-pathak>

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**FLUID MECHANICS AND HYDRAULICS MACHINERY LAB**

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**III-B.TECH I-SEMESTER****Course Code: A1CE508PC**

L	T	P	C
0	0	2	1

**COURSE OBJECTIVES:**

To give the student an exposure to various hydraulic machines.

1. The course deals with basic concepts of flow in open channel and working principles of different types of turbines
2. The objective of this course is to provide knowledge regarding uniform and non-uniform flows in open channels, impact of jet, study of different types of turbines and working of centrifugal and reciprocating pumps.
3. The objective of this course is to provide knowledge regarding Performance test on Kaplan turbine.
4. The objective of this course Performance characteristics of a reciprocating pump.
5. The objective is to know the Determination of Coefficient of discharge for the given Weir

**COURSE OUTCOMES:**

1. Compute drag coefficients
2. Test the performance of pumps and turbines
3. Determine Manning's and Chezy's coefficients for smooth and rough channels
4. Determine Energy loss in Hydraulic jump and Calibrate standing wave flume.
5. To know the Study of Flow in Open Channel

**LIST OF EXPERIMENTS**

- Experiment1.** Impact of jets on Vanes.  
**Experiment2.** Performance Test on Pelton Wheel.  
**Experiment3.** Performance Test on Francis Turbine.  
**Experiment4.** Performance Test on Kaplan Turbine.  
**Experiment5.** Performance Test on Single Stage Centrifugal Pump.  
**Experiment6.** Performance Test on Multi Stage Centrifugal Pump.  
**Experiment7.** Performance Test on Reciprocating Pump.  
**Experiment8.** Calibration of Venturimeter.  
**Experiment9.** Calibration of Orifice meter.  
**Experiment10.** Determination of friction factor for a given pipe line.  
**Experiment11.** Determination of loss of head due to sudden contraction in a pipeline.  
**Experiment12.** Verification of Bernoulli's Theorems.

**TEXT BOOKS:**

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

**REFERENCE BOOKS:**

1. Fluid Mechanics and Hydraulic Machines by Manish Kumar Goyal, PHI learning Private Limited,
2. Fluid mechanics & Hydraulic Machines, Domkundwar & Domkundwar Dhanpat Rai &Co

## **ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE**

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

**Course Code: A1CE506MC**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>

### **COURSE OBJECTIVES**

#### **To learn**

1. To facilitate the students with the concepts of Indian traditional knowledge and to make them understand the Importance of roots of knowledge system.
2. To make the students understand the traditional knowledge and analyse it and apply it to their day to day life
3. Know the need and importance of protecting traditional knowledge.
4. Know the various enactments related to the protection of traditional knowledge.

### **COURSE OUTCOMES**

#### **At the end of the course, student will be able to:**

1. Identify the concept of Traditional knowledge and its importance.
2. Explain the need and importance of protecting traditional knowledge.
3. Illustrate the various enactments related to the protection of traditional knowledge.
4. Interpret the concepts of Intellectual property to protect the traditional knowledge.
5. Explain the importance of Traditional knowledge in Agriculture and Medicine.

### **UNIT-I INTRODUCTION TO TRADITIONAL KNOWLEDGE**

Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge, Indigenous Knowledge (IK), characteristics, traditional knowledge vis-a-vis indigenous knowledge, traditional knowledge Vs western knowledge traditional knowledge

### **UNIT-II PROTECTION OF TRADITIONAL KNOWLEDGE**

The need for protecting traditional knowledge Significance of TK Protection, value of TK in global economy, Role of Government to harness TK

### **UNIT -III LEGAL FRAMEWORK AND TRADITIONA KNOWLEDGE**

The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, Plant Varieties Protection and Farmer's Rights Act, 2001 (PPVFR Act); The Biological Diversity Act 2002 and Rules 2004, the protection of traditional knowledge bill, 2016

### **UNIT -IV TRADITIONAL KNOWLEDGE AND INTELLECTUAL PROPERTY**

Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge

### **UNIT-V TRADITIONAL KNOWLEDGE IN DIFFERENT SECTORS**

Traditional knowledge and engineering, Traditional medicine system, TK in agriculture, Traditional societies depend on it for their food and healthcare needs, Importance of conservation and sustainable development of environment, Management of biodiversity, Food security of the country and protection of TK

### **TEXT BOOKS**

1. Traditional Knowledge System in India, by Amit Jha, 2009
2. Traditional Knowledge System in India by Amit Jha Atlantic publishers, 2002.

### **REFERENCE BOOKS**

1. "Knowledge Traditions and Practices of India" Kapil Kapoor<sup>1</sup>, Michel Danino<sup>2</sup>.

### **WEB REFERENCES**

1. <https://www.youtube.com/watch?v=LZP1StpYEPM>
2. <http://nptel.ac.in/courses/121106003/>

### **E-TEXT BOOKS**

1. Traditional Knowledge System in India by Amit Jha Atlantic publishers, 2002

### **MOOCS COURSE**

1. <http://nptel.ac.in/courses/121106003/>

## **III-YEAR (II-SEMESTER)**

## **DESIGN OF STEEL STRUCTURES**

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

**Course Code: A1CE601PC**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>

### **COURSE OBJECTIVES**

The course should enable the students to:

1. Explain the mechanical properties of structural steel, plasticity, yield.
2. Describe the salient features of Limit State Method of design of Steel structures.
3. Identify and explain the codal provisions given in IS. 800.
4. Analyze the behavior of steel structures under tension, compression and flexure.
5. Design the tension, compression, flexural members and plate girder

### **COURSE OUTCOMES:**

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

1. Analyze the tension members, compression members.
2. Design the tension members, compression members and column bases and joints and connections
3. Analyze and Design the beams including built-up sections and beam and connections.
4. Identify and Design the various components of welded plate girder including stiffeners
5. Analyze & design of the Flexural members.

### **UNIT-I INTRODUCTION TO STEEL STRUCTURES**

Materials – Types of structural steel – Mechanical properties of steel – Concepts of plasticity – yield strength - Loads and Stresses – Local buckling behavior of steel. Concepts of limit State Design –Load combinations - Design Strengths - deflection limits– serviceability – stability check. Design of Connections– types of connections – Bolted connections – Design strength – efficiency of joint– prying action - Welded connections – Types of welded joints – Design requirements

Design of tension members –Simple and built up members - Design strength – Design procedure for splicing - lug angle

### **UNIT-II DESIGN OF COMPRESSION MEMBERS**

Design of compression members – Buckling class – slenderness ratio – Design of simple compression members - laced – battened columns – splice – column base – slab base.

Plastic Analysis; Plastic moment – Plastic section modulus - Plastic analysis of continuous beams

### **UNIT -III DESIGN OF FLEXURAL MEMBERS**

Design of Flexural Members – Laterally supported and unsupported Beams – Design of laterally supported beams - Bending and shear strength/buckling – Built-up sections - Beam splice

Design of Beam-column connections - Eccentric connections - Type I and Type II connection – Framed connection– stiffened / seated connection

### **UNIT -IV DESIGN OF WELDED PLATE GIRDERS**

Design of welded plate girders – elements – economical depth – design of main section – connections between web and flange – design of stiffeners - bearing stiffener– intermediate stiffeners – Design of web splice and flange splice



## **UNIT-V      DESIGN OF TRUSSES**

Design of Industrial Structures; Types of roof trusses - loads on trusses – wind loads - Purlin design –truss design – Design of welded Gantry girder

### **TEXT BOOKS:**

1. Design of steel structures by S.K.Duggal, Tata Macgrawhill publishers, 2000, 2<sup>nd</sup> Edition.
2. Design of steel structures by N.Subramanian, Oxford University press, 2008.
3. Design of steel structures by K.S.Sairam, Pearson Educational India, 2<sup>nd</sup> Edition, 2013.

### **REFERENCE BOOKS:**

1. Design of steel structures by Edwin H. Gaylord and Charles N. Gaylord, Tata Mac-grawhill publishers, 1972
2. Design of steel structures by L.S. Jaya Gopal, D. Tensing, Vikas Publishing House

### **WEB REFERENCES:**

1. <https://www.oreilly.com/library/view/design-of-steel/9789332511224/xhtml/bm001.xhtml>

### **E-TEXT BOOKS:**

1. <https://onlinelibrary.wiley.com/doi/10.1002/9781118631201.ch2>
2. <https://www.sanfoundry.com/best-reference-books-design-steel-structures-alloy-steel-making-process/>

### **MOOCS COURSE**

1. <https://nptel.ac.in/courses/105/106/105106112/>
2. <https://nptel.ac.in/courses/105/105/105105162/>
3. [https://onlinecourses.nptel.ac.in/noc19\\_ce25/preview](https://onlinecourses.nptel.ac.in/noc19_ce25/preview)

## **GEOTECHNICAL ENGINEERING**

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

**Course Code: A1CE602PC**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>

### **COURSE OBJECTIVES:**

The objectives of the course are to

1. Understand the formation of soil and classification of the soils
2. Determine the Index & Engineering Properties of Soils
3. Determine the flow characteristics & stresses due to externally applied loads
4. Estimate the consolidation properties of soils
5. Estimate the shear strength and seepage loss

### **COURSE OUTCOMES**

At the end of the course the student will able to

1. Characterize and classify the soils
2. Able to estimate seepage, stresses under various loading conditions
3. Able to know compaction and its characteristics
4. Able to analyze the compressibility of the soils
5. Able to understand the strength of soils under various drainage conditions

### **UNIT-I INTRODUCTION**

**Introduction:** Origin and Classification of Soils-Soil structures – moisture content – Mass, volume relationships – Specific Gravity. –Unit weight of soil by Core-cutter method and Sand-replacement method - Relative density.

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

### **UNIT -II PERMEABILITY AND EFFECTIVE STRESS**

**Permeability:** Soil water – capillary rise – flow of water through soils – Darcy's law- permeability – Factors affecting permeability – Determination of coefficient of permeability by constant-head method and falling-head method –Permeability of layered soils.

**Effective Stress:** Total, neutral and effective stress – principle of effective stress.

**Seepage Analysis:** Seepage through soils – Flownets: Characteristics and Use- quick sand condition.

### **UNIT-III STRESS DISTRIBUTION IN SOILS AND COMPACTION OF SOIL**

**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 of Soil:-**Introduction, theory of compaction, laboratory determination of optimum moisture content and maximum dry density. Factors affecting compaction. Compaction in field and compaction control.

### **UNIT-IV CONSOLIDATION**

**Consolidation:** Difference between compaction and 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**

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

**TEXT BOOKS:**

1. Basic and Applied Soil Mechanics by Gopal Ranjan & ASR Rao, New age International Pvt Ltd,
2. Soil Mechanics and Foundation Engg. By K.R. Arora, Standard Publishers and Distributors, Delhi.
3. Soil Mechanics and Foundation Engineering by VNS Murthy, CBS Publishers and Distributors.

**REFERENCE BOOKS:**

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

**WEB REFERENCES:**

1. <https://www.classcentral.com/course/swayam-advanced-soil-mechanics-22886>
2. <https://www.classcentral.com/course/swayam-soil..>

**E-TEXT BOOKS:**

1. <https://drive.google.com/u/0/uc?id=1eA2nVv0PxxrlFRTpgP9sl6p4OcGUgbqu&export=download>

**MOOCS COURSE**

1. <https://nptel.ac.in/courses/105/103/105103097/>

## **TRANSPORTATION ENGINEERING (PROFESSIONAL ELECTIVE-II)**

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

**Course Code: A1CE604PE**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **COURSE OBJECTIVES**

1. This course aims at providing a comprehensive insight of various elements of Highway transportation engineering.
2. Know the traffic planning and characteristics
3. Know the geometric design the highway roads
4. Know the traffic survey and its applications
5. Know the safety, preventions and environmental hazard of traffic

### **COURSE OUTCOMES**

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

1. An ability to apply the knowledge of mathematics, science and engineering in the areas of traffic engineering, highway development and maintenance
2. An ability to design, conduct experiments to assess the suitability of the highway materials like soil, bitumen, aggregates and a variety of bituminous mixtures. Also the students will develop the ability to interpret the results and assess the suitability of these materials for construction of highways.
3. An ability to design flexible and rigid highway pavements for varying traffic compositions as well as soil sub grade and environmental conditions using the standards stipulated by Indian Roads Congress.
4. An ability to evaluate the structural and functional conditions of in-service highway pavements and provide solution in the form of routine maintenance measures or designed overlays using Indian Roads congress guidelines.
5. An ability to assess the issues related to road traffic and provide engineering solutions supported with an understanding of road user psychological and behavioral patterns.

### **UNIT-I TRAFFIC PLANNING AND CHARACTERISTICS**

Introduction, History and Importance of Highways, Characteristics of road transport, Current road development plans in India, Road Characteristics-Road user characteristics, PIEV theory, Vehicle Performance characteristics, Fundamentals of Traffic Flow, Urban Traffic problems in India, Integrated planning of town, country, regional and all urban infrastructures, Sustainable approach- land use & transport and modal integration.

### **UNIT -II HIGHWAY GEOMETRIC DESIGN**

Introduction to Highway Geometric Design; Width of Pavement, Formation and Land, Cross Slopes etc; Concept of Friction: Skid and Slip; Elements of geometric design of highways; Sight Distances: Stopping Sight Distance, Overtaking Sight Distance and Intermediate Sight Distance; Horizontal alignment: Design of horizontal curves, super elevation, extra widening of pavement at curves; Vertical Alignment: Gradients, Compensation in Gradient, Design of summit curves and valley curves using different criteria; Integration of Horizontal and Vertical Curves

### **UNIT -III TRAFFIC SURVEYS**

Traffic Surveys- Speed, journey time and delay surveys, Vehicles Volume Survey including non-motorized transports, Methods and interpretation, Origin Destination Survey, Methods and presentation, Parking Survey, Accident analyses-Methods, interpretation and presentation, Statistical applications in traffic studies and traffic forecasting, Level of service- Concept, applications and significance.

**UNIT -IV TRAFFIC SAFETY AND ENVIRONMENT**

Road accidents, Causes, effect, prevention, and cost, Street lighting, Traffic and environment hazards, Air and Noise Pollution, causes, abatement measures, Promotion and integration of public transportation, Promotion of non-motorized transport

**UNIT-V TRAFFIC DESIGN AND VISUAL AIDS**

Intersection Design- channelization, Rotary intersection design, Signal design, Coordination of signals, Grade separation, Traffic signs including VMS and road markings, Significant roles of traffic control personnel, Networking pedestrian facilities & cycle tracks

**TEXT BOOKS:**

1. S.K Khanna, , C.E.G. Justo and Veeraragavan, A, 'Highway Engineering', Nem Chand & Bros. Revised Tenth Edition, 2014
2. L R Kadiyali. and Dr N B Lal, Principles and Practices of Highway Engineering; Seventh Edition, First Reprint; Khanna Publishers, New Delhi, 2018

**REFERENCE BOOKS:**

1. Papacoastas, C. S. and Prevedouros, Transportation Engineering and Planning, Third Edition, Third Impression; Pearson Education, 2018.
2. Khisty C J and Lall B Kent; Transportation Engineering: An Introduction, Third Edition, 1st Indian Adaptation; Pearson India Education Service Pvt. Ltd, New Delhi 2017.
3. Subhash C Saxena, Text Book of Highway and Traffic Engineering; First Edition; CBS Publishers and Distributors. New Delhi, 2014
4. C Venkatramaih, Transportation Engineering Volume 1 – Highway Engineering, 1st Edition, Universities Press, 2016
5. Garber, N.J. and Hoel, L.A. Traffic and Highway Engineering, Fourth Edition; Cengage Learning, Stamford, CT, USA, 2010
6. Partha chakroborty and Animesh Das, Principles of Transportation Engineering, PHI, 2013
7. Nicholas J Garber and Lester A Hoel, Traffic and Highway Engineering, 5th Edition, Cengage Learning India Private Limited, New Delhi, 5th Indian Reprint, 201

**WEB REFERENCES:**

1. <https://easyengineering.net/transportation-engineering-books/>
2. <https://thegatehunt.com/civil-engineering-made-easy-transportation-engineering-notes-part-1-free-download/>

**E-TEXT BOOKS:**

1. <http://www.freeengineeringbooks.com/Civil/Transportation-Engineering-Books.php>
2. <https://civilenggforall.com/highway-and-traffic-engineering-textbook-by-civilenggforall-free-download-pdf/>

**MOOCS COURSE**

1. <https://swayam.gov.in/>
2. <https://onlinecourses.nptel.ac.in/>

## **ENGINEERING MATERIALS FOR SUSTAINABILITY (PROFESSIONAL ELECTIVE-II)**

### **III B.TECH II SEMESTER**

**Course Code: A1CE605PE**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **COURSE OBJECTIVES**

The course should enable the students to:

1. To make the students knowledgeable with respect to the subject and its practicable applicability.
2. To promote understanding of basic and advanced concepts in Engineering materials aspects.
3. To expose the students to know the different type of materials used in engineering point of view.
4. To make the students to learn about sustainability of engineering materials in economic point of view.
5. To know the testing and specification of said materials. various service and environmental loadings

### **COURSE OUTCOMES:**

The end of the course the student should be able to:

1. The objective of this course is to expose the students to the concepts of sustainability in the context of building and conventional engineered building materials, such as Concrete, Bricks, and achieving the same through lower Carbon cements, Superior brick kilns and Recycled aggregate minimizing consumption of natural resources including water.
2. VOC and indoor air quality.
3. Exposing the student to concepts of embodied, Operational and Life Cycle Energy, Minimizing Energy consumption by optimal design, use of BIPV.
4. Exposing the student to concepts Use of Waste Water for Mixing and Curing, Modern Composite Concrete, Recycled Aggregate-ITZ and Processing
5. The objective of this course is to expose the students for testing and specification of said material

### **UNIT-I INTRODUCTION OF MATERIALS & ITS ROLE**

Fundamentals of Sustainability, Role of Materials and Embodied Energy, Case Study for Energy in Building, Calculation of Ecological Footprint, Role of Cement in Sustainability and Calculation of Chemical Energy. Fuel for Cement, Cementitious/ Supplementary Cementitious Materials and Their Characterization, Strength of Concrete with Supplementary Cementitious Materials and Composite Cements, Types of Composite Cements.

### **UNIT -II SUSTAINABLE DEVELOPMENT GOALS**

No Poverty, Zero Hunger, Good Health and Well-being, Quality Education, Gender Equality, Clean Water and Sanitation, Affordable and Clean Energy, Decent Work and Economic Growth, Industry, Innovation and Infrastructure, Reduced Inequality, Sustainable Cities and Communities, Responsible Consumption and Production, Climate Action, Life Below Water, Life on Land, Peace and Justice Strong, Institutions, Partnerships to achieve the Goal.

### **UNIT -III QUALITY OF MATERIALS & SUSTAINABILITY**

Life Cycle Embodied Energy and Concrete Sustainability, Strength of Concrete and Use of Admixtures, Curing Methods and Use of Waste Water for Mixing and Curing, Modern Composite Concrete, Recycled Aggregate-ITZ and Processing, Types of Bricks Kilns and Carbon Balance, Sealants, Health Hazards of Building Materials and Emission Models.

**UNIT -IV IDENTIFICATION OF KEY MATERIAL PROPERTIES**

Identify key material properties important to the successful application of aggregates, asphalt concrete, portland cement concrete, wood and metals to a variety of civil works. Describe the different material properties that affect fresh properties, mechanical properties, and durability properties.

**UNIT-V DESIGN OF PCC MIXTURE AND HMA**

Design a PCC mixture and an HMA mixture using sustainability concepts that will be durable and meet the requirements of a particular construction project, Design a concrete mixture using the volumetric method. Exercises Choose materials for and design an asphalt mixture according to the Superpave process

**TEXT BOOKS:**

1. Building Materials and Construction – Arora & Bindra, Dhanpat Roy Publications.
2. Sustainable Materials - With Both Eyes Open- Julian M. Allwood, UIT Cambridge Ltd.; first edition, replaced with second edition April 1, 2012.
3. Materials and the Environment: Eco-informed Material Choice- Michael F. Ashby, Butterworth-Heinemann; 2nd edition, April 11, 2012
4. Materials Science and engineering / William and callister.

**REFERENCE BOOKS:**

1. Properties of Concrete by A. M. Neville – Low priced Edition – 4th edition
2. Concrete: Micro structure, Properties and Materials – P.K. Mehta and J.M. Monteiro, McGraw Hill Publishers

**WEB REFERENCES:**

1. [https://rajabipour.weebly.com/uploads/1/2/2/3/12233456/ce-437\\_syllabus\\_fa14.pdf](https://rajabipour.weebly.com/uploads/1/2/2/3/12233456/ce-437_syllabus_fa14.pdf)
2. <https://www.un.org/sustainabledevelopment/sdgbookclub/>
3. <https://digitalcommons.njit.edu/cgi/viewcontent.cgi?article=1014&context=ce-syllabi>

**E-TEXT BOOKS**

1. <https://books.google.co.in/books?id=GDLXDwAAQBAJ&sitesec=reviews>
2. [https://www.amazon.in/Sustainable-Materials-buildings-equipment-efficiently/dp/1906860076/ref=sr\\_1\\_4?dchild=1&hvadid=73117665969165&hvbm=bb&hvd-ev=c&hvqmt=b&keywords=sustainable+materials&qid=1617949748&sr=8-4](https://www.amazon.in/Sustainable-Materials-buildings-equipment-efficiently/dp/1906860076/ref=sr_1_4?dchild=1&hvadid=73117665969165&hvbm=bb&hvd-ev=c&hvqmt=b&keywords=sustainable+materials&qid=1617949748&sr=8-4)
3. <https://www.amazon.in/Materials-Environment-Eco-informed-Material-Choice/dp/0123859719/>
4. <https://www.amazon.in/sustainable-development-Nations-Department-Information/dp/9211013690>

**MOOCS COURSE**

1. <https://nptel.ac.in/courses/105/102/105102195/>
2. [https://onlinecourses.swayam2.ac.in/arp19\\_ap75/preview](https://onlinecourses.swayam2.ac.in/arp19_ap75/preview)

**EARTH AND ROCKFILL DAMS AND SLOPE STABILITY  
(PROFESSIONAL ELECTIVE-II)**

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

**Course Code: A1CE606PE**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**COURSE OBJECTIVES**

**To learn**

1. Have an understanding of seismic design concepts and current practices for earth dams and other similar structures to enable them to plan and direct the construction activity appropriately.
2. Understand the soil dynamic testing procedure and methodology of seismic design to be able to execute a proper design.
3. Have a clear understanding of design methodology and the interpretation in the seismic codes.

**COURSE OUTCOMES**

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

1. Describe the behaviour of natural and engineered soil / rock slopes under various weather and engineering conditions.
2. Explain the factors that may affect the stability of slopes.
3. Select an appropriate slope stability analysis method subject to geometry of slope, material properties, and uncertainty of observations.
4. Assess the potential landslide risk of slopes.

**UNIT-I EARTH AND ROCKFILL DAMS**

General features, Selection of site; Merits and demerits of the earth and rock fill dams, Classification of earth dams, Causes of failure, Safe design criteria. Instrumentation in earth dams: Pore pressure measurements, Settlement gauges, Inclinometers, Stress measurements, Seismic measurements.

**UNIT - II FAILURES, DAMAGES AND PROTECTION OF EARTH DAMS**

Nature and importance of failure, Piping through embankment and foundations, Methods of seepage control through embankments and foundations, Design Criteria for filters, Treatment of upstream and downstream of slopes, Drainage control, Filter design.

**UNIT – III SLOPE STABILITY ANALYSIS**

Types of Failure: Failure surfaces - Planar surfaces, Circular surfaces, Non-circular surfaces, Limit equilibrium methods, Total stress analysis versus effective Stress analysis, Use of Bishop's pore pressure parameters, Short term and Long term stability in slopes. Taylor Charts.

**UNIT – IV METHODS OF SLOPE STABILITY**

Method of Slices, Effect of Tension Cracks, Vertical Cuts. Bishop's Analysis, Bishop and Morgenstern Analysis, Non-circular Failure Surfaces: Janbu Analysis, Sliding Block Analysis, Seismic stability, Stabilization of slopes: Soil reinforcement (geosynthetics/soil nailing/micro piles etc), soil treatment (cement/lime treatment), surface protection (vegetation/erosion control mats/shotcrete

**UNIT – V ROCKFILL DAMS**

Requirements of compacted rockfill, Shear strength of rockfill, Rockfill mixtures, Rockfill embankments, Earth-core Rockfill dams, Stability, Upstream & Downstream slopes.



**TEXT BOOK:**

1. Sherard, Woodward, Gizienski and Clevenger. Earth and Earth-Rock Dams. John Wiley & Sons. 1963
2. Sowers, G. F. and Salley, H. I. – Earth and Rockfill Dams, Willams, R.C., and Willace, T.S. 1965.

**REFERENCES:**

1. Abramson, L. W., Lee, T. S. and Sharma, S. - Slope Stability and Stabilization methods – John Wiley & sons. (2002)
2. Bromhead, E. N. (1992). The Stability of Slopes, Blackie academic and professional, London.
3. Christian, Earth & Rockfill Dams – Principles of Design and Construction, Kutzner Published Oxford and IBH.
4. Ortiago, J. A. R. and Sayao, A. S. F. J. - Handbook of Slope Stabilization, 2004.

## **FOUNDATION ENGINEERING (PROFESSIONAL ELECTIVE-III)**

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

**Course Code: A1CE607PE**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **COURSE OBJECTIVES**

#### **To Learn**

1. To Understand The Nature Of Stresses Developed In Simple Geometries Such As Bars, Cantilevers And Beams For Various Types Of Simple Loads
2. To Calculate The Elastic Deformation Occurring In Simple Members For Different Types Of Loading.
3. To Show The Plane Stress Transformation With A Particular Coordinate System For Different Orientation Of The Plane.
4. To Understand The Nature Of Stresses Developed In Simple Geometries Shafts, Springs, Columns & Cylindrical And Spherical Shells For Various Types Of Simple Loads
5. To Understand The Nature Of Stresses Developed In Simple Geometries Shafts, Springs, Columns & Cylindrical Shells For Various Types Of Simple Loads

### **COURSE OUTCOMES**

#### **At The End Of The Course, Student Will Be Able To:**

1. Describe The Concepts And Principles, Understand The Theory Of Elasticity Including Strain/Displacement And Hooke's Law Relationships.
2. Recognize Various Types Loads Applied On Structural Components Of Simple Framing Geometries And Understand The Nature Of Internal Stresses That Will Develop Within The Components.
3. To Evaluate The Strains And Deformation That Will Result Due To The Elastic Stresses Developed Within The Materials For Simple Types Of Loading
4. Analyze Various Situations Involving Structural Members Subjected To Plane Stresses By Application Of Mohr's Circle Of Stress
5. Describe The Concepts Perform Calculations, Relative To The Strength Of Structures And Mechanical Components In Particular To Torsion And Direct Compression

### **UNIT-I SOIL INVESTIGATION**

Soil Investigation : Need – Methods Of Soil Exploration – Boring And Sampling Methods – Penetration Tests – Plate Load Test– Planning Of Soil Exploration Programme, Bore Logs And Preparation Of Soil Investigation Report-Soil Stabilization Method

### **UNIT -II STABILITY OF SLOPES**

Stability Of Slopes: Infinite And Finite Earth Slopes – Types Of Failures – Factor Of Safety Of Infinite Slopes- Stability Analysis By Swedish Slip Circle Method, Method Of Slices, Bishop's Simplified Method Of Slices- Taylor's Stability Number- Stability Of Slopes Of Earth Dams Under Different Conditions.

Earth Pressure Theories: Types Of Lateral Earth Pressures (Active, Passive And At Rest Soil Pressures) Rankine's Theory Of Earth Pressure – Earth Pressures In Layered Soils – Coulomb's Earth Pressure Theory. Culmann's Graphical Method

### **UNIT -III RETAINING WALLS**

Retaining Walls: Types Of Retaining Walls – Stability Of Gravity And Cantilever Retaining Walls Against Overturning, Sliding And, Bearing Capacity, Filter Material For Drainage.

Shallow Foundations - Types - Choice Of Foundation – Location And Depth - Safe Bearing Capacity-Shear Criteria – Terzaghi's, And Is Code Methods - Settlement Criteria – Allowable Bearing Pressure Based On Spt N Value And Plate Load Test – Allowable Settlements Of Structures.

## **UNIT -IV    PILE FOUNDATION**

Pile Foundation: Types Of Piles – Load Carrying Capacity Of Piles Based On Static Pile Formulae – Dynamic Pile Formulae –Pile Load Tests - Load Carrying Capacity Of Pile Groups In Sands And Clays – Settlement Of Pile Groups – Negative Skin Friction

## **UNIT-V      WELL FOUNDATION**

Well Foundation: Introduction –Different Shapes Of Wells-Grip Length-Forces Acting On Well Foundation-Terzaghi's Analysis. Measures Of Rectification Of Tilts And Shifts

## **TEXT BOOKS**

1. Basic And Applied Soil Mechanics By Gopal Ranjan & Asr Rao, New Age International Pvt . Ltd,
2. Principals Of Geotechnical Engineering By Braja M. Das, Cengage Learning Publishers.
3. Soil Mechanics And Foundation Engineering By K.R.Arora ,Standard Publishers Distributors

## **REFERENCE BOOKS**

1. Analysis And Design Of Substructures – Swami Saran, Oxford And Ibh Publishing Company Pvt Ltd
2. Soil Mechanics And Foundation Engineering By Vns Murthy, Cbs Publishers And Distributors.
3. Geotechnical Engineering Principles And Practices By Cuduto, Phi International Engineering

## **WEB REFERENCES**

1. <https://Easyengineering.Net/A-Textbook-Of-Strength-Of-Materials/>
2. <https://Civilenggforall.Com/Strength-Of-Materials-Textbook-Free-Download-Pdf-Civilenggforall/>

## **E-TEXT BOOKS**

1. [https://Books.Google.Co.In/Books?Id=2iheqp8dnwwc&Printsec=Frontcover&Redir\\_Esc=Y#V=Onepage&Q&F=False](https://Books.Google.Co.In/Books?Id=2iheqp8dnwwc&Printsec=Frontcover&Redir_Esc=Y#V=Onepage&Q&F=False)

## **MOOCS COURSE**

1. <https://Swayam.Gov.In/>
2. <https://Onlinecourses.Nptel.Ac.In/>

## **IRRIGATION AND HYDRAULIC STRUCTURES (PROFESSIONAL ELECTIVE-III)**

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

**Course Code: A1CE608PE**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **COURSE OBJECTIVES**

1. To understand practical applications of problems associated with improper usage and management of water in irrigation engineering.
2. Train the students and bring awareness in them about effective and proper usage of ground water resources and also motivate them for the research of potential natural ground water zones.
3. Train them for the estimation and interpret the data obtained from mass – curve by using Excel tools for estimating the capacity of a reservoir.
4. Train them for the effective and proper design of various types of dams and reservoirs, problems associated with those structures while handling in real scenario.
5. Train them for the design of aqueducts, weir, barrage and other important irrigation structures according to their usage and location of construction

### **COURSE OUTCOMES**

1. To understand different types of irrigation structures along with their designs and analysis by using different evaluation methods.
2. Interpret performance, safety and stability of the gravity dam.
3. Calculate flow through the earthen dams and also corresponding remedial measures to prevent more seepage through dams, various irrigation structures.
4. Design various diversion head works by using Bligh's and Khosla's theory.
5. Design of various hydraulic structures like canal falls and canal regulator works along with their suitability.

### **UNIT I INTRODUCTION**

Estimation of crop water requirement; Analysis for surface and sub-surface flow at hydraulic structures, Cross section of channels, Silt control methods in canals. Estimation of channel losses. Design of lined and unlined channels.

### **UNIT II GRAVITY DAMS**

Forces acting on a gravity dam, causes of failure of a gravity dam, elementary, common profile and practical profile of a gravity dam, limiting height of a low gravity dam, Factors of Safety -stability Analysis, Foundation for Gravity Dam, drainage and inspection galleries and their impact, stress analysis of a gravity dam.

### **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 through embankments and foundations. Spillways: types of spillways, Design principles of Ogee spillways – Spillway gates.

### **UNIT IV DIVERSION HEAD WORKS**

Types of Diversion head works- weirs and barrages, layout of diversion head work - components. causes and failure of weirs and Barrages on permeable foundations, - Silt Ejectors and Silt Excluders weirs on Permeable Foundations - creep Theories - Bligh's, Lane and Khosla's theories, Determination of uplift pressure- Various Correction Factors - Design principles of weirs on permeable foundations using creep theories - exit gradient, U/s and D/s Sheet Piles - Launching Apron

**UNIT V        CANAL FALLS**

Types of falls and their location, design principles of Notch fall and sarada type fall. Canal regulation works, principles of design of distributor and head regulators, canal cross regulators-canal outlets, types of canal modules, proportionality, sensitivity and flexibility. Cross drainage works types: selection of site, design principles of aqueduct siphon aqueduct and super passage. Design of Type II Aqueduct (Under Tunnel).

**TEXT BOOKS:**

1. Irrigation Engineering and Hydraulic Structures. S.K.Garg 2014- Khanna Publishers 19th edition.

**REFERENCE BOOKS:**

1. Irrigation and water power engineering. B.C.Punmia, Pande B.B.Lal, Ashokkumarjain, Arunkumarjain- Laxmi publications 16th edition.
2. Irrigation Engineering and Hydraulic structures. S.R.Sahasrabudhe, 2013 S.K.Kataria & sons

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## GROUND IMPROVEMENT TECHNIQUES (PROFESSIONAL ELECTIVE-III)

### III-B.TECH II-SEMESTER

**Course Code: A1CE609PE**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### COURSE OBJECTIVES

To Learn

1. Gain Knowledge on Methods and Selection of Ground Improvement Techniques.
2. Understand Dewatering Techniques And Design For Simple Cases.
3. Get Knowledge on Insitu Treatment of Cohesion less and Cohesive Soils.
4. Understand The Concept Of Earth Reinforcement And Design Of Reinforced Earth.
5. Get To Know Types Of Grouts And Grouting Technique.

### COURSE OUTCOMES

At The End Of The Course, Student Will Be Able To:

1. Gain Knowledge on Methods And Selection Of Ground Improvement Techniques.
2. Understand Dewatering Techniques And Design For Simple Cases.
3. Get Knowledge On Insitu Treatment Of cohesion less And Cohesive Soils.
4. Understand The Concept Of Earth Reinforcement And Design Of Reinforced Earth.
5. Get To Know Types Of Grouts And Grouting Technique.

### UNIT-I GROUND IMPROVEMENT MECHANICAL MODIFICATION

**Ground improvement:** definition, objectives of soil improvement, classification of ground improvement techniques.

**Mechanical modification:** type of mechanical modification, aim of modification, compaction, principle of modification for various types of soils

### UNIT -II DEWATERING

Dewatering Techniques – Well points – Vacuum and electro osmotic methods – Seepage analysis for two dimensional flow for fully and partially penetrated slots in homogeneous deposits – Design for simple cases.

### UNIT -III INSITU TREATMENT OF COHESIONLESS AND COHESIVE SOILS

Insitu Densification Of Cohesionless Soils – Shallow As Deep Compaction – Dynamic Compaction – Vibroflotation, Sand Compaction Piles And Deep Compaction. Consolidation Of Cohesionless Soils - Preloading With Sand Drains, And Fabric Drains, Stabilization Of Soft Clay Ground Using Stone Columns And Lime Piles-Installation Techniques – Simple Design – Relative Merits Of Above Methods And Their Limitations.

### UNIT -IV GROUTING TECHNIQUES

Types Of Grouts – Grouting Equipments And Machinery – Injection Methods – Grout Monitoring - Stabilization With Cement, Lime And Chemicals – Stabilization Of Expansive Soil.

### UNIT-V PROBLEMATIC SOIL AND IMPROVEMENT TECHNIQUES

Role of ground improvement in foundation engineering – methods of ground improvement – Geotechnical problems in alluvial, lateritic and black cotton soils – Selection of suitable ground improvement techniques based on soil conditions

### **TEXT BOOKS**

1. Purushothama Raj. P, Ground Improvement Techniques, Lakshmi Publications, 2nd Edition, 2016.
2. Koerner, R.M. Construction and Geotechnical Methods in Foundation Engineering, Mcgraw Hill, 1994.
3. Nihar Ranjan Patra, Ground Improvement Techniques, Vikas Publishing House, First Edition, 2012.
4. Mittal.S, an Introduction to Ground Improvement Engineering, Medtech Publisher, First Edition, 2013.

### **REFERENCE BOOKS**

1. Moseley, M.P., Ground Improvement Blockie Academic And Professional, 1992.
2. Moseley, M.P And Kirsch. K., Ground Improvement, Spon Press, Taylor And Francis Group, London, 2nd Edition, 2004.
3. Jones C.J.F.P. Earth Reinforcement And Soil Structure, Thomas Telford Publishing, 1996.
4. Winterkorn, H.F. And Fang, H.Y. Foundation Engineering Hand Book. Van Nostrand Reinhold, 1994.
5. Das, B.M., Principles Of Foundation Engineering (Seventh Edition), Cengage Learning, 2010

### **WEB REFERENCES**

1. <https://Easyengineering.Net/A-Textbook-Of-Strength-Of-Materials/>
2. <https://Civilenggforall.Com/Strength-Of-Materials-Textbook-Free-Download-Pdf-Civilenggforall/>

### **E-TEXT BOOKS**

1. [https://Books.Google.Co.In/Books?Id=2iheqp8dnwwc&Printsec=Frontcover&Redir\\_Esc=Y#V=Onepage&Q&F=False](https://Books.Google.Co.In/Books?Id=2iheqp8dnwwc&Printsec=Frontcover&Redir_Esc=Y#V=Onepage&Q&F=False)

### **MOOCS COURSE**

1. <https://Swayam.Gov.In/>
2. <https://Onlinecourses.Nptel.Ac.In/>

## **ENGINEERING MATERIALS FOR SUSTAINABILITY (OPEN ELECTIVE-I)**

### **III B.TECH II SEMESTER**

**Course Code: A1CE601OE**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **COURSE OBJECTIVES**

The course should enable the students to:

6. To make the students knowledgeable with respect to the subject and its practicable applicability.
7. To promote understanding of basic and advanced concepts in Engineering materials aspects.
8. To expose the students to know the different type of materials used in engineering point of view.
9. To make the students to learn about sustainability of engineering materials in economic point of view.
10. To know the testing and specification of said materials. various service and environmental loadings

### **COURSE OUTCOMES:**

The end of the course the student should be able to:

6. The objective of this course is to expose the students to the concepts of sustainability in the context of building and conventional engineered building materials, such as Concrete, Bricks, and achieving the same through lower Carbon cements, Superior brick kilns and Recycled aggregate minimizing consumption of natural resources including water.
7. VOC and indoor air quality.
8. Exposing the student to concepts of embodied, Operational and Life Cycle Energy, Minimizing Energy consumption by optimal design, use of BIPV.
9. Exposing the student to concepts Use of Waste Water for Mixing and Curing, Modern Composite Concrete, Recycled Aggregate-ITZ and Processing
10. The objective of this course is to expose the students for testing and specification of said material

### **UNIT-I INTRODUCTION OF MATERIALS & ITS ROLE**

Fundamentals of Sustainability, Role of Materials and Embodied Energy, Case Study for Energy in Building, Calculation of Ecological Footprint, Role of Cement in Sustainability and Calculation of Chemical Energy. Fuel for Cement, Cementitious/ Supplementary Cementitious Materials and Their Characterization, Strength of Concrete with Supplementary Cementitious Materials and Composite Cements, Types of Composite Cements.

### **UNIT -II SUSTAINABLE DEVELOPMENT GOALS**

No Poverty, Zero Hunger, Good Health and Well-being, Quality Education, Gender Equality, Clean Water and Sanitation, Affordable and Clean Energy, Decent Work and Economic Growth, Industry, Innovation and Infrastructure, Reduced Inequality, Sustainable Cities and Communities, Responsible Consumption and Production, Climate Action, Life Below Water, Life on Land, Peace and Justice Strong, Institutions, Partnerships to achieve the Goal.

### **UNIT -III QUALITY OF MATERIALS & SUSTAINABILITY**

Life Cycle Embodied Energy and Concrete Sustainability, Strength of Concrete and Use of Admixtures, Curing Methods and Use of Waste Water for Mixing and Curing, Modern Composite Concrete, Recycled Aggregate-ITZ and Processing, Types of Bricks Kilns and Carbon Balance, Sealants, Health Hazards of Building Materials and Emission Models.



**UNIT -IV IDENTIFICATION OF KEY MATERIAL PROPERTIES**

Identify key material properties important to the successful application of aggregates, asphalt concrete, portland cement concrete, wood and metals to a variety of civil works. Describe the different material properties that affect fresh properties, mechanical properties, and durability properties.

**UNIT-V DESIGN OF PCC MIXTURE AND HMA**

Design a PCC mixture and an HMA mixture using sustainability concepts that will be durable and meet the requirements of a particular construction project, Design a concrete mixture using the volumetric method. Exercises Choose materials for and design an asphalt mixture according to the Superpave process

**TEXT BOOKS:**

5. Building Materials and Construction – Arora & Bindra, Dhanpat Roy Publications.
6. Sustainable Materials - With Both Eyes Open- Julian M. Allwood, UIT Cambridge Ltd.; first edition, replaced with second edition April 1, 2012.
7. Materials and the Environment: Eco-informed Material Choice- Michael F. Ashby, Butterworth-Heinemann; 2nd edition, April 11, 2012
8. Materials Science and engineering / William and callister.

**REFERENCE BOOKS:**

3. Properties of Concrete by A. M. Neville – Low priced Edition – 4th edition
4. Concrete: Micro structure, Properties and Materials – P.K. Mehta and J.M. Monteiro, McGraw Hill Publishers

**WEB REFERENCES:**

4. [https://rajabipour.weebly.com/uploads/1/2/2/3/12233456/ce-437\\_syllabus\\_fa14.pdf](https://rajabipour.weebly.com/uploads/1/2/2/3/12233456/ce-437_syllabus_fa14.pdf)
5. <https://www.un.org/sustainabledevelopment/sdgbookclub/>
6. <https://digitalcommons.njit.edu/cgi/viewcontent.cgi?article=1014&context=ce-syllabi>

**E-TEXT BOOKS**

5. <https://books.google.co.in/books?id=GDLXDwAAQBAJ&sitesec=reviews>
6. [https://www.amazon.in/Sustainable-Materials-buildings-equipment-efficiently/dp/1906860076/ref=sr\\_1\\_4?dchild=1&hvadid=73117665969165&hvbmt=bb&hvdev=c&hvqmt=b&keywords=sustainable+materials&qid=1617949748&sr=8-4](https://www.amazon.in/Sustainable-Materials-buildings-equipment-efficiently/dp/1906860076/ref=sr_1_4?dchild=1&hvadid=73117665969165&hvbmt=bb&hvdev=c&hvqmt=b&keywords=sustainable+materials&qid=1617949748&sr=8-4)
7. <https://www.amazon.in/Materials-Environment-Eco-informed-Material-Choice/dp/0123859719/>
8. <https://www.amazon.in/sustainable-development-Nations-Department-Information/dp/9211013690>

**MOOCS COURSE**

3. <https://nptel.ac.in/courses/105/102/105102195/>
4. [https://onlinecourses.swayam2.ac.in/arp19\\_ap75/preview](https://onlinecourses.swayam2.ac.in/arp19_ap75/preview)

**DISASTER PREPAREDNESS & PLANNING MANAGEMENT**  
**(OPEN ELECTIVE-I)**

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

**Course Code: A1CE602OE**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**COURSE OBJECTIVES**

The objectives of the course are

1. To Understand basic concepts in Disaster Management
2. To Understand Definitions and Terminologies used in Disaster Management
3. To Understand Types and Categories of Disasters
4. To Understand the Challenges posed by Disasters
5. To understand the mitigation measures for disaster

**COURSE OUTCOMES**

The student will develop competencies in

1. The application of Disaster Concepts to Management
2. Analyzing Relationship between Development and Disasters.
3. Ability to understand Categories of Disasters and realization of the responsibilities to society
4. Ability to understand disaster management cycle

**UNIT-I INTRODUCTION**

Concepts and definitions: disaster, hazard, vulnerability, resilience, risks severity, frequency and details, capacity, impact, prevention, mitigation.

**UNIT -II DISASTERS**

Disasters classification; natural disasters (floods, draught, cyclones, volcanoes, earthquakes, tsunami, landslides, coastal erosion, soil erosion, forest fires etc.); manmade disasters (industrial pollution, artificial flooding in urban areas, nuclear radiation, chemical spills, transportation accidents, terrorist strikes, etc.); hazard and vulnerability profile of India, mountain and coastal areas, ecological fragility.

**UNIT -III DISASTER IMPACTS**

Disaster impacts (environmental, physical, social, ecological, economic, political, etc.); health, psycho-social issues; demographic aspects (gender, age, special needs); hazard locations; global and national disaster trends; climate change and urban disasters.

Coping with Disaster: Coping Strategies

**UNIT -IV DISASTER RISK REDUCTION**

Disaster management cycle – its phases; prevention, mitigation, preparedness, relief and recovery; structural and non-structural measures; risk analysis, vulnerability and capacity assessment; early warning systems, Post disaster environmental response (water, sanitation, food safety, waste management, disease control, security, communications); Roles and responsibilities of government, community, local institutions, NGOs and other stakeholders; Policies and legislation for disaster risk reduction, DRR programmes in India and the activities of National Disaster Management Authority.

**UNIT -V PLANNING FOR DISASTER MANAGEMENT**

Strategies for disaster management planning - Steps for formulating a disaster risk reduction plan Disaster management Act and Policy in India-Organizational structure for disaster management in India - Preparation of state and district disaster management plans

**TEXT BOOKS**

1. Pradeep Sahni, 2004, Disaster Risk Reduction in South Asia, Prentice Hall.
2. Singh B.K., 2008, Handbook of Disaster Management: Techniques & Guidelines, Rajat Publication.
3. Ghosh G.K., 2006, Disaster Management, APH Publishing Corporation
4. Manual on Disaster Management, National Disaster Management, Agency Govt of india.

**REFERENCE BOOKS**

1. <http://ndma.gov.in/> (Home page of National Disaster Management Authority)
2. <http://www.ndmindia.nic.in/> (National Disaster management in India, Ministry of Home Affairs).
3. Disaster Medical Systems Guidelines. Emergency Medical Services Authority, State of California, EMSA no.214, June 2003
4. Inter-Agency Standing Committee (IASC) (Feb. 2007). IASC Guidelines on Mental Health and Psychosocial Support in Emergency Settings. Geneva: IASC.
5. Earth and Atmospheric Disasters Management, N. Pandharinath, CK Rajan, BS Publications 2009.
6. National Disaster Management Plan, Ministry of Home affairs, Government of India. (<http://www.ndma.gov.in/images/policyplan/dmplan/draftndmp.pdf>)

**WEB REFERENCES**

1. <https://www.emeraldgrouppublishing.com/journal/dpm>
2. [file:///C:/Users/CIVIL-2/Downloads/activity-547-1%20\(1\).pdf](file:///C:/Users/CIVIL-2/Downloads/activity-547-1%20(1).pdf)

**E-TEXT BOOKS**

1. <https://easyengineering.net/disaster-management-handbook-by-jack-pinkowski/>
2. <https://www.smartzworld.com/notes/disaster-management-pdf-notes-dm/>

**MOOCS COURSE**

1. <https://nptel.ac.in/courses/105/104/105104183/>
2. <https://www.classcentral.com/course/disasterprep-481>

**GEOTECHNICAL ENGINEERING LAB****III-B.TECH II-SEMESTER****Course Code: A1CE603PC**

L	T	P	C
0	0	2	1

**COURSE OBJECTIVES:**

Student will

1. Identify physical and mechanical properties of soil in the field and laboratory.
2. Develop an understand the relationships between physical characteristics and mechanical properties of soils;
3. Understand techniques used in soil mechanics for Darcy's Law
4. Understand Mohr-Coulomb theory for shear strength behavior of soils.
5. Choose different tests for soils according to IS standards.

**COURSE OUTCOMES:****Student should be able to:**

1. Identify soils with reference to their characteristics.
2. Evaluate and classify soils according to IS classification.
3. Calculate seepage volume for different soils.
4. Examine methods to improve soil stability of soils.
5. Conduct tests according to IS laboratory standards and procedures.

**LIST OF EXPERIMENTS**

<b>Experiment-1</b>	Grain size distribution by Sieve Analysis.
<b>Experiment-2</b>	Consistency limits - Liquid limit and Plastic limit using Casagrande's method.
<b>Experiment-3</b>	Compaction test: Standard Proctor test.
<b>Experiment-4</b>	Field Density using Sand Replacement method& Core Cutter method.
<b>Experiment-5</b>	Unconfined compression test.
<b>Experiment-6</b>	Specific gravity of soils.
<b>Experiment-7</b>	Vane shear test
<b>Experiment-8</b>	Direct Shear test.
<b>Experiment-9</b>	Permeability test using Falling-head method&constant head method.
<b>Experiment-10</b>	Differential free swell index (DFSI) test.

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**STRUCTURAL ANALYSIS AND DESIGN LAB**

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**III-B.TECH II-SEMESTER****Course Code: A1CE604PC**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>

**COURSE OBJECTIVES:****The course should enable the students to:**

1. To Learn the Numerical Programming Methods
2. To Use the Computer to Apply Numerical Methods
3. To Learn the Basics of Software Oriented Design
4. To Design the Structures using excel
5. To Analyze the structures using staad pro.

**COURSE OUTCOMES:****By the end of the course students will be able:**

1. Develop the Programs for Numerical Methods
2. To Understand the Computer to Apply Numerical Methods
3. Apply Excel sheets to design of structural elements
4. Solve the structural design problem by using Software.
5. Analyse the structure for various loads by using Staad-Pro

**LIST OF EXPERIMENTS**

<b>Experiment-1</b>	Design of Slab using Excel.
<b>Experiment-2</b>	Design of Column using Excel..
<b>Experiment-3</b>	Design of Beam using Excel.
<b>Experiment-4</b>	Design of Footing using Excel..
<b>Experiment-5</b>	Introduction to Staad Pro
<b>Experiment-6</b>	Analysis and Design of Continuous Beam
<b>Experiment-7</b>	Analysis and Design of Multi-Storey Frame
<b>Experiment-8</b>	Analysis and Design of Multi-Storey Building
<b>Experiment-9</b>	Wind load analysis on RCC Building
<b>Experiment-10</b>	Analysis and Design of Steel Truss

**REFERENCE BOOKS:**

1. Learning Bentley Staad.Pro V8I for Structural Analysis
2. Design of R C C Buildings using Staad Pro V8i with Indian Examples
3. Excel 2019 All-in-One: Master the new features of Excel 2019

**WEB REFERENCES:**

1. <https://open.umn.edu/opentextbooks/textbooks/70>
2. <https://spreadsheeto.com/excel-books/>
3. <https://www.scribd.com/book/241562296/Staad-Pro-v8i-for-beginners>
4. [https://www.academia.edu/32862611/Learning\\_Bentley\\_STAAD\\_Pro\\_V8i\\_for\\_Structural\\_Analysis\\_CADCIM\\_Technologies?auto=download](https://www.academia.edu/32862611/Learning_Bentley_STAAD_Pro_V8i_for_Structural_Analysis_CADCIM_Technologies?auto=download)

**ADVANCED ENGLISH COMMUNICATION SKILLS LAB****III-B.TECH II-SEMESTER****Course Code: A1EN603HS**

L	T	P	C
0	0	2	1

The introduction of the Advanced Communication Skills Lab is considered essential at 3rd year level. At this stage, the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalized context. The proposed course should be a laboratory course to enable students to use 'good' English and perform the following:

**COURSE OBJECTIVES:**

1. To provide students with a wide range of vocabulary to enable them to take language tests for higher education and employment
2. To assist students acquire effective and adequate presentation skills
3. To improve communication skills of students by making them participate in different language activities
4. To prepare students for facing interviews self-assuredly.
5. To help students to develop an awareness in studies about the significance of silent reading and comprehension.

**COURSE OUTCOMES:** Students will be able to

1. State meanings, synonyms, antonyms, analogies, idioms, phrases, one-word substitutes, word roots, prefixes and suffixes for words in general.
2. Present and interpret data on select topics using pre-existing slides.
3. Collect data extensively on a social issue and make it public for the sake of enlightening populace.
4. Contribute proactively and extrapolate in group discussions.
5. Make impromptu speeches.

**The following course content to conduct the activities is prescribed for the Advanced English Communication Skills (AECS) Lab:**

- 1. Activities on Fundamentals of Inter-personal Communication and Building Vocabulary** - Starting a conversation – responding appropriately and relevantly – using the right body language – Role Play in different situations & Discourse Skills- using visuals - Synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, study of word origin, business vocabulary, analogy, idioms and phrases, collocations & usage of vocabulary.
- 2. Activities on Reading Comprehension** –General Vs Local comprehension, reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading& effective googling.
- 3. Activities on Writing Skills** – Structure and presentation of different types of writing – letter writing/Resume writing/ e-correspondence/Technical report writing/ – planning for writing – improving one's writing.
- 4. Activities on Presentation Skills** – Oral presentations (individual and group) through JAM sessions/seminars/PPTs and written presentations through posters/projects/reports/ emails/assignments etc.

- 5. Activities on Group Discussion and Interview Skills** – Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and organization of ideas and rubrics for evaluation- Concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele-conference & video-conference and Mock Interviews.

**TEXT BOOKS:**

1. Effective Technical Communication by M Asharaf Rizvi. McGraw Hill Education (India) Pvt. Ltd. 2nd Edition
2. Academic Writing: A Handbook for International Students by Stephen Bailey, Routledge, 5th Edition.

**REFERENCE BOOKS:**

1. Learn Correct English – A Book of Grammar, Usage and Composition by Shiv K. Kumar and Hemalatha Nagarajan. Pearson 2007
2. Professional Communication by Aruna Koneru, McGraw Hill Education (India) Pvt. Ltd, 2016.
3. Technical Communication by Meenakshi Raman & Sangeeta Sharma, Oxford University Press 2009.
4. Technical Communication by Paul V. Anderson. 2007. Cengage Learning pvt. Ltd. New Delhi.
5. English Vocabulary in Use series, Cambridge University Press 2008. 6. Handbook for Technical Communication by David A. McMurrey & Joanne Buckley. 2012. Cengage Learning.
6. Communication Skills by Leena Sen, PHI Learning Pvt Ltd., New Delhi, 2009.
7. Job Hunting by Colm Downes, Cambridge University Press 2008.
8. English for Technical Communication for Engineering Students, Aysha Vishwamohan, Tata Mc Graw-Hill 2009.

## **CONSTITUTION OF INDIA**

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

**Course Code: A1CE606MC**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>

The Constitution of India is the supreme law of India. Parliament of India cannot make any law which violates the Fundamental Rights enumerated under the Part III of the Constitution. The Parliament of India has been empowered to amend the Constitution under Article 368, however, it cannot use this power to change the “basic structure” of the constitution, which has been ruled and explained by the Supreme Court of India in its historical judgments. The Constitution of India reflects the idea of “Constitutionalism” – a modern and progressive concept historically developed by the thinkers of “liberalism” – an ideology which has been recognized as one of the most popular political ideology and result of historical struggles against arbitrary use of sovereign power by state. The historic revolutions in France, England, America and particularly European Renaissance and Reformation movement have resulted into progressive legal reforms in the form of “constitutionalism” in many countries. The Constitution of India was made by borrowing models and principles from many countries including United Kingdom and America.

The Constitution of India is not only a legal document but it also reflects social, political and economic perspectives of the Indian Society. It reflects India’s legacy of “diversity”. It has been said that Indian constitution reflects ideals of its freedom movement; however, few critics have argued that it does not truly incorporate our own ancient legal heritage and cultural values. No law can be “static” and therefore the Constitution of India has also been amended more than one hundred times. These amendments reflect political, social and economic developments since the year 1950. The Indian judiciary and particularly the Supreme Court of India has played an historic role as the guardian of people. It has been protecting not only basic ideals of the Constitution but also strengthened the same through progressive interpretations of the text of the Constitution. The judicial activism of the Supreme Court of India and its historic contributions has been recognized throughout the world and it gradually made it “as one of the strongest court in the world”.

#### **Course content**

1. Meaning of the constitution law and constitutionalism
2. Historical perspective of the Constitution of India
3. Salient features and characteristics of the Constitution of India
4. Scheme of the fundamental rights
5. The scheme of the Fundamental Duties and its legal status
6. The Directive Principles of State Policy – Its importance and implementation
7. Federal structure and distribution of legislative and financial powers between the Union and the States
8. Parliamentary Form of Government in India – The constitution powers and status of the President of India
9. Amendment of the Constitutional Powers and Procedure
10. The historical perspectives of the constitutional amendments in India
11. Emergency Provisions: National Emergency, President Rule, Financial Emergency
12. Local Self Government – Constitutional Scheme in India
13. Scheme of the Fundamental Right to Equality
14. Scheme of the Fundamental Right to certain Freedom under Article 19
15. Scope of the Right to Life and Personal Liberty under Article 21



# **IV-YEAR (I-SEMESTER)**

## **ENVIRONMENTAL ENGINEERING**

### **IV-B.TECH I-SEMESTER**

**Course Code: A1CE701PC**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>

### **COURSE OBJECTIVES**

**The course should enable the students to:**

1. This subject provides the knowledge of water sources, water treatment, design of distribution system waste
2. Water treatment, and safe disposal methods.
3. The topics of characteristics of waste water, sludge digestion are also included
4. To know B.O.D. Equation & C.O.D. Design of sewers
5. To know Sludge digestion and factors effecting, design of Digestion tank

### **COURSE OUTCOMES:**

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

1. Assess characteristics of water and wastewater and their impacts
2. Determine the water quality parameters
3. Estimate quantities of water and waste water and plan conveyance components
4. Design components of water and waste water treatment plant
5. Design the Digestion tank – Sludge disposal by drying – septic tanks working principles and design – soak pits

### **UNIT-I INTRODUCTION**

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 WATER TREATMENT UNITS**

Layout and general outline of water treatment units – sedimentation – principles – design factors – coagulation-flocculation clarifier design – coagulants - feeding arrangements. Filtration – theory – working of slow and rapid gravity filters – multimedia filters – design of filters – troubles in operation - comparison of filters – disinfection – theory of chlorination, chlorine demand - other disinfection practices–Design of distribution systems–pipe appurtenances.

### **UNIT – III CHARACTERISTICS OF SEWAGE**

characteristics of sewage –waste water collection–Estimation of waste water and storm water – 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 pump houses – house drainage – plumbing requirements – sanitary fittings-traps – one pipe and two pipe systems of plumbing – ultimate disposal of sewage – sewage farming –self-purification of rivers.

### **UNIT – IV WASTE WATER TREATMENT**

Waste water treatment plant – Flow diagram - primary treatment Design of screens – grit chambers – skimming tanks – sedimentation tanks – principles of design – Biological treatment – trickling 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.

**UNIT – V AIR POLLUTION**

Air pollution– classification of air pollution– Effects air pollution–Global effects–Meteorological parameters affecting air pollution–Atmospheric stability–Plume behavior –Control of particulates – Gravity settlers, cyclone filters, ESPs–Control of gaseous pollutants–automobile pollution and control.

**TEXT BOOKS:**

1. Environmental Engineering by H. S Peavy, D. R. Rowe, G. Tchobanoglous, McGraw Hill Education (India) Pvt Ltd, 2014
2. Environmental Engineering by D. P. Sincero and G.A Sincero, Pearson 2015.
3. Environmental Engineering, I and II by BC Punmia, Std. Publications
4. Environmental Engineering, I and II by SK Garg, Khanna Publications.
5. Environmental Pollution and Control Engineering CS Rao, Wiley Publications

**REFERENCE BOOKS:**

1. Water and Waste Water Technology by Steel, Wiley
2. Waste water engineering by Metcalf and Eddy, McGraw Hill, 2015.
3. Water and Waste Water Engineering by Fair Geyer and Okun, Wiley, 2011
4. Water and Waste Water Technology by Mark J Hammar and Mark J. Hammar Jr. Wiley, 2007.
5. Introduction to Environmental Engineering and Science by Gilbert Masters, PrenticeHall, New Jersey.
6. Introduction to Environmental Engineering by P. Aarne Vesilind, Susan M. Morgan, Thompson /Brooks/Cole; Second Edition 2008.
7. Integrated Solid Waste Management, Tchobanoglous, Theissen & Vigil. McGraw Hill Publication

**WEB REFERENCES:**

1. <https://ascelibrary.org/doi/10.1061/%28ASCE%29EE.1943-7870.0001734>
2. [https://www.hrpub.org/journals/jour\\_info.php?id=45](https://www.hrpub.org/journals/jour_info.php?id=45)

**E-TEXT BOOKS:**

1. <https://www.mdpi.com/2071-1050/12/18/7239/pdf>
2. [https://easyengineering.net/environmental-engineering-books\\_18/](https://easyengineering.net/environmental-engineering-books_18/)

**MOOCS COURSE:**

1. <https://nptel.ac.in/noc/courses/noc19/SEM2/noc19-ge22/>
2. <https://nptel.ac.in/courses/108/108/108108076/>
3. <https://nptel.ac.in/courses/108/105/108105053/>

## **PRESTRESSED CONCRETE**

### **IV-B.TECH I-SEMESTER**

**Course Code: A1CE702PC**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>

### **COURSE OBJECTIVES**

#### **To learn**

1. Understand basics of prestressing
2. Understand flexure and shear in prestressed beams
3. Understand deflection in prestressed beams
4. Analyze and design of composite beams
5. Understand the concept of partial prestressing

### **COURSE OUTCOMES**

#### **At the end of the course, student will be able to:**

1. Analysis prestressed concrete members
2. Design of prestressed concrete members using IS Code
3. Calculate deflections in prestressed members
4. Analyse and design of composite beams
5. Analyse and design of partial prestressing of members

### **UNIT-I INTRODUCTION**

Historic development- General principles of prestressing pretensioning and post tensioning- Advantages and limitations of Prestressed concrete- General principles of PSC Classification and types of prestressing- Materials- high strength concrete and high tensile steel their characteristics.

### **UNIT -II METHODS AND SYSTEMS OF PRESTRESSING**

**Methods and Systems of prestressing:** Pretensioning and Post tensioning methods and systems of prestressing like Hoyer system, Magnel Blaton system, Freyssinet system and Gifford- Udall System- Lee McCall system.

**Losses of Prestress:** Loss of prestress in pretensioned and post-tensioned members due to various causes like elastic shortening of concrete, shrinkage of concrete, creep of concrete, relaxation of stress in steel, slip in anchorage, frictional losses IS 1343-2012 code provisions

### **UNIT -III FLEXURE AND SHEAR**

**Flexure:** Analysis of sections for flexure- beams prestressed with straight, concentric, eccentric, bent and parabolic tendons- stress diagrams- Elastic design of PSC slabs and beams of rectangular and I sections- Kern line – Cable profile and cable layout.

**Shear:** General Considerations- Principal tension and compression- Improving shear resistance of concrete by horizontal and vertical prestressing and by using inclined or parabolic cables- Analysis of rectangular and I beams for shear – Design of shear reinforcements- IS Code provisions.

### **UNIT -IV TRANSFER OF PRESTRESS IN PRETENSIONED MEMBERS**

**Transfer of Prestress in Pretensioned Members :** Transmission of prestressing force by bond – Transmission length – Flexural bond stresses – IS code provisions – Anchorage zone stresses in post tensioned members – stress distribution in End block – Analysis by Guyon, Magnel, Zienlinski and Rowe's methods – Anchorage zone reinforcement- IS 1343-2012 code Provisions

## **UNIT-V COMPOSITE BEAMS AND DEFLECTIONS**

**Composite Beams:** Different Types- Propped and Unpropped- stress distribution- Differential shrinkage- Analysis of composite beams- General design considerations.

**Deflections:** Importance of control of deflections- Factors influencing deflections – Short term deflections of uncracked beams- prediction of long time deflections- IS code requirements.

### **TEXT BOOKS**

1. Prestressed concrete by N Krishna Raju, Tata Mc Graw Hill Book – Co. New Delhi.
2. Design of prestress concrete structures by T.Y. Lin and Burn, John Wiley, New York.

### **REFERENCE BOOKS**

1. Prestressed concrete by S. Ramamrutham Dhanpat Rai & Sons, Delhi.
2. Prestressed Concrete by N. Rajagopalan Narosa Publishing House

### **WEB REFERENCES**

1. <https://civiltoday.com/civil-engineering-materials/concrete/225-pre-stressed-concrete>

### **E-TEXT BOOKS**

1. <https://www.sanfoundry.com/best-reference-books-prestressed-concrete-design/>
2. [https://www.amazon.com/Prestressed-Concrete-Fifth-Upgrade-Version/dp/0136081509/ref=sr\\_1\\_1?dchild=1&keywords=Prestressed+Concrete&qid=1618045563&sr=8-1](https://www.amazon.com/Prestressed-Concrete-Fifth-Upgrade-Version/dp/0136081509/ref=sr_1_1?dchild=1&keywords=Prestressed+Concrete&qid=1618045563&sr=8-1)

### **MOOCS COURSE**

2. <https://swayam.gov.in/>
3. <https://onlinecourses.nptel.ac.in/>

## **EARTHQUAKE ENGINEERING (PROFESSIONAL ELECTIVE-IV)**

### **IV-B.TECH I-SEMESTER**

**Course Code: A1CE710PE**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>

### **COURSE OBJECTIVES**

1. This subject is useful to understand the behavior of the structure subjected to earthquake forces and earthquake resistant design of the structure.
2. This subject is conceptual applications of principles of dynamics and earthquake resistant design & detailing of RC structures
3. This subject is useful to understand the Philosophy of earthquake resistant design
4. This subject is useful to understand the Analysis of frames using approximate methods like portal & cantilever methods
5. To understand the effect of earth quake on buildings.

### **COURSE OUTCOMES**

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

1. Determine the response of SDOF & MDOF structural system subjected to vibration including earthquake.
2. Apply the concept of Earthquake Resistant Design & concept of lateral load distribution on buildings.
3. Determine the lateral forces generated in the structure due to earthquake.
4. Apply the concept of ductile detailing in RC structures.
5. Determine the response of Soil liquefaction, Structural controls, Seismic strengthening.

### **UNIT-I EARTHQUAKE BASICS**

Interior of Earth, plate tectonics, faults, consequences of earthquake, Basic parameters of earthquake, magnitude & intensity, scales, Seismic zones of India, damages caused during past earthquakes (worldwide).

### **UNIT -II FUNDAMENTALS OF EARTHQUAKE VIBRATIONS OF BUILDINGS**

Static load v/s Dynamic load (force control and displacement control), simplified single degree of freedom system, mathematical modelling of buildings, natural frequency, resonance v/s increased response, responses of buildings to different types of vibrations like free and forced, damped and un-damped vibration, response of building to earthquake ground motion, Response to multi degree (maximum three) of freedom systems up to mode shapes.

### **UNIT -III DESIGN PHILOSOPHY**

Design Philosophy: Philosophy of earthquake resistant design, earthquake proof v/s earthquake resistant design, four virtues of earthquake resistant structures (strength, stiffness, ductility and configuration), seismic structural configuration, Introduction to IS: 1893 (Part I), IS: 875 (Part V). Seismic load: Seismic Coefficient Method – base shear and its distribution along height. Introduction to Response spectrum, IS code provisions.

## **UNIT -IV LATERAL LOADS ON BUILDINGS**

Lateral Load Distribution (SDOF): Rigid diaphragm effect, centers of mass and stiffness, torsion ally coupled and uncoupled system.

Lateral Load Analysis: Analysis of frames using approximate methods like portal & cantilever methods

## **UNIT-V DUCTILE DETAILING**

**Ductile Detailing:** Concepts of Detailing of various structural components as per IS:13920 provisions.

**Special topics:** Introduction to Earthquake Resistant Features of un-reinforced & reinforced masonry Structure, Confined Masonry, Soil liquefaction, Structural controls, Seismic strengthening.

## **TEXT BOOKS**

1. S.K.Duggal; Earthquake resistance design of structures; Oxford University Press, New Delhi.
2. A.K.Chopra; Dynamics of structures , Pearson, New Delhi
3. Clough & Penzin; Dynamics of structures
4. Park & Pauly; Behaviour of RC structure

## **REFERENCE BOOKS**

1. John M.Biggs; Introduction to Structural Dynamics
2. C V R Murthy - Earthquake Tips, NICEE
3. IITK-GSDMA EQ26 – V -3.0 Design Example of a Six Storey Building
4. S S Rao; Mechanical Vibration; Pearson, New Delhi.
5. Manish Shrikhande & Pankaj Agrawal; Earthquake resistant design of structures, PHI Publication, New Delhi

## **WEB REFERENCES**

1. <https://www.sciencedirect.com/topics/materials-science/earthquake-engineering>
2. <https://www.tandfonline.com/loi/ueqe20>
3. <https://onlinelibrary.wiley.com/journal/10969845>

## **E-TEXT BOOKS**

1. <https://www.engineeringbookspdf.com/civil-engineering/earthquake/>
2. <http://www.sadra.ac.ir/images/userfiles/files/03.pdf>

## **MOOCS COURSE**

1. <https://nptel.ac.in/courses/105/101/105101004/>
2. <https://www.classcentral.com/course/swayam-introduction-to-engineering-sesimology-19907>

## **PAVEMENT DESIGN (PROFESSIONAL ELECTIVE-IV)**

### **IV-B.TECH I-SEMESTER**

**Course Code: A1CE711PE**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>

### **COURSE OBJECTIVES**

1. The study factors affecting pavement design,
2. The study factors material characteristics, design of flexible,
3. The study factors rigid pavements and low volume roads
4. The study the Fundamental Design Concepts. Stresses In Rigid Pavements
5. The study CBR and Modulus of Sub grade Reaction of Soil, Mineral aggregates

### **COURSE OUTCOMES**

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

1. Characterize the response characteristics of soil, aggregate, asphalt, and asphalt mixes
2. Analyze flexible pavements
3. Analyze rigid pavements
4. Design a flexible pavement using IRC, Asphalt Institute, and AASHTO methods
5. Design a rigid pavement using IRC, and AASHTO methods

### **UNIT-I INTRODUCTION**

Factors 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**

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 MATERIALS**

CBR and Modulus of Sub grade 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 Stabilization and Use of Geo Synthetics.

### **UNIT –IV DESIGN OF FLEXIBLE PAVEMENTS**

Flexible Pavement Design Concepts, Asphalt Institute's Methods with HMA and other Base Combinations, AASHTO, IRC Methods Design Of Rigid Pavements: Calibrated Mechanistic Design Process, PCA, AASHTO & IRC Specifications, and Introduction to Prestressed and Continuously Reinforced Cement Concrete Pavement Design.



## **UNIT-V DESIGN OF LOW VOLUME ROADS**

Pavement design for low volume roads, rural road designs – code of practice. Design of Overlays: Types of Overlays, Suitability, Design of overlays

### **TEXT BOOKS**

1. Concrete Pavements, AF Stock, Elsevier, Applied Science Publishers
2. Pavement Analysis & Design, Yang H. Huang, Prentice Hall Inc

### **REFERENCE BOOKS**

1. Design of Functional Pavements, Nai C. Yang, McGraw Hill Publications
2. Principles of Pavement Design, Yoder.J. & Witzorac Mathew, W. John Wiley & Sons Inc
3. Pavement and Surfacing for Highway & Airports, Micheal Sargious, Applied Science Publishers Limited.
4. IRC Codes for Flexible and Rigid Pavements design

### **CODE OF PROVISIONS**

1. Code of Provisions: Design Codes: IRC 37,IRC 58

### **MOOCS COURSE**

1. <https://swayam.gov.in/>
2. <https://onlinecourses.nptel.ac.in/>

**REPAIRS AND REHABILITATION OF STRUCTURES  
(PROFESSIONAL ELECTIVE-IV)**

**IV-B.TECH I-SEMESTER**

**Course Code: A1CE712PE**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>

**COURSE OBJECTIVES:**

The course should enable the students to:

1. To learn various distress and damages to concrete and masonry structures
2. To understand the importance of maintenance of structures
3. To study the various types and properties of repair materials
4. To assess the damage to structures using various tests
5. To learn the importance and methods of substrate preparation

**COURSE OUTCOMES:**

At the end of the course the student should be able to:

1. Various distress and damages to concrete and masonry structures
2. The importance of maintenance of structures, types and properties of repair materials etc
3. Assessing damage to structures and various repair techniques
4. To understand various repair techniques of damaged structures
5. To understand corroded structures

**UNIT-I INTRODUCTION**

Maintenance, rehabilitation, repairs, retrofit and strengthening, need for rehabilitation of structures. Various cracks in R.C. buildings, causes and effects, various damages to masonry structures and causes.

**UNIT -II REHABILITATION MATERIALS**

Various repair materials, Criteria for material selection, Methodology of selection, Health and safety precautions for handling and applications of repair materials, Polymer Concrete and Mortar, Quick setting compounds, Gas forming grouts, Salfo aluminate grouts, Polymer grouts, Acrylate and Urethane grouts. Latex emulsions, Epoxy bonding agents. Protective coatings for Concrete and Steel.

**UNIT -III DAMAGE DIAGNOSIS AND ASSESSEMENT**

Visual inspection, Non Destructive Testing using Rebound hammer, Ultra sonic pulse velocity, Semi destructive testing, Probe test, Pull out test, Chloride penetration test, Carbonation, Carbonation depth testing, Corrosion activity measurement.

**UNIT -IV CRACK REPAIRS AND CORROSION OF STEEL**

Various methods of crack repair, Grouting, Routing and sealing, Stitching, Dry packing, Auto genous healing, Overlays, Repair to active cracks, Repair to dormant cracks. Corrosion of embedded steel in concrete, Mechanism, Stages of corrosion damage, Repair of various corrosion damaged of structural elements (slab, beam and columns)

**UNIT-V HEALTH MONITORING & STRENGTHENING OF STRUCTURES**

Health Monitoring of Structures – Use of Sensors – Building Instrumentation. Strengthening, Beam shear strengthening, Flexural strengthening.

**TEXT BOOKS:**

1. Repair and protection of concrete structures by Noel P.Mailvaganam, CRC Press,1991.
2. Concrete repair and maintenance Illustrated by Peter.H.Emmons, Galgotia publications Pvt. Ltd., 2001.
3. Earthquake Resistant Design Of Structures by Pankaj agarwal, Manish shrikande, PHI, 2006.

**REFERENCE BOOKS:**

1. Failures and repair of concrete structures by S.Champion, John Wiley and Sons, 1961.
2. Diagnosis and treatment of structures in distress by R.N.Raikar Published by R & D
3. Centre of Structural Designers and Consultants Pvt.Ltd, Mumbai.
4. Handbook on repair and rehabilitation of RCC buildings, CPWD, Government of India.
5. Handbook on seismic retrofit of buildings, A. Chakrabarti et.al., Narosa Publishing House, 2010.

**WEB REFERENCES:**

1. <https://www.sciencedirect.com/science/article/pii/S0921344998000330>
2. [http://icrier.org/pdf/4-Jan-2019/Utkarsh\\_Patel-SWM\\_%20in\\_India.pdf](http://icrier.org/pdf/4-Jan-2019/Utkarsh_Patel-SWM_%20in_India.pdf)

**E-TEXT BOOKS:**

1. <https://books.askvenkat.org/rehabilitation-retrofitting-structures-book-download/>
2. <https://www.amazon.in/Concrete-Structures-Repair-Rehabilitation-Retrofitting/dp/9385915908>
3. <https://www.springer.com/gp/book/9789811058578>

**MOOC COURSE**

1. [https://www.iare.ac.in/sites/default/files/lecture\\_notes/IARE\\_RRS\\_Lecture\\_Notes\\_0.pdf](https://www.iare.ac.in/sites/default/files/lecture_notes/IARE_RRS_Lecture_Notes_0.pdf)
2. <https://lecturenotes.in/subject/486>
3. <https://nptel.ac.in/courses/105/106/105106202/>

## **ENVIRONMENTAL ENGINEERING**

### **(OPEN ELECTIVE-II)**

#### **IV-B.TECH I-SEMESTER**

**Course Code: A1CE703OE**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

#### **COURSE OBJECTIVES**

**The course should enable the students to:**

6. This subject provides the knowledge of water sources, water treatment, design of distribution system waste
7. Water treatment, and safe disposal methods.
8. The topics of characteristics of waste water, sludge digestion are also included
9. To know B.O.D. Equation & C.O.D. Design of sewers
10. To know Sludge digestion and factors effecting, design of Digestion tank

#### **COURSE OUTCOMES:**

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

6. Assess characteristics of water and wastewater and their impacts
7. Determine the water quality parameters
8. Estimate quantities of water and waste water and plan conveyance components
9. Design components of water and waste water treatment plant
10. Design the Digestion tank – Sludge disposal by drying – septic tanks working principles and design – soak pits

#### **UNIT-I INTRODUCTION**

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 WATER TREATMENT UNITS**

Layout and general outline of water treatment units – sedimentation – principles – design factors – coagulation-flocculation clarifier design – coagulants - feeding arrangements. Filtration – theory – working of slow and rapid gravity filters – multimedia filters – design of filters – troubles in operation - comparison of filters – disinfection – theory of chlorination, chlorine demand - other disinfection practices–Design of distribution systems–pipe appurtenances.

#### **UNIT – III CHARACTERISTICS OF SEWAGE**

characteristics of sewage –waste water collection–Estimation of waste water and storm water – 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 pump houses – house drainage – plumbing requirements – sanitary fittings-traps – one pipe and two pipe systems of plumbing – ultimate disposal of sewage – sewage farming –self-purification of rivers.

#### **UNIT – IV WASTE WATER TREATMENT**

Waste water treatment plant – Flow diagram - primary treatment Design of screens – grit chambers – skimming tanks – sedimentation tanks – principles of design – Biological treatment – trickling 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.

**UNIT – V AIR POLLUTION**

Air pollution– classification of air pollution– Effects air pollution–Global effects–Meteorological parameters affecting air pollution–Atmospheric stability–Plume behavior –Control of particulates – Gravity settlers, cyclone filters, ESPs–Control of gaseous pollutants–automobile pollution and control.

**TEXT BOOKS:**

2. Environmental Engineering by H. S Peavy, D. R. Rowe, G. Tchobanoglous, McGraw Hill Education (India) Pvt Ltd, 2014
- 6 Environmental Engineering by D. P. Sincero and G.A Sincero, Pearson 2015.
- 7 Environmental Engineering, I and II by BC Punmia, Std. Publications
- 8 Environmental Engineering, I and II by SK Garg, Khanna Publications.
- 9 Environmental Pollution and Control Engineering CS Rao, Wiley Publications

**REFERENCE BOOKS:**

8. Water and Waste Water Technology by Steel, Wiley
9. Waste water engineering by Metcalf and Eddy, McGraw Hill, 2015.
10. Water and Waste Water Engineering by Fair Geyer and Okun, Wiley, 2011
11. Water and Waste Water Technology by Mark J Hammar and Mark J. Hammar Jr. Wiley, 2007.
12. Introduction to Environmental Engineering and Science by Gilbert Masters, Prentice Hall, New Jersey.
13. Introduction to Environmental Engineering by P. Aarne Vesilind, Susan M. Morgan, Thompson /Brooks/Cole; Second Edition 2008.
14. Integrated Solid Waste Management, Tchobanoglous, Theissen & Vigil. McGraw Hill Publication

**WEB REFERENCES:**

3. <https://ascelibrary.org/doi/10.1061/%28ASCE%29EE.1943-7870.0001734>
4. [https://www.hrpub.org/journals/jour\\_info.php?id=45](https://www.hrpub.org/journals/jour_info.php?id=45)

**E-TEXT BOOKS:**

3. <https://www.mdpi.com/2071-1050/12/18/7239/pdf>
4. [https://easyengineering.net/environmental-engineering-books\\_18/](https://easyengineering.net/environmental-engineering-books_18/)

**MOOCS COURSE:**

4. <https://nptel.ac.in/noc/courses/noc19/SEM2/noc19-ge22/>
5. <https://nptel.ac.in/courses/108/108/108108076/>
6. <https://nptel.ac.in/courses/108/105/108105053/>

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**CONSTRUCTION ENGINEERING AND MANAGEMENT  
(OPEN ELECTIVE-II)**

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

**Course Code: A1CE704OE**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**COURSE OBJECTIVES:**

**The course should enable the students to:**

6. This subject deals with overall planning, coordination and control of project.
7. This course gives the students scientific principles involved in construction.
8. Understand the behavior of construction materials.
9. Know the fundamentals of structural mechanics.
10. Know the equipment used in construction

**COURSE OUTCOMES:**

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

6. Understand the roles and responsibilities of a project manager
7. Prepare schedule of activities in a construction project
8. Identify the equipment used in construction
9. Understand safety practices in construction industry
10. Prepare tender and contract document for a construction project

**UNIT-I FUNDAMENTALS OF CONSTRUCTION PROJECT MANAGEMENT**

Management -Fundamentals of construction project management: Introduction, Project Initiation and Planning. Coordination –scheduling – monitoring – bar charts – milestone charts – critical path method

**UNIT -II CONSTRUCTION METHODS**

Construction methods – earthwork – piling – placing of concrete – form work – fabrication and erection – quality control and safety engineering– decision making, Cement concrete construction- Construction of Piles - Construction of Cofferdams - Construction of Tunnels.

**UNIT -III PROJECT ACTIVITY NETWORKS**

Development of project activity networks, Precedence Diagram Method, Critical Path Method (CPM), Program Evaluation and Review Technique (PERT), Line Balance Methods in scheduling, Time Value of Money, Investment Analysis, Cost-Benefit Analysis.

**UNIT -IV BUILDING INFORMATION MODELLING (BIM)**

Introduction to Building Information Modelling (BIM), Lean construction, and Integrated Project Delivery in construction, Crashing of project, Cost Optimization, Invoicing, Preparation of RA bill, Safety in construction, Estimation

**UNIT-V CONTRACTS IN CONSTRUCTION**

Contracts: Contracts in construction, fundamentals of delay analysis and claims; Advances in construction management, tender and tender document - Deposits by the contractor - Arbitration. Negotiation - M. Book - Muster roll –stores.

**TEXT BOOKS:**

4. R.L. Peurifoy, W.B Ledbetter and schexnayder, C, construction planning and equipment methods, 5th Edition, McGraw Hill, Singapore, 1995.
5. Sharma S.C. Construction equipment and management, Khanna publishers, New Delhi, 2011.
6. M.R.S. Murthy, Cost Analysis for Management Decisions, Tata McGraw-Hill Publishing Company Ltd.,1988.

**REFERENCE BOOKS:**

3. James, J.O Brain, construction inspection handbook-quality assurance, and quality control, Van Nostrand, New York, 1989.
4. Kwaku A., Tenah and jose M. Guevera, fundamental of construction management and organization, PHI, 1995.

**WEB REFERENCES:**

3. <https://pgcm.xime.org/>
4. <https://ascelibrary.org/journal/jcemd4>

**E-TEXT BOOKS:**

3. <https://www.amazon.in/Construction-Engineering-Management-Seetharaman/dp/9382533095>
4. <https://easyengineering.net/>      [civildatas.com/download/construction-engineering-and-management-by-seetharaman](https://civildatas.com/download/construction-engineering-and-management-by-seetharaman)

**MOOCS COURSE**

1. <https://nptel.ac.in/courses/105/107/105107123/>

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**ENVIRONMENTAL ENGINEERING LAB**

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**IV-B.TECH I-SEMESTER****Course Code: A1CE703PC**

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

**COURSE OBJECTIVES:****The course should enable the students to:**

1. Perform the experiments to determine water and waste water quality
2. Understand the water & waste water sampling, their quality standards
3. Estimate quality of water, waste water, Industrial water
4. Know the COD, BOD and DO in a given water sample
5. Know the Residual Chlorine in a given water sample

**COURSE OUTCOMES:****By the end of the course students will be able:**

1. Understand about the equipment used to conduct the test procedures
2. Perform the experiments in the lab
3. Examine and Estimate water, waste water, air and soil Quality
4. Compare the water, air quality standards with prescribed standards set by the local governments
5. Develop a report on the quality aspect of the environment

**LIST OF EXPERIMENTS**

<b>Experiment-1</b>	Determination of pH in a given water sample
<b>Experiment-2</b>	Determination of Electrical Conductivity in a given water sample
<b>Experiment-3</b>	Determination of Total Solids (Organic and inorganic) in a given water sample
<b>Experiment-4</b>	Determination of Acidity in a given water sample
<b>Experiment-5</b>	Determination of Alkalinity in a given water sample
<b>Experiment-6</b>	Determination of Hardness (Total, Calcium and Magnesium Hardness) in a given water sample
<b>Experiment-7</b>	Determination of Chlorides in a given water sample
<b>Experiment-8</b>	Determination of optimum coagulant Dosage in a given water sample
<b>Experiment-9</b>	Determination of Dissolved Oxygen (Winkler Method) in a given water sample
<b>Experiment-10</b>	Determination of COD in a given water sample
<b>Experiment-11</b>	Determination of BOD/DO in a given water sample
<b>Experiment-12</b>	Determination of Residual Chlorine in a given water sample

**REFERENCE BOOKS:**

1. Introduction to Environmental Engineering and Science by Gilbert Masters, Prentice Hall, New Jersey.
2. Introduction to Environmental Engineering by P. Aarne Vesilind, Susan M. Morgan,
3. Peavy, H.s, Rowe, D.R, Tchobanoglous, G. Environmental Engineering, Mc-Graw - Hill International Editions, New York 1985.
4. MetCalf and Eddy. Wastewater Engineering, Treatment, Disposal and Reuse, Tata McGraw-Hill, New Delhi.
5. Manual on Water Supply and Treatment. Ministry of Urban Development, New Delhi.
6. Plumbing Engineering. Theory, Design and Practice, S.M. Patil, 1999



**WEB REFERENCES:**

1. <https://www.slideshare.net/RambabuPalaka/environmental-engineering-lab-manual>
2. [http://www.darshan.ac.in/Upload/DIET/Documents/CI/2150603\\_Environmental\\_Engineering\\_Lab\\_Manual\\_02072018\\_083846AM.pdf](http://www.darshan.ac.in/Upload/DIET/Documents/CI/2150603_Environmental_Engineering_Lab_Manual_02072018_083846AM.pdf)
3. [https://engineering.siu.edu/civil/\\_common/documents/environmental-lab-manual.pdf](https://engineering.siu.edu/civil/_common/documents/environmental-lab-manual.pdf)

**PAVEMENT MATERIAL TESTING LAB****IV-B.TECH I-SEMESTER****Course Code: A1CE704PC**

L	T	P	C
0	0	4	2

**COURSE OBJECTIVES:**

1. To learn laboratory tests and their procedures fine aggregate, coarse aggregates and bitumen materials.
2. To Evaluate the strength parameters of pavement materials
3. To understand the test procedures for characterization of bituminous mixes.
4. To Evaluate the Impact & Crushing Test Of Aggregates
5. To Evaluate the Flash And Fire Point Test

**COURSE OUTCOMES:**

1. Categorize the test on materials used Civil Engineering Building & Pavement constructions
2. To perform the tests on aggregates for its characterization.
3. Examine the tests performed for Bitumen mixes.
4. To prepare a laboratory report
5. To know the Marshall's Stability Test

**LIST OF EXPERIMENTS**

<b>EXPERIMENT-1</b>	Water Absorption And Specific Gravity Of Aggregates
<b>EXPERIMENT-2</b>	Gradation Of Aggregates By Sieve Analysis
<b>EXPERIMENT-3</b>	Shape Test By Elongation And Flakiness Indices
<b>EXPERIMENT-4</b>	Impact & Crushing Test Of Aggregates
<b>EXPERIMENT-5</b>	Abrasion And Attrition Test
<b>EXPERIMENT-6</b>	Bitumen Penetration And Softening Point Test
<b>EXPERIMENT-7</b>	Flash And Fire Point Test
<b>EXPERIMENT-8</b>	Ductility Test
<b>EXPERIMENT-9</b>	Viscosity Test
<b>EXPERIMENT-10</b>	Marshall's Stability Test

**TEXT BOOKS:**

1. Concrete Manual by M.L. Gambhir, Dhanpat Rai & Sons
2. Highway Material Testing manual, Khanna, Justo and Veeraraghavan, Nemchand Brothers

**INDIAN STANDARD CODE BOOKS:**

1. IS 10262:2009 "Concrete Mix Proportioning – Guidelines".
2. IS 516:2006 "Methods of Tests on Strength of Concrete".
3. IS 383:1993 "Specification For Coarse And Fine Aggregates From Natural Sources For Concrete".
4. IS 1201 -1220 (1978) "Methods for testing tars and bituminous materials".
5. IRC SP 53 -2010 "Guidelines on use of modified bitumen".
6. MS-2 Manual for Marshall's Mix design 2002.

**WEB REFERENCES:**

1. <https://www.iitk.ac.in/ce/test/IS-codes/is.2386.1.1963.pdf>
2. [https://web.iitd.ac.in/~sahil/PDFs/IS\\_Codes\\_List.pdf](https://web.iitd.ac.in/~sahil/PDFs/IS_Codes_List.pdf)
3. [https://bis.gov.in/wp-content/uploads/2019/09/IS\\_383\\_03092019.pdf](https://bis.gov.in/wp-content/uploads/2019/09/IS_383_03092019.pdf)

## **IV-YEAR (II-SEMESTER)**

## **GREEN BUILDING TECHNOLOGIES**

### **IV B.TECH II SEMESTER**

**Course Code: A1CE801PC**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **COURSE OBJECTIVES**

**The course should enable the students to:**

1. To make the students knowledgeable with respect to the subject and its practicable applicability.
2. To promote understanding of basic and advanced concepts in Engineering materials aspects.
3. To expose the students to know the different type of materials used in engineering point of view.
4. To make the students to learn about sustainability of engineering materials in economic point of view.
5. To know the testing and specification of said materials. various service and environmental loadings

### **COURSE OUTCOMES:**

**The end of the course the student should be able to:**

1. The objective of this course is to expose the students to the concepts of sustainability in the context of building and conventional engineered building materials, such as Concrete, Bricks, and achieving the same through lower Carbon cements, Superior brick kilns and Recycled aggregate minimizing consumption of natural resources including water.
2. VOC and indoor air quality.
3. Exposing the student to concepts of embodied, Operational and Life Cycle Energy, Minimizing Energy consumption by optimal design, use of BIPV.
4. Exposing the student to concepts Use of Waste Water for Mixing and Curing, Modern Composite Concrete, Recycled Aggregate-ITZ and Processing
5. The objective of this course is to expose the students for testing and specification of said material

### **UNIT-I: INTRODUCTION TO GREEN BUILDINGS**

Green Buildings: Definition of Green Buildings, typical features of green buildings, benefits of Green Buildings- Sustainable site selection and planning of buildings to maximize comfort, day lighting, ventilation, planning for storm water drainage

### **UNIT- II: NATURAL AVAILABLE MATERIALS FOR GREEN BUILDINGS**

Environmentally friendly building materials and technologies: Natural Materials like bamboo, timber, rammed earth, stabilized mud blocks, hollow blocks, lime & lime- pozzolana cements, materials from agro and industrial waste, ferro-cement and Ferro-concrete, alternative roofing systems, various paints reducing the heat gain of the building, etc.

### **UNIT – III: NATURAL AND RENEWABLE ENERGY RESOURCES FOR GREEN BUILDINGS**

Energy and resource conservation: Need for energy conservation, various forms of energy used in buildings, embodied energy of materials, energy used in transportation and construction processes- water conservation systems in buildings-water harvesting in buildings – waste to energy management in residential complexes or gated communities. Use of renewable energy resources: Wind and Solar Energy Harvesting, potential of solar energy in India and world, construction and operation of various solar appliances, success case studies of fully solar energy based buildings in India.

**UNIT- IV: ENVIRONMENTAL ASPECTS OF GREEN BUILDINGS**

Climate Design: Local climatic conditions – temperature, humidity, wind speed and direction-impact of climate change on built environment – comforts: the desirable conditions – Principles of thermal design – means of thermal –light and lighting-building acoustics- energy efficient lighting, Ventilation and air quality requirement, various techniques for passive cooling, garden roofs, case studies for passive cooling and thermal comfort.

**UNIT- V: GREEN BUILDING SYSTEMS**

Green Building Rating Systems: Introduction to Leadership in Energy and Environment Design (LEED), Green Rating systems for Integrated Habitat Assessment – Modular wastewater treatment systems for built environment – Building automation and building management systems.

**TEXT BOOKS:**

1. 'Alternative building materials and technologies' by K.S. Jagadish, B.V. Venkatarama Reddy and K.S. Nanjunda Rao.
2. 'Non-Conventional Energy Resources' by G. D. Rai, Khanna Publishers.
3. Solar Energy by Sukhatme S.P.

**E-TEXTBOOKS:**

1. <https://www.springer.com/gp/book/9783642006340>
2. <https://onlinelibrary.wiley.com/doi/book/10.1002/9781118984048>
3. <https://www.lap-publishing.com/catalog/details/store/gb/book/978-613-8-38918-7/a-text-book-on-green-buildings>

**MOOCS COURSE:**

1. <https://nptel.ac.in/courses/105/102/105102195/>
2. <https://nptel.ac.in/noc/courses/noc19/SEM2/noc19-ce40/>

**CONSTRUCTION COST ANALYSIS  
(PROFESSIONAL ELECTIVE-V)**

**IV-B.TECH II-SEMESTER**

**Course Code: A1CE813PE**

L	T	P	C
3	0	0	3

**COURSE OBJECTIVES**

**The course should enable the students to:**

1. The subject provide process of estimations required for various work in construction.
2. To have knowledge of using SOR & SSR for analysis of rates on various works.
3. To know the detailing of estimation
4. To know the detain of earthwork.
5. To detailing about contracts.

**COURSE OUTCOMES:**

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

1. Do estimation of Buildings, Roads and Canals.
2. Understand the using SOR & SSR for analysis of rates on various works.
3. Understand the detailing of estimation and earthwork.
4. Understand contracts and specification.
5. Do estimate the rate and value

**UNIT-I INTRODUCTION TO ESTIMATION**

Introduction to estimates: Purpose of estimating; Different types of estimates - their function and preparation  
.General items of work in Building – Standard Units Principles of working out quantities for detailed and abstract estimates – Approximate method of Estimating

**UNIT -II DETAILING OF ESTIMATION**

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

**UNIT -III DETAILING ON EARTHWORK**

Earthwork for roads and canals. Problems on earthwork for roads and canals.

**UNIT -IV RATE ANALYSIS & VALUTION**

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

Valuation: Purpose, difference between value and cost, qualifications and functions of a valuer, scrap & salvage value, sinking fund, capitalized value

**UNIT-V DETAILING ABOUT CONTRACTS**

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

**TEXT BOOKS:**

1. Estimating and Costing by B.N. Dutta, UBS publishers, 2000.
2. Estimating and Costing by G.S. Birdie Dhanpat Rai Publisher
3. M. Chakraborti, Estimation, costing, specifications and valuation in civil engineering National Half-tone Co. Calcutta, 2005.

**REFERENCE BOOKS:**

1. Standard Schedule of rates and standard data book by public works department.
2. S. 1200 (Parts I to XXV – 1974/ method of measurement of building and Civil Engineering works – B.I.S.)

**WEB REFERENCES:**

1. <https://vintage.agency/blog/estimate-cost-and-timeframe-for-a-website-design-project/>
2. <https://www.nap.edu/read/14014/chapter/12>

**E-TEXT BOOKS:**

1. <https://www.civilnotess.com/2019/10/estimation-and-costing-book-by-m-chakraborti.html>
2. <https://www.schandpublishing.com/books/tech-professional/civil-engineering/a-textbook-estimating-costing-civil/9788121903325/>

**MOOCS COURSE**

1. <https://www.mooc-list.com/tags/cost-estimating>
2. <https://nptel.ac.in/courses/105/103/105103023/>
3. <https://nptel.ac.in/content/storage2/courses/105103023/pdf/mod5.p>

## **INDUSTRIAL WASTE TREATMENT AND DISPOSAL (PROFESSIONAL ELECTIVE-V)**

### **IV-B.TECH II-SEMESTER**

**Course Code: A1CE814PE**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **COURSE OBJECTIVES:**

The course should enable the students to:

1. To make the students knowledgeable with respect to the subject and its practicable applicability.
2. To promote understanding of basic and advanced concepts in Industrial pollution aspects and waste water treatment technologies.
3. To expose the students to different processes used in industries and in research field.
4. To know the Durability concept; factors affecting, reinforcement corrosion; fire resistance
5. To know the Roller compacted concrete Ready mixed concrete, Fiber reinforced concrete, polymer concrete Special processes and technology for particular types of structure

### **COURSE OUTCOMES:**

The end of the course the student should be able to:

1. The student is expected to know about the polluting potential of major industries in the country and the methods of controlling the same.
2. Identify the characteristics of industrial wastewaters
3. Describe pollution effects of disposal of industrial effluent
4. Identify and design treatment options for industrial wastewater
5. Formulate environmental management plan

### **UNIT- I OVERVIEW OF ENVIRONMENTAL CONCEPTS**

Global Warming – Ozone Layer & UV Radiations – Deforestation – Energy & Matter Cycles – Case Studies of Significant Environmental Problems and Disasters and the lessons learnt.

### **UNIT – II AIR POLLUTION**

Natural and anthropogenic sources of pollution – Primary and Secondary pollutants – Transport and diffusion of pollutants – Gas laws governing the behavior of pollutants in the atmosphere – air sampling methods – Methods of monitoring and control of air pollutants SO<sub>2</sub>, NO<sub>2</sub>, CO, SPM – Effect of pollutants on human beings – Plants – Animals – Materials and on climate – Acid Rain – Ambient Air Quality Standards – Air pollution control methods and equipment.

### **UNIT – III LAND POLLUTION**

Sources and classification of land pollutants – Industrial waste effluents and heavy metals – Their interactions with soil components – Degradation of different insecticides – fungicides and weedicides in soil – Solid waste management – Process and equipment for energy recovery from municipal solid waste and industrial waste – MSW Act 2000.

### **UNIT – IV WATER POLLUTION**

Types, Sources and consequences of water pollution – Physical – chemical and Bacteriological sampling and analysis of water quality – Standards – Sewage and waste water treatment and recycling ASP/STP – Water quality standard – Treatment – Utilization and disposal of sludge – Government norms.



**UNIT – V     MARINE POLLUTION**

Sources and nature of pollutants – Oil pollution – Metallic pollutants – Status of coastal and estuarine pollution in India – Chemicals and drugs from oceans – Sea level rise – Cause – effect.

**TEXT BOOKS:**

1. Environmental Pollution Control Engineering. C. S. Rao, Wiley Eastern Ltd. Delhi 1991.
2. Management of Energy Environment Systems W. K. Foell John Wiley and Sons.

**REFERENCE BOOKS:**

1. Wastewater Treatment by M. N. Rao and A. K. Datta–Oxford I. B. H publishers
2. Handbook of Industrial Waste Disposal by Richard A. Conway Richard Ross– Van Nostrand publisher (1980)
3. Industrial Waste Treatment: Contemporary Practice and Vision for the Future by Nelson Leonard Nemerow, Nemerow – Butterworth Weinemann publisher (2006)

**WEB REFERENCES:**

1. <https://nptel.ac.in/courses/105/106/105106176>
2. [https://onlinecourses.nptel.ac.in/noc20\\_ce45/preview](https://onlinecourses.nptel.ac.in/noc20_ce45/preview)
3. <https://nptel.ac.in/courses/105/106/105106187>

**MOOCS COURSE:**

1. <https://swayam.gov.in/>
2. <https://onlinecourses.nptel.ac.in/>

**POLLUTION CONTROL AND MONITORING  
(PROFESSIONAL ELECTIVE-V)**

**IV-B.TECH II-SEMESTER**

**Course Code: A1CE815PE**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>

**COURSE OBJECTIVES**

**To Learn**

1. Impart knowledge on fundamental aspects of air pollution & control, noise pollution, and solid waste management.
2. Provide basic knowledge on sustainable development.
3. Introduces some basics of sanitation methods essential for protection of community health.
4. Differentiate the solid and hazardous waste based on characterization
5. To know the Air pollution Control Methods

**COURSE OUTCOMES**

**At The End Of The Course, Student Will Be Able To:**

1. Identify the air pollutant control devices
2. Have knowledge on the NAAQ standards and air emission standards
3. Differentiate the treatment techniques used for sewage and industrial wastewater treatment methods.
4. Understand the fundamentals of solid waste management, practices adopted in his town/village and its importance in keeping the health of the city.
5. Understand the fundamentals Environmental Sanitation Methods for Hostels and Hotels, Hospitals, Swimming pools and public bathing places

**UNIT-I AIR POLLUTION**

Air pollution Control Methods–Particulate control devices – Methods of Controlling Gaseous Emissions – Air quality standards. Noise Pollution: Noise standards, Measurement and control methods – Reducing residential and industrial noise.

**UNIT -II INDUSTRIAL WASTEWATER MANAGEMENT**

Strategies for pollution control – Volume and Strength reduction – Neutralization – Equalization – Proportioning – Common Effluent Treatment Plants – Recirculation of industrial wastes – Effluent standards

**UNIT -III SOLID WASTE MANAGEMENT:**

Solid waste characteristics – basics of on-site handling and collection – separation and processing – Incineration- Composting-Solid waste disposal methods – fundamentals of Land filling

**UNIT -IV ENVIRONMENTAL SANITATION**

Environmental Sanitation Methods for Hostels and Hotels, Hospitals, Swimming pools and public bathing places, social gatherings (melas and fairs), Schools and Institutions, Rural Sanitation-low cost waste disposal methods

**UNIT-V HAZARDOUS WASTE**

Characterization – Nuclear waste – Biomedical wastes – Electronic wastes – Chemical wastes – Treatment and management of hazardous waste-Disposal and Control methods

**TEXT BOOKS**

1. Environmental Engineering, by Ruth F. Weiner and Robin Matthews – 4th Edition Elsevier, 2003.
2. Environmental Science and Engineering by J.G. Henry and G.W. Heinke – Pearson Education.

**REFERENCE BOOKS**

1. Environmental Engineering by Mackenzie L Davis & David A Cornwell. McGraw Hill Publishing

**E-TEXT BOOKS**

1. [https://books.google.co.in/books?id=2iheqp8dnwwc&printsec=frontcover&redir\\_esc=y#v=onepage&q&f=false](https://books.google.co.in/books?id=2iheqp8dnwwc&printsec=frontcover&redir_esc=y#v=onepage&q&f=false)

**MOOCS COURSE**

1. <https://swayam.gov.in/>
2. <https://onlinecourses.nptel.ac.in/>

## **GREEN BUILDING TECHNOLOGIES (OPEN ELECTIVE-III)**

### **IV B.TECH II SEMESTER**

**Course Code: A1CE805OE**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **COURSE OBJECTIVES**

**The course should enable the students to:**

6. To make the students knowledgeable with respect to the subject and its practicable applicability.
7. To promote understanding of basic and advanced concepts in Engineering materials aspects.
8. To expose the students to know the different type of materials used in engineering point of view.
9. To make the students to learn about sustainability of engineering materials in economic point of view.
10. To know the testing and specification of said materials. various service and environmental loadings

### **COURSE OUTCOMES:**

**The end of the course the student should be able to:**

6. The objective of this course is to expose the students to the concepts of sustainability in the context of building and conventional engineered building materials, such as Concrete, Bricks, and achieving the same through lower Carbon cements, Superior brick kilns and Recycled aggregate minimizing consumption of natural resources including water.
7. VOC and indoor air quality.
8. Exposing the student to concepts of embodied, Operational and Life Cycle Energy, Minimizing Energy consumption by optimal design, use of BIPV.
9. Exposing the student to concepts Use of Waste Water for Mixing and Curing, Modern Composite Concrete, Recycled Aggregate-ITZ and Processing
10. The objective of this course is to expose the students for testing and specification of said material

### **UNIT-I: INTRODUCTION TO GREEN BUILDINGS**

Green Buildings: Definition of Green Buildings, typical features of green buildings, benefits of Green Buildings- Sustainable site selection and planning of buildings to maximize comfort, day lighting, ventilation, planning for storm water drainage

### **UNIT- II: NATURAL AVAILABLE MATERIALS FOR GREEN BUILDINGS**

Environmentally friendly building materials and technologies: Natural Materials like bamboo, timber, rammed earth, stabilized mud blocks, hollow blocks, lime & lime- pozzolana cements, materials from agro and industrial waste, ferro-cement and Ferro-concrete, alternative roofing systems, various paints reducing the heat gain of the building, etc.

### **UNIT – III: NATURAL AND RENEWABLE ENERGY RESOURCES FOR GREEN BUILDINGS**

Energy and resource conservation: Need for energy conservation, various forms of energy used in buildings, embodied energy of materials, energy used in transportation and construction processes- water conservation systems in buildings-water harvesting in buildings – waste to energy management in residential complexes or gated communities. Use of renewable energy resources: Wind and Solar Energy Harvesting, potential of solar energy in India and world, construction and operation of various solar appliances, success case studies of fully solar energy based buildings in India.

#### **UNIT- IV: ENVIRONMENTAL ASPECTS OF GREEN BUILDINGS**

Climate Design: Local climatic conditions – temperature, humidity, wind speed and direction-impact of climate change on built environment – comforts: the desirable conditions – Principles of thermal design – means of thermal –light and lighting-building acoustics- energy efficient lighting, Ventilation and air quality requirement, various techniques for passive cooling, garden roofs, case studies for passive cooling and thermal comfort.

#### **UNIT- V: GREEN BUILDING SYSTEMS**

Green Building Rating Systems: Introduction to Leadership in Energy and Environment Design (LEED), Green Rating systems for Integrated Habitat Assessment – Modular wastewater treatment systems for built environment – Building automation and building management systems.

#### **TEXT BOOKS:**

4. 'Alternative building materials and technologies' by K.S. Jagadish, B.V. Venkatarama Reddy and K.S. Nanjunda Rao.
5. 'Non-Conventional Energy Resources' by G. D. Rai, Khanna Publishers.
6. Solar Energy by Sukhatme S.P.

#### **E-TEXTBOOKS:**

4. <https://www.springer.com/gp/book/9783642006340>
5. <https://onlinelibrary.wiley.com/doi/book/10.1002/9781118984048>
6. <https://www.lap-publishing.com/catalog/details/store/gb/book/978-613-8-38918-7/a-text-book-on-green-buildings>

#### **MOOCS COURSE:**

1. <https://nptel.ac.in/courses/105/102/105102195/>
2. <https://nptel.ac.in/noc/courses/noc19/SEM2/noc19-ce40/>

## **AIR POLLUTION AND CONTROL (OPEN ELECTIVE-III)**

### **IV-B.TECH II-SEMESTER**

**Course Code: A1CE806OE**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **COURSE OBJECTIVES**

The objectives of the course are to

1. Understand the Air pollution Concepts
2. Identify the source of air pollution
3. Understanding the properties of different pollutants
4. Know Air pollution Control devices
5. Distinguish the Air quality monitoring devices

### **COURSE OUTCOMES**

1. At the end of the course the student will be able to Identify sampling and analysis techniques for air quality assessment
2. Describe the plume behavior for atmospheric stability conditions
3. Apply plume dispersion modelling and assess the concentrations
4. Describing the dust removal mechanism and equipments
5. Design air pollution controlling devices

### **UNIT-I AIR POLLUTION**

Sampling and analysis of air pollutants, conversion of ppm into  $\mu\text{g}/\text{m}^3$ . Definition of terms related to air pollution and control - secondary pollutants - Indoor air pollution – Ozone holes and Climate Change and its impact - Carbon Trade.

### **UNIT -II METEROLOGY AND AIR POLLUTION**

Properties of atmosphere: Heat, Pressure, Wind forces, Moisture and relative Humidity, Lapse Rates - Influence of Terrain and Meteorological phenomena on plume behaviour and Air Quality - Wind rose diagrams and Isopleths Plume Rise Model

### **UNIT -III CONTROL OF PARTICULATE POLLUTANTS**

Properties of particulate pollution - Particle size distribution - Control mechanism - Dust removal equipment – Working principles and operation of settling chambers, cyclones, wet dust scrubbers, fabric filters & ESP.

### **UNIT -IV CONTROL OF GASEOUS POLLUTANT**

Process and equipment for the removal by chemical methods - Working principles and operation of absorption and adsorption equipment - Combustion and condensation equipment.

### **UNIT -V AUTOMOBILE AND INDOOR POLLUTION**

Vehicular pollution – Sources and types of emission – Effect of operating conditions-Alternate fuels and emissions-Emission controls and standards, Strategies to control automobile pollution– Causes of indoor air pollution-changes in indoor air quality-control and air cleaning systems-indoor air quality

**TEXT BOOKS**

1. M.N. Rao and HVN Rao, Air Pollution, Tata McGraw Hill Publishers
2. Noel, D. N., Air Pollution Control Engineering, Tata McGraw Hill Publishers, 1999
3. K.V.S.G. Murali Krishna , Air Pollution and Control, Laxmi Publications, New Delhi, 2015

**REFERENCE BOOKS**

1. An Introduction to Air pollution, R. K. Trivedy and P.K. Goel, B.S. Publications.
2. Air Pollution by Wark and Warner - Harper & Row, New York.

**WEB REFERENCES**

1. <https://onlinelibrary.wiley.com/doi/10.1002/0471238961.01091823151206.a01.pub3>
2. <https://www.nature.com/articles/s41598-020-62475-0>

**E-TEXT BOOKS**

1. <https://www.ulektzbooks.com/books/Laxmi-Publications-eBooks/Air-Pollution-and-Control-MTE4MDk=>
2. <https://bookboon.com/en/pollution-prevention-and-control-ebookc>

**MOOC COURSE**

1. <https://nptel.ac.in/courses/105/102/105102089/>