



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India

Civil Engineering
Academic Regulations (R23) for B. Tech (Regular-Full time)
(Effective for the students admitted into I year from the Academic Year 2023-24 onwards)

1. Award of the Degree

- (a) Award of the B.Tech. Degree / B.Tech. Degree with a Minor if he/she fulfils the following:
- i Pursues a course of study for not less than four academic years and not more than eight academic years. However, for the students availing Gap year facility this period shall be extended by two years at the most and these two years would in addition to the maximum period permitted for graduation (Eight years).
 - ii Registers for 160 credits and secures all 160 credits.
- (b) Award of B.Tech. degree with Honors if he/she fulfils the following:
- i Student secures additional 15 credits fulfilling all the requisites of a B.Tech. program i.e., 160 credits.
 - ii Registering for Honors is optional.
 - iii Honors is to be completed simultaneously with B.Tech. programme.

(c) Programs offered by the College:

The following programs are offered at present as specializations for the B. Tech. course from 2023-2024.

S. No.	Branch	Program Code
01.	Computer Science & Engineering	01
02.	Electronics and Communication Engineering	02
03.	Mechanical Engineering	03
04.	Electrical and Electronics Engineering	04
05.	Civil Engineering	05

2. Students, who fail to fulfil all the academic requirements for the award of the degree within eight academic years from the year of their admission shall forfeit their seat in B.Tech. course and their admission stands cancelled. This clause shall be read along with clause 1 a) i).

3. Admissions

Admission to the B. Tech Program shall be made subject to the eligibility, qualifications and specialization prescribed by the A.P. State Government/University from time to time. Admissions shall be made either based on the merit rank obtained by the student in the common entrance examination conducted by the A.P. Government/University or any other order of merit approved by the A.P. Government/University, subject to reservations as prescribed by the Government/University from time to time.

4. Program related terms

Credit: A unit by which the course work is measured. It determines the number of hours of instruction required per week. One credit is equivalent to one hour of teaching (Lecture/Tutorial) or two hours of practical work/field work per week.



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Credit Definition:

1 Hr. Lecture (L) per week	1 credit
1 Hr. Tutorial (T) per week	1 credit
1 Hr. Practical (P) per week	0.5 credit
2 Hrs. Practical (Lab) per week	1 credit

- a) **Academic Year:** Two consecutive (one odd + one even) semesters constitute one academic year.
b) **Choice Based Credit System (CBCS):** The CBCS provides a choice for students to select from the prescribed courses.

5. Semester/Credits:

- i) A semester comprises 90 working days excluding mid-semester Examination and End Examination dates. An academic year is divided into two semesters.
ii) The summer term is for eight weeks during summer vacation. Internship/ apprenticeship / work-based vocational education and training can be carried out during the summer term, especially by students who wish to exit after two semesters or four semesters of study.
iii) Regular courses may also be completed well in advance through MOOCs satisfying prerequisites.

6. Structure of the Undergraduate Programme

All courses offered for the undergraduate program (B. Tech.) are broadly classified as follows:

S.No.	Category	Breakup of Credits (Total 160)	Percentage of total credits	AICTE Recommendation (%)
1.	Humanities and Social Science including Management (HM)	13	8 %	8 – 9%
2.	Basic Sciences (BS)	20	13 %	12 - 16%
3.	Engineering Sciences (ES)	23.5	14%	10 – 18%
4.	Professional Core (PC)	54.5	34 %	30 – 36%
5.	Electives – Professional (PE) & Open (OE); Domain Specific Skill Enhancement Courses (SEC)	33	21 %	19 - 23%
6.	Internships & Project work (PR)	16	10 %	8 – 11%
7.	Mandatory Courses (MC)	Non-credit	Non-credit	-

7. Course Classification:

All subjects/ courses offered for the undergraduate programme in Engineering & Technology (B.Tech. degree programmes) are broadly classified as follows:



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S.No.	Broad Course Classification	Course Category	Description
1.	Foundation Courses	Foundation courses	Includes Mathematics, Physics and Chemistry; fundamental engineering courses; humanities, social sciences and management courses
2.	Core Courses	Professional Core Courses (PC)	Includes subjects related to the parent discipline/department/branch of Engineering
3.	Elective Courses	Professional Elective Courses (PE)	Includes elective subjects related to the parent discipline/department/ branch of Engineering
		Open Elective Courses (OE)	Elective subjects which include interdisciplinary subjects or subjects in an area outside the parent discipline/ department/ branch of Engineering
		Domain specific skill enhancement courses (SEC)	interdisciplinary/job-oriented/domain courses which are relevant to the industry
4.	Project & Internships	Project	B.Tech. Project or Major Project
		Internships	Summer Internships – Community based and Industry Internships; Industry oriented Full Semester Internship
5.	Audit Courses	Mandatory non-credit courses	Covering subjects of developing desired attitude among the learners

8. Programme Pattern

- i. The total duration of the B. Tech (Regular) Programme is four academic years.
- ii. Each academic year of study is divided into two semesters.
- iii. The minimum number of instruction days in each semester is 90 days excluding mid-semester Examination and End Examination dates.
- iv. There shall be a mandatory student induction program for freshers, with a three- week duration before the commencement of first semester. Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations etc., are included as per the guidelines issued by AICTE.
- v. Health/wellness/yoga/sports and NSS /NSS /Scouts & Guides / Community service activities are made mandatory as credit courses for all the undergraduate students.
- vi. Courses like Environmental Sciences, Indian Constitution, Technical Paper Writing & IPR are offered as non-credit mandatory courses for all the undergraduate students.
- vii. Design Thinking for Innovation & Tinkering Labs are made mandatory as credit courses for all the undergraduate students.
- viii. Increased flexibility for students through an increase in the elective component of the curriculum, with 05 Professional Elective courses and 04 Open Elective courses.
- ix. Professional Elective Courses include the elective courses relevant to the chosen specialization/branch. Proper choice of professional elective courses can lead to students



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specializing in emerging areas within the chosen field of study.

- x. A total of 04 Open Electives are offered in the curriculum. A student can complete the requirement for B.Tech. Degree with a Minor within the 160 credits by opting for the courses offered through various verticals/tracks under Open Electives.
- xi. While choosing the electives, students shall ensure that they do not opt for the courses with syllabus contents similar to courses already pursued.
- xii. A pool of interdisciplinary/job-oriented/domain skill courses which are relevant to the industry are integrated into the curriculum of all disciplines. There shall be 05 skill-oriented courses offered during III to VII semesters. Among the five skill courses, four courses shall focus on the basic and advanced skills related to the domain/interdisciplinary courses and the other shall be a soft skills course.
- xiii. Students shall undergo mandatory summer internships, for a minimum of eight weeks duration at the end of the second and third year of the programme. The internship at the end of second year shall be community oriented and industry internship at the end of third year.
- xiv. There shall also be mandatory full internship in the final semester of the programme along with the project work.
- xv. An undergraduate degree with Honors is introduced by the University for the students having good academic record.
- xvi. Each college shall take measures to implement Virtual Labs (<https://www.vlab.co.in>) which provide remote access to labs in various disciplines of Engineering and will help student in learning basic and advanced concept through remote experimentation. Student shall be made to work on virtual lab experiments during the regular labs.
- xvii. Each college shall assign a faculty advisor/mentor after admission to a group of students from same department to provide guidance in courses registration/career growth/placements/opportunities for higher studies/GATE/ other competitive exams etc.
- xviii. Preferably 25% of course work for the theory courses in every semester shall be conducted in the blended mode of learning.

9. Evaluation Process

The performance of a student in each semester shall be evaluated subject-wise with a maximum of 100 marks for theory and 100 marks for practical subject. Summer Internships shall be evaluated for 50 marks, Full Internship & Project work in final semester shall be evaluated for 200 marks, mandatory courses with no credits shall be evaluated for 30 mid semester marks. A student has to secure not less than 35% of marks in the end examination and a minimum of 40% of marks in the sum total of the mid semester and end examination marks taken together for the theory, practical, design, drawing subject or project etc. In the case of a mandatory course, he/she should secure 40% of the total marks.

Theory Courses

Assessment Method	Marks
Continuous Internal Assessment	30
Semester End Examination	70
Total	100

- i) For the theory subject, the distribution shall be 30 marks for Internal Evaluation and 70 marks for the End-Examination.
- ii) For practical subjects, the distribution shall be 30 marks for the Internal Evaluation and 70 marks for the End- Examination.
- iii) If any course contains two different branch subjects, the syllabus shall be written in two parts with



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3 units each (Part-A and Part-B) and external examination question paper shall be set with two parts each for 35 marks.

- iv) If any subject has both theory and practical components, they will be evaluated separately as theory subject and practical subject. However, they will be given same subject code with an extension of 'T' for theory subject and 'P' for practical subject.

a) Continuous Internal Evaluation

- i) For theory subjects, during the semester, there shall be two midterm examinations. Each midterm examination shall be evaluated for 30 marks of which 10 marks for objective paper (20 minutes duration), 15 marks for subjective paper (90 minutes duration) and 5 marks for assignment.
- ii) Objective paper shall contain 05 short answer questions with 2 marks each or maximum of 20 bits for 10 marks. Subjective paper shall contain 3 either or type questions (totally six questions from 1 to 6) of which student has to answer one from each either-or type of question. Each question carries 10 marks. The marks obtained in the subjective paper are condensed to 15 marks.

Note:

- The objective paper shall be prepared in line with the quality of competitive examinations questions.
 - The subjective paper shall contain 3 either or type questions of equal weightage of 10 marks. Any fraction shall be rounded off to the next higher mark.
 - The objective paper shall be conducted by the respective institution on the day of subjective paper test.
 - Assignments shall be in the form of problems, mini projects, design problems, slip tests, quizzes etc., depending on the course content. It should be continuous assessment throughout the semester and the average marks shall be considered.
- iii) If the student is absent for the mid semester examination, no re-exam shall be conducted and mid semester marks for that examination shall be considered as zero.
- iv) The first midterm examination shall be conducted for I, II units of syllabus with one either or type question from each unit and third either or type question from both the units. The second midterm examination shall be conducted for III, IV and V units with one either or type question from each unit.
- v) Finalized mid marks of first and second mid semesters shall be arrived at by considering the marks secured by the student in both the mid examinations with 80% weightage given to the better mid exam and 20% to the other.

For Example:

Marks obtained in first mid: 25 Marks obtained in second mid: 20

Final Marks: $(25 \times 0.8) + (20 \times 0.2) = 24$

If the student is absent for any one midterm examination, the finalized mid semester marks shall be arrived at by considering 80% weightage to the marks secured by the student in the appeared examination and zero to the other. For Example:

Marks obtained in first mid: Absent Marks obtained in second mid: 25

Final Marks: $(25 \times 0.8) + (0 \times 0.2) = 20$

b) End Examination Evaluation:

End examination of theory subjects shall have the following pattern:

- i) There shall be 6 questions and all questions are compulsory.
- ii) Question I shall contain 10 compulsory short answer questions for a total of 20 marks such that each question carries 2 marks.



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- iii) There shall be 2 short answer questions from each unit.
- a) In each of the questions from 2 to 6, there shall be either/or type questions of 10 marks each. Students shall answer any one of them.
- iv) The questions from 2 to 6 shall be set by covering one unit of the syllabus for each question.

End examination of theory subjects consisting of two parts of different subjects, for Example: Basic Electrical & Electronics Engineering shall have the following pattern:

- i) The question paper shall be in two parts viz., Part A and Part B with equal weightage of 35 marks each.
- ii) In each part, question 1 shall contain 5 compulsory short answer questions for a total of 5 marks such that each question carries 1 mark.
- iii) In each part, questions from 2 to 4, there shall be either/or type questions of 10 marks each. Students shall answer any one of them.
- iv) The questions from 2 to 4 shall be set by covering one unit of the syllabus for each question.

Practical Courses

Assessment Method	Marks
Continuous Internal Assessment	30
Semester End Examination	70
Total	100

- b) For practical courses, there shall be a continuous evaluation during the semester for 30 sessional marks and the end examination shall be for 70 marks.
- c) Day-to-daywork in the laboratory shall be evaluated for 15 marks by the concerned laboratory teacher based on the record/viva and 15 marks for the internal test.
- d) The end examination shall be evaluated for 70 marks, conducted by the concerned laboratory teacher and a senior expert in the subject from the same department.
 - Procedure: 20 marks
 - Experimental work & Results: 30 marks
 - Viva voce: 20 marks.

In a practical subject consisting of two parts (Eg: Basic Electrical & Electronics Engineering Lab), the end examination shall be conducted for 70 marks as a single laboratory in 3 hours. Mid semester examination shall be evaluated as above for 30 marks in each part and final mid semester marks shall be arrived by considering the average of marks obtained in two parts.

- e) For the subject having design and/or drawing, such as Engineering Drawing, the distribution of marks shall be 30 for mid semester evaluation and 70 for end examination.

Assessment Method	Marks
Continuous Internal Assessment	30
Semester End Examination	70
Total	100

Day-to-day work shall be evaluated for 15 marks by the concerned subject teacher based on the reports/submissions prepared in the class. And there shall be two midterm examinations in a semester for duration of 2 hours each for 15 marks with weightage of 80% to better mid marks and



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20% for the other. The subjective paper shall contain 3 either or type questions of equal weightage of 5 marks. There shall be no objective paper in mid semester examination. The sum of day-to-day evaluation and the mid semester marks will be the final sessional marks for the subject.

The end examination pattern for Engineering Graphics shall consists of 5 questions, either/or type, of 14 marks each. There shall be no objective type questions in the end examination. However, the end examination pattern for other subjects related to design/drawing, multiple branches, etc is mentioned along with the syllabus.

- f) There shall be no external examination for mandatory courses with zero credits. However, attendance shall be considered while calculating aggregate attendance and student shall be declared to have passed the mandatory course only when he/she secures 40% or more in the internal examinations. In case the student fails, a re-examination shall be conducted for failed candidates for 30 marks satisfying the conditions mentioned in item 1 & 2 of the regulations.
- g) The laboratory records and mid semester test papers shall be preserved for a minimum of 3 years in the respective institutions as per the University norms and shall be produced to the Committees of the University as and when the same are asked for.

10. Skill oriented Courses

- i) There shall be five skill-oriented courses offered during III to VII semesters.
- ii) Out of the five skill courses two shall be skill-oriented courses from the same domain. Of the remaining three skill courses, one shall be a soft skill course and the remaining two shall be skill-advanced courses from the same domain/Interdisciplinary/Job oriented.
- iii) The course shall carry 100 marks and shall be evaluated through continuous assessments during the semester for 30 sessional marks and end examination shall be for 70 marks. Day-to-day work in the class / laboratory shall be evaluated for 30 marks by the concerned teacher based on the regularity/assignments/viva/mid semester test. The end examination similar to practical examination pattern shall be conducted by the concerned teacher and an expert in the subject nominated by the principal.
- iv) The Head of the Department shall identify a faculty member as coordinator for the course. A committee consisting of the Head of the Department, coordinator and a senior Faculty member nominated by the Head of the Department shall monitor the evaluation process. The marks/grades shall be assigned to the students by the above committee based on their performance.
- v) The student shall be given an option to choose either the skill courses being offered by the college or to choose a certificate course being offered by industries/Professional bodies or any other accredited bodies. If a student chooses to take a Certificate Course offered by external agencies, the credits shall be awarded to the student upon producing the Course Completion Certificate from the agency. A committee shall be formed at the level of the college to evaluate the grades/marks given for a course by external agencies and convert to the equivalent marks/grades.
- vi) The recommended courses offered by external agencies, conversions and appropriate grades/marks are to be approved by the University at the beginning of the semester. The principal of the respective college shall forward such proposals to the University for approval.
- vii) If a student prefers to take a certificate course offered by external agency, the department shall mark attendance of the student for the remaining courses in that semester excluding the skill course in all the calculations of mandatory attendance requirements upon producing a valid certificate as approved by the University.



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11. Massive Open Online Courses (MOOCs):

A Student must pursue and complete one course compulsorily through MOOCs approved by the University. A student can pursue courses other than core through MOOCs and it is mandatory to complete one course successfully through MOOCs for awarding the degree. A student is not permitted to register and pursue core courses through MOOCs.

A student shall register for the course (Minimum of 12 weeks) offered through MOOCs with the approval of the Head of the Department. The Head of the Department shall appoint one mentor to monitor the student's progression. The student needs to earn a certificate by passing the exam. The student shall be awarded the credits assigned in the curriculum only by submission of the certificate. The examination fee, if any, will be borne by the student.

Students who have qualified in the proctored examinations conducted through MOOCs platform can apply for credit transfer as specified and are exempted from appearing internal as well as external examination (for the specified equivalent credit course only) conducted by the university.

Necessary amendments to the rules and regulations regarding adoption of MOOC courses would be proposed from time to time.

12. Credit Transfer Policy

Adoption of MOOCs is mandatory, to enable Blended model of teaching-learning as also envisaged in the NEP 2020. As per University Grants Commission (Credit Framework for Online Learning Courses through SWAYAM) Regulation, 2016, the University shall allow up to a maximum of 20% of the total courses being offered in a particular programme i.e., maximum of 32 credits through MOOCs platform.

- i) The University shall offer credit mobility for MOOCs and give the equivalent credit weightage to the students for the credits earned through online learning courses.
- ii) Student registration for the MOOCs shall be only through the respective department of the institution, it is mandatory for the student to share necessary information with the department.
- iii) The credit transfer policy will be applicable to the Professional & Open Elective courses only.
- iv) The concerned department shall identify the courses permitted for credit transfer.
- v) The University/institution shall notify at the beginning of semester the list of the online learning courses eligible for credit transfer.
- vi) The institution shall designate a faculty member as a Mentor for each course to guide the students from registration till completion of the credit course.
- vii) The university shall ensure no overlap of MOOC exams with that of the university examination schedule. In case of delay in results, the university will re-issue the marks sheet for such students.
- viii) Students pursuing courses under MOOCs shall acquire the required credits only after successful completion of the course and submitting a certificate issued by the competent authority along with the percentage of marks and grades.
- ix) The institution shall submit the following to the examination section of the university:
 - a) List of students who have passed MOOC courses in the current semester along with the certificate of completion.
 - b) Undertaking form filled in by the students for credit transfer.
- x) The universities shall resolve any issues that may arise in the implementation of this policy from time to time and shall review its credit transfer policy in the light of periodic changes brought by UGC, SWAYAM, NPTEL and state government.

Note: Students shall be permitted to register for MOOCs offered through online platforms approved by the University from time to time.



13. Academic Bank of Credits (ABC)

The University has implemented Academic Bank of Credits (ABC) to promote flexibility in curriculum as per NEP 2020 to

- i. provide option of mobility for learners across the universities of their choice
- ii. provide option to gain the credits through MOOCs from approved digital platforms.
- iii. facilitate award of certificate/diploma/degree in line with the accumulated credits in ABC
- iv. execute Multiple Entry and Exit system with credit count, credit transfer and credit acceptance from students' account.

14. Mandatory Internships

Summer Internships: Two summer internships either onsite or virtual each with a minimum of 08 weeks duration, done at the end of second and third years, respectively are mandatory. It shall be completed in collaboration with local industries, Govt. Organizations, construction agencies, Power projects, software MNCs or any industries in the areas of concerned specialization of the Undergraduate program. One of the two summer internships at the end of second year (Community Service Project) shall be society oriented and shall be completed in collaboration with government organizations/NGOs & others. The other internship at the end of third year is Industry Internship and shall be completed in collaboration with Industries. The student shall register for the internship as per course structure after commencement of academic year. The guidelines issued by the APSICHE / University shall be followed for carrying out and evaluation of Community Service Project and Industry Internship.

Evaluation of the summer internships shall be through the departmental committee. A student will be required to submit a summer internship report to the concerned department and appear for an oral presentation before the departmental committee comprising of Head of the Department, supervisor of the internship and a senior faculty member of the department. A certificate of successful completion from industry shall be included in the report. The report and the oral presentation shall carry 50% weightage each. It shall be evaluated for 50 external marks. There shall be no internal marks for Summer Internship. A student shall secure a minimum of 40% of marks for successful completion. In case a student fails, he/she shall reappear as and when semester supplementary examinations are conducted by the University.

Full Semester Internship and Project work: In the final semester, the student should mandatorily register and undergo internship (onsite/virtual) and in parallel he/she should work on a project with well-defined objectives. At the end of the semester the candidate shall submit an internship completion certificate and a project report. A student shall also be permitted to submit a project report on the work carried out during the internship.

The project report shall be evaluated by an external examiner. The total marks for project work 200 marks and distribution shall be 60 marks for internal and 140 marks for external evaluation. The supervisor assesses the student for 30 marks (Report: 15 marks, Seminar: 15 marks). At the end of the semester, all projects shall be showcased at the department for the benefit of all students and staff and the same is to be evaluated by the departmental Project Review Committee consisting of supervisor, a senior faculty and HOD for 30 marks. The external evaluation of Project Work is a Viva-Voce Examination conducted in the presence of an internal examiner and external examiner appointed by the University and is evaluated for 140 marks.

The college shall facilitate and monitor the student internship programs. Completion of internships is mandatory, if any student fails to complete internship, he/she will not be eligible for the award of degree. In such cases, the student shall repeat and complete the internship.



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15. Guidelines for offering a Minor.

To promote interdisciplinary knowledge among the students, the students admitted into B.Tech. in a major stream/branch are eligible to obtain a degree in Minor in another stream.

- i) The Minor program requires the completion of 12 credits in Minor stream chosen.
- ii) Two courses for 06 credits related to a Minor are to be pursued compulsorily for the minor degree, but maybe waived for students who have done similar/equivalent courses. If waived for a student, then the student must take an extra elective course in its place. It is recommended that students should complete the compulsory courses (or equivalents) before registering for the electives.
- iii) Electives (minimum of 2 courses) to complete a total of 12 credits.

Note: A total of 4 (Four) Open Electives are offered in the curriculum. A student can complete the requirement for Minor by opting for the courses offered through various verticals/tracks under Open Electives.

16. Guidelines for offering Honors.

The objective of introducing B.Tech. (Hons.) is to facilitate the students to choose additionally the specialized courses of their choice and build their competence in a specialized area in the UG level. The programme is the best choice for academically excellent students having a good academic record and interest towards higher studies and research.

- i) Honors is introduced in the curriculum of all B. Tech. programs offering a major degree and is applicable to all B. Tech (Regular and Lateral Entry) students admitted in Engineering & Technology.
- ii) A student shall earn an additional 15 credits for award of B.Tech.(Honors) degree from same branch/department/discipline registered for major degree. This is in addition to the credits essential for obtaining the Undergraduate degree in Major Discipline (i.e., 160 credits).
- iii) A student is permitted to register for Honors in IV semester after the results of III Semester are declared and students may be allowed to take maximum two subjects per semester pertaining to the Honors from V Semester onwards.
- iv) The concerned Principal of the college shall arrange separate class work and timetable of the courses offered under the Honors program.
- v) Courses that are used to fulfil the student's primary major may not be double counted towards the Honors. Courses with content substantially equivalent to courses in the student's primary Major may not be counted towards the Honors.
- vi) Students can complete the courses offered under Honors either in the college or in online platforms like SWAYAM with a minimum duration of 12 weeks for a 3-credit course and 8 weeks duration for a 2-credit course satisfying the criteria for credit mobility. If the courses under Honors are offered in conventional mode, then the teaching and evaluation procedure shall be similar to regular B. Tech courses.
- vii) The attendance for the registered courses under Honors and regular courses offered for Major degree in a semester are to be considered separately.
- viii) A student shall maintain an attendance of 75% in all registered courses under Honors to be eligible for attending semester end examinations.
- ix) A student registered for Honors shall pass in all subjects that constitute the requirement for the Honors degree program. No class/division (i.e., second class, first class and distinction, etc.) shall be awarded for an Honors degree programme.
- x) If a student drops or is terminated from the Honors program, the additional credits so far earned cannot be converted into open or core electives; they will remain extra. However, such students will receive a separate grade sheet mentioning the additional courses completed by them.
- xi) Honors will be mentioned in the degree certificate as Bachelor of Technology (Honors) in XYZ. For example, B.Tech. (Honors) in Mechanical Engineering

Enrolment into Honors:

- i) Students of a Department/Discipline are eligible to opt for Honors program offered by the



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same Department/Discipline

- ii) The enrolment of students into Honors is based on the CGPA obtained in the major degree program. CGPA shall be taken up to III semester in case of regular entry students and only III semester in case of lateral entry students. Students having 7.0 CGPA without any backlog subjects will be permitted to register for Honors.
- iii) If a student is detained due to lack of attendance either in Major or in Honors, registration shall be cancelled.
- iv) Transfer of credits from Honors to regular B. Tech degree and vice-versa shall not be permitted.
- v) Honors are to be completed simultaneously with a Major degree program.

Registration for Honors:

- i) The eligible and interested students shall apply through the Head of the Department (HOD) of his/her parent department. The whole process should be completed within one week before the start of every semester. Selected students shall be permitted to register the courses under Honors.
- ii) The selected students shall submit their willingness to the principal through his/her parent department offering Honors. The parent department shall maintain the record of student pursuing the Honors.
- iii) The students enrolled in the Honors courses will be monitored continuously. An advisor/mentor from parent department shall be assigned to a group of students to monitor the progress.
- iv) There is no fee for registration of subjects for Honors program offered offline at the respective institutions.

17. Attendance Requirements:

- i) A student shall be eligible to appear for the University external examinations if he/she acquires a minimum of 40% attendance in each subject and 75% of attendance in aggregate of all the subjects.
 - b) Condonation 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.
- ii) Shortage of Attendance below 65% in aggregate shall in NO CASE be condoned.
- iii) A stipulated fee shall be payable towards condonation of shortage of attendance to the University.
- iv) Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examination of that class and their registration shall stand cancelled.
- v) A student will not be promoted to the next semester unless he satisfies the attendance requirements of the present semester. They may seek readmission for that semester from the date of commencement of class work.
- vi) If any candidate fulfils the attendance requirement in the present semester, he shall not be eligible for readmission into the same class.
- vii) If the learning is carried out in blended mode (both offline & online), then the total attendance of the student shall be calculated considering the offline and online attendance of the student.
- viii) For induction programme attendance shall be maintained as per AICTE norms.

18. Promotion Rules:

The following academic requirements must be satisfied in addition to the attendance requirements mentioned in section 16.

- i) A student shall be promoted from first year to second year if he/she fulfils the minimum attendance requirement as per university norms.
- ii) A student will be promoted from II to III year if he/she fulfils the academic requirement of securing 40% of the credits (any *decimal* fraction should be *rounded off to lower* digit) up to in the subjects that have been studied up to III semester.
- iii) A student shall be promoted from III year to IV year if he/she fulfils the academic requirements of securing 40% of the credits (any *decimal* fraction should be *rounded off to lower* digit) in the subjects that have been studied up to V semester.

And in case a student is detained for want of credits for a particular academic year by ii) & iii) above,



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the student may make up the credits through supplementary examinations and only after securing the required credits he/she shall be permitted to join in the V semester or VII semester respectively as the case may be.

- iv) When a student is detained due to lack of credits/shortage of attendance he/she may be re-admitted when the semester is offered after fulfilment of academic regulations. In such a case, he/she shall be in the academic regulations into which he/she is readmitted.

19. Grading:

As a measure of the student's performance, a 10-point Absolute Grading System using the following Letter Grades and corresponding percentage of marks shall be followed:

After each course is evaluated for 100 marks, the marks obtained in each course will be converted to a corresponding letter grade as given below, depending on the range in which the marks obtained by the student fall.

Structure of Grading of Academic Performance

Range in which the marks in the subject fall	Grade	Grade points
		Assigned
90 & above	Superior	10
80 - 89	A (Excellent)	9
70 - 79	B (Very Good)	8
60 - 69	C (Good)	7
50 - 59	D (Average)	6
40 - 49	E (Pass)	5
< 40	F (Fail)	0
Absent	Ab (Absent)	0

- i) A student obtaining Grade 'F' or Grade 'Ab' in a subject shall be considered failed and will be required to reappear for that subject when it is offered the next supplementary examination.
- ii) For non-credit audit courses, "Satisfactory" or "Unsatisfactory" shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA/Percentage.

Computation of Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):

The Semester Grade Point Average (SGPA) is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e.,

$$SGPA = \frac{\sum (C_i \times G_i)}{\sum C_i}$$

where, C_i is the number of credits of the i^{th} subject and G_i is the grade point scored by the student in the i^{th} course.

The Cumulative Grade Point Average (CGPA) will be computed in the same manner considering all the courses undergone by a student over all the semesters of a program, i.e.,

$$CGPA = \frac{\sum (C_i \times S_i)}{\sum C_i}$$

where "S_i" is the SGPA of the i^{th} semester and C_i is the total number of credits up to that semester.

Both SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

While computing the SGPA the subjects in which the student is awarded Zero grade points will also be included.

Grade Point: It is a numerical weight allotted to each letter grade on a 10-point scale. Letter Grade:



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It is an index of the performance of students in a said course. Grades are denoted by the letters S, A, B, C, D and F.

Award of Class:

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

Class Awarded	CGPA Secured
First Class with Distinction	≥ 7.5
First Class	$\geq 6.5 < 7.5$
Second Class	$\geq 5.5 < 6.5$
Pass Class	$\geq 5.0 < 5.5$

CGPA to Percentage conversion Formula – (CGPA – 0.5) x 10

20. With-holding of Results

If the candidate has any dues not paid to the university or if any case of indiscipline or malpractice is pending against him/her, the result of the candidate shall be withheld in such cases.

21. Multiple Entry / Exit Option

a. Exit Policy:

The students can choose to exit the four-year programme at the end of first/second/third year.

- i) **UG Certificate in (Field of study/discipline)** - Programme duration: First year (first two semesters) of the undergraduate programme, 40 credits followed by an additional exit 10-credit bridge course(s) lasting two months, including at least 6- credit job-specific internship/apprenticeship that would help the candidates acquire job-ready competencies required to enter the workforce.
- ii) **UG Diploma (in Field of study/discipline)** - Programme duration: First two years (first four semesters) of the undergraduate programme, 80 credits followed by an additional exit 10-credit bridge course(s) lasting two months, including at least 6- credit job-specific internship/apprenticeship that would help the candidates acquire job-ready competencies required to enter the workforce.
- iii) **Bachelor of Science (in Field of study/discipline) i.e., B.Sc. Engineering in (Field of study/discipline)**- Programme duration: First three years (first six semesters) of the undergraduate programme, 120 credits.

b. Entry Policy:

Modalities on multiple entry by the student into the B.Tech. programme will be provided in due course of time.

Note: The Universities shall resolve any issues that may arise in the implementation of Multiple Entry and Exit policies from time to time and shall review the policies in the light of periodic changes brought by UGC, AICTE and State government.

22. Gap Year Concept:

Gap year concept for Student Entrepreneur in Residence is introduced and outstanding students who wish to pursue entrepreneurship / become entrepreneur are allowed to take a break of one year at any time after II year to pursue full-time entrepreneurship programme/to establish startups. This period may be extended to two years at the most and these two years would not be counted for the time₁f₃or



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the maximum time for graduation. The principal of the respective college shall forward such proposals submitted by the students to the University. An evaluation committee constituted by the University shall evaluate the proposal submitted by the student and the committee shall decide whether to permit the student(s) to avail the Gap Year or not

23. Transitory Regulations

Discontinued, detained, or failed candidates are eligible for readmission as and when the semester is offered after fulfilment of academic regulations. Candidates who have been detained for want of attendance or not fulfilled academic requirements or who have failed after having undergone the course in earlier regulations or have discontinued and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work with the same or equivalent subjects as and when subjects are offered, subject to Section 2 and they will follow the academic regulations into which they are readmitted.

Candidates who are permitted to avail Gap Year shall be eligible for re-joining into the succeeding year of their B. Tech from the date of commencement of class work, subject to Section 2 and they will follow the academic regulations into which they are readmitted.

24. Minimum Instruction Days for a Semester:

The minimum instruction days including exams for each semester shall be 90 days excluding mid semester examination and End Examination dates.

25. Medium of Instruction:

The medium of instruction of the entire B. Tech undergraduate programme in Engineering & Technology (including examinations and project reports) will be in English only.

26. Student Transfers:

Student transfers shall be as per the guidelines issued by the Government of Andhra Pradesh and the Universities from time to time.

27. General Instructions:

- i. The academic regulations should be read as a whole for purpose of any interpretation.
- ii. Malpractices rules-nature and punishments are appended.
- iii. Where the words “he”, “him”, “his”, occur in the regulations, they also include “she”, “her”, “hers”, respectively.
- iv. The Universities may change or amend the academic regulations or syllabi at any time and the changes or amendments shall be made applicable to all the students on rolls with effect from the dates notified by the Universities.
- v. In the case of any doubt or ambiguity in the interpretation of the guidelines given, the decision of the Vice-Chancellor / Head of the institution is final.



Academic Regulations (R23) for B. Tech (Lateral Entry Scheme)

(Effective for the students admitted into II year from the Academic Year 2024-25 onwards)

1. Award of the Degree

(a) Award of the B.Tech. Degree / B.Tech. Degree with a Minor if he/she fulfils the following:

(i) Pursues a course of study for not less than three academic years and not more than six academic years. However, for the students availing Gap year facility this period shall be extended by two years at the most and these two years would in addition to the maximum period permitted for graduation (Six years).

(ii) Registers for 120 credits and secures all 120 credits.

(b) **Award of B.Tech. degree with Honors** if he/she fulfils the following:

Student secures additional 15 credits fulfilling all the requisites of a B.Tech. program i.e., 120 credits.

(i) Registering for Honors is optional.

(ii) Honors is to be completed simultaneously with B.Tech. programme.

2. Students who fail to fulfil the requirement for the award of the degree within six consecutive academic years from the year of admission, shall forfeit their seat.

3. Minimum Academic Requirements

The following academic requirements have to be satisfied in addition to the requirements mentioned in item no.2.

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

ii. A student shall be promoted from III year to IV year if he/she fulfils the academic requirements of securing 40% of the credits (any decimal fraction should be rounded off to lower digit) in the subjects that have been studied up to V semester.

And in case if student is already detained for want of credits for particular academic year, the student may make up the credits through supplementary exams of the above exams before the commencement of IV year I semester class work of next year.

4. Course Pattern

i) The entire course of study is three academic years on semester pattern.

ii) A student eligible to appear for the end examination in a subject but absent at it or has failed in the end examination may appear for that subject at the next supplementary examination offered.

iii) When a student is detained due to lack of credits/shortage of attendance the student may be re-admitted when the semester is offered after fulfilment of academic regulations, the student shall be in the academic regulations into which he/she is readmitted.

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



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SKUCET Curriculum
B. Tech Course Structure – R23
CIVIL ENGINEERING

Semester – 0 Common for All Branches of Engineering				
S.No	Course No	Course Name	Category	L-T-P-C
1		Physical Activities -- Sports, Yoga and Meditation, Plantation	MC	0-0-6-0
2		Career Counselling	MC	2-0-2-0
3		Orientation to all branches -- career options, tools, etc.	MC	3-0-0-0
4		Orientation on admitted Branch -- corresponding labs, tools and platforms	EC	2-0-3-0
5		Proficiency Modules & Productivity Tools	ES	2-1-2-0
6		Assessment on basic aptitude and mathematical skills	MC	2-0-3-0
7		Remedial Training in Foundation Courses	MC	2-1-2-0
8		Human Values & Professional Ethics	MC	3-0-0-0
9		Communication Skills -- focus on Listening, Speaking, Reading, Writing skills	BS	2-1-2-0
10		Concepts of Programming	ES	2-0-2-0



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I Year I Semester					
S.No	Course Code	Course Name	Category	L-T-P	Credits
1.		Engineering Chemistry	BS&H	3-0-0	3
2.		Linear Algebra & Calculus	BS&H	3-0-0	3
3.		Basic Electrical & Electronics Engineering	ES	3-0-0	3
4.		Engineering Graphics	ES	1-0-4	3
5.		Introduction to Programming	ES	3-0-0	3
6.		I.T.Workshop	BS&H	0-0-2	1
7.		Electrical & Electronics Engineering Workshop	ES	0-0-3	1.5
8.		Engineering Chemistry Lab	ES	0-0-2	1
9		Introduction to Programming lab	ES	0-0-3	1.5
10		NCC/NSS,/Scouts & Guides/Community service	BS&H	0-0-1	0.5
Total					20.5

Category	CREDITS
Engineering Science Courses	7.5
Basic Science and Humanities	12.5
TOTAL CREDITS	20.5



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I Year II Semester					
S.No	Course Code	Course Name	Category	L-T-P	Credits
1.		Communicative English	BS&H	2-0-0	2
2.		Engineering Physics	BS & H	3-0-0	3
3.		Differential Equations and Vector calculus	ES	3-0-0	3
4.		Basic Civil & Mechanical Engineering	ES	3-0-0	3
5.		Engineering Mechanics	PC	3-0-0	3
6.		Communicative English Lab	BS& H	0-0-2	1
7.		Engineering Physics Lab	BS& H	0-0-2	1
8.		Engineering Workshop	ES	0-0-3	1.5
9.		Engineering Mechanics and Building Practices Lab	PC	0-0-3	1.5
10.		Health & Wellness, YOGA and Sports	BS&H	0-0-1	0.5
Total					19.5

Category	CREDITS
Basic Sciences and Humanities course	7.5
Engineering Science Courses	7.5
Professional Core Courses	4.5
TOTAL CREDITS	19.5



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II Year I Semester

S.No	Course Code	Course Name	Category	L-T-P	Credits
1.		Numerical and Statistical Methods	BS&H	3-0-0	3
2.		Managerial Economics and Financial Analysis	MG	2-0-0	2
3.		Surveying	PC	3-0-0	3
4.		Strength of Materials	PC	3-0-0	3
5.		Fluid Mechanics and Hydraulic Machinery	ES	3-0-0	3
6.		Surveying Lab	PC	0-0-3	1.5
7.		Strength of Materials Lab	PC	0-0-3	1.5
8.		Python Programming	SC	0-1-2	2
9		Environmental Science	MC	2-0-0	-
10		Design Thinking & Innovation	BS&H	0-1-2	2
Total					21

Category	Credits
Engineering Science Courses	3
Professional Core Courses	9
Management Course	2
Basic Science and Humanities	5
Skill Course	2
TOTAL CREDITS	21



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II Year II Semester					
S.No	Course Code	Course Name	Category	L-T-P	Credits
1.		Universal Human Values – Understanding Harmony	BS&H	2-1-0	3
2.		Engineering Geology	ES	2-0-0	2
3.		Concrete Technology	PC	3-0-0	3
4.		Structural Analysis	PC	3-0-0	3
5.		Building Planning and Drawing	PC	1-2-0	3
6.		FH & HM Lab	PC	0-0-3	1.5
7.		Engineering Geology Lab	PC	0-0-2	1
8.		Concrete Technology Lab	PC	0-0-3	1.5
9.		Soft Skills	SC	0-1-2	2
Total					20
Mandatory Community Service Project Internship of 08 weeks duration during summer Vacation					

Category	CREDITS
Basic Sciences and Humanities course	3
Engineering Science Courses	2
Professional Core Courses	13
Skill Course	2
TOTAL CREDITS	20



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III Year I Semester					
S.No	Course Code	Course Name	Category	L-T-P	Credits
1.		Geotechnical Engineering	PC	3-0-0	3
2.		Design of Reinforced Concrete Structures	PC	3-0-0	3
3.		Water Resource Engineering	PC	3-0-0	3
4.		1. Building Service and Maintenance 2. Sustainable Construction Materials. 3. Urban Hydrology	PE-I	3-0-0	3
5.		1. Civil Engineering Materials 2. Noise and Air Pollution 3. Disaster Mitigation and Management	OE-I	3-0-0	3
6.		Geotechnical Engineering Lab	PC	0-0-3	1.5
7.		Survey Field Work Lab (Survey Camp)	PC	0-0-3	1.5
8.		CAD Lab	SC	1-0-2	2
		Tinkering Lab	ES	2-0-0	1
9.		Evaluation of Community Service Project	PR		2
Total					23

Category	CREDITS
Professional core Courses	12
Professional Elective courses	3
Open Elective Course/Job oriented elective	3
Skill Enhancement course/soft skill course*	2
Engineering Science	1
Community Service Internship	2
TOTALCREDITS	23



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Dept. of Civil Engineering					
III Year II Semester					
S.No	Course Code	Course Name	Category	L-T-P	Credits
1.		Design of Steel Structures	PC	3-0-0	3
2.		Highway Engineering	PC	3-0-0	3
3.		Environmental Engineering	PC	3-0-0	3
4.		1. Design of Irrigation Structures 2. Repairs and Rehabilitation of Structures. 3. Expansive Soil	PE-II	3-0-0	3
5.		1. Earthquake Resistance Structures 2. Foundation Engineering 3. Advanced Structural Design	PE-III	3-0-0	3
6.		1. Green Buildings 2. Environmental Pollution Control. 3. Environmental Impact Assessment.	OE-II	3-0-0	3
7.		Environmental Engineering Lab	PC	0-0-3	1.5
8.		Highway Engineering Lab	PC	0-0-3	1.5
9.		STAAD	SC	1-0-2	2
10.		Technical paper writing & IPR	AC	2-0-0	0
Total					23
Industrial/Research Internship (Mandatory) for 8 weeks duration during summer vacation					

Category	CREDITS
Professional core courses	12
Professional Elective courses	6
Open Elective Course/Job oriented elective	3
Skill Enhancement course/soft skill course*	2
Audit course	0
TOTAL CREDITS	23



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IV Year I Semester					
S.No	Course Code	Course Name	Category	L-T-P	Credits
1.		Pre-Stressed Concrete	PC	3-0-0	3
2.		Construction Planning and Management	MGT	2-0-0	2
3.		1. Finite Element Methods 2. Geo-Informatics 3. Traffic Engineering	PE-IV	3-0-0	3
4.		1. Experimental Stress Analysis 2. Environmental Impact Assessment 3. Ground Improvement Techniques	PE-V	3-0-0	3
5.		1. Geographic Information System GIS 2. Sustainability in Engineering Practices. 3. Low-cost Effective Housing Techniques.	OE-III	3-0-0	3
6.		1. Solid Waste Management. 2. Construction Technology 3. Intelligent Transport System.	OE-IV	3-0-0	3
9.		Estimation, Specifications and Contracts	SC	1-0-2	2
10.		Constitution of India	AC	2-0-0	0
11		Evaluation of Summer Internship	PR	-	2
				Total	21

Category	CREDITS
Professional Core courses	3
Management Elective	2
Professional Elective courses	6
Open Elective Course/Job oriented elective	6
Skill Enhancement course/soft skill course*	2
Industrial/Research Internship	2
TOTAL CREDITS	21



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IV Year II Semester					
S.No	Course Code	Course Name	Category	L-T-P	Credits
1.		Internship	PR	-	4
2.		Project	PR	-	8
Total					12

Category	CREDITS
Internship	4
Project work	8
TOTAL CREDITS	12



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HONOURS IN CIVIL ENGINEERING

S.No	Course Code	Course Title	L-T-P	Credits
1		Advanced Structural Design	3-0-0	3
2		Advanced Concrete Technology	3-0-0	3
3		Stability of Structures	3-0-0	3
4		Repairs and Rehabilitation of Structures	3-0-0	3
5		Road Safety Engineering	3-0-0	3
6		Repairs And Rehabilitation of Structures Lab	0-0-3	1.5
7		Advanced Concrete Technology Lab	0-0-3	1.5
Total				18

LIST OF MINORS OFFERED BY THE CIVIL ENGINEERING

BUILDING PLANNING & CONSTRUCTION TECHNOLOGY

S.No	Course Code	Course Title	L-T-P	Credits
1		Building Materials	3-0-0	3
2		Construction Technology	3-0-0	3
3		Building Planning And Drawing	3-0-0	3
4		Surveying	3-0-0	3
5		Concrete Technology	3-0-0	3
6		Concrete Technology Lab	0-0-3	1.5
7		Surveying Lab	0-0-3	1.5



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I Year I Semester

S.No	Course Code	Course Name	Category	L-T-P	Credits
1.		Engineering Chemistry	BS&H	3-0-0	3
2.		Linear Algebra & Calculus	BS&H	3-0-0	3
3.		Basic Electrical & Electronics Engineering	ES	3-0-0	3
4.		Engineering Graphics	ES	1-0-4	3
5.		Introduction to Programming	ES	3-0-0	3
6.		I.T.Workshop	BS&H	0-0-2	1
7.		Electrical & Electronics Engineering Workshop	ES	0-0-3	1.5
8.		Engineering Chemistry Lab	ES	0-0-2	1
9		Introduction to Programming lab	ES	0-0-3	1.5
10		NCC/NSS,/Scouts & Guides/Community service	BS&H	0-0-1	0.5
				Total	20.5

Category	CREDITS
Engineering Science Courses	7.5
Basic Science and Humanities	12.5
TOTAL CREDITS	20.5



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Course Code	ENGINEERING CHEMISTRY	L	T	P	C
	(Common to Civil, Mechanical Engineering and allied branches)	3	0	0	3
I Year 1st Semester					
Course Objectives:					
<ul style="list-style-type: none"> • To familiarize engineering chemistry and its applications • To impart the concept of soft and hard waters, softening methods of hard water • To train the students on the principles and applications of electrochemistry, polymers, surface chemistry, and cement. 					
Course Outcomes (CO):					
<p>At the end of the course, the students will be able to</p> <p>CO1: Demonstrate the corrosion prevention methods and factors affecting corrosion.</p> <p>CO2: Explain the preparation, properties, and applications of thermoplastics & thermosetting, elastomers & conducting polymers.</p> <p>CO3: Explain calorific values, octane number, refining of petroleum and cracking of oils.</p> <p>CO4: Explain the setting and hardening of cement.</p> <p>CO5: Summarize the concepts of colloids, micelle and nanomaterials.</p>					
UNIT - I	Water Technology				
Soft and hardwater, Estimation of hardness of water by EDTA Method, Estimation of dissolved Oxygen - Boiler troubles –Priming, foaming, scale and sludge, Caustic embrittlement, Industrial water treatment – Specifications for drinking water, Bureau of Indian Standards(BIS) and World health organization(WHO) standards, Ion-exchange processes - desalination of brackish water, reverse osmosis (RO) and electro dialysis.					
UNIT II	Electrochemistry and Applications				
Electrodes –electrochemical cell, Nernst equation, cell potential calculations. Primary cells – Zinc-air battery, Secondary cells – Nickel-Cadmium (NiCad),and lithium ion batteries- working principle of the batteries including cell reactions; Fuel cells-Basic Concepts, the principle and working of hydrogen-oxygen Fuel cell. Corrosion: Introduction to corrosion, electrochemical theory of corrosion, differential aeration cell corrosion, galvanic corrosion, metal oxide formation by dry electrochemical corrosion, Pilling Bedworth ratios and uses, Factors affecting the corrosion, cathodic and anodic protection, electroplating and electro less plating (Nickel and Copper).					
UNIT - III	Polymers and Fuel Chemistry				
Introduction to polymers, functionality of monomers, Mechanism of chain growth, step growth polymerization. Thermoplastics and Thermo-setting plastics:- Preparation, properties and applications of poly styrene. PVC Nylon 6,6 and Bakelite. Elastomers – Preparation, properties and applications of Buna S, Buna N, Thiokol rubbers. Fuels – Types of fuels, calorific value of fuels, numerical problems based on calorific value; Analysis of coal (Proximate and Ultimate analysis), Liquid Fuels, refining of petroleum, Octane and Cetane number- alternative fuels- propane, methanol, ethanol and bio fuel-bio diesel.					
UNIT - IV	Modern Engineering Materials				
Composites- Definition, Constituents, Classification- Particle, Fibre and Structural reinforced composites, properties and Engineering applications Refractories- Classification, Properties, Factors affecting the refractory materials and Applications. Lubricants- Classification, Functions of lubricants, Mechanism, Properties of lubricating oils – Viscosity, Viscosity Index, Flash point, Fire point, Cloud point, saponification and Applications. Building materials- Portland Cement, constituents, Setting and Hardening of cement.).					



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UNIT - V	Surface Chemistry and Nanomaterials	
<p>Introduction to surface chemistry, colloids, nanometals and nanometal oxides, micelle formation, synthesis of colloids (Braggs Method), chemical and biological methods of preparation of nanometals and metal oxides, stabilization of colloids and nanomaterials by stabilizing agents, adsorption isotherm (Freundlich and Longmuir), BET equation (no derivation) applications of colloids and nanomaterials – catalysis, medicine, sensors, etc.</p>		
Textbooks:		
<ol style="list-style-type: none">1. Jain and Jain, Engineering Chemistry, 16/e, DhanpatRai, 2013.2. Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10/e, Oxford University Press, 2010.		
Reference Books:		
<ol style="list-style-type: none">1. H.F.W. Taylor, Cement Chemistry, 2/e, Thomas Telford Publications, 1997.2. D.J. Shaw, Introduction to Colloids and Surface Chemistry, Butterworth-Heinemann, 1992.3. Textbook of Polymer Science, Fred W. Billmeyer Jr, 3rd Edition		



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Course Code	LINEAR ALGEBRA & CALCULUS (Common to All Branches of Engineering)	L	T	P	C
		3	0	0	3
I Year 1st Semester					
Course Objectives:					
<ul style="list-style-type: none"> To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real-world problems and their applications 					
Course Outcomes (CO):					
At the end of the course, the student will be able to CO1: Develop and use of matrix algebra techniques that are needed by engineers for practical applications. CO2: Utilize mean value theorems to real life problems. CO3: Familiarize with functions of several variables which is useful in optimization. CO4: Learn important tools of calculus in higher dimensions. CO5: Familiarize with double and triple integrals of functions of several variables in two dimensions using Cartesian and polar coordinates and in three dimensions using cylindrical and spherical coordinates.					
UNIT - I	Matrices				
Rank of a matrix by echelon form, normal form. Cauchy–Binet formulae (without proof). Inverse of Non- singular matrices by Gauss-Jordan method, System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations by Gauss elimination method, Jacobi and Gauss Seidel Iteration Methods.					
UNIT II	Eigenvalues, Eigenvectors and Orthogonal Transformation				
Eigenvalues, 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	Calculus				
Mean Value Theorems: Rolle’s Theorem, Lagrange’s mean value theorem with their geometrical interpretation, Cauchy’s mean value theorem, Taylor’s and Maclaurin theorems with remainders (without proof), Problems and applications on the above theorems					
UNIT - IV	Partial differentiation and Applications (Multi variable calculus)				
Functions of several variables: Continuity and Differentiability, Partial derivatives, total derivatives, chain rule, Directional derivative, Taylor’s and Maclaurin’s series expansion of functions of two variables. Jacobians, Functional dependence, maxima and minima of functions of two variables, method of Lagrange multipliers.					
UNIT - V	Multiple Integrals (Multi variable Calculus)				
Double integrals, triple integrals, change of order of integration, change of variables to polar, cylindrical and spherical coordinates. Finding areas (by double integrals) and volumes (by double integrals and triple integrals).					



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Textbooks:

1. Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, 2017, 44th Edition
2. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons, 2018, 10th Edition.

Reference Books:

1. Thomas Calculus, George B. Thomas, Maurice D. Weir and Joel Hass, Pearson Publishers, 2018, 14th Edition.
2. Advanced Engineering Mathematics, R. K. Jain and S. R. K. Iyengar, Alpha Science International Ltd., 2021 5th Edition (9th reprint).
3. Advanced Modern Engineering Mathematics, Glyn James, Pearson publishers, 2018, 5th Edition.
4. Advanced Engineering Mathematics, Micheael Greenberg, , Pearson publishers, 9th edition
5. Higher Engineering Mathematics, H. K Das, Er. Rajnish Verma, S. Chand Publications, 2014, Third Edition (Reprint 2021)



Sri Krishnadevaraya University
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Civil Engineering

Course Code	BASIC ELECTRICAL & ELECTRONICS ENGINEERING (Common to All branches of Engineering)	L	T	P	C
		3	0	0	3
I Year 1st Semester					
Course Objectives:					
<ul style="list-style-type: none"> To expose to the field of electrical & electronics engineering, laws and principles of electrical/electronic engineering and to acquire fundamental knowledge in the relevant field. 					
Course Outcomes (CO):					
<p>After the completion of the course students will be able to</p> <p>CO1: Remember the fundamental laws, operating principles of motors, generators, MC and MI instruments.</p> <p>CO2: Understand the problem-solving concepts associated to AC and DC circuits, construction and operation of AC and DC machines, measuring instruments; different power generation mechanisms, Electricity billing concept and important safety measures related to electrical operations.</p> <p>CO3: Apply mathematical tools and fundamental concepts to derive various equations related to machines, circuits and measuring instruments; electricity bill calculations and layout representation of electrical power systems.</p> <p>CO4: Analyze different electrical circuits, performance of machines and measuring instruments.</p> <p>CO5: Evaluate different circuit configurations, Machine performance and Power systems operation.</p>					
PART A: BASIC ELECTRICAL ENGINEERING					
UNIT I	DC & AC Circuits				
<p>DC Circuits: Electrical circuit elements (R, L and C), Ohm’s Law and its limitations, KCL & KVL, series, parallel, series-parallel circuits, Super Position theorem, Simple numerical problems.</p> <p>AC Circuits: A.C. Fundamentals: Equation of AC Voltage and current, waveform, time period, frequency, amplitude, phase, phase difference, average value, RMS value, form factor, peak factor, Voltage and current relationship with phasor diagrams in R, L, and C circuits, Concept of Impedance, Active power, reactive power and apparent power, Concept of power factor (Simple Numerical problems).</p>					
UNIT II	Machines and Measuring Instruments				
<p>Machines: Construction, principle and operation of (i) DC Motor, (ii) DC Generator, (iii) Single Phase Transformer, (iv) Three Phase Induction Motor and (v) Alternator, Applications of electrical machines.</p> <p>Measuring Instruments: Construction and working principle of Permanent Magnet Moving Coil (PMMC), Moving Iron (MI) Instruments and Wheat Stone bridge.</p>					
UNIT - III	Energy Resources, Electricity Bill & Safety Measures				
<p>Energy Resources: Conventional and non-conventional energy resources; Layout and operation of various Power Generation systems: Hydrel, Nuclear, Solar & Wind power generation.</p> <p>Electricity bill: Power rating of household appliances including air conditioners, PCs, Laptops, Printers, etc. Definition of “unit” used for consumption of electrical energy, two-part electricity tariff, calculation of electricity bill for domestic consumers.</p> <p>Equipment Safety Measures: Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits. Personal safety measures: Electric Shock, Earthing and its types, Safety Precautions to avoid shock.</p>					



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Textbooks:

1. Basic Electrical Engineering, D. C. Kulshreshtha, Tata McGraw Hill, 2019, First Edition
2. Power System Engineering, P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, Dhanpat Rai & Co, 2013
3. Fundamentals of Electrical Engineering, Rajendra Prasad, PHI publishers, 2014, Third Edition

Reference Books:

1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, Mc Graw Hill, 2019, Fourth Edition
 2. Principles of Power Systems, V.K. Mehtha, S.Chand Technical Publishers, 2020
 3. Basic Electrical Engineering, T. K. Nagsarkar and M. S. Sukhija, Oxford University Press, 2017
- Basic Electrical and Electronics Engineering, S. K. Bhattacharya, Person Publications, 2018, Second Edition.

Web Resources:

1. <https://nptel.ac.in/courses/108105053>
2. <https://nptel.ac.in/courses/108108076>

PART B: BASIC ELECTRONICS ENGINEERING**Course Objectives:**

To teach the fundamentals of semiconductor devices and its applications, principles of digital electronics.

UNIT I**SEMICONDUCTOR DEVICES**

Introduction - Evolution of electronics – Vacuum tubes to nano electronics - Characteristics of PN Junction Diode — Zener Effect — Zener Diode and its Characteristics. Bipolar Junction Transistor — CB, CE, CC Configurations and Characteristics — Elementary Treatment of Small Signal CE Amplifier.

UNIT II BASIC ELECTRONIC CIRCUITS AND INSTRUMENTATION

Rectifiers and power supplies: Block diagram description of a dc power supply, working of a full wave bridge rectifier, capacitor filter (no analysis), working of simple zener voltage regulator. Amplifiers: Block diagram of Public Address system, Circuit diagram and working of common emitter (RC coupled) amplifier with its frequency response. Electronic Instrumentation: Block diagram of an electronic instrumentation system.

UNIT III DIGITAL ELECTRONICS

Overview of Number Systems, Logic gates including Universal Gates, BCD codes, Excess-3 code, Graycode, Hamming code. Boolean Algebra, Basic Theorems and properties of Boolean Algebra, Truth Tables and Functionality of Logic Gates – NOT, OR, AND, NOR, NAND, XOR and XNOR. Simple combinational circuits–Half and Full Adders. Introduction to sequential circuits, Flip flops.

Textbooks:

1. R. L. Boylestad & Louis Nashlesky, Electronic Devices & Circuit Theory, Pearson Education, 2021.
2. R. P. Jain, Modern Digital Electronics, 4th Edition, Tata Mc Graw Hill, 2009

Reference Books:

1. R. S. Sedha, A Textbook of Electronic Devices and Circuits, S. Chand & Co, 2010.
2. Santiram Kal, Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall, India, 2002.
3. R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Edition, Pearson Education, 2009.



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Civil Engineering

Course Code	ENGINEERING GRAPHICS (Common to All branches of Engineering)	L	T	P	C
		1	0	4	3
I Year 1st Semester					
Course Objectives:					
<ul style="list-style-type: none"> • To enable the students with various concepts like dimensioning, conventions and standards related to Engineering Drawing • To impart knowledge on the projection of points, lines and plane surfaces • To improve the visualization skills for better understanding of projection of solids • To develop the imaginative skills of the students required to understand Section of solids and Developments of surfaces. • To make the students understand the viewing perception of a solid object in Isometric and Perspective projections. 					
Course Outcomes (CO):					
CO1: Understand the principles of engineering drawing, including engineering curves, scales, orthographic and isometric projections. CO2: Draw and interpret orthographic projections of points, lines, planes and solids in front, top and side views. CO3: Understand and draw projection of solids in various positions in first quadrant.CO4: Explain principles behind development of surfaces. CO5: Prepare isometric and perspective sections of simple solids.					
UNIT - I					
Introduction: Lines, Lettering and Dimensioning, Geometrical Constructions and Constructing regular polygons by general methods. Curves: construction of ellipse, parabola and hyperbola by general, Cycloids, Involute, Normal and tangent to Curves. Scales: Plain scales, diagonal scales and vernier scales.					
UNIT II					
Orthographic Projections: Reference plane, importance of reference lines or Plane, Projections of a point situated in any one of the four quadrants. Projections of Straight Lines: Projections of straight lines parallel to both reference planes, perpendicular to one reference plane and parallel to other reference plane, inclined to one reference plane and parallel to the other reference plane. Projections of Straight Line Inclined to both the reference planes Projections of Planes: regular planes Perpendicular to both reference planes, parallel to one reference plane and inclined to the other reference plane; plane inclined to both the reference planes.					
UNIT - III					
Projections of Solids: Types of solids: Polyhedra and Solids of revolution. Projections of solids in simple positions: Axis perpendicular to horizontal plane, Axis perpendicular to vertical plane and Axis parallel to both the reference planes, Projection of Solids with axis inclined to one reference plane and parallel to another plane, inclined to both the reference planes.					
UNIT - IV					
Sections of Solids: Perpendicular and inclined section planes, Sectional views and True shape of section, Sections of solids in simple position only. Development of Surfaces: Methods of Development: Parallel line development and radial line development. Development of a cube, prism, cylinder, pyramid and cone					
UNIT - V					
Conversion of Views: Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.					
Computer graphics: Creating 2D&3D drawings of objects including PCB and Transformations using Auto CAD (Not for end examination).					



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Textbooks:

1. N. D. Bhatt, Engineering Drawing, Charotar Publishing House, 2016
2. Engineering Drawing by K.L. Narayana & P. Kannaiah Tata Mcgrawhill Publications as textbook
3. Engineering Drawing - R.K. Dhawan, S Chand Publications

Reference Books:

1. Engineering Drawing - K.R. Gopala Krishna, Subhas publications, as reference books .
2. Engineering Drawing, M.B.Shah and B.C. Rana, Pearson Education Inc,2009.
3. Engineering Drawing with an Introduction to AutoCAD, Dhananjay Jolhe, TataMcGraw Hill, 2017.



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Civil Engineering

Course Code	INTRODUCTION TO PROGRAMMING (Common to All branches of Engineering)	L	T	P	C
		3	0	0	3
I Year 1st Semester					
Course Objectives:					
<ul style="list-style-type: none"> ● To introduce students to the fundamentals of computer programming. ● To provide hands-on experience with coding and debugging. ● To foster logical thinking and problem-solving skills using programming. ● To familiarize students with programming concepts such as data types, control structures, functions, and arrays. ● To encourage collaborative learning and teamwork in coding projects. 					
Course Outcomes (CO):					
<p>A student after completion of the course will be able to</p> <p>CO1: Understand basics of computers, the concept of algorithm and algorithmic thinking. CO2: Analyse a problem and develop an algorithm to solve it. CO3: Implement various algorithms using the C programming language. CO4: Understand more advanced features of C language. CO5: Develop problem-solving skills and the ability to debug and optimize the code</p>					
UNIT - I	Introduction to Programming and Problem Solving				
<p>History of Computers, Basic organization of a computer: ALU, input-output units, memory, program counter, Introduction to Programming Languages, Basics of a Computer Program- Algorithms, flowcharts (Using Dia Tool), pseudo code. Introduction to Compilation and Execution, Primitive Data Types, Variables, and Constants, Basic Input and Output, Operations, Type Conversion, and Casting.</p> <p>Problem solving techniques: Algorithmic approach, characteristics of algorithm, Problem solving strategies: Top-down approach, Bottom-up approach, Time and space complexities of algorithms</p>					
UNIT II	Control Structures				
<p>Simple sequential programs Conditional Statements (if, if-else, switch), Loops (for, while, do-while) Break and Continue.</p>					
UNIT - III	Arrays and Strings				
<p>Arrays indexing, memory model, programs with array of integers, two dimensional arrays, Introduction to Strings.</p>					
UNIT - IV	Pointers & User Defined Data types				
<p>Pointers, dereferencing and address operators, pointer and address arithmetic, array manipulation using pointers, User-defined data types-Structures and Unions.</p>					
UNIT - V	Functions & File Handling				
<p>Introduction to Functions, Function Declaration and Definition, Function call Return Types and Arguments, modifying parameters inside functions using pointers, arrays as parameters. Scope and Lifetime of Variables, Basics of File Handling</p> <p>Note: The syllabus is designed with C Language as the fundamental language of implementation.</p>					



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Textbooks:

1. "The C Programming Language", Brian W. Kernighan and Dennis M. Ritchie, Prentice-Hall, 1988
2. Schaum's Outline of Programming with C, Byron S Gottfried, McGraw-Hill Education, 1996

Reference Books:

1. Computing fundamentals and C Programming, Balagurusamy, E., McGraw-Hill Education, 2008.
2. Programming in C, Rema Theraja, Oxford, 2016, 2nd edition
3. C Programming, A Problem-Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE, 3rd edition



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Civil Engineering

Course Code	IT WORKSHOP	L	T	P	C
	(Common to all branches of Engineering)	0	0	2	1
I Year 1st Semester					
Course Objectives:					
<ul style="list-style-type: none"> ● To introduce the internal parts of a computer, peripherals, I/O ports, connecting cables ● To demonstrate configuring the system as Dual boot both Windows and other Operating Systems Viz. Linux, BOSS ● To teach basic command line interface commands on Linux. ● To teach the usage of Internet for productivity and self-paced life-long learning ● To introduce Compression, Multimedia and Antivirus tools and Office Tools such as Word processors, Spread sheets and Presentation tools. 					
Course Outcomes (CO):					
CO1: Perform Hardware troubleshooting. CO2: Understand Hardware components and inter dependencies. CO3: Safeguard computer systems from viruses/worms. CO4: Document/ Presentation preparation. CO5: Perform calculations using spreadsheets.					
PC Hardware & Software Installation					
<p>Task 1: Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.</p> <p>Task 2: Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.</p> <p>Task 3: Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.</p> <p>Task 4: Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot (VMWare) with both Windows and Linux. Lab instructors should verify the installation and follow it up with a Viva</p> <p>Task 5: Every student should install BOSS on the computer. The system should be configured as dual boot (VMWare) with both Windows and BOSS. Lab instructors should verify the installation and follow it up with a Viva</p>					
Internet & World Wide Web					
<p>Task 1: Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.</p> <p>Task 2: Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.</p> <p>Task 3: Search Engines & Netiquette: Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student.</p> <p>Task 4: Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms.</p>					

**LaTeX and WORD**

Task 1 – Word Orientation: The mentor needs to give an overview of La TeX and Microsoft (MS) office or equivalent (FOSS) tool word: Importance of La TeX and MS office or equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using La TeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.

Task 2: Using La TeX and Word to create a project certificate. Features to be covered:- Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both La TeX and Word.

Task 3: Creating project abstract Features to be covered:- Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

Task 4: Creating a Newsletter: Features to be covered:- Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

EXCEL

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

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

Task 2: Calculating GPA -. Features to be covered:- Cell Referencing, Formulae in excel – average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function.

LOOKUP/VLOOKUP

Task 3: Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting

POWER POINT

Task 1: Students will be working on basic power point utilities and tools which help them create basic power point presentations. PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in PowerPoint.

Task 2: Interactive presentations - Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts.

Task 3: Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), and Inserting – Background, textures, Design Templates, Hidden slides.

AI TOOLS – ChatGPT

Task 1: Prompt Engineering: Experiment with different types of prompts to see how the model responds. Try asking questions, starting conversations, or even providing incomplete sentences to see how the model completes them.

- Ex: Prompt: "You are a knowledgeable AI. Please answer the following question: What is the capital of France?"

Task 2: Creative Writing: Use the model as a writing assistant. Provide the beginning of a story or a description of a scene, and let the model generate the rest of the content. This can be a fun way to brainstorm creative ideas

- Ex: Prompt: "In a world where gravity suddenly stopped working, people started floating upwards. Write a story about how society adapted to this new reality."

Task 3: Language Translation: Experiment with translation tasks by providing a sentence in one language and asking the model to translate it into another language. Compare the output to see how accurate and fluent the translations are.

- Ex: Prompt: "Translate the following English sentence to French: 'Hello, how are you doing today?'"



Reference Books:

1. Comdex Information Technology course tool kit, Vikas Gupta, WILEY Dream tech, 2003
2. The Complete Computer upgrade and repair book, Cheryl A Schmidt, WILEY Dream tech, 2013, 3rd edition
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education, 2012, 2nd edition.
4. PC Hardware - A Handbook, Kate J. Chase, PHI (Microsoft)
5. LaTeX Companion, Leslie Lamport, PHI/Pearson.
6. IT Essentials PC Hardware and Software Companion Guide, David Anfinson and Ken Quamme. – CISCO Press, Pearson Education, 3rd edition
7. IT Essentials PC Hardware and Software Labs and Study Guide, Patrick Regan– CISCO Press, Pearson Education, 3rd edition



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Civil Engineering

Course Code	ELECTRICAL & ELECTRONICS ENGINEERING WORKSHOP (Common to All branches of Engineering)	L	T	P	C
		0	0	3	1.5
I Year 1st Semester					
Course Objectives:					
To impart knowledge on the fundamental laws & theorems of electrical circuits, functions of electrical machines and energy calculations					
Course Outcomes (CO):					
<p>CO1: Understand the Electrical circuit design concept; measurement of resistance, power, power factor; concept of wiring and operation of Electrical Machines and Transformer.</p> <p>CO2: Apply the theoretical concepts and operating principles to derive mathematical models for circuits, Electrical machines and measuring instruments; calculations for the measurement of resistance, power and power factor.</p> <p>CO3: Apply the theoretical concepts to obtain calculations for the measurement of resistance, power and power factor.</p> <p>CO4: Analyse various characteristics of electrical circuits, electrical machines and measuring instruments.</p> <p>CO5: Design suitable circuits and methodologies for the measurement of various electrical parameters; Household and commercial wiring.</p>					
Activities:					
<p>Familiarization of commonly used Electrical & Electronic Workshop Tools: Bread board, Solder, cables, relays, switches, connectors, fuses, Cutter, plier, screwdriver set, wire stripper, flux, knife/blade, soldering iron, de-soldering pump etc.</p> <p>Provide some exercises so that hardware tools and instruments are learned to be used by the students.</p> <p>Familiarization of Measuring Instruments like Voltmeters, Ammeters, multimeter, LCR-Q meter, Power Supplies, CRO, DSO, Function Generator, Frequency counter.</p> <p>Provide some exercises so that measuring instruments are learned to be used by the students.</p> <p>Components:</p> <p>Familiarization/Identification of components (Resistors, Capacitors, Inductors, Diodes, transistors, IC's etc.) – Functionality, type, size, colour coding package, symbol, cost etc.</p> <p>Testing of components like Resistor, Capacitor, Diode, Transistor, ICs etc. - Compare values of components like resistors, inductors, capacitors etc with the measured values by using instruments</p>					
PART A: ELECTRICAL ENGINEERING LAB					
List of experiments:					
<ol style="list-style-type: none"> 1. Verification of KCL and KVL 2. Verification of Superposition theorem 3. Measurement of Resistance using Wheat stone bridge 4. Magnetization Characteristics of DC shunt Generator 5. Measurement of Power and Power factor using Single-phase wattmeter 6. Measurement of Earth Resistance using Megger 7. Calculation of Electrical Energy for Domestic Premises 					



Reference Books: <ol style="list-style-type: none">1. Basic Electrical Engineering, D. C. Kulshreshtha, Tata McGraw Hill, 2019, FirstEdition2. Power System Engineering, P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, Dhanpat Rai & Co, 20133. Fundamentals of Electrical Engineering, Rajendra Prasad, PHI publishers, 2014, ThirdEdition <p>Note: Minimum Six Experiments to be performed.</p>
PART B: ELECTRONICS ENGINEERING LAB
Course Objectives: <ul style="list-style-type: none">• To impart knowledge on the principles of digital electronics and fundamentals of electron devices & its applications.
Course Outcomes: At the end of the course, the student will be able to CO1: Identify & testing of various electronic components. CO2: Understand the usage of electronic measuring instruments. CO3: Plot and discuss the characteristics of various electron devices. CO4: Explain the operation of a digital circuit.
List of Experiments: <ol style="list-style-type: none">1. Plot V-I characteristics of PN Junction diode A) Forward bias B) Reverse bias.2. Plot V – I characteristics of Zener Diode and its application as voltage Regulator.3. Implementation of half wave and full wave rectifiers 4. Plot Input & Output characteristics of BJT in CE and CB configurations5. Frequency response of CE amplifier.6. Simulation of RC coupled amplifier with the design supplied7. Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates using ICs.8. Verification of Truth Tables of S-R, J-K & D flip flops using respective ICs. <p>Tools / Equipment Required: DC Power supplies, Multi meters, DC Ammeters, DC Voltmeters, AC Voltmeters, CROs, all the required active devices.</p>
References: <ol style="list-style-type: none">1. R. L. Boylestad & Louis Nashlesky, Electronic Devices & Circuit Theory, Pearson Education, 2021.2. R. P. Jain, Modern Digital Electronics, 4th Edition, Tata Mc Graw Hill, 20093. R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version, Pearson Education, 2009. <p>Note: Minimum Six Experiments to be performed. All the experiments shall be implemented using both Hardware and Software.</p>



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Civil Engineering

Course Code	ENGINEERING CHEMISTRY LAB (Common to Civil, Mechanical Engineering & allied branches)	L	T	P	C
		0	0	2	1
I Year 1st Semester					
Course Objectives:					
Verify the fundamental concepts with experiments.					
Course Outcomes (CO):					
At the end of the course, the students will be able to CO1: Determine the cell constant and conductance of solutions. CO2: Prepare advanced polymer materials. CO3: Determine the physical properties like surface tension, adsorption and viscosity. CO4: Estimate the Iron and Calcium in cement. CO5: Calculate the hardness of water.					
Experiments					
<ol style="list-style-type: none">1. Determination of Hardness of a groundwater sample.2. Estimation of Dissolved Oxygen by Winkler's method3. Determination of Strength of an acid in Pb-Acid battery4. Preparation of a polymer (Bakelite)5. Determination of percentage of Iron in Cement sample by colorimetry6. Estimation of Calcium in port land Cement7. Preparation of nanomaterials by precipitation method.8. Adsorption of acetic acid by charcoal9. Determination of percentage Moisture content in a coal sample10. Determination of Viscosity of lubricating oil by Redwood Viscometer 111. Determination of Viscosity of lubricating oil by Redwood Viscometer 212. Determination of Calorific value of gases by Junker's gas Calorimeter					
Reference:					
"Vogel's Quantitative Chemical Analysis 6th Edition 6th Edition" Pearson Publications by J. Mendham, R.C. Denney, J.D. Barnes and B. Sivasankar					



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Civil Engineering

Course Code	INTRODUCTION TO PROGRAMMING LAB (Common to All Branches of Engineering)	L	T	P	C
		0	0	3	1.5
I Year 1st Semester					
Course Objectives:					
<ul style="list-style-type: none"> The course aims to give students hands – on experience and train them on the concepts of the C- programming language 					
Course Outcomes (CO):					
<ul style="list-style-type: none"> CO1: Read, understand, and trace the execution of programs written in C language. CO2: Select the right control structure for solving the problem. CO3: Develop C programs which utilize memory efficiently using programming constructs like pointers. CO4: Develop, Debug and Execute programs to demonstrate the applications of arrays, functions, basic concepts of pointers in C 					
List of Experiments:					
<p>UNIT I WEEK 1</p> <p>Objective: Getting familiar with the programming environment on the computer and writing the first program.</p> <p>Suggested Experiments/Activities:</p> <p>Tutorial 1: Problem-solving using Computers.</p> <p>Lab1: Familiarization with programming environment</p> <ol style="list-style-type: none"> Basic Linux environment and its editors like Vi, Vim & Emacs etc. Exposure to Turbo C, gcc Writing simple programs using printf(), scanf() <p>WEEK 2</p> <p>Objective: Getting familiar with how to formally describe a solution to a problem in a series of finite steps both using textual notation and graphic notation.</p> <p>Suggested Experiments /Activities:</p> <p>Tutorial 2: Problem-solving using Algorithms and Flow charts.</p> <p>Lab 1: Converting algorithms/flow charts into C Source code. Developing the algorithms/flowcharts for the following sample programs</p> <ol style="list-style-type: none"> Sum and average of 3 numbers Conversion of Fahrenheit to Celsius and vice versa Simple interest calculation <p>WEEK 3</p> <p>Objective: Learn how to define variables with the desired data-type, initialize them with appropriate values and how arithmetic operators can be used with variables and constants.</p> <p>Suggested Experiments/Activities:</p> <p>Tutorial 3: Variable types and type conversions:</p> <p>Lab 3: Simple computational problems using arithmetic expressions.</p> <ol style="list-style-type: none"> Finding the square root of a given number Finding compound interest Area of a triangle using heron's formulae Distance travelled by an object. 					

**UNIT II WEEK 4**

Objective: Explore the full scope of expressions, type-compatibility of variables & constants and operators used in the expression and how operator precedence works.

Suggested Experiments/Activities:

Tutorial4: Operators and the precedence and as associativity:

Lab4: Simple computational problems using the operator' precedence and associativity

- i) Evaluate the following expressions.
 - a. $A+B*C+(D*E) + F*G$
 - b. $A/B*C-B+A*D/3$
 - c. $A+++B---A$
 - d. $J=(i++) + (++i)$
- ii) Find the maximum of three numbers using conditional operator
- iii) Take marks of 5 subjects in integers, and find the total, average in float

WEEK 5

Objective: Explore the full scope of different variants of “if construct” namely if-else, null-else, if-else if*-else, switch and nested-if including in what scenario each one of them can be used and how to use them. Explore all relational and logical operators while writing conditionals for “if construct”.

Suggested Experiments/Activities:

Tutorial 5: Branching and logical expressions:

Lab 5: Problems involving if-then-else structures.

- i) Write a C program to find the max and min of four numbers using if-else.
- ii) Write a C program to generate electricity bill.
- iii) Find the roots of the quadratic equation.
- iv) Write a C program to simulate a calculator using switch case.
- v) Write a C program to find the given year is a leap year or not.

WEEK 6

Objective: Explore the full scope of iterative constructs namely while loop, do-while loop and

for loop in addition to structured jump constructs like break and continue including when each of these statements is more appropriate to use.

Suggested Experiments/Activities:

Tutorial 6: Loops, while and for loops

Lab 6: Iterative problems e.g., the sum of series

- i) Find the factorial of given number using any loop.
- ii) Find the given number is a prime or not.
- iii) Compute sine and cos series
- iv) Checking a number palindrome
- v) Construct a pyramid of numbers.
- vi)

UNIT III WEEK 7:

Objective: Explore the full scope of Arrays construct namely defining and initializing 1-D and 2-D and more generically n-D arrays and referencing individual array elements from³⁶ the defined array. Using integer 1-D arrays, explore search solution linear search.



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Suggested Experiments/Activities:**Tutorial 7:** 1 D Arrays: searching.**Lab 7:** 1D Array manipulation, linear search

- i) Find the min and max of a 1-D integer array.
- ii) Perform linear search on 1D array.
- iii) The reverse of a 1D integer array
- iv) Find 2's complement of the given binary number.
- v) Eliminate duplicate elements in an array.

WEEK 8:

Objective: Explore the difference between other arrays and character arrays that can be used as Strings by using null character and get comfortable with string by doing experiments that will reverse a string and concatenate two strings. Explore sorting solution bubble sort using integer arrays.

Suggested Experiments/Activities:**Tutorial 8:** 2 D arrays, sorting and Strings.**Lab 8:** Matrix problems, String operations, Bubble sort

- i) Addition of two matrices
- ii) Multiplication two matrices
- iii) Sort array elements using bubble sort
- iv) Concatenate two strings without built-in functions
- v) Reverse a string using built-in and without built-in string functions

UNIT IV WEEK 9:

Objective: Explore pointers to manage a dynamic array of integers, including memory allocation & value initialization, resizing changing and reordering the contents of an array and memory de-allocation using malloc (), calloc (), realloc () and free () functions. Gain experience processing command-line arguments received by C

Suggested Experiments/Activities:**Tutorial 9:** Pointers, structures and dynamic memory allocation**Lab 9:** Pointers and structures, memory dereference.

- i) Write a C program to find the sum of a 1D array using malloc()
- ii) Write a C program to find the total, average of n students using structures
- iii) Enter n students data using calloc() and display failed students list
- iv) Read student name and marks from the command line and display the student details alongwith the total.
- v) Write a C program to implement realloc()

WEEK 10:

Objective: Experiment with C Structures, Unions, bit fields and self-referential structures (Singly linked lists) and nested structures

Suggested Experiments/Activities:**Tutorial 10:** Bitfields, Self-Referential Structures, Linked lists**Lab 10 :** Bitfields, linked lists

Read and print a date using dd/mm/yyyy format using bit-fields and differentiate the same without using bit- fields

- i) Create and display a singly linked list using self-referential structure.
- ii) Demonstrate the differences between structures and unions using a C program.
- iii) Write a C program to shift/rotate using bitfields.
- iv) Write a C program to copy one structure variable to another structure of the same type.

UNIT V WEEK 11:

Objective: Explore the Functions, sub-routines, scope and extent of variables, doing some experiments by parameter passing using call by value. Basic methods of numerical integration

**Suggested Experiments/Activities:****Tutorial 11:** Functions, call by value, scope and extent,**Lab 11:** Simple functions using call by value, solving differential equations using Eulers theorem.

- i) Write a C function to calculate NCR value.
- ii) Write a C function to find the length of a string.
- iii) Write a C function to transpose of a matrix.
- iv) Write a C function to demonstrate numerical integration of differential equations using Euler's method

WEEK 12:**Objective:** Explore how recursive solutions can be programmed by writing recursive functions that can be invoked from the main by programming at-least five distinct problems that have naturally recursive solutions.**Suggested Experiments/Activities:****Tutorial 12:** Recursion, the structure of recursive calls**Lab 12:** Recursive functions

- i) Write a recursive function to generate Fibonacci series.
- ii) Write a recursive function to find the lcm of two numbers.
- iii) Write a recursive function to find the factorial of a number.
- iv) Write a C Program to implement Ackermann function using recursion.
- v) Write a recursive function to find the sum of series.

WEEK 13:**Objective:** Explore the basic difference between normal and pointer variables, Arithmetic operations using pointers and passing variables to functions using pointers**Suggested Experiments/Activities:****Tutorial 13:** Call by reference, dangling pointers**Lab 13:** Simple functions using Call by reference, Dangling pointers.

- i) Write a C program to swap two numbers using call by reference.
- ii) Demonstrate Dangling pointer problem using a C program.
- iii) Write a C program to copy one string into another using pointer.
- iv) Write a C program to find no of lowercase, uppercase, digits and other characters using pointers.

WEEK 14:**Objective:** To understand data files and file handling with various file I/O functions. Explore the differences between text and binary files.**Suggested Experiments/Activities:****Tutorial 14:** File handling**Lab 14:** File operations

- i) Write a C program to write and read text into a file.
- ii) Write a C program to write and read text into a binary file using fread() and fwrite()
- iii) Copy the contents of one file to another file.
- iv) Write a C program to merge two files into the third file using command-line arguments.
- v) Find no. of lines, words, and characters in a file
- vi) Write a C program to print last n characters of a given file.



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Textbooks:

1. Ajay Mittal, Programming in C: A practical approach, Pearson.
2. Byron Gottfried, Schaum's Outline of Programming with C, McGraw Hill

Reference Books:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice-Hall of India
2. C Programming, A Problem-Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE



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Course Code	NSS/NCC/SCOUTS & GUIDES/COMMUNITY SERVICE (Common to All branches of Engineering)	L	T	P	C
		0	0	1	0.5
I Year 1st Semester					
Course Objectives:					
<ul style="list-style-type: none"> The objective of introducing this course is to impart discipline, character, fraternity, teamwork, social consciousness among the students and engaging them in selfless service. 					
Course Outcomes (CO):					
<p>After completion of the course the students will be able to</p> <p>CO1: Understand the importance of discipline, character and service motto. CO2: Solve some societal issues by applying acquired knowledge, facts, and techniques. CO3: Explore human relationships by analyzing social problems. CO4: Determine to extend their help for the fellow beings and downtrodden people. CO5: Develop leadership skills and civic responsibilities</p>					
UNIT I Orientation					
General Orientation on NSS/NCC/ Scouts & Guides/Community Service activities, careerguidance.					
Activities:					
i) Conducting –ice breaking sessions-expectations from the course-knowing personal talents and skills ii) Conducting orientations programs for the students –future plans-activities-releasing road map etc. iii) Displaying success stories-motivational biopics- award winning movies on societal issues etc. iv) Conducting talent show in singing patriotic songs-paintings- any other contribution.					
UNIT II Nature & Care Activities:					
i) Best out of waste competition. ii) Poster and signs making competition to spread environmental awareness. iii) Recycling and environmental pollution article writing competition. iv) Organising Zero-waste day. v) Digital Environmental awareness activity via various social media platforms. vi) Virtual demonstration of different eco-friendly approaches for sustainable living. vii) Write a summary on any book related to environmental issues.					
UNIT III Community Service					
Activities:					
i) Conducting One Day Special Camp in a village contacting village-area leaders- Survey in the village, identification of problems- helping them to solve via media- authorities-experts-etc. ii) Conducting awareness programs on Health-related issues such as General Health, Mental health, Spiritual Health, HIV/AIDS, iii) Conducting consumer Awareness. Explaining various legal provisions etc. iv) Women Empowerment Programmes- Sexual Abuse, Adolescent Health and Population Education. v) Any other programmes in collaboration with local charities, NGOs etc.					
Reference Books:					
40					
1. Nirmalya Kumar Sinha & Surajit Majumder, <i>A Text Book of National Service Scheme</i> Vol;I, Vidya Kutir Publication, 2021 (ISBN 978-81-952368-8-6)					



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2. *Red Book - National Cadet Corps – Standing Instructions Vol I & II*, Directorate General of NCC, Ministry of Defence, New Delhi
3. Davis M. L. and Cornwell D. A., “Introduction to Environmental Engineering”, McGraw Hill, New York 4/e 2008
4. Masters G. M., Joseph K. and Nagendran R. “Introduction to Environmental Engineering and Science”, Pearson Education, New Delhi. 2/e 2007
5. Ram Ahuja. *Social Problems in India*, Rawat Publications, New Delhi.

General Guidelines:

1. Institutes must assign slots in the Timetable for the activities.
2. Institutes are required to provide instructor to mentor the students.

Evaluation Guidelines:

- Evaluated for a total of 100 marks.
- A student can select 6 activities of his/her choice with a minimum of 01 activity per unit. Each activity shall be evaluated by the concerned teacher for 15 marks, totalling to 90 marks.
- A student shall be evaluated by the concerned teacher for 10 marks by conducting vivavoce on the subject.



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Dept. Civil Engineering					
I Year II Semester					
S.No	Course Code	Course Name	Category	L-T-P	Credits
1.		Communicative English	BS&H	2-0-0	2
2.		Engineering Physics	BS & H	3-0-0	3
3.		Differential Equations and Vector calculus	ES	3-0-0	3
4.		Basic Civil & Mechanical Engineering	ES	3-0-0	3
5.		Engineering Mechanics	PC	3-0-0	3
6.		Communicative English Lab	BS& H	0-0-2	1
7.		Engineering Physics Lab	BS& H	0-0-2	1
8.		Engineering Workshop	ES	0-0-3	1.5
9.		Engineering Mechanics and Building Practices Lab	PC	0-0-3	1.5
10.		Health & Wellness, YOGA and Sports	BS&H	0-0-1	0.5
				Total	19.5

Category	CREDITS
Basic Sciences and Humanities course	7.5
Engineering Science Courses	7.5
Professional Core Courses	4.5
TOTAL CREDITS	19..5



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Course Code	COMMUNICATIVE ENGLISH (Common to All Branches of Engineering)	L	T	P	C
		2	0	0	2
I Year 2nd Semester					
Course Objectives:					
The main objective of introducing this course, <i>Communicative English</i> , is to facilitate effective listening, Reading, Speaking and Writing skills among the students. It enhances the same in their comprehending abilities, oral presentations, reporting useful information and providing knowledge of grammatical structures and vocabulary. This course helps the students to make them effective in speaking and writing skills and to make them industry ready.					
Course Outcomes (CO):					
CO1: Understand the context, topic, and pieces of specific information from social or Transactional dialogues. CO2: Apply grammatical structures to formulate sentences and correct word forms. CO3: Analyze discourse markers to speak clearly on a specific topic in informal discussions. CO4: Evaluate reading / listening texts and to write summaries based on global comprehension of these texts. CO5: Create a coherent paragraph, essay, and resume.					
UNIT - I					
Lesson: HUMAN VALUES: Gift of Magi (Short Story)					
Listening: Identifying the topic, the context, and specific pieces of information by listening to short audio texts and answering a series of questions.					
Speaking: Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others.					
Reading: Skimming to get the main idea of a text; scanning to look for specific pieces of information.					
Writing: Mechanics of Writing-Capitalization, Spellings, Punctuation-Parts of Sentences.					
Grammar: Parts of Speech, Basic Sentence Structures-forming questions					
Vocabulary: Synonyms, Antonyms, Affixes (Prefixes/Suffixes), Root words.					
UNIT - II					
Lesson: NATURE: The Brook by Alfred Tennyson (Poem)					
Listening: Answering a series of questions about main ideas and supporting ideas after listening to audio texts.					
Speaking: Discussion in pairs/small groups on specific topics followed by short structure talks.					
Reading: Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.					
Writing: Structure of a paragraph - Paragraph writing (specific topics) Grammar: Cohesive devices - linkers, use of articles and zero article; prepositions. Vocabulary: Homonyms, Homophones, Homographs					
UNIT - III					
Lesson: BIOGRAPHY: Elon Musk					
Listening: Listening for global comprehension and summarizing what is listened to.					
Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed					
Reading: Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension.					
Writing: Summarizing, Note-making, paraphrasing					
Grammar: Verbs - tenses; subject-verb agreement; Compound words, Collocations					
Vocabulary: Compound words, Collocations					



UNIT IV		
<p>Lesson: INSPIRATION: The Toys of Peace by Saki</p> <p>Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video.</p> <p>Speaking: Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions.</p> <p>Reading: Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data.</p> <p>Writing: Letter Writing: Official Letters, Resumes</p> <p>Grammar: Reporting verbs, Direct & Indirect speech, Active & Passive Voice</p> <p>Vocabulary: Words often confused, Jargons</p>		
UNIT V		
<p>Lesson: MOTIVATION: The Power of Intrapersonal Communication (An Essay)</p> <p>Listening: Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension.</p> <p>Speaking: Formal oral presentations on topics from academic contexts</p> <p>Reading: Reading comprehension.</p> <p>Writing: Writing structured essays on specific topics.</p> <p>Grammar: Editing short texts –identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)</p> <p>Vocabulary: Technical Jargons</p>		
<p>Textbooks:</p> <ul style="list-style-type: none"> • Pathfinder: Communicative English for Undergraduate Students, 1st Edition, Orient Black Swan, 2023 (Units 1,2 & 3) • Empowering with Language by Cengage Publications, 2023 (Units 4 & 5) <p>Reference Books:</p> <ol style="list-style-type: none"> 1. Dubey, Sham Ji & Co. English for Engineers, Vikas Publishers, 2020 2. Bailey, Stephen. Academic writing: A Handbook for International Students. Routledge, 2014. 3. Murphy, Raymond. English Grammar in Use, Fourth Edition, Cambridge University Press, 2019. 4. Lewis, Norman. Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary. Anchor, 2014. <p>Web Resources:</p> <p>GRAMMAR:</p> <ul style="list-style-type: none"> • www.bbc.co.uk/learningenglish • https://dictionary.cambridge.org/grammar/british-grammar/ • www.eslpod.com/index.html • https://www.learngrammar.net/ • https://english4today.com/english-grammar-online-with-quizzes/ • https://www.talkenglish.com/grammar/grammar.aspx <p>VOCABULARY</p> <ol style="list-style-type: none"> 1. https://www.youtube.com/c/DailyVideoVocabulary/videos 2. https://www.youtube.com/channel/UC4cmBAit8i_NJZE8qK8sfpA 		



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Course Code	ENGINEERING PHYSICS (Common for all branches of Engineering)	L	T	P	C
		3	0	0	3
I Year 2nd Semester					
Course Objectives:					
To bridge the gap between the Physics in school at 10+2 level and UG level engineering courses by identifying the importance of the optical phenomenon like interference, diffraction etc, enlightening the periodic arrangement of atoms in crystalline solids and concepts of quantum mechanics, introduce novel concepts of dielectric and magnetic materials, physics of semiconductors.					
Course Outcomes (CO):					
CO1: Analyze the intensity variation of light due to polarization, interference, and diffraction. CO2: Familiarize with the basics of crystals and their structures. CO3: Explain fundamentals of quantum mechanics and apply it to one dimensional motion of particles. CO4: Summarize various types of polarization of dielectrics and classify the magnetic materials. CO5: Explain the basic concepts of Quantum Mechanics and the band theory of solids. CO6: Identify the type of semiconductor using Hall effect					
UNIT - I	Wave Optics				
Interference: Introduction - Principle of superposition –Interference of light - Interference in thin films (Reflection Geometry) & applications - Colours in thin films- Newton’s Rings, Determination of wavelength and refractive index. Diffraction: Introduction - Fresnel and Fraunhofer diffractions - Fraunhofer diffraction due to single slit, double slit & N-slits (Qualitative) – Diffraction Grating - Dispersive power and resolving power of Grating (Qualitative). Polarization: Introduction -Types of polarization - Polarization by reflection, refraction and Double refraction - Nicol’s Prism -Half wave and Quarter wave plates.					
UNIT - II	Crystallography and X-ray diffraction				
Crystallography: Space lattice, Basis, Unit Cell and lattice parameters – Bravais Lattices – crystal systems (3D) – coordination number - packing fraction of SC, BCC & FCC - Miller indices – separation between successive (hkl) planes. 1. ray diffraction: Bragg’s law - X-ray Diffractometer – crystal structure determination by Laue’s and powder methods					
UNIT - III	Dielectric and Magnetic Materials				
Dielectric Materials: Introduction - Dielectric polarization - Dielectric polarizability, Susceptibility, Dielectric constant and Displacement Vector – Relation between the electric vectors - Types of polarizations- Electronic (Quantitative), Ionic (Quantitative) and Orientation polarizations (Qualitative) - Lorentz internal field - Clausius- Mossotti equation - complex dielectric constant – Frequency dependence of polarization – dielectric loss Magnetic Materials: Introduction - Magnetic dipole moment - Magnetization-Magnetic susceptibility and permeability – Atomic origin of magnetism - Classification of magnetic materials: Dia, para, Ferro, anti-ferro & Ferri magnetic materials - Domain concept for Ferromagnetism & Domain walls (Qualitative) - Hysteresis - soft and hard magnetic materials.					
UNIT - IV	Quantum Mechanics and Free electron Theory				
Quantum Mechanics: Dual nature of matter – Heisenberg’s Uncertainty Principle – Significance and properties of wave function – Schrodinger’s time independent and dependent wave equations– Particle in a one-dimensional infinite potential well. Free Electron Theory: Classical free electron theory (Qualitative with discussion of merits and demerits) – Quantum free electron theory – electrical conductivity based on quantum free					



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electron theory - Fermi-Dirac distribution - Density of states - Fermi energy

UNIT – V Semiconductors

Semiconductors: Formation of energy bands – classification of crystalline solids - Intrinsic semiconductors: Density of charge carriers – Electrical conductivity – Fermi level – Extrinsic semiconductors: density of charge carriers – dependence of Fermi energy on carrier concentration and temperature - Drift and diffusion currents – Einstein’s equation – Hall effect and its applications.

Textbooks:

1. A Text book of Engineering Physics, M. N. Avadhanulu, P.G.Kshirsagar & TVS ArunMurthy, S. Chand Publications, 11th Edition 2019.
2. Engineering Physics - D.K.Bhattacharya and Poonam Tandon, Oxford press (2015)

Reference Books:

1. Engineering Physics - B.K. Pandey and S. Chaturvedi, Cengage Learning 2021.
2. Engineering Physics - Shatendra Sharma, Jyotsna Sharma, Pearson Education, 2018.
3. Engineering Physics” - Sanjay D. Jain, D. Sahasrabudhe and Girish, University Press.2010
4. Engineering Physics - M.R. Srinivasan, New Age international publishers (2009).

Web Resources: <https://www.loc.gov/rr/scitech/selected-internet/physics.html>



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Course Code	DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS (Common for all branches of Engineering)	L	T	P	C
		3	0	0	3
I Year 2nd Semester					
Course Objectives:					
<ul style="list-style-type: none"> • To enlighten the learners in the concept of differential equations and multivariable calculus. • To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real-world applications. 					
Course Outcomes (CO):					
At the end of the course, the student will be able to					
CO1: Solve the differential equations related to various engineering fields.					
CO2: Identify solution methods for partial differential equations that model physical processes.					
CO3: Interpret the physical meaning of different operators such as gradient, curl and divergence.					
CO4: Estimate the work done against a field, circulation and flux using vector calculus.					
UNIT - I	Differential equations of first order and first degree				
Linear differential equations – Bernoulli’s equations- Exact equations and equations reducible to exact form. Applications: Newton’s Law of cooling – Law of natural growth and decay- Electrical circuits.					
UNIT - II	Partial Differential Equations				
Definitions, homogenous and non-homogenous, complimentary function, general solution, particular integral, Wronskian, Method of variation of parameters. Simultaneous linear equations, Applications to L-C-R Circuit problems and Simple Harmonic motion					
UNIT - III	Dielectric and Magnetic Materials				
Introduction and formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, solutions of first order linear equations using Lagrange’s method. Homogeneous Linear Partial differential equations with constant coefficients.					
UNIT - IV	Vector differentiation				
Scalar and vector point functions, vector operator Del, Del applies to scalar point functions- Gradient, Directional derivative, del applied to vector point functions-Divergence and Curl, vector identities.					
UNIT V	Vector integration				
L Without integral-circulation-work done, surface integral-flux, Green’s theorem in the plane(without proof), Stoke’s theorem (without proof), volume integral, Divergence theorem (without proof) and related problems.					

**Textbooks:**

1. Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, 2017, 44th Edition
2. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons, 2018, 10th Edition.

Reference Books:

1. Thomas Calculus, George B. Thomas, Maurice D. Weir and Joel Hass, Pearson Publishers, 2018, 14th Edition.
2. Advanced Engineering Mathematics, Dennis G. Zill and Warren S. Wright, Jones and Bartlett, 2018.
3. Advanced Modern Engineering Mathematics, Glyn James, Pearson publishers, 2018, 5th Edition.
4. Advanced Engineering Mathematics, R. K. Jain and S. R. K. Iyengar, Alpha Science International Ltd., 2021 5th Edition (9th reprint).
5. Higher Engineering Mathematics, B. V. Ramana, , McGraw Hill Education, 2017



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Course Code	BASIC CIVIL AND MECHANICAL ENGINEERING	L	T	P	C
	(Common to All branches of Engineering)	3	0	0	3
I Year 2nd Semester					
Course Objectives:					
<ul style="list-style-type: none"> • Get familiarized with the scope and importance of Civil Engineering sub-divisions. • Introduce the preliminary concepts of surveying. • Acquire preliminary knowledge on Transportation and its importance in nation's economy. • Get familiarized with the importance of quality, conveyance and storage of water. • Introduction to basic civil engineering materials and construction techniques 					
Course Outcomes (CO):					
<p>After the completion of the course students will be able to</p> <p>CO1: Understand various sub-divisions of Civil Engineering and to appreciate their role in ensuring better society.</p> <p>CO2: Know the concepts of surveying and to understand the measurement of distances, angles, and levels through surveying.</p> <p>CO3: Realize the importance of Transportation in nation's economy and the engineering measures related to Transportation.</p> <p>CO4: Understand the importance of Water Storage and Conveyance Structures so that the social responsibilities of water conservation will be appreciated.</p> <p>CO5: Understand the basic characteristics of Civil Engineering Materials and attain knowledge on prefabricated technology.</p>					
PART A: BASIC CIVIL ENGINEERING					
UNIT I					
<p>Basics of Civil Engineering: Role of Civil Engineers in Society- Various Disciplines of Civil Engineering- Structural Engineering- Geo-technical Engineering- Transportation Engineering-Hydraulics and Water Resources Engineering - Environmental Engineering- Scope of each discipline - Building Construction and Planning- Construction Materials- Cement - Aggregate - Bricks- Cement concrete- Steel. Introduction to Prefabricated construction Techniques.</p>					
UNIT II					
<p>Surveying: Objectives of Surveying- Horizontal Measurements- Angular Measurements- Introduction to Bearings Levelling instruments used for levelling -Simple problems on levelling and bearings-Contour mapping.</p>					
UNIT - III					
<p>Transportation Engineering Importance of Transportation in Nation's economic development- Types of Highway Pavements- Flexible Pavements and Rigid Pavements - Simple Differences. Basics of Harbour, Tunnel, Airport, and Railway Engineering.</p> <p>Water Resources and Environmental Engineering: Introduction, Sources of water- Quality of water- Specifications- Introduction to Hydrology–Rainwater Harvesting-Water Storage and Conveyance Structures (Simple introduction to Dams and Reservoirs</p>					
Textbooks:					
<ol style="list-style-type: none"> 1. Basic Civil Engineering, M.S.Palanisamy, , Tata Mcgraw Hill publications (India) Pvt.Ltd. Fourth Edition. 2. Introduction to Civil Engineering, S.S. Bhavikatti, New Age International Publishers.2022. First Edition. 3. Basic Civil Engineering, Satheesh Gopi, Pearson Publications, 2009, First Edition 					



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Reference Books:	
<ol style="list-style-type: none"> 1. Surveying, Vol- I and Vol-II, S.K. Duggal, Tata McGraw Hill Publishers 2019. Fifth Edition. 2. Hydrology and Water Resources Engineering, Santosh Kumar Garg, KhannaPublishers, Delhi. 2016 3. Irrigation Engineering and Hydraulic Structures - Santosh Kumar Garg, KhannaPublishers, Delhi 2023. 38th Edition. 4. Highway Engineering, S.K.Khanna, C.E.G. Justo and Veeraraghavan, Nemchand andBrothers Publications 2019. 10th Edition. 5. Indian Standard DRINKING WATER — SPECIFICATION IS 10500-2012. 	
PART B: BASIC MECHANICAL ENGINEERING	
Course Objectives:	
<p>The students after completing the course are expected to</p> <ul style="list-style-type: none"> • Get familiarized with the scope and importance of Mechanical Engineering in different sectors and industries. • Explain different engineering materials and different manufacturing processes. <p>Provide an overview of different thermal and mechanical transmission systems and introduce basics of robotics and its applications</p>	
Course Outcomes: On completion of the course, the student should be able to	
<p>CO1: Understand the different manufacturing processes.</p> <p>CO2: Explain the basics of thermal engineering and its applications.</p> <p>CO3: Describe the working of different mechanical power transmission systems and power plants.</p> <p>CO4: Describe the basics of robotics and its applications</p>	
UNIT I	
Introduction to Mechanical Engineering: Role of Mechanical Engineering in Industries and Society- Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace, and Marine sectors.	
Engineering Materials - Metals-Ferrous and Non-ferrous, Ceramics, Composites, Smart materials.	
UNIT II	
Manufacturing Processes: Principles of Casting, Forming, joining processes, Machining.	
Thermal Engineering – Introduction to Boilers, Otto cycle, Diesel cycle, Refrigeration and air-conditioning cycles, Components of Electric and Hybrid Vehicles.	
UNIT III	
Power plants – working principle of Steam, Diesel, Hydro, Nuclear power plants.	
Introduction to Robotics - Joints & links, configurations, and applications of robotics. (Note: The subject covers only the basic principles of Civil and Mechanical Engineering systems. The evaluation shall be intended to test only the fundamentals of the subject)	
Textbooks:	
<ol style="list-style-type: none"> 1. Internal Combustion Engines by V.Ganesan, By Tata McGraw Hill publications (India)Pvt. Ltd. 2. A Tear book of Theory of Machines by S.S. Rattan, Tata McGraw Hill Publications, (India) Pvt. Ltd. 3. An introduction to Mechanical Engg by Jonathan Wicker and Kemper Lewis, Cengage learning India Pvt. Ltd 	



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Reference Books:

1. Appuu Kuttan KK, Robotics, I.K. International Publishing House Pvt. Ltd. Volume-I
2. 3D printing & Additive Manufacturing Technology- L. Jyothish Kumar, Pulak MPandey, Springer publications
3. Thermal Engineering by Mahesh M Rathore Tata McGraw Hill publications (India) Pvt.Ltd.
4. G. Shanmugam and M.S.Palanisamy, Basic Civil and the Mechanical Engineering, TataMcGraw Hill publications (India) Pvt. Ltd.
5. Elements of Mechanical Engineering, - Sadhu Singh, S Chand Publications,
6. Elements of Mechanical Engineering - R. K. Rajput, Laxmi Publications as textbooks.



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Course Code	ENGINEERING MECHANICS (Common to CIVIL & MECH. Engineering)	L	T	P	C
		3	0	0	3
I Year 2nd Semester					
Course Objectives:					
<ul style="list-style-type: none"> • To get familiarized with different types of force systems. • To draw accurate free body diagrams representing forces and moments acting on a body to analyze the equilibrium of system of forces. • To teach the basic principles of center of gravity, centroid and moment of inertia and determine them for different simple and composite bodies. • To apply the Work-Energy method to particle motion. • To understand the kinematics and kinetics of translational and rotational motion of rigid bodies. 					
Course Outcomes (CO):					
CO1: Understand the fundamental concepts in mechanics and determine the frictional forces for bodies in contact. CO2: Analyze different force systems such as concurrent, coplanar and spatial systems and calculate their resultant forces and moments. CO3: Calculate the centroids, center of gravity and moment of inertia of different geometric shapes. CO4: Apply the principles of work-energy and impulse-momentum to solve the problems of rectilinear and curvilinear motion of a particle. CO5: Solve the problems involving the translational and rotational motion of rigid bodies.					
UNIT I					
Introduction to Engineering Mechanics – Basic Concepts. Scope and Applications Systems of Forces: Coplanar Concurrent Forces– Components in Space–Resultant–Moment of Force and its Application –Couples and Resultant of Force Systems. Friction: Introduction, limiting friction and impending motion, Coulomb’s laws of dry friction, coefficient of friction, Cone of Static friction.					
UNIT II					
Equilibrium of Systems of Forces: Free Body Diagrams, Lami’s Theorem, Equations of Equilibrium of Coplanar Systems, Graphical method for the equilibrium, Triangle law of forces, converse of the law of polygon of forces condition of equilibrium, Equations of Equilibrium for Spatial System of forces, Numerical examples on spatial system of forces using vector approach, Analysis of plane trusses. Principle of virtual work with simple examples.					
UNIT - III					
Centroid: Centroids of simple figures (from basic principles)–Centroids of Composite Figures. Centre of Gravity: Centre of gravity of simple body (from basic principles), Centre of gravity of composite bodies, Pappus theorems. Area Moments of Inertia: Definition– Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product of Inertia. Mass Moment of Inertia: Moment of Inertia of Masses, Transfer Formula for Mass Moments of Inertia, Mass Moment of Inertia of composite bodies.					
UNIT - IV					
Rectilinear and Curvilinear motion of a particle: Kinematics and Kinetics –D’Alembert’s Principle - Work Energy method and applications to particle motion-Impulse Momentum method.					
UNIT - V					
Rigid body Motion: Kinematics and Kinetics of translation, Rotation about fixed axis and plane motion, Work Energy method and Impulse Momentum method.					



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Textbooks:

1. Engineering Mechanics, S. Timoshenko, D. H. Young, J.V. Rao, S. Pati., , McGraw Hill Education 2017. 5th Edition.
2. Engineering Mechanics, P.C.Dumir- S.Sengupta and Srinivas V veeravalli , University press. 2020. First Edition.
3. A Textbook of Engineering Mechanics, S.S Bhavikatti. New age international publications 2018. 4th Edition.

Reference Books:

1. Engineering Mechanics, Statics and Dynamics, Rogers and M A. Nelson., McGraw Hill Education. 2017. First Edition.
2. Engineering Mechanics, Statics and Dynamics, I.H. Shames., PHI, 2002. 4th Edition.
3. Engineering Mechanics, Volume-I: Statics, Volume-II: Dynamics, J. L. Meriam and L. G. Kraige., John Wiley, 2008. 6th Edition.
4. Introduction to Statics and Dynamics, Basudev Battachatia, Oxford University Press, 2014. Second Edition
5. Engineering Mechanics: Statics and Dynamics, Hibbeler R.C., Pearson Education, Inc., New Delhi, 2022, 14th Edition



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Course Code	COMMUNICATIVE ENGLISH LAB (Common to All Branches of Engineering)	L	T	P	C
			0	0	2
I Year 2nd Semester					
Course Objectives:					
The main objective of introducing this course, Communicative English Laboratory, is to expose the students to a variety of self-instructional, learner friendly modes of language learning. The students will get trained in basic communication skills and also make them ready to face job interviews					
Course Outcomes (CO):					
CO1: Understand the different aspects of the English language proficiency with emphasis on LSRW skills. CO2: Apply communication skills through various language learning activities. CO3: Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension. CO4: Evaluate and exhibit professionalism in participating in debates and group discussions. CO5: Create effective Course Objectives					
List of Topics:					
<ol style="list-style-type: none"> 1. Vowels & Consonants 2. Neutralization/Accent Rules 3. Communication Skills & JAM 4. Role Play or Conversational Practice 5. E-mail Writing 6. Resume Writing, Cover letter, SOP 7. Group Discussions-methods & practice 8. Debates - Methods & Practice 9. PPT Presentations/ Poster Presentation 10. Interviews Skills 					
Suggested Software:					
<ul style="list-style-type: none"> • Walden Infotech • Young India Films 					
Reference Books:					
<ol style="list-style-type: none"> 1. Raman Meenakshi, Sangeeta-Sharma. <i>Technical Communication</i>. Oxford Press. 2018. 2. Taylor Grant: <i>English Conversation Practice</i>, Tata McGraw-Hill Education India, 2016 3. Hewing's, Martin. <i>Cambridge Academic English (B2)</i>. CUP, 2012. 4. J. Sethi & P.V. Dhamija. <i>A Course in Phonetics and Spoken English</i>, (2nd Ed), Kindle, 2013 					
Web Resources:					
Spoken English:					
<ol style="list-style-type: none"> 1. www.esl-lab.com 2. www.englishmedialab.com 3. www.englishinteractive.net 4. https://www.britishcouncil.in/english/online 5. http://www.letstalkpodcast.com/ 6. https://www.youtube.com/c/mmmEnglish_Emma/featured 7. https://www.youtube.com/c/ArnelsEverydayEnglish/featured 					



8. <https://www.youtube.com/c/engvidAdam/featured>
9. <https://www.youtube.com/c/EnglishClass101/featured>
10. <https://www.youtube.com/c/SpeakEnglishWithTiffani/playlists>
11. https://www.youtube.com/channel/UCV1h_cBE0Drdx19qkTM0WNw

Voice & Accent:

1. <https://www.youtube.com/user/letstalkaccent/videos>
 2. <https://www.youtube.com/c/EngLanguageClub/featured>
 3. https://www.youtube.com/channel/UC_OskgZBoS4dAnVUgJVexc
- https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp_IA



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Civil Engineering

Course Code	ENGINEERING PHYSICS LAB (Common to All Branches of Engineering)	L	T	P	C
		0	0	2	1
I Year 2nd Semester					
Course Objectives:					
To study the concepts of optical phenomenon like interference, diffraction etc., recognize the importance of energy gap in the study of conductivity and Hall effect in semiconductors and study the parameters and applications of dielectric and magnetic materials by conducting experiments.					
Course Outcomes (CO):					
The students will be able to CO1: Operate optical instruments like travelling microscope and spectrometer. CO2: Estimate the wavelengths of different colours using diffraction grating. CO3: Plot the intensity of the magnetic field of circular coil carrying current with distance. CO4: Evaluate dielectric constant and magnetic susceptibility for dielectric and magnetic materials respectively. CO5: Calculate the band gap of a given semiconductor. CO6: Identify the type of semiconductor using Hall effect.					
List of Experiments:					
<ol style="list-style-type: none"> 1. Determination of radius of curvature of a given Plano-convex lens by Newton's rings. 2. Determination of wavelengths of different spectral lines in mercury spectrum using diffraction grating in normal incidence configuration. 3. Verification of Brewster's law 4. Determination of dielectric constant using charging and discharging method. 5. Study the variation of B versus H by magnetizing the magnetic material (B-H curve). 6. Determination of wavelength of Laser light using diffraction grating. 7. Estimation of Planck's constant using photoelectric effect. 8. Determination of the resistivity of semiconductors by four probe methods. 9. Determination of energy gap of a semiconductor using p-n junction diode. 10. Magnetic field along the axis of a current carrying circular coil by Stewart Gee's Method. 11. Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall effect. 12. Determination of temperature coefficients of a thermistor. 13. Determination of acceleration due to gravity and radius of Gyration by using a compound pendulum. 14. Determination of magnetic susceptibility by Kundt's tube method. 15. Determination of rigidity modulus of the material of the given wire using Torsional pendulum. 16. Sonometer: Verification of laws of stretched string. 17. Determination of young's modulus for the given material of wooden scale by non-uniform bending (or double cantilever) method. 18. Determination of Frequency of electrically maintained tuning fork by Melde's experiment. 					
Note: Any TEN of the listed experiments are to be conducted. Out of which any TWO experiments may be conducted in virtual mode.					
References:					
<ul style="list-style-type: none"> • A Textbook of Practical Physics - S. Balasubramanian, M.N. Srinivasan, S. Chand Publishers, 2017. 					
Web Resources					
<ul style="list-style-type: none"> • www.vlab.co.in • https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html.prototype 					



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Course Code	ENGINEERING WORKSHOP (Common to All branches of Engineering)	L	T	P	C
		0	0	3	1.5
I Year 2nd Semester					
Course Objectives:					
To familiarize students with wood working, sheet metal operations, fitting and electrical house wiring skills					
Course Outcomes (CO):					
CO1: Identify workshop tools and their operational capabilities. CO2: Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry and welding. CO3: Apply fitting operations in various applications. CO4: Apply basic electrical engineering knowledge for House Wiring Practice					
List of Experiments:					
<ul style="list-style-type: none"> • Demonstration: Safety practices and precautions to be observed in workshop. • Wood Working: Familiarity with different types of woods and tools used in wood working and make following joints. a) Half – Lap joint b) Mortise and Tenon joint c) Corner Dovetail joint or Bridle joint • Sheet Metal Working: Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets. Tapered tray b) Conical funnel c) Elbow pipe d) Brazing • Fitting: Familiarity with different types of tools used in fitting and do the following fitting exercises. a) V-fit b) Dovetail fit c) Semi-circular fit d) Bicycle tire puncture and change of two-wheeler tyre • Electrical Wiring: Familiarity with different types of basic electrical circuits and make the following connections. a) Parallel and series b) Two-way switch c) Godown lighting d) Tube light e) Three phase motor f) Soldering of wires • Foundry Trade: Demonstration and practice on Moulding tools and processes, Preparation of Green Sand Moulds for given Patterns. • Welding Shop: Demonstration and practice on Arc Welding and Gas welding. Preparation of Lap joint and Butt joint. • Plumbing: Demonstration and practice of Plumbing tools, Preparation of Pipe joints with coupling for same diameter and with reducer for different diameters. 					
Textbooks:					
<ul style="list-style-type: none"> • Basic Workshop Technology: Manufacturing Process, Felix W.; Independently Published, 2019. Workshop Processes, Practices and Materials; Bruce J. Black, Routledge publishers, 5th Edn. 2015. • A Course in Workshop Technology Vol I. & II, B.S. Raghuwanshi, Dhanpath Rai & Co., 2015 & 2017. 					
Reference Books:					
<ul style="list-style-type: none"> • Elements of Workshop Technology, Vol. I by S. K. Hajra Choudhury & Others, Media • Promoters and Publishers, Mumbai. 2007, 14th edition • Workshop Practice by H. S. Bawa, Tata-McGraw Hill, 2004. • Wiring Estimating, Costing and Contracting; Soni P.M. & Upadhyay P.A.; AtulPrakashan, 2021-22. 					



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Civil Engineering

Course Code	ENGINEERING MECHANICS & BUILDING PRACTICES LAB	L	T	P	C
		0	0	3	1.5

I Year 2nd Semester

Course Objectives:

The students completing the course are expected to

- Verify the Law of Parallelogram of Forces and Lami’s theorem.
- Determine the coefficients of friction of Static and Rolling friction and Centre of gravity of different plane Lamina.
- Understand the layout of a building, concepts of Non-Destructive Testing and different Alternative Materials.

Course Outcomes (CO):

On completion of the course, the student should be able to:

- CO1: Evaluate the coefficient of friction between two different surfaces and between the inclined plane and the roller.
- CO2: Verify Law of Parallelogram of forces and Law of Moment using force polygon and bellcrank lever.
- CO3: Determine the Centre of gravity different configurations and
- CO4: Understand the Quality Testing and Assessment Procedures and principles of Non-Destructive Testing.
- CO5: Exposure to safety practices in the construction industry

List of Experiments:

1. To study various types of tools used in construction.
2. Forces in Pin Jointed Trusses
3. Experimental Proof of Lami’s Theorem
4. Verification of Law of Parallelogram of Forces.
5. Determination of Center of Gravity of different shaped Plane Lamina.
6. Determination of coefficient of Static and Rolling Friction.
7. Verification of Law of Moment using Rotation Disc Apparatus and Bell Crank Lever
8. Study of Alternative Materials like M-sand, Fly ash, Sea Sand etc.
9. Field-Visit to understand the Quality Testing - report.
10. Safety Practices in Construction industry
11. Demonstration of Non-Destructive Testing - using Rebound Hammer & UPV
12. Study of Plumbing in buildings

Students have to perform any 10 of the following Experiments



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Course Code	HEALTH AND WELLNESS, YOGA AND SPORTS (Common to All branches of Engineering)	L	T	P	C
		0	0	1	0.5
I Year 2nd Semester					
Course Objectives:					
<ul style="list-style-type: none"> The main objective of introducing this course is to make the students maintain their mental and physical wellness by balancing emotions in their life. It mainly enhances the essential traits required for the development of the personality 					
Course Outcomes (CO):					
After completion of the course the student will be able to CO1: Understand the importance of yoga and sports for Physical fitness and sound health. CO2: Demonstrate an understanding of health-related fitness components. CO3: Compare and contrast various activities that help enhance their health. CO4: Assess current personal fitness levels. CO5: Develop Positive Personality					
UNIT I					
Concept of health and fitness, Nutrition and Balanced diet, basic concept of immunity Relationship between diet and fitness, Globalization and its impact on health, Body Mass Index (BMI) of all age groups.					
Activities:					
i) Organizing health awareness programmes in community ii) Preparation of health profile iii) Preparation of chart for balance diet for all age groups					
UNIT II					
Concept of yoga, need for and importance of yoga, origin and history of yoga in Indian context, classification of yoga, Physiological effects of Asanas- Pranayama and meditation, stress management and yoga, Mental health and yoga practice.					
Activities:					
Yoga practices – Asana, Kriya, Mudra, Bandha, Dhyana, Surya Namaskar					
UNIT III					
Concept of Sports and fitness, importance, fitness components, history of sports, Ancient and Modern Olympics, Asian games and Commonwealth games.					
Activities:					
i) Participation in one major game and one individual sport viz., Athletics, Volleyball, Basketball, Handball, Football, Badminton, Kabaddi, Kho-kho, Table tennis, Cricket etc. Practicing general and specific warm up, aerobics					
ii) Practicing cardiorespiratory fitness, treadmill, run test, 9 min walk, skipping and running.					



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Reference Books:

1. Gordon Edlin, Eric Golanty. Health and Wellness, 14th Edn. Jones & Bartlett Learning, 2022
2. T.K.V.Desikachar. The Heart of Yoga: Developing a Personal Practice
3. Archie J.Bahm. Yoga Sutras of Patanjali, Jain Publishing Company, 1993
4. Wiseman, John Lofty, SAS Survival Handbook: The Ultimate Guide to Surviving Anywhere Third Edition, William Morrow Paperbacks, 2014
5. The Sports Rules Book/ Human Kinetics with Thomas Hanlon. -- 3rd ed. Human Kinetics, Inc. 2014

General Guidelines:

1. Institutes must assign slots in the Timetable for the activities of Health/Sports/Yoga.
2. Institutes must provide field/facility and offer the minimum of five choices of as many Games/Sports.
3. Institutes are required to provide sports instructor / yoga teacher to mentor the students.



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Dept. of Civil Engineering					
II Year I Semester					
S.No	Course Code	Course Name	Category	L-T-P	Credits
1.		Numerical and Statistical Methods	BS&H	3-0-0	3
2.		Managerial Economics and Financial Analysis	MG	2-0-0	2
3.		Surveying	PC	3-0-0	3
4.		Strength of Materials	PC	3-0-0	3
5.		Fluid Mechanics and Hydraulic Machinery	ES	3-0-0	3
6.		Surveying Lab	PC	0-0-3	1.5
7.		Strength of Materials Lab	PC	0-0-3	1.5
8.		Python Programming	SC	0-1-2	2
9		Environmental Science	MC	2-0-0	-
10		Design Thinking & Innovation	BS&H	0-1-2	2
Total					21

Category	Credits
Engineering Science Courses	3
Professional Core Courses	9
Management Course	2
Basic Science and Humanities	5
Skill Course	2
TOTAL CREDITS	21



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Course Code	NUMERICAL & STATISTICAL METHODS	L	T	P	C
		3	0	0	3
II Year 1st Semester					
Course Objectives:					
<ul style="list-style-type: none"> ● Equip students to solve algebraic and transcendental equations. ● Introduce interpolation techniques for data fitting. ● Provide understanding of numerical solutions for ordinary differential equations. ● Train students in statistical analysis and hypothesis testing. 					
Course Outcomes (CO):					
<ul style="list-style-type: none"> ● Students will use methods like Bisection and Newton-Raphson effectively. ● Students will apply Newton’s and Lagrange’s formulas for accurate data analysis. ● Students will implement Euler’s and Runge-Kutta methods for initial value problems. ● Students will perform t-tests and chi-square tests to analyze real data. 					
UNIT - I	Solution of Algebraic & Transcendental Equations				
Introduction-Bisection Method-Iterative method, Regula-falsi method and Newton Raphson method System of Algebraic equations: Gauss Elimination, Jacoby and Gauss Siedal method.					
UNIT II	Interpolation				
Finite differences-Newton’s forward and backward interpolation formulae – Lagrange’s formulae. Curve fitting: Fitting of straight line, second-degree and Exponential curve by method of least squares.					
UNIT - III	Solution of Initial value problems to Ordinary differential equations				
Numerical solution of Ordinary Differential equations: Solution by Taylor’s series-Picard’s Method of successive Approximations-Euler’s and modified Euler’s methods-Runge-Kutta methods (second and fourth order).					
UNIT - IV	Estimation and Testing of hypothesis, large sample tests				
Estimation-parameters, statistics, sampling distribution, point estimation, Formulation of null hypothesis, alternative hypothesis, the critical and acceptance regions, level of significance, two types of errors and power of the test. Large Sample Tests: Test for single proportion, difference of proportions, test for single mean and difference of means. Confidence interval for parameters in one sample and two sample problems					
UNIT - V	Small sample tests				
Student t-distribution (test for single mean, two means and paired t-test), testing of equality of variances (F-test), χ^2 - test for goodness of fit, χ^2 - test for independence of attributes.					



Textbooks:

1. S S Sastry, Introductory Methods of Numerical Analysis, PHI Learning Private Limited.
2. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 2017, 44th Edition
3. Miller and Friends, Probability and Statistics for Engineers, 7/e, Pearson, 2008. India.

Reference Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 2018, 10th Edition.
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Alpha Science International Ltd., 2021 5th Edition (9th reprint).
3. Ronald E. Walpole, Probability and Statistics for Engineers and Scientists, PNIE
4. H. K Das, Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand Publications, 2014, Third Edition (Reprint 2021)

Online Learning Resources:

1. https://onlinecourses.nptel.ac.in/noc17_ma14/preview
2. https://onlinecourses.nptel.ac.in/noc24_ma05/preview
3. <http://nptel.ac.in/courses/111105090>



Course Code	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS	L	T	P	C
		2	0	0	2
II Year Ist Semester					
Course Objectives:					
<ul style="list-style-type: none"> • To inculcate the basic knowledge of microeconomics and financial accounting • To make the students learn how demand is estimated for different products, input-output relationship for optimizing production and cost • To Know the Various types of market structure and pricing methods and strategy • To give an overview on investment appraisal methods to promote the students to learn how to plan long-term investment decisions. • To provide fundamental skills on accounting and to explain the process of preparing financial statements. 					
Course Outcomes (CO):					
<ul style="list-style-type: none"> • Define the concepts related to Managerial Economics, financial accounting and management • Understand the fundamentals of Economics viz., Demand, Production, cost, revenue and markets • Apply the Concept of Production cost and revenues for effective Business decision • Analyze how to invest their capital and maximize returns • Evaluate the capital budgeting techniques. • Develop the accounting statements and evaluate the financial performance of business entity. 					
UNIT - I	Managerial Economics and Demand analysis				
Introduction- Nature and Scope of Managerial Economics. Demand-Concept- Demand Function- Law of Demand and its Exceptions. Demand Elasticity- Types of Elasticity – Measurement- Significance of elasticity. Demand Forecasting-Factors governing Forecasting- Methods of Demand Forecasting.					
UNIT - II	Production and Cost Analysis				
Introduction –Production Function– Short run and long run Production Function- Isoquants and Isocosts, Least-Cost Combination. Cost concepts and Cost behavior- Break-Even Analysis (BEA) - Determination of Break-Even Point (Simple Problems) –Significance of BEA.					
UNIT - III	Business Organizations and Markets				
Introduction – Forms of Business Organizations- Sole Proprietorship - Partnership - Joint Stock Companies - Public Sector Enterprises. Types of Markets - Perfect and Imperfect Competition: Features of Perfect Competition-Monopoly- Monopolistic Competition– Oligopoly-Price-Output Determination - Pricing Methods and Strategies					
UNIT - IV	Capital and Capital Budgeting				
Introduction – Capital and its Significance- Types of Capital- Estimating Fixed and Working capital requirements- Sources of Short-term and Long-term Capital. Capital Budgeting– Features of capital budgeting Proposals, Methods and Evaluation of Projects – Pay Back Method, Accounting Rate of Return (ARR), Net Present Value (NPV) and Internal Rate Return (IRR) Method (sample problems)					
UNIT-V Financial Accounting and Analysis					
Introduction - Double-Entry Bookkeeping- preparation of Journal- Ledger -Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments). Introduction to Financial Analysis - Analysis and Interpretation of Liquidity Ratios, Activity Ratios, Capital structure Ratios and Profitability Ratios					



Textbooks:

1. Varshney & Maheswari: Managerial Economics, Sultan Chand.
2. Aryasri: Business Economics and Financial Analysis, 4/e, MGH.

Reference Books:

1. Ahuja HI Managerial economics Schand.
2. S.A. Siddiqui and A.S. Siddiqui: Managerial Economics and Financial Analysis, New Age International.
3. Joseph G. Nellis and David Parker: Principles of Business Economics, Pearson, 2/e, New Delhi.
4. Domnick Salvatore: Managerial Economics in a Global Economy, Cengage

. Online Learning Resources:

- <https://www.slideshare.net/123ps/managerial-economics-ppt>
- <https://www.slideshare.net/rossanz/production-and-cost-45827016>
- <https://www.slideshare.net/darkyla/business-organizations-19917607>
- <https://www.slideshare.net/balarajbl/market-and-classification-of-market>
- <https://www.slideshare.net/ruchi101/capital-budgeting-ppt-59565396>
- <https://www.slideshare.net/ashu1983/financial-accounting>



Course Code	SURVEYING	L	T	P	C
		3	0	0	3
II Year Ist Semester					
Course Objectives:					
<ul style="list-style-type: none"> • To make the student to get well conversant with the fundamentals of various basic methods and instruments of surveying. • To introduce to the students in identifying reduced level of the ground and its profile for finding areas and volumes of embankments and cuttings. • To make the student to use angular measuring instruments for horizontal and vertical control. • To enable the student to set simple horizontal curves. • To introduce the knowledge construction surveys and usage of modern instrument such as total station. 					
Course Outcomes (CO):					
<ul style="list-style-type: none"> • Calculate angles, distances, and levels • Identify data collection methods and prepare field notes • Understand the working principles of survey instruments • Estimate the volumes of earthwork • Able to use modern survey instruments. 					
UNIT - I					
<p>Introduction and Basic Concepts: Introduction, Objectives, classification and principles of surveying, Surveying accessories, phases of surveying. Measurement of Distances and Directions Linear distances, Approximate methods, Direct Methods, Chains, Tapes, ranging, Tape corrections, indirect methods</p> <p>Prismatic Compass- Working of prismatic & surveyor compass- Temporary & permanent adjustments, Designation of Bearings, Determination of included angles, Local Attraction, Magnetic Declination.</p>					
UNIT - II					
<p>Levelling - Basics definitions, types of levels and levelling staves, temporary adjustments, methods of levelling, booking and Determination of levels, HI Method, Rise and Fall method, Effect of Curvature of Earth and Refraction. Contouring: Characteristics and uses of Contours, Direct & Indirect methods of contour surveying, interpolation and sketching of Contours.</p> <p>Computation of Areas and Volumes: Areas, Determination of areas consisting of irregular boundary and regular boundary, Planimeter. Computation of areas for level section and two level sections with and without transverse slopes, determination of volume of earth work in cutting and embankments, the volume of borrow pits, the capacity of reservoirs.</p>					
UNIT - III					
<p>Theodolite Surveying: Types of Theodolites, Fundamental Lines, temporary adjustments, measurement of horizontal angles by repetition and reiteration method, measurement of vertical Angle, Trigonometrical levelling when base is accessible and inaccessible.</p> <p>Traversing: Methods of traversing, traverse computations and adjustments, Gale's traverse table, Omitted measurements..</p>					
UNIT - IV					
<p>Tacheometric Surveying: Principles of Tacheometry, stadia and tangential methods of Tacheometry.</p> <p>Curves: Types of curves and their necessity, elements of simple circular curve, setting out of simple horizontal circular curves.</p>					
UNIT-V					
<p>Construction surveys: Introduction, setting out a building, pipelines and sewers, highways, culverts. Surface surveys and tunnel alignment, underground surveys, and levelling in tunnels.</p> <p>Total station Surveying: Basic principles, applications, Electromagnetic wave theory, EDM instruments, electromagnetic distance measuring system, Introduction to Global Positioning System GPS.</p>					



Text Books:

1. S.S Bhavikatti, “Surveying theory and Practice”, 2nd edition, Dreamtech press, Wiley distributors.
2. C.Venkatramaiah, “Text book of surveying”, 2nd edition, Universities press, 2018.
3. Surveying (Vol – 1 & 2) by Duggal S K, Tata McGraw Hill Publishing Co. Ltd. New Delhi, 5th edition, 2019.

References:

1. Arthur R Benton and Philip J Taety, “Elements of Plane Surveying”, McGraw Hill – 2000.
2. Arora K R “Surveying” Vol 1, 2 & 3, Standard Book House, Delhi, 2004.
3. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, “Surveying” (Vol – 1, 2 & 3), - Laxmi Publications (P) ltd., New Delhi.
4. Chandra A M, “Plane Surveying”, New Age International Pvt. Ltd., New Delhi, 2002.
5. Bhavikatti “Surveying” Vikas publishing house ltd.
6. Hoffman. B, H. Lichtenegga and J. Collins, Global Positioning System – “Theory and Practice”, Springer -Verlag Publishers, 2001.
7. R. Agor Khanna Publishers 2015 “Surveying and leveling”.
8. R. Subramanian, “Surveying and leveling” Oxford university press, New Delhi.
9. Chandra A M, “Higher Surveying”, Newage International Pvt. Ltd., Publishers, New Delhi, 2002.



Course Code	STRENGTH OF MATERIALS	L	T	P	C
		3	0	0	3
II Year 1st Semester					
Course Objectives:					
<ul style="list-style-type: none"> • To teach the student with basic concepts for determination of principal stresses and strains in various structural elements. • To demonstrate analytical methods for determining strength & stiffness and assess stability of structural members. • To make the student analyze circular shafts subjected to torsion • To make the student determine critical loads for columns with different end conditions. 					
Course Outcomes (CO):					
<ul style="list-style-type: none"> • Understand principal stresses and principal planes. • Determine deflection at any point on a beam under simple and combined loads • Analyze members under torsion. • Know the effect of eccentricity of load in columns, apply failure criteria to implement in design of structural members. 					
UNIT - I					
Simple Stress and Strains:					
Types of stresses and strains, Hooke's law, Stress, strain diagram for mild steel, working stress – Factor of safety, lateral strain, Poisson's ratio and volumetric strain, Elastic moduli and the relationship between them – Bars of Varying section – Composite bars					
UNIT - II					
Shear Force and Bending Moment:					
Definition of beam – types of beams – Concept of Shear force and bending moment, S.F and B.M diagrams for cantilever, simply supported and over hanging beams subjected to point loads, uniformly distributed load, uniformly varying loads, and combination of these loads – point of contra flexure – Relation between S.F, B.M, and rate of loading at section of a beam.					
UNIT - III					
Flexural Stress:					
Theory of simple bending, Assumptions, Derivation of bending equation, Neutral axis, Determination of bending stresses, Section modulus of rectangular and circular sections (Solid and Hollow), I, T, Angle and Channel Sections, Design of simple beam sections.					
Shear Stresses: Derivation of formula, Shear stress distribution across various beam sections like rectangular, circular, I, T Angle sections					
UNIT - IV					
Thin Cylinders:					
Derivation of formula for longitudinal and circumferential stresses, hoop, longitudinal and volumetric strains, changes in diameter, and volume of thin cylinders.					
Torsion: Theory of pure torsion – Assumptions and Derivation of Torsion formula for circular shaft. Columns and Struts: Introduction, Classification of columns, Axially loaded compression members – Euler's crippling load theory – Derivation of Euler's critical load formulae for various end conditions.					
UNIT-V					
Deflection of Beams:					
Uniform bending – slope, deflection and radius of curvature – Differential equation for elastic line of a beam – Double integration and Macaulay's methods. Determination of slope and deflection for cantilever and simply supported beams under point loads, U.D.L. Uniformly varying load-Mohr's theorems – Moment area method – application to cantilever and simply supported					



Text Books:

1. R.S.Khurmi and N.Khurmi, “Strength of Materials (Mechanics of Solids)”, S Chand And Company Limited, Ramnagar, New Delhi-110 055.
2. Strength of Materials by R. K. Bansal, Lakshmi Publications, 16th Edition, 2022.
3. B. S. Basavarajaiah and P. Mahadevappa, “Strength of Materials” 3rd Edition 2010, in SI UNITS, Universities Press Pvt Ltd, Hyderabad.
4. S.S. Bhavikatti, “Strength of Materials”, Fourth edition, Vikas Publishing House, Pvt. Ltd.
5. Strength of Materials by J.K. Gupta and S.K. Gupta, Cengage publications 2nd edition, 2024

References:

1. B. C. Punmia Strength of Materials by.- Laxmi publications.
2. D. S. Prakasa Rao Strength of Materials by, Universities Press Pvt Ltd, Hyderabad.
3. Advanced Mechanics of Solids, L.S Srinath, McGraw Hill Education, 2017, 3rd Edition.
4. A Textbook of Strength of Materials, by R. K. Rajput, 7e (Mechanics of Solids) SI Units S. Chand & Co, New Delhi 7th edition 2022.
5. Strength of Materials by S.S.Ratan Tata McGrill Publications 3rd Edition, 2016.
6. Strength of Materials - Fundamentals and Applications, T.D.Gunneswara Rao and Mudimby Andal, Cambridge University Press, 2018, 1st Edition



Course Code	FLUID MECHANICS AND HYDRAULICS MACHINERY	L	T	P	C
		3	0	0	3
II Year 1st Semester					
Course Objectives:					
<ul style="list-style-type: none"> • To explain basics of statics, kinematics and dynamics of fluids and various measuring techniques of hydrostatic forces on objects. • To impart ability to solve engineering problems in fluid mechanics • To enable the students measure quantities of fluid flowing in pipes, tanks and channels • To teach integral forms of fundamental laws of fluid mechanics to predict relevant pressures, velocities and forces. • To strengthen the students with fundamentals useful in application-intensive courses dealing with hydraulics, and hydraulic machinery future courses. 					
Course Outcomes (CO):					
<ul style="list-style-type: none"> • Understand the principles of fluid statics, kinematics and dynamics • Familiarize basic terms used in fluid mechanics • Understand flow characteristics and classify the flows • Apply the continuity, momentum and energy principles • Estimate various losses in flow through channels 					
UNIT - I					
Basic concepts and definitions:					
Distinction between a fluid and a solid; Physical properties of fluids and their influences on fluid motion. Fluid statics: Pascal's law, pressure variation with temperature, density and altitude. Piezometer, U-Tube Manometer, Single Column Manometer, U Tube Differential Manometer. pressure gauges, Hydrostatic pressure and force: horizontal, vertical and inclined surfaces. Buoyancy and stability of floating bodies.					
UNIT - II					
Fluid kinematics:					
Classification of fluid flow, Streamline, 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; Equations of motion - Euler's equation; Bernoulli's equation, derivation; Energy Principle; Practical applications of Bernoulli's equation, Momentum principle; Forces exerted by fluid flow on pipe bend; Vortex Flow – Free and Forced; Definitions of Reynolds Number, Froude , Mach Number, Weber Number and Euler Number.					
UNIT - III					
Laminar & Turbulent flow in pipes: Laminar Flow- Laminar flow through: circular pipes, annulus and parallel plates. Stoke's law, Measurement of viscosity. Reynolds experiment, Transition from laminar to turbulent flow. Resistance to flow of fluid in smooth and rough pipes-Moody's diagram, Introduction to boundary layer theory.					
UNIT - IV					
Analysis Of Pipe Flow: Energy losses in pipelines; Darcy – Weisbach equation; Minor losses in pipelines; Hydraulic Grade Line and Total Energy Line; Concept of equivalent length, Pipes in Parallel and Series.					
Flow in Open Channels:					
Open Channel Flow-Comparison between open channel flow and pipe flow, geometrical parameters of a channel, classification of open channels, classification of open channel flow, Velocity Distribution of channel section.					
UNIT-V					
Hydraulic Machines					
Impact of Jets, Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes - velocity triangles at inlet and outlet, Work done and efficiency, Hydraulic Turbines: Classification of turbines; pelton wheel and its design. Francis turbine and its design, efficiency. Draft tube: theory - characteristic curves of hydraulic turbines. Cavitation - Working principles of a centrifugal pump, work done by impeller; heads, losses and efficiencies; minimum starting speed; Priming; specific speed; limitation of suction lift, net positive suction head (NPSH); Performance and characteristic curves; Cavitations effects;					



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Text Books:

1. P. M. Modi and S. M. Seth, Hydraulics and Fluid Mechanics, Standard Book House 22nd, 2019.
2. K. Subrahmanya, Theory and Applications of Fluid Mechanics, Tata McGraw Hill, 2nd edition 2018

References:

1. S.C.Gupta, “Fluid Mechanics and Hydraulic Machines”, Pearson publication
2. R. K. Bansal, A text of Fluid mechanics and hydraulic machines, Laxmi Publications (P) Ltd., New Delhi 11th edition, 2024.
3. K. Subrahmanya, “Theory and Applications of Fluid Mechanics”, Tata McGraw Hill
4. N. Narayana Pillai, Principles of “Fluid Mechanics and Fluid Machines”, Universities Press Pvt Ltd, Hyderabad. 3rd Edition 2009.
5. K. Subramanya, Open Channel flow, Tata Mc.Grawhill Publishers.
6. C. S. P. Ojha, R. Berndtsson and P. N. Chadramouli, Fluid Mechanics and Machinery, Oxford University Press, 2010



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Course Code	SURVEYING LAB	L	T	P	C
		0	0	3	1.5
II Year 1st Semester					
Course Objectives:					
By performing this laboratory, the student will be able to know the usage of various surveying equipment's and their practical applicability.					
Course Outcomes (CO):					
By performing the various tests in this laboratory the student will be able to know the principles of surveying in chain surveying, compass surveying, plane table surveying, levelling, theodolite surveying and total station.					
List of Experiments:					
<ul style="list-style-type: none">• Setting up of Right angles using cross staff• Plane table survey; finding the area of a given boundary• Two Point Problem by the plane table survey.• Fly levelling: Height of the instrument method and rise and fall method.• Fly levelling; Longitudinal Section and Cross sections of a given road profile.• Theodolite Survey: Determining the Horizontal and Vertical Angles• Finding the distance between two inaccessible points using Theodolite• Tachometric survey: Heights and distance problems using tachometric principles.• One Exercise on Curve setting.• Developing a Contour map					



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Course Code	STRENGTH OF MATERIALS LAB	L	T	P	C
		0	0	3	1.5

II Year 1st Semester

Course Objectives:

By performing this laboratory, the student will be able to know the structural behaviour of various materials.

Course Outcomes (CO):

By performing the various tests in this laboratory the student will be able to know the structural behaviour various structural elements when subjected to external loads.

List of Experiments:

- Tension test.
- Bending test on (Steel/Wood) Cantilever beam.
- Bending test on simply supported beam.
- Torsion test.
- Hardness test.
- Compression test on wood/ concrete
- Izod/Charpy Impact test on metals
- Shear test on metals
- Use of electrical resistance strain gauges.
- Continuous beam – deflection test.



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Course Code	PYTHON PROGRAMMING	L	T	P	C
		0	1	2	2
II Year 1st Semester					
Course Objectives:					
<ul style="list-style-type: none"> • Introduce the fundamental concepts of Python programming, including data types, control flow, and the use of functions, strings, and lists. • Explore advanced data structures like dictionaries, tuples, and sets, along with their applications in Python. • Familiarize students with file handling, object-oriented programming (OOP), and the creation and manipulation of files. • Provide an introduction to data science concepts, including NumPy, Pandas, and the handling of JSON and XML in Python. 					
Course Outcomes (CO):					
<ul style="list-style-type: none"> • Demonstrate proficiency in writing Python programs that use variables, operators, control flow statements, and functions. • Implement and manipulate data structures such as lists, dictionaries, tuples, and sets to solve problems efficiently. • Develop Python programs that handle files, implement object-oriented programming concepts, and interact with files using Python's file handling mechanisms. • Use Python libraries like NumPy and Pandas for basic data analysis, and visualize data using plotting techniques. 					
List of Experiments:					
<p>UNTI-I: History of Python Programming Language, Thrust Areas of Python, Installing Anaconda Python Distribution, Installing and Using Jupyter Notebook.</p> <p>Parts of Python Programming Language: Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data Types, Indentation, Comments, Reading Input, Print Output, Type Conversions, the type () Function and Is Operator, Dynamic and Strongly Typed Language.</p> <p>Control Flow Statements: if statement, if-else statement, if...elif...else, Nested if statement, while Loop, for Loop, continue and break Statements, Catching Exceptions Using try and except Statement.</p>					
Sample Experiments:					
<ol style="list-style-type: none"> 1. Write a program to find the largest element among three Numbers. 2. Write a Program to display all prime numbers within an interval 3. Write a program to swap two numbers without using a temporary variable. 4. Demonstrate the following Operators in Python with suitable examples. <ol style="list-style-type: none"> i) Arithmetic Operators ii) Relational Operators iii) Assignment Operators iv) Logical Operators v) Bit wise Operators vi) Ternary Operator vii) Membership Operators viii) Identity Operators 5. Write a program to add and multiply complex numbers 6. Write a program to print multiplication table of a given number 					
<p>UNIT-II: Functions: Built-In Functions, Commonly Used Modules, Function Definition and Calling the function, return Statement and void Function, Scope and Lifetime of Variables, Default Parameters, Keyword Arguments, *args and **kwargs, Command Line Arguments. Strings: Creating and Storing Strings, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods, Formatting Strings.</p> <p>Lists: Creating Lists, Basic List Operations, Indexing and Slicing in Lists, Built-In Functions Used on Lists, List Methods, del Statement.</p>					
Sample Experiments:					
<ol style="list-style-type: none"> 7. Write a program to define a function with multiple return values. 8. Write a program to define a function using default arguments. 					



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9. Write a program to find the length of the string without using any library functions.
10. Write a program to check if the substring is present in a given string or not.
11. Write a program to perform the given operations on a list:
 - i. Addition
 - ii. Insertion
 - iii. slicing
12. Write a program to perform any 5 built-in functions by taking any list.

UNIT-III: Dictionaries: Creating Dictionary, Accessing and Modifying key:value Pairs in Dictionaries, Built-In Functions Used on Dictionaries, Dictionary Methods, del Statement.

Tuples and Sets: Creating Tuples, Basic Tuple Operations, tuple() Function, Indexing and Slicing in Tuples, Built-In Functions Used on Tuples, Relation between Tuples and Lists, Relation between Tuples and Dictionaries, Using zip() Function, Sets, Set Methods, FrozenSet.

Sample Experiments:

13. Write a program to create tuples (name, age, address, college) for at least two members and concatenate the tuples and print the concatenated tuples.
14. Write a program to count the number of vowels in a string (No control flow allowed).
15. Write a program to check if a given key exists in a dictionary or not.
16. Write a program to add a new key-value pair to an existing dictionary.
17. Write a program to sum all the items in a given dictionary.

UNIT-IV:Files: Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data, Reading and Writing Binary Files, Pickle Module, Reading and Writing CSV Files, Python os and os.path Modules.

Object-Oriented Programming: Classes and Objects, Creating Classes in Python, Creating Objects in Python, Constructor Method, Classes with Multiple Objects, Class Attributes Vs Data Attributes, Encapsulation, Inheritance, Polymorphism.

<Sample Experiments:

18. Write a program to sort words in a file and put them in another file. The output file should have only lower-case words, so any upper-case words from source must be lowered.
19. Python program to print each line of a file in reverse order.
20. Python program to compute the number of characters, words and lines in a file.
21. Write a program to create, display, append, insert and reverse the order of the items in the array.
22. Write a program to add, transpose and multiply two matrices.
23. Write a Python program to create a class that represents a shape. Include methods to calculate its area and perimeter. Implement subclasses for different shapes like circle, triangle, and square.

UNIT-V: Introduction to Data Science: Functional Programming, JSON and XML in Python, NumPy with Python, Pandas.

Sample Experiments:

24. Python program to check whether a JSON string contains complex object or not.
25. Python Program to demonstrate NumPy arrays creation using array () function.
26. Python program to demonstrate use of ndim, shape, size, dtype.
27. Python program to demonstrate basic slicing, integer and Boolean indexing.
28. Python program to find min, max, sum, cumulative sum of array
29. Create a dictionary with at least five keys and each key represent value as a list where this list contains at least ten values and convert this dictionary as a pandas data frame and explore the data through the data frame as follows:
 - a) Apply head () function to the pandas data frame
 - b) Perform various data selection operations on Data Frame
30. Select any two columns from the above data frame, and observe the change in one attribute



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with respect to other attribute with scatter and plot operations in matplotlib

Reference Books:

1. Gowrishankar S, Veena A., Introduction to Python Programming, CRC Press.
2. Python Programming, S Sridhar, J Indumathi, V M Hariharan, 2nd Edition, Pearson, 2024
3. Introduction to Programming Using Python, Y. Daniel Liang, Pearson.

Online Learning Resources/Virtual Labs:

1. <https://www.coursera.org/learn/python-for-applied-data-science-ai>
2. <https://www.coursera.org/learn/python?specialization=python#syllabus>



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Course Code	DESIGN THINKING AND INNOVATION	L	T	P	C
		0	1	2	2
II Year 1st Semester					
Course Objectives:					
The objective of this course is to familiarize students with design thinking process as a tool for breakthrough innovation. It aims to equip students with design thinking skills and ignite the minds to create innovative ideas, develop solutions for real-time problems.					
Course Outcomes (CO):					
<ul style="list-style-type: none"> • Define the concepts related to design thinking. • Explain the fundamentals of Design Thinking and innovation • Apply the design thinking techniques for solving problems in various sectors. • Analyse to work in a multidisciplinary environment • Evaluate the value of creativity • Formulate specific problem statements of real time issues 					
UNIT - I	Introduction to Design Thinking				
Introduction to elements and principles of Design, basics of design-dot, line, shape, form as fundamental design components. Principles of design. Introduction to design thinking, history of Design Thinking, New materials in Industry.					
UNIT - II	Design Thinking Process				
Design thinking process (empathize, analyze, idea & prototype), implementing the process in driving inventions, design thinking in social innovations. Tools of design thinking - person, customer, journey map, brainstorming, product development. Activity: Every student presents their idea in three minutes, Every student can present design process in the form of flow diagram or flow chart etc. Every student should explain about product development.					
UNIT - III	Innovation				
Art of innovation, Difference between innovation and creativity, role of creativity and innovation in organizations- Creativity to Innovation- Teams for innovation- Measuring the impact and value of creativity Activity: Debate on innovation and creativity, Flow and planning from idea to innovation, Debate on value-based innovation.					
UNIT - IV	Product Design				
Problem formation, introduction to product design, Product strategies, Product value, Product planning, product specifications- Innovation towards product design- Case studies. Activity: Importance of modelling, how to set specifications, Explaining their own product design.					
UNIT-V Design Thinking in Business Processes					
Design Thinking applied in Business & Strategic Innovation, Design Thinking principles that redefine business – Business challenges: Growth, Predictability, Change, Maintaining Relevance, Extreme competition, Standardization. Design thinking to meet corporate needs- Design thinking for Startups- Defining and testing Business Models and Business Cases- Developing & testing prototypes. Activity: How to market our own product, About maintenance, Reliability and plan for startup.					
Textbooks:					
<ol style="list-style-type: none"> 1. Tim Brown, Change by design, Harper BOLLINS (2009) 2. Idris Mootee, Design Thinking for Strategic Innovation, 2013, John Wiley & Sons. 					
Reference Books:					
<ol style="list-style-type: none"> 1. David Lee, Design Thinking in the Classroom, Ulysses press 2. Shrutin N Shetty, Design the Future, Norton Press 3. William Lidwell, Universal Principles of Design- Kritinaholden, Jill Butter. 					



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4. Chesbrough.H, The Era of Open Innovation – 2013

Online Learning Resources:

<https://nptel.ac.in/courses/110/106/110106124/>

<https://nptel.ac.in/courses/109/104/109104109/>

https://swayam.gov.in/nd1_noc19_mg60/previ



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Course Code	ENVIRONMENTAL SCIENCE	L	T	P	C
		2	0	0	0

II Year Ist Semester

Course Objectives:

- To make the students to get awareness on environment.
- To understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day-to-day activities of human life
- To save earth from the inventions by the engineers.

Course Outcomes (CO):

- Analyze various energy sources and their environmental impacts.
- Understand ecosystem functions and propose biodiversity conservation strategies.
- Identify causes of pollution and recommend control measures.
- Evaluate climate change impacts and suggest mitigation strategies.
- Apply environmental management systems and sustainability practices.

UNIT - I

NATURAL RESOURCES:

Energy resources: Sources of energy and their classification, renewable and non-renewable sources of energy; Conventional energy sources, non-conventional energy sources; Implications of energy use on the environment.

Forest resources – Use and over – exploitation, deforestation, **Water resources** – Use and over utilization of surface and ground water–**Mineral resources:** Use and exploitation, environmental effects of extracting and using mineral resources

Introduction to sustainable development: Sustainable Development Goals (SDGs) - targets and indicators, challenges and strategies for SDGs.

UNIT - II

ECOSYSTEMS: Concept of an ecosystem, Structure and function of an ecosystem, Energy flow in the ecosystem, Ecological succession. Introduction, types, characteristic features, structure and function of Forest, Grassland, Desert and aquatic ecosystems.

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

UNIT - III

ENVIRONMENTAL POLLUTION: Definition, Cause, effects and control measures of Air, Water, Soil, Marine, Noise, Thermal and Nuclear Pollutions.

SOLID WASTE MANAGEMENT: Causes, effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution.

UNIT - IV

Climate Change: Impacts, Adaptation and Mitigation:

Understanding climate change: Natural variations in climate; Structure of atmosphere; **Anthropogenic climate change from greenhouse gas emissions**– past, present and future; Projections of global climate change

Impacts, vulnerability and adaptation to climate change. Observed impacts of climate change on ocean and land systems.

Mitigation of climate change: Green House Gas (GHG) reduction vs. sink enhancement; Concept of carbon intensity, energy intensity and carbon neutrality; Energy efficiency measures; Renewable energy sources; Carbon capture and storage.

UNIT-V



Environmental Management

Introduction to environmental laws and regulation: Constitutional provisions- Article 48A, Article 51A (g) and other derived environmental rights; Introduction to environmental legislations on the forest, wildlife and pollution control.

Environmental management system: ISO 14001, Concept of Circular Economy, Life cycle analysis; Cost-benefit analysis, Environmental audit and impact assessment; Environmental risk assessment Pollution control and management; Waste Management- Concept of 3R (Reduce, Recycle and Reuse) and sustainability; Ecolabeling /Ecomark scheme.

TEXTBOOKS:

Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission, Universities Press.

Environmental Studies by PalaniSwamy – Pearson education

Environmental Studies by Dr.S.AzeemUnnisa, Academic Publishing Company

REFERENCES:

Textbook of Environmental Science by Deeksha Dave and E.Sai Baba Reddy, Cengage Publications.

Text book of Environmental Sciences and Technology by M.Anji Reddy, BS Publication.

Comprehensive Environmental studies by J.P.Sharma, Laxmi publications.

Environmental sciences and engineering – J. Glynn Henry and Gary W. Heinke – Printice hall of India Private limited.

A Text Book of Environmental Studies by G.R.Chatwal, Himalaya PUBLISHING House

Introduction to Environmental engineering and science by Gilbert M. Masters and Wendell P. Ela - Prentice hall of India Private limited



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Sri Krishnadevaraya University College of Engineering & Technology					
Dept. of Civil Engineering					
II Year II Semester					
S.No	Course Code	Course Name	Category	L-T-P	Credits
1.		Universal Human Values – Understanding Harmony	BS&H	2-1-0	3
2.		Engineering Geology	ES	2-0-0	2
3.		Concrete Technology	PC	3-0-0	3
4.		Structural Analysis	PC	3-0-0	3
5.		Building Planning and Drawing	PC	1-2-0	3
6.		FH & HM Lab	PC	0-0-3	1.5
7.		Engineering Geology Lab	PC	0-0-2	1
8.		Concrete Technology Lab	PC	0-0-3	1.5
9.		Soft Skills	SC	0-1-2	2
Total					20
Mandatory Community Service Project Internship of 08 weeks duration during summer Vacation					

Category	CREDITS
Basic Sciences and Humanities course	3
Engineering Science Courses	2
Professional Core Courses	13
Skill Course	2
TOTAL CREDITS	20



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Course Code	UNIVERSAL HUMAN VALUES – UNDERSTANDING HARMONY AND ETHICAL HUMAN CONDUCT	L	T	P	C
		2	1	0	3

II Year 2nd Semester

Course Objectives:

- To help the students appreciate the essential complementary between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
- To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.
- To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature.

Course Outcomes (CO):

- Define the terms like Natural Acceptance, Happiness and Prosperity
- Identify oneself, and one's surroundings (family, society nature)
- Apply what they have learnt to their own self in different day-to-day settings in real life
- Relate human values with human relationship and human society.
- Justify the need for universal human values and harmonious existence
- Develop as socially and ecologically responsible engineers

Course Topics

The course has 28 lectures and 14 tutorials in 5 modules. The lectures and tutorials are of 1-hour duration. Tutorial sessions are to be used to explore and practice what has been proposed during the lecture sessions.

The Teacher's Manual provides the outline for lectures as well as practice sessions. The teacher is expected to present the issues to be discussed as propositions and encourage the students to have a dialogue.

UNIT - I

Introduction to Value Education (6 lectures and 3 tutorials for practice session)
 Lecture 1: Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education)
 Lecture 2: Understanding Value Education
 Tutorial 1: Practice Session PS1 Sharing about Oneself
 Lecture 3: self-exploration as the Process for Value Education
 Lecture 4: Continuous Happiness and Prosperity – the Basic Human Aspirations
 Tutorial 2: Practice Session PS2 Exploring Human Consciousness
 Lecture 5: Happiness and Prosperity – Current Scenario
 Lecture 6: Method to Fulfill the Basic Human Aspirations
 Tutorial 3: Practice Session PS3 Exploring Natural Acceptance.

UNIT II

Harmony in the Human Being (6 lectures and 3 tutorials for practice session)
 Lecture 7: Understanding Human being as the Co-existence of the self and the body.
 Lecture 8: Distinguishing between the Needs of the self and the body
 Tutorial 4: Practice Session PS4 Exploring the difference of Needs of self and body.
 Lecture 9: The body as an Instrument of the self
 Lecture 10: Understanding Harmony in the self
 Tutorial 5: Practice Session PS5 Exploring Sources of Imagination in the self



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Lecture 11: Harmony of the self with the body Lecture 12: Programme to ensure self-regulation and Health Tutorial 6: Practice Session PS6 Exploring Harmony of self with the body	
UNIT - III	
Harmony in the Family and Society (6 lectures and 3 tutorials for practice session) Lecture 13: Harmony in the Family – the Basic Unit of Human Interaction Lecture 14: 'Trust' – the Foundational Value in Relationship Tutorial 7: Practice Session PS7 Exploring the Feeling of Trust Lecture 15: 'Respect' – as the Right Evaluation Tutorial 8: Practice Session PS8 Exploring the Feeling of Respect Lecture 16: Other Feelings, Justice in Human-to-Human Relationship Lecture 17: Understanding Harmony in the Society Lecture 18: Vision for the Universal Human Order Tutorial 9: Practice Session PS9 Exploring Systems to fulfil Human Goal	
UNIT - IV	
Harmony in the Nature/Existence (4 lectures and 2 tutorials for practice session) Lecture 19: Understanding Harmony in the Nature Lecture 20: Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature Tutorial 10: Practice Session PS10 Exploring the Four Orders of Nature Lecture 21: Realizing Existence as Co-existence at All Levels Lecture 22: The Holistic Perception of Harmony in Existence Tutorial 11: Practice Session PS11 Exploring Co-existence in Existence.	
UNIT - V	
Implications of the Holistic Understanding – a Look at Professional Ethics (6 lectures and 3 tutorials for practice session) Lecture 23: Natural Acceptance of Human Values Lecture 24: Definitiveness of (Ethical) Human Conduct Tutorial 12: Practice Session PS12 Exploring Ethical Human Conduct Lecture 25: A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order Lecture 26: Competence in Professional Ethics Tutorial 13: Practice Session PS13 Exploring Humanistic Models in Education Lecture 27: Holistic Technologies, Production Systems and Management Models-Typical Case Studies Lecture 28: Strategies for Transition towards Value-based Life and Profession Tutorial 14: Practice Session PS14 Exploring Steps of Transition towards Universal Human Order	
Practice Sessions for UNIT I – Introduction to Value Education PS1 Sharing about Oneself PS2 Exploring Human Consciousness PS3 Exploring Natural Acceptance Practice Sessions for UNIT II – Harmony in the Human Being PS4 Exploring the difference of Needs of self and body PS5 Exploring Sources of Imagination in the self PS6 Exploring Harmony of self with the body Practice Sessions for UNIT III – Harmony in the Family and Society PS7 Exploring the Feeling of Trust PS8 Exploring the Feeling of Respect PS9 Exploring Systems to fulfil Human Goal Practice Sessions for UNIT IV – Harmony in the Nature (Existence) PS10 Exploring the Four Orders of Nature PS11 Exploring Co-existence in Existence Practice Sessions for UNIT V – Implications of the Holistic Understanding – a Look at Professional Ethics	



PS12 Exploring Ethical Human Conduct
PS13 Exploring Humanistic Models in Education
PS14 Exploring Steps of Transition towards Universal Human Order

Textbook READINGS:
Textbook and Teachers Manual

- a. The Textbook
R R Gaur, R Asthana, G P Bagaria, A Foundation Course in Human Values and Professional Ethics, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1
- b. The Teacher's Manual
R R Gaur, R Asthana, G P Bagaria, Teachers' Manual for A Foundation Course in Human Values and Professional Ethics, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2

Reference Books:

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
5. Small is Beautiful - E. F Schumacher.
6. Slow is Beautiful - Cecile Andrews
7. Economy of Permanence - J C Kumarappa
8. Bharat Mein Angreji Raj – Pandit Sunderlal
9. Rediscovering India - by Dharampal
10. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
11. India Wins Freedom - Maulana Abdul Kalam Azad
12. Vivekananda - Romain Rolland (English)
13. Gandhi - Romain Rolland (English)

Mode of Conduct:

Lecture hours are to be used for interactive discussion, placing the proposals about the topics at hand and motivating students to reflect, explore and verify them.

Tutorial hours are to be used for practice sessions.

While analyzing and discussing the topic, the faculty mentor's role is in pointing to essential elements to help in sorting them out from the surface elements. In other words, help the students explore the important or critical elements.

In the discussions, particularly during practice sessions (tutorials), the mentor encourages the student to connect with one's own self and do self-observation, self-reflection and self-exploration.

Scenarios may be used to initiate discussion. The student is encouraged to take up "ordinary" situations rather than "extra-ordinary" situations. Such observations and their analyses are shared and discussed with other students and faculty mentor, in a group sitting.

Tutorials (experiments or practical) are important for the course. The difference is that the laboratory is everyday life, and practical are how you behave and work in real life.

Depending on the nature of topics, worksheets, home assignment and/or activity are included. The practice sessions (tutorials) would also provide support to a student in performing actions commensurate to his/her beliefs. It is intended that this would lead to development of commitment, namely behaving and working based on basic human values.

It is recommended that this content be placed before the student as it is, in the form of a basic foundation course, without including anything else or excluding any part of this content. Additional content may be offered in separate, higher courses. This course is to be



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taught by faculty from every teaching department, not exclusively by any one department. Teacher preparation with a minimum exposure to at least one 8-day Faculty Development Program on Universal Human Values is deemed essential.

Online Resources:

1. <https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%201-Introduction%20to%20Value%20Education.pdf>
2. <https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%202-Harmony%20in%20the%20Human%20Being.pdf>
3. <https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%203-Harmony%20in%20the%20Family.pdf>
4. <https://fdp-si.aicte-india.org/UHV%201%20Teaching%20Material/D3-S2%20Respect%20July%202023.pdf>
5. <https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%205-Harmony%20in%20the%20Nature%20and%20Existence.pdf>
6. <https://fdp-si.aicte-india.org/download/FDPTeachingMaterial/3-days%20FDP-SI%20UHV%20Teaching%20Material/Day%203%20Handouts/UHV%203D%20D3-S2A%20Und%20Nature-Existence.pdf>
7. <https://fdp-si.aicte-india.org/UHV%20II%20Teaching%20Material/UHV%20II%20Lecture%2023-25%20Ethics%20v1.pdf>
8. <https://www.studocu.com/in/document/kiet-group-of-institutions/universal-human-values/chapter-5-holistic-understanding-of-harmony-on-professional-ethics/62490385>
9. https://onlinecourses.swayam2.ac.in/aic22_ge23/preview.



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Course Code	ENGINEERING GEOLOGY	L	T	P	C
		2	0	0	2
II Year 2nd Semester					
Course Objectives:					
<ul style="list-style-type: none"> • Understand the significance of geology in civil engineering and its impact on construction projects. • Study the physical and chemical properties of minerals for effective identification and application. • Gain knowledge of rock classifications and their structural characteristics relevant to engineering. • Explore the causes and effects of natural hazards like earthquakes and landslides in civil engineering contexts. 					
Course Outcomes (CO):					
<ul style="list-style-type: none"> • Analyze geological case histories to identify potential risks in civil engineering projects. • Classify and identify minerals based on their physical properties. • Describe the characteristics of various rock types and their engineering applications. • Assess risks associated with earthquakes and landslides and recommend mitigation strategies. 					
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, Geological agents, weathering process of Rock, Rivers and geological work of rivers.					
UNIT - II					
MINERALOGY: Definition of mineral, Importance of study of minerals, Different methods of study of minerals. Advantages of study of minerals by physical properties. Role of study of physical properties of minerals in the identification of minerals. Study of physical properties of following common rock forming minerals: Feldspar , Quartz , Flint , Jasper, Olivine , Augite , Hornblende , Muscovite , Biotite , Asbestos, Chlorite , Kyanite , Garnet, Talc , Calcite. Study of other common economics minerals such as Pyrite, Hematite, Magnetite, Chlorite, Galena , Pyrolusite , Graphite, Magnesite, and Bauxite.					
UNIT - III					
PETROLOGY: Definition of rock: Geological classification of rocks into igneous, Sedimentary and metamorphic rocks. Dykes and sills, common structures and textures of Igneous. Sedimentary and Metamorphic rocks. Their distinguishing features, Megascopic study of Granite, Dolerite, Basalt, Pegmatite, Laterite, Conglomerate, Sand Stone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble and Slate.					
STRUCTURAL GEOLOGY: Outcrop, strike and dip study of common geological structures associating with the rocks such as folds, faults unconformities, and joints – their important types. Their importance Insitu and drift soils, common types of soils, their origin and occurrence in India.					
UNIT - IV					
EARTHQUAKE & LAND SLIDES: Earthquakes, their causes and effects, shield areas and seismic belts. Seismic waves, Richter scale, precautions to be taken for building construction in seismic areas. Land slides, their causes and effect; measures to be taken to prevent their occurrence. Importance of study of earthquakes and land slides.					
GEOPHYSICAL STUDIES: 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					
UNIT-V					
APPLICATON OF ENGINEERING GEOLOGY FOR DAMS AND RESERVOIRS: Types of dams and bearing of Geology of site in their selection, Geological Considerations in the selection of a dam site. Analysis of dam failures of the past. Factor’s contributing to the success of a reservoir. Geological factors influencing water Lightness and life of reservoirs. TUNNEL PROJECTS: Purposes of tunneling, Effects of Tunneling on the ground Role of Geological Considerations. Structural and groundwater in tunneling over break and lining in tunnels.					



R23 Regulations

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TEXT BOOKS:

1. Engineering Geology by N. ChennaKesavulu, Laxmi Publications . 2nd Edn 2014.
2. Engineering & General Geology by Parbin Singh Katson educational series 8th2023

REFERENCES:

1. Engineering Geology by D. Venkat Reddy, Vikas Publishing, 2nd Edn, 2017.
2. F.G. Bell, Fundamental of Engineering Geology Butterworths, Publications, New Delhi, 1992
3. Krynine & Judd, Principles of Engineering Geology & Geotechnics, CBS Publishers & Distribution,
4. Engineering Geology by Mukarjee, World Press.
5. Foundations of Engineering Geology by Tony Waltham, Special Indian Edition, CRC Press NewDelhi.
6. Environmental Geology' (2013) K.S.Valdiya, 2nd ed., McGraw Hill Publications.



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Course Code	CONCRETE TECHNOLOGY	L	T	P	C
		3	0	0	3
II Year 2nd Semester					
Course Objectives:					
<ul style="list-style-type: none"> • To explain the functional role of ingredients of concrete and apply this knowledge to mix design philosophy. • To develop fundamental knowledge in the fresh and hardened properties of concrete • To inculcate the testing methodology to evaluate the properties of concrete during fresh and hardened stage. • To impart the knowledge on the behavior of concrete with response to stresses developed. • To impart the knowledge on the special concretes And design a concrete mix which fulfils the required properties for fresh and hardened concrete. 					
Course Outcomes (CO):					
<ul style="list-style-type: none"> • Understand various ingredients of concrete and their role. • Examine knowledge on the fresh and hardened properties of concrete. • Design concrete mixes using various methods. • Perceive special concretes for accomplishing performance levels. 					
UNIT - I					
Ingredients of concrete:					
<p>Cement-chemical composition-hydration process-Bogue’s compound-Tests on properties of cement-Types of cement - I.S. Specifications. Aggregates- classification of aggregate, tests on properties of aggregates, characteristics of aggregate - I.S. Specifications. Water-quality of water, characteristics of water, I.S. Specifications. Admixtures – classification of chemical admixtures, properties and limitations, classification of mineral admixtures – properties and limitations - I.S. Specifications.</p>					
UNIT - II					
Properties of concrete:					
<p>Fresh concrete: Mixing of concrete-workability-factors influencing workability- measurement of workability for conventional concrete (Slump Cone, Compaction Factor and Vee-Bee test) Hardened concrete: Water/Cement Ratio(Abram’s Law)-Gel Space Ratio-tests on hardened concrete-Destructive Tests (Compression, Split Tensile and Flexural)-Semi Destructive Tests (Core Cutter and Pull out test) and Non-Destructive Tests (Rebound Hammer-UPV methods).</p>					
UNIT - III					
Elasticity, Shrinkage, and Creep:					
<p>Curing of concrete -methods of curing, effects of improper curing-self curing-Modulus of Elasticity-Poisson’s Ratio-Dynamic Modulus of Elasticity, Shrinkage, and various types, Factors Affecting Shrinkage-Moisture Movement-Creep of Concrete-Factors Influencing Creep.</p>					
UNIT - IV					
Concrete Mix Design:					
<p>Proportioning of Concrete Mixes-factors influencing - IS Code Methods- IS 456 provisions on Durability-Quality Control and Statistical Methods – ACI method of Mix Design for High Strength concrete.</p>					
UNIT-V					
Special Concretes:					
<p>Light Weight Concretes –Light Weight Aggregate Concrete- Cellular Concrete, No Fines Concrete-High Density Concrete – Fiber Reinforced Concrete-Polymer Concrete-Self Compacting Concrete.</p>					



Text Books:

1. A. M. Neville, “Properties of Concrete”, Pearson Publication – 4th Edition
2. M.S. Shetty, A. K. Jain, “Concrete Technology Theory and Practice”, S. Chand and Company Limited, New Delhi

References:

1. M. L. Gambhir, “Concrete Technology”, Tata Mc. Graw Hill Publishers, New Delhi.
2. N. Krishna Raju, “Design of Concrete Mixes”, CBS Publishers.
3. Concrete Microstructure, Properties of Materials by P.K. Mehta and Moterio. McGraw Hill 4th edition 2014
4. J. Prasad, C.G.K. Nair, “Non-Destructive Test and Evaluation of Materials”, Tata Mcgraw Hill Publishers, New Delhi.
5. Concrete Technology, J.J. Brooks and A. M. Neville, Pearson, 2019, 2nd Edition.



Course Code	STRUCTURAL ANALYSIS	L	T	P	C
		3	0	0	3
II Year 2nd Semester					
Course Objectives:					
<ul style="list-style-type: none">• Learn energy theorems• Analysis of fixed and continuous beams• Learn about slope-deflection method• Learn about Moment – distribution method					
Course Outcomes (CO):					
<ul style="list-style-type: none">• Apply energy theorems to analyze trusses• Analysis of fixed and continuous beams• Analyze continuous beams and portal frames by using slope-deflection method• Analyze continuous beams and portal frames by using Moment – distribution method					
UNIT - I					
ENERGY THEOREMS: Introduction-Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear forces, Castigliano’s first theorem Deflections of simple beams and pin jointed trusses.					
FIXED BEAMS – Introduction to statically indeterminate beams with U.D. load central point load, eccentric point load. Number of point loads, uniformly varying load, Deflection of fixed beams effect of sinking of support, effect of rotation of a support.					
UNIT - III					
CONTINUOUS BEAMS: Introduction-Clapeyron’s theorem of three moments- Analysis of continuous beams with constant moment of inertia with one or both ends fixed-Effects of sinking of supports-shear force and Bending moment diagrams.					
UNIT - IV					
SLOPE-DEFLECTION METHOD: Introduction, derivation of slope deflection equation, application to continuous beams with and without settlement of supports. Analysis of single bayportal frames without sway					
UNIT-V					
MOMENT DISTRIBUTION METHOD: Introduction and application to continuous beams with and without settlement of supports. Analysis of single bay-storey portal frames without sway.					



Text Books:

1. Analysis of Structures-Vol I & Vol II by V.N. Vazirani & M.M.Ratwani, Khanna Publications New Delhi.
2. Analysis of Structures by T.S. Thandavamoorthy, Oxford University Press, New Delhi Basic structural Analysis by C.S. Reddy, Tata Mc Graw Hill, New Delhi

Reference:

1. Mechanics of Structures by S.B. Junnarkar, Charotar Publishing House, Anand, Gujrat
2. Theory of Structures by Gupta, Pandit & Gupta; Tata Mc.Graw – Hill Publishing Co.Ltd., New Delhi.
3. Theory of Structures by R.S. Khurmi, S. Chand Publishers
4. Strength of Materials and Mechanics of Structures- by B.C.Punmia, Khanna Publications, New Delhi.
5. Introduction to structural analysis by B.D. Nautiyal, New age international publishers, New Delhi
6. Structural Analysis by V.D.Prasad Galgotia publications, 2nd Editions.
7. Comprehensive Structural Analysis-Vol.I&2 by Dr. R. Vaidyanathan & Dr. P.Perumal- Laxm publications pvt. Ltd., New Delhi.



Course Code	BUILDING MATERIALS AND PLANNING	L	T	P	C
		3	0	0	3
II Year 2nd Semester					
Course Objectives:					
<ul style="list-style-type: none"> • Understand the properties, classification, and applications of various building materials, including stones, bricks, lime, and wood. • Learn the design and structural roles of key building components, such as floors, roofs, lintels, and arches. • Familiarize with building byelaws and regulations to ensure compliance in residential construction. • Develop skills in creating accurate architectural drawings, including plans, sections, and elevations. 					
Course Outcomes (CO):					
<ul style="list-style-type: none"> • Students will be able to identify and classify different building materials and assess their suitability for construction. • Students will demonstrate knowledge of various building components and their functions in structural design. • Students will apply building regulations and byelaws effectively in their design projects. • Students will create precise architectural drawings that include necessary specifications and dimensions. 					
PART-A					
UNIT - I					
STONES & BRICKS: Different types of rock formations, properties & classification of building stones, stone quarrying, precautions in blasting and dressing of stones. Composition of brick earth, various methods of manufacture of bricks. Qualities of bricks. LIME & TILES: Various ingredients of lime, constituents of limestone, classification of lime. Types of tiles. Wood: Structure, properties, seasoning, and defects in timber. Preservation, various types of woods used in buildings					
UNIT - II					
BUILDING COMPONENTS: Lintels, arches, staircase types. Different types of floors-concrete, mosaic, terrazzo floors, pitched, flat and curved roofs. Lean to roof, coupled roofs, trussed roof-king, and queen post trusses.					
UNIT - III					
BUILDING BYELAWS & REGULATIONS: Introduction, Terminology – Objectives of building bye-laws Floor area ratio (FAR), Floor space Index (FSI), Principles underlying building bye-laws, classification of bye buildings, Open space requirements, built-up area limitations, Height of Buildings, Wall thickness, lighting, and ventilation requirement. Residential Buildings: Minimum standards for various parts of buildings, requirements of different rooms and their grouping, and characteristics of various types of residential buildings.					
PART-B					
UNIT - IV					
SIGN CONVENTIONS AND BONDS: Brick, Stone, Plaster, Sand filling, Concrete, Glass, Steel, Cast iron, Copper alloys, Aluminium alloys, etc., Lead, Zinc, tin, white lead, etc., Earth, Rock, Timber, and Marble. English bond & Flemish bond odd & even courses for one, one and half, two and two and half brick walls in thickness at the junction of a corner. DOORS, WINDOWS AND ROOFS: Panalled, Door paneled and glazed door, glazed windows, paneled windows, Couple roof, Collar roof, King Post truss, Queen post truss.					
UNIT-V					
UNIT – V:					
Given line diagram with specifications to draw, plan, sections section and elevation					
Note: Final examination pattern: Part- A Three questions out of 6 each Question 10 marks from unit I to III Part-B From Unit IV one question out of two 10 Marks. From Unit V one question out of Two Question 30 Marks (Compulsory Question)					



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TEXT BOOKS:

1. S.C. Rangwala, Engineering Materials, 41/e, Charotar Publishing House, 2014.
2. Building Planning & Drawing by Dr N. Kumaraswamy
3. Planning and Designing and Scheduling – Gurucharan singh and Jagadish singh- Standard publishers.
4. PERT and CPM – Project planning and control with by Dr.B.C.Punmia & Khandelwal – Laxmi publications

REFERENCE:

1. Building materials by P.C. Varghese, Prentice-Hall of India private Ltd, New Delhi
2. Building material by S K Duggal – New Age International Publishers; Second Edition.
3. National Building Code 2016 (Volume- I & II).
4. Principles of Building Drawing, M G Shah and C M Kale, Trinity Publications, New Delhi.
5. 'A' Series & 'B' Series of JNTU Engineering College, Anantapur.
6. Construction Planning, Equipment and methods by R.L. Peurifoy etal. – Tata Mc. Graw Hill Publications.



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Civil Engineering

Course Code	FLUID MECHANICS AND HYDRAULIC	L	T	P	C
	MACHINERY LAB	0	0	3	1.5

II Year 2nd Semester

Course Objectives:

The object of the course is to make the students understand the working principles of vanes under impact of water jets, various turbines and pumps.

Course Outcomes (CO):

By performing the various tests in this laboratory, the student will be able to know the performance of various hydraulic machinery and flow characteristics.

List of Experiments:

- Verification of Bernoulli's equation.
- Calibration of Venturimeter.
- Calibration of Orifice meter
- Determination of Coefficient of discharge for a small orifice by constant head method.
- Determination of Coefficient of discharge for a small orifice by variable head method.
- Determination of Coefficient of discharge for an external mouthpiece by Constant head method and Variable head method.
- Calibration of contracted Rectangular Notch.
- Calibration of contracted Triangular Notch.
- Determination of friction factor
- Determination of loss of head in a sudden contraction and sudden Expansion
- Impact of jet on vanes
- Study of Hydraulic jump.
- Performance test on Pelton wheel turbine
- Performance test on Francis turbine.
- Efficiency test on centrifugal pump.
- Efficiency test on reciprocating pump.
- Efficiency test on multi stage centrifugal pump.
- Head loss due to bend
- Experiment on turbine flow meter (water meter)



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Civil Engineering

Course Code	ENGINERRING GEOLOGY LAB	L	T	P	C
		0	0	2	1

II Year 2nd Semester

Course Objectives:

Study of physical properties and identification of minerals referred under theory. Megascopic description and identification of rocks referred under theory. Interpretation and drawing of sections for geological maps showing tilted beds, faults, uniformities etc. Simple Structural Geology problems.

List of Experiments:

- Description and identification of Six minerals
- Description and identification of Six rocks.
- Interpretation of a Geological map along with a geological section.
- Interpretation of a Geological bore holes
- Simple strike and Dip problems.



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Course Code	CONCRETE TECHNOOGY LAB	L	T	P	C
		0	0	3	1.5
II Year 2nd Semester					
Course Objectives:					
To learn laboratory tests and their procedures cement, fine aggregate, and coarse aggregates. To evaluate fresh concrete properties.					
Course Outcomes (CO):					
By performing the various tests in this laboratory, the student will be able to know the performance of cement and fresh concrete properties.					
List of Experiments:					
Test on Cement <ol style="list-style-type: none">1. Normal Consistency and fineness of cement.2. Initial setting time and final setting time of cement.3. Specific gravity of cement4. Soundness of cement5. Compressive strength of cement.					
Test on Aggregates (Coarse and Fine) <ol style="list-style-type: none">1. Specific gravity (Pycnometer and wire basket), water absorption2. Shape (Flakiness and elongation indices)3. Impact and abrasion value tests4. Crushing resistance and durability tests5. Sieve Analysis and gradation charts (Job mix formula using Rothfuch's charts)6. Bulking of sand, Bulk and compact densities of fine and coarse aggregates					
Test on Fresh Concrete <ol style="list-style-type: none">1. Slump test2. CF (compact factor stress)3. Vee-bee Test4. Flow Table Test					
Test on hardened concrete and Non Destructive Testing <ol style="list-style-type: none">1. Compression test on cubes & Cylinders2. Flexure test3. Modulus of Elasticity4. Rebound Hammer Test5. Ultra-Sonic Pulse Velocity Test.					



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Civil Engineering
SOFT SKILLS

Course Code		L	T	P	C
		0	1	2	2

II Year 2nd Semester

Course Objectives:

- To encourage all round development of the students by focusing on soft skills
- To make the students aware of critical thinking and problem-solving skills
- To enhance healthy relationship and understanding within and outside an organization
- To function effectively with heterogeneous teams

Course Outcomes (CO):

- List out various elements of soft skills
- Describe methods for building professional image
- Apply critical thinking skills in problem solving
- Analyze the needs of an individual and team for well-being
- Assess the situation and take necessary decisions
- Create a productive workplace atmosphere using social and work-life skills ensuring personal and emotional well-being

UNIT - I

Soft Skills & Communication Skills

Soft Skills - Introduction, Need - Mastering Techniques of Soft Skills – Communication Skills - Significance, process, types - Barriers of communication - Improving techniques.

Activities:

Intrapersonal Skills- Narration about self- strengths and weaknesses- clarity of thought – self-expression – articulating with felicity.

(The facilitator can guide the participants before the activity citing examples from the lives of the great, anecdotes and literary sources)

Interpersonal Skills- Group Discussion – Debate – Team Tasks - Book and film Reviews by groups - Group leader presenting views (non- controversial and secular) on contemporary issues or on a given topic.

Verbal Communication- Oral Presentations- Extempore- brief addresses and speeches- convincing- negotiating- agreeing and disagreeing with professional grace.

Non-verbal communication – Public speaking – Mock interviews – presentations with an objective to identify non- verbal clues and remedy the lapses on observation.

UNIT - II

Critical Thinking

Active Listening – Observation – Curiosity – Introspection – Analytical Thinking – Open-mindedness – Creative Thinking - Positive thinking - Reflection

Activities:

Gathering information and statistics on a topic - sequencing – assorting – reasoning – critiquing issues – placing the problem – finding the root cause - seeking viable solution – judging with rationale – evaluating the views of others - Case Study, Story Analysis

UNIT - III

Problem Solving & Decision Making

Meaning & features of Problem Solving – Managing Conflict – Conflict resolution – Team building - Effective decision making in teams – Methods & Styles

Activities:

Placing a problem which involves conflict of interests, choice and views – formulating the problem – exploring solutions by proper reasoning – Discussion on important professional, career and organizational decisions and initiate debate on the appropriateness of the decision. Case Study & Group Discussion

UNIT - IV

Emotional Intelligence & Stress Management

Managing Emotions – Thinking before Reacting – Empathy for Others – Self-awareness – Self-Regulation – Stress factors – Controlling Stress – Tips

Activities:

Providing situations for the participants to express emotions such as happiness, enthusiasm, gratitude, sympathy, and confidence, compassion in the form of written or oral presentations. Providing opportunities for the participants to narrate certain crisis and stress – ridden situations caused by failure, anger, jealousy, resentment and frustration in the form of written and oral presentation, Organizing Debates.

**UNIT-V Corporate Etiquette**

Etiquette- Introduction, concept, significance - Corporate etiquette - meaning, modern etiquette, benefits - Global and local culture sensitivity - Gender Sensitivity - Etiquette in interaction- Cell phone etiquette - Dining etiquette - Netiquette - Job interview etiquette - Corporate grooming tips - Overcoming challenges

Activities

Providing situations to take part in the Role Plays where the students will learn about bad and good manners and etiquette - Group Activities to showcase gender sensitivity, dining etiquette etc. - Conducting mock job interviews - Case Study - Business Etiquette Games

NOTE-:

The facilitator can guide the participants before the activity citing examples from the lives of the great, anecdotes, epics, scriptures, autobiographies and literary sources which bear true relevance to the prescribed skill.

Case studies may be given wherever feasible for example for Decision Making- The decision of King Lear.

Textbooks:

Mitra Barun K, Personality Development and Soft Skills, Oxford University Press, Pap/Cdr edition 2012

Dr Shikha Kapoor, Personality Development and Soft Skills: Preparing for Tomorrow, I K International Publishing House, 2018

Reference Books

Sharma, Prashant, Soft Skills: Personality Development for Life Success, BPB Publications 2018.
Alex K, Soft Skills S.Chand & Co, 2012 (Revised edition)

Gajendra Singh Chauhan & Sangeetha Sharma, Soft Skills: An Integrated Approach to Maximise Personality Published by Wiley, 2013

Pillai, Sabina & Fernandez Agna, Soft Skills and Employability Skills, Cambridge University Press, 2018

Soft Skills for a Big Impact (English, Paperback, Renu Shorey) Publisher: Notion Press

Dr. Rajiv Kumar Jain, Dr. Usha Jain, Life Skills (Paperback English) Publisher : Vayu Education of India, 2014

Online Learning Resources:

https://youtu.be/DUlsNJtg2L8?list=PLLy_2iUCG87CQhELCYtvXh0E_y-bOO1_q

https://youtu.be/xBaLgJZ0t6A?list=PLzf4HHIsQFwJZel_j2PUy0pwjVUgj7KIJ

<https://youtu.be/-Y-R9hDI7IU>

<https://youtu.be/gkLsn4ddmTs>

<https://youtu.be/2bf9K2rRWwo>

<https://youtu.be/FchfE3c2jzc>

<https://www.businesstrainingworks.com/training-resource/five-free-business-etiquette-training-games/>

https://onlinecourses.nptel.ac.in/noc24_hs15/preview

https://onlinecourses.nptel.ac.in/noc21_hs76/preview



Course Code	COMMUNITY SERVICE PROJECTExperiential learning through community engagement				
II Year 2nd Semester					
INTRODUCTION					
<ul style="list-style-type: none"> Community Service Project is an experiential learning strategy that integrates meaningful community service with instruction, participation, learning and community development. Community Service Project involves students in community development and service activities and applies the experience to personal and academic development. Community Service Project is meant to link the community with the college for mutual benefit. The community will benefit with the focused contribution of the college students for the village/ local development. The college finds an opportunity to develop social sensibility and responsibility among students and emerge as a socially responsible institution. 					
OBJECTIVE					
<p>Community Service Project should be an integral part of the curriculum, as an alternative to the 2 months of Summer Internships / Apprenticeships / On the Job Training, whenever there is an exigency when students cannot pursue their summer internships. The specific objectives are;</p> <ul style="list-style-type: none"> To sensitize the students to the living conditions of the people who are around them, To help students to realize the stark realities of society. To bring about an attitudinal change in the students and help them to develop societal consciousness, sensibility, responsibility and accountability To make students aware of their inner strength and help them to find new /out of box solutions to social problems. To make students socially responsible citizens who are sensitive to the needs of the disadvantaged sections. To help students to initiate developmental activities in the community in coordination with public and government authorities. To develop a holistic life perspective among the students by making them study culture, traditions, habits, lifestyles, resource utilization, wastages and its management, social problems, public administration system and the roles and responsibilities of different persons across different social systems. 					
Implementation of Community Service Project					
<ul style="list-style-type: none"> Every student should put in 6 weeks for the Community Service Project during the summer vacation. Each class/section should be assigned with a mentor. Specific Departments could concentrate on their major areas of concern. For example, Dept. of Computer Science can take up activities related to Computer Literacy to different sections of people like - youth, women, housewives, etc A logbook must be maintained by each of the students, where the activities undertaken/involved to be recorded. The logbook has to be countersigned by the concerned mentor/faculty in charge. An evaluation to be done based on the active participation of the student and grade could be awarded by the mentor/faculty member. The final evaluation to be reflected in the grade memo of the student. 					



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- The Community Service Project should be different from the regular programs of NSS/NCC/Green Corps/Red Ribbon Club, etc.
- Minor project reports should be submitted by each student. An internal Viva shall also be conducted by a committee constituted by the principal of the college.
- Award of marks shall be made as per the guidelines of Internship/apprentice/ on the job training.

Procedure

- A group of students or even a single student could be assigned for a particular habitation or village or municipal ward, as far as possible, in the near vicinity of their place of stay, to enable them to commute from their residence and return back by evening or so.
- The Community Service Project is a twofold one –
 - First, the student/s could conduct a survey of the habitation, if necessary, in terms of their own domain or subject area. Or it can even be a general survey, incorporating all the different areas. A common survey format could be designed. This should not be viewed as a duplication of work by the Village or Ward volunteers, rather, it could be another primary source of data.
 - Secondly, the student/s could take up a social activity, concerning their domain or subject area. The different areas, could be like –
 - Agriculture
 - Health
 - Marketing and Cooperation
 - Animal Husbandry
 - Horticulture
 - Fisheries
 - Sericulture
 - Revenue and Survey
 - Natural Disaster Management
 - Irrigation
 - Law & Order
 - Excise and Prohibition
 - Mines and Geology
 - Energy
 - Internet
 - Free Electricity
 - Drinking Water

EXPECTED OUTCOMES

BENEFITS OF COMMUNITY SERVICE PROJECT TO STUDENTS

Learning Outcomes

- Positive impact on students' academic learning
- Improves students' ability to apply what they have learned in "the real world"
- Positive impact on academic outcomes such as demonstrated complexity of understanding, problem analysis, problem-solving, critical thinking, and cognitive development.
- Improved ability to understand complexity and ambiguity

Personal Outcomes

- Greater sense of personal efficacy, personal identity, spiritual growth, and moral development
- Greater interpersonal development, particularly the ability to work well with others, and build leadership and communication skills.

Social Outcomes

- Reduced stereotypes and greater inter-cultural understanding
- Improved social responsibility and citizenship skills
- Greater involvement in community service after graduation

**Career Development**

- Connections with professionals and community members for learning and career opportunities
- Greater academic learning, leadership skills, and personal efficacy can lead to greater opportunity.

Relationship with the Institution

- Stronger relationships with faculty
- Greater satisfaction with college
- Improved graduation rates

BENEFITS OF COMMUNITY SERVICE PROJECT TO FACULTY MEMBERS

- Satisfaction with the quality of student learning
- New avenues for research and publication via new relationships between faculty and community
- Providing networking opportunities with engaged faculty in other disciplines or institutions
- A stronger commitment to one's research.

BENEFITS OF COMMUNITY SERVICE PROJECT TO COLLEGES AND UNIVERSITIES

- Improved institutional commitment.
- Improved student retention
- Enhanced community relations

BENEFITS OF COMMUNITY SERVICE PROJECT TO COMMUNITY

- Satisfaction with student participation
- Valuable human resources needed to achieve community goals.
- New energy, enthusiasm and perspectives applied to community work.
- Enhanced community-university relations.

SUGGESTIVE LIST OF PROGRAMMES UNDER COMMUNITY SERVICE PROJECT

The following the recommended list of projects for Engineering students. The lists are not exhaustive and open for additions, deletions, and modifications. Colleges are expected to focus on specific local issues for this kind of project. The students are expected to carry out these projects with involvement, commitment, responsibility, and accountability. The mentors of a group of students should take the responsibility of motivating, facilitating, and guiding the students. They have to interact with local leadership and people and appraise the objectives and benefits of this kind of project. The project reports shall be placed in the college website for reference. Systematic, Factual, methodical and honest reporting should be ensured.

For Engineering Students

1. Water facilities and drinking water availability
2. Health and hygiene
3. Stress levels and coping mechanisms
4. Health intervention programmes
5. Horticulture
6. Herbal plants
7. Botanical survey
8. Zoological survey
9. Marine products
10. Aqua culture
11. Inland fisheries
12. Animals and species
13. Nutrition
14. Traditional health care methods



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15. Food habits
16. Air pollution
17. Water pollution
18. Plantation
19. Soil protection
20. Renewable energy
21. Plant diseases
22. Yoga awareness and practice
23. Health care awareness programmes and their impact
24. Use of chemicals on fruits and vegetables
25. Organic farming
26. Crop rotation
27. Floury culture
28. Access to safe drinking water
29. Geographical survey
30. Geological survey
31. Sericulture
32. Study of species
33. Food adulteration
34. Incidence of Diabetes and other chronic diseases
35. Human genetics
36. Blood groups and blood levels
37. Internet Usage in Villages
38. Android Phone usage by different people
39. Utilisation of free electricity to farmers and related issues
40. Gender ration in schooling level- observation.

Complimenting the community service project the students may be involved to take up some awareness campaigns on social issues/special groups. The suggested list of programs

Programs for School Children

1. Reading Skill Program (Reading Competition)
 2. Preparation of Study Materials for the next class.
 3. Personality / Leadership Development
 4. Career Guidance for X class students
 5. Screening Documentary and other educational films
 6. Awareness Program on Good Touch and Bad Touch (Sexual abuse)
 7. Awareness Program on Socially relevant themes.
- Programs for Women
- Empowerment
1. Government Guidelines and Policy Guidelines
 2. Women's Rights
 3. Domestic Violence
 4. Prevention and Control of Cancer
 5. Promotion of Social Entrepreneurship
- General Camps
1. General Medical camps
 2. Eye Camps
 3. Dental Camps
 4. Importance of protected drinking water
 5. ODF awareness camp
 6. Swatch Bharath
 7. AIDS awareness camp
 8. Anti Plastic Awareness
 9. Programs on Environment
 10. Health and Hygiene



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11. Hand wash programmes

12. Commemoration and Celebration of important days
Programs for Youth Empowerment

1. Leadership

2. Anti-alcoholism and Drug addiction

3. Anti-tobacco

4. Awareness on Competitive Examinations

5. Personality Development
Common Programs

1. Awareness on RTI

2. Health intervention programmes

3. Yoga

4. Tree plantation

5. Programs in consonance with the Govt. Departments like –

i. Agriculture

ii. Health

iii. Marketing and Cooperation

iv. Animal Husbandry

v. Horticulture

vi. Fisheries

vii. Sericulture

viii. Revenue and Survey

ix. Natural Disaster Management

x. Irrigation

xi. Law & Order

xii. Excise and Prohibition

Role of Students:

- Students may not have the expertise to conduct all the programmes on their own. The students then can play a facilitator role.
- For conducting special camps like Health related, they will be coordinating with the Governmental agencies.
- As and when required the College faculty themselves act as Resource Persons.
- Students can work in close association with Non-Governmental Organizations like Lions Club, Rotary Club, etc or with any NGO actively working in that habitation.
- And also, with the Governmental Departments. If the program is rolled out, the District Administration could be roped in for the successful deployment of the program.
- An in-house training and induction program could be arranged for the faculty and participating students, to expose them to the methodology of Service Learning.

**Timeline for the Community Service Project Activity
Duration: 8 weeks**

1. Preliminary Survey (One Week)

- A preliminary survey including the socio-economic conditions of the allotted habitation to be conducted.
- A survey form based on the type of habitation to be prepared before visiting the habitation with the help of social sciences faculty. (However, a template could be designed for different habitations, rural/urban.
- The Governmental agencies, like revenue administration, corporation and municipal authorities and village secretariats could be aligned for the survey.

2. Community Awareness Campaigns (One Week)

- Based on the survey and the specific requirements of the habitation, different awareness campaigns and programmes to be conducted, spread over two weeks of time. The list of activities suggested could be taken into consideration.

3. Community Immersion Programme (Three Weeks)



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Along with the Community Awareness Programmes, the student batch can also work with any one of the below-listed governmental agencies and work in tandem with them. This community involvement programme will involve the students in exposing themselves to experiential learning about the community and its dynamics. Programs could be in consonance with the Govt. Departments.

4. Community Exit Report (One Week)

- During the last week of the Community Service Project, a detailed report of the outcome of the 8 weeks' works to be drafted and a copy shall be submitted to the local administration. This report will be a basis for the next batch of students visiting that habitation. The same report submitted to the teacher-mentor will be evaluated by the mentor and suitable marks are awarded for onward submission to the University. Throughout the Community Service Project, a daily logbook need to be maintained by the students batch, which should be countersigned by the governmental agency representative and the teacher-mentor, who is required to periodically visit the students and guide them.



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Dept. of Civil Engineering					
III Year I Semester					
S.No	Course Code	Course Name	Category	L-T-P	Credits
1.		Geotechnical Engineering	PC	3-0-0	3
2.		Design of Reinforced Concrete Structures	PC	3-0-0	3
3.		Water Resource Engineering	PC	3-0-0	3
4.		1. Building Service and Maintenance 2. Sustainable Construction Materials. 3. Urban Hydrology	PE-I	3-0-0	3
5.		1. Civil Engineering Materials 2. Noise and Air Pollution 3. Disaster Mitigation and Management	OE-I	3-0-0	3
6.		Geotechnical Engineering Lab	PC	0-0-3	1.5
7.		Survey Field Work Lab (Survey Camp)	PC	0-0-3	1.5
8.		CAD Lab	SC	1-0-2	2
		Tinkering Lab	ES	2-0-0	1
9.		Evaluation of Community Service Project	PR		2
Total					23

Category	CREDITS
Professional core Courses	12
Professional Elective courses	3
Open Elective Course/Job oriented elective	3
Skill Enhancement course/soft skill course*	2
Engineering Science	1
Community Service Internship	2
TOTALCREDITS	23



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Course Code	GEOTECHNICAL ENGINEERING	L	T	P	C
		3	0	0	0
III Year I Semester					
Course Objectives:					
<ul style="list-style-type: none"> • To impart fundamental knowledge of soil mechanics, including soil formation, classification, and engineering behavior. • To enable students to understand and analyze soil compaction, permeability, seepage, and stress distribution characteristics. • To provide an understanding of the shear strength and stability analysis of slopes in geotechnical engineering. 					
Course Outcomes (CO):					
<ul style="list-style-type: none"> • Classify soils based on Indian Standard Classification System and analyze soil compaction characteristics. • Evaluate effective stress and permeability of soils through laboratory and field testing methods. • Analyze seepage and flow conditions to address engineering challenges such as quicksand and groundwater flow. • Understand soil consolidation and settlement analysis under various loading conditions. Assess the shear strength parameters and perform stability analysis for slopes. 					
UNIT - I	SOIL CLASSIFICATION AND COMPACTION				
Origin and Soil formation, soil structure and clay mineralogy, Adsorbed water, Mass-volume relationship, Relative density. Index properties of soils, Moisture Content, Specific Gravity, Insitu density, particle size classification, I.S. Classification of soils. COMPACTION: Mechanism of compaction, factors affecting, effect of compaction on physical and engineering properties of soils. field compaction Equipment.					
UNIT - II	EFFECTIVE STRESS AND PERMEABILITY				
Types of Soil water – Capillary phenomena – Effective stress concepts in soil – Permeability – Darcy’s law – Determination of Permeability of soil – Laboratory methods (Constant head and falling head methods) - Field measurement - pumping out test in unconfined and confined aquifer – Permeability of stratified soil - Factors influencing permeability of soil – Seepage velocity – Seepage pressure - Quicksand Condition – Introduction to flow nets – properties and uses.					
UNIT - III	STRESS DISTRIBUTION & SETTLEMENT				
Stress distribution in homogeneous and isotropic medium – Boussinesq’s theory for point loads, uniformly loaded circular and rectangular areas – Newmark’s influence chart – Contact pressure distribution in sand and clay. Components of settlement — Immediate and consolidation settlement – Terzaghi’s one dimensional consolidation theory – Computation of rate of settlement. — \sqrt{t} and $\log t$ methods, e - $\log p$ relationship. SHEAR STRENGTH: Shear strength of cohesive and cohesionless soil – Normal and Shear Stresses on a plane – Mohr’s Stress Circle - Mohr-Coulomb failure theory – Measurement of shear strength					
UNIT - IV	SITE INVESTIGATION AND SELECTION OF FOUNDATION				
Scope and objectives – Methods of exploration – boring - Depth and spacing of bore holes – Auguring, wash boring and rotary drilling — Soil samples – Representative and undisturbed – Sampling methods – Split spoon sampler, Thin wall sampler, Stationary piston sampler – Penetration tests - SPT and SCPT – Data interpretation - Bore log report and Selection of foundation.					
UNIT - V	SLOPE STABILITY				
Slope failures – Types and causes – Stability Analysis - Infinite slopes and finite slopes – Taylor’s stability charts – Friction circle method - Swedish Circle Method - Fellenius method – Determination of center of most critical slip circle - Slope protection measures.					
Textbooks:					
1. K.R. Arora, Soil Mechanics and Foundation Engineering, Standard Publishers and Distributors, Delhi.					



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| <ol style="list-style-type: none">2. B.C. Punmia, Ashok Kumar Jain, and Arun Kumar Jain, Soil Mechanics and Foundations.3. V.N.S. Murthy, Geotechnical Engineering, CRC Press, New York (Special Indian Edition). |
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Reference Books:

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| <ol style="list-style-type: none">1. C. Venkataramiah, <i>Geotechnical Engineering</i>, New Age International Pvt. Ltd., 2002.2. Brij M. Das, <i>Geotechnical Engineering</i>, Cengage Publications, New Delhi.3. C. Venkataramiah, <i>Geotechnical Engineering</i>, New Age International (P) Ltd., Fourth Revised Edition, 2012.4. D.F. McCarthy, <i>Essentials of Soil Mechanics and Foundations: Basic Geotechnics</i>, Prentice Education Ltd., 2014. |
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Course Code	DESIGN OF REINFORCED CONCRETE STRUCTURES	L	T	P	C
		3	0	0	3
III Year I Semester					
Course Objectives:					
<ul style="list-style-type: none"> • To introduce the importance of reinforced concrete structures and familiarize students with different design methods. • To design various structural elements such as beams, columns, footings, and slabs. • To understand and apply the serviceability requirements in reinforced concrete structures. • To develop competency in using IS codes for structural design applications. 					
Course Outcomes (CO):					
On successful completion of the course, students will be able to: <ul style="list-style-type: none"> • Understand and apply different methods for designing reinforced structural members. • Design and analyze various reinforced concrete structural elements such as beams, slabs, columns, and footings. 					
UNIT - I					
INTRODUCTION Brief Introduction of working stress, ultimate load, and limit state, working stress: design, singly and doubly reinforced beam LIMIT STATE DESIGN: Limit State Design: Concepts, Characteristic loads, Characteristic strength, Partial load and safety factors, Assumptions, stress -block parameters					
UNIT - II					
Beams: Limit state of collapse for singly reinforced, doubly reinforced, T beam, simply supported and continuous beams and detailing.					
UNIT - III					
Columns: Design of Short and Long columns subjected to axial loads, uniaxial bending and biaxial bending.					
UNIT - IV					
Footings: Design of isolated, square, and rectangular footings					
UNIT - V					
Slabs: Design of Two-way slabs, one way slab, and continuous slab and introduction to flat slab theory only Using I S Coefficients. Serviceability: Limit state design for serviceability for deflection and cracking.					
Note: IS 456:2000 Plain and Reinforced Concrete code to be permitted into the examination Hall.					
Textbooks:					
<ol style="list-style-type: none"> 1. Reinforced concrete design by S.Unnikrishna Pillai & Devdas Menon, Tata Mc.Graw Hill, New Delhi. 2. Fundamentals of reinforced concrete by N.C. Sinha and S.K Roy, S. Chand publishers. 3. Reinforced concrete design by N. Krishna Raju and R.N. Pranesh, New age International Publishres, New Delhi. 4. Limit State Design by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi. 					
Reference Books:					
<ol style="list-style-type: none"> 1. Fundamentals of Reinforced concrete design by M.L. Gambhir, Printice Hall of India Private Ltd., New Delhi. 2. Reinforced concrete structural elements – behaviour, Analysis and design by P.Purushotham, Tata Mc.Graw-Hill, 1994. 3. Reinforced concrete structures, Vol.1, by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt.Ltd.New Delhi 4. Reinforced concrete structures – I.C. Syal&A.K.Goel, S.Chand Publishers. 5. Limit state designed of reinforced concrete – P.C.Varghese, Printice Hall of India, New 					



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Course Code	WATER RESOURCE ENGINEERING	L	T	P	C
		3	0	0	3
III Year I Semester					
Course Objectives:					
<ul style="list-style-type: none"> • To understand the basic principles of hydrology and its applications in water resource management. • To learn methods of rainfall measurement, hydrograph analysis, and abstraction processes such as evaporation and infiltration. • To gain knowledge about irrigation concepts, soil-water relationships, and methods of water application. 					
Course Outcomes (CO):					
<ul style="list-style-type: none"> • Comprehend the concepts of hydrology, rainfall measurement, and related applications. • Analyze rainfall, evaporation, and runoff processes along with the factors influencing them. • Understand the necessity of irrigation, groundwater concepts, and relevant terminology. • Describe the classifications, alignments, and design concepts of canals and their practical importance. 					
UNIT – I	INTRODUCTION TO HYDROLOGY				
Introduction to engineering hydrology and its applications, Hydrologic cycle, types and forms of precipitation, rainfall measurement, types of rain gauges, computation of average rainfall over a basin, processing of rainfall data.					
UNIT - II					
ABSTRACTION FROM RAINFALL: Abstraction from rainfall-evaporation, factors affecting evaporation, measurement of evaporation-evapotranspiration-Infiltration, factors affecting infiltration, measurement of infiltration, infiltration indices. Runoff-components of runoff, factors affecting runoff, separation of base flow.					
UNIT - III					
HYDROGRAPHY: Unit Hydrograph, definition, and limitations of applications of Unit hydrograph, derivation of Unit Hydrograph, S-hydrograph, IUH, Synthetic Unit Hydrograph. GROUND WATER: Ground water Occurrence, types of aquifers, aquifer parameters, Darcy's law, steady and unsteady unidirectional flow in un-confined and confined aquifers, radial flow to wells in confined and unconfined aquifers.					
UNIT - IV					
IRRIGATION: Necessity and Importance of Irrigation, advantages and ill effects of Irrigation, types of Irrigation, methods of application of Irrigation water, Indian agricultural soils, methods of improving soil fertility. Soil-water-plant relationship, vertical distribution of soil moisture, soil moisture constants, consumptive use, estimation of consumptive use, Duty and delta, factors affecting duty, depth and frequency of Irrigation, irrigation efficiencies.					
UNIT - V					
CANALS: Classification; Canal Alignment; Inundation Canals; Cross-Section of An Irrigation Channel; Balancing Depth; Borrow Pit; Spoil Bank; Land Width; Silt Theories-Kennedy's Theory, Kennedy's Method of Channel Design; Drawbacks in Kennedy's Theory; Lacey's Regime Theory-Lacey's Theory Applied to Channel Design; Defects in Lacey's Theory; Comparison of Kennedy's and Lacey's Theory.					
Textbooks:					
<ol style="list-style-type: none"> 1. Engineering Hydrology – Jayarami Reddy, Laxmi Publications Pvt. Ltd., New Delhi. 2. Irrigation and Water Power Engineering – B.C. Punmia & Pande Lal, Laxmi Publications Pvt. Ltd., New Delhi. 3. Engineering Hydrology – K. Subramanya, Tata McGraw Hill, Delhi. 					
Reference Books:					
<ol style="list-style-type: none"> 1. Irrigation and Water Resources & Water Power – P.N. Modi, Standard Book House. 2. Irrigation Water Management – D.K. Majumdar, Prentice Hall of India. 3. Engineering Hydrology – C.S.P. Ojha, Oxford Publishers, New Delhi. 					



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ICourse Code	BUILDING SERVICES AND MAINTENANCE (Professional Elective-I)	L	T	P	C
		3	0	0	3
III Year I Semester					
Course Objectives:					
<ul style="list-style-type: none"> • To understand the fundamental concepts and objectives of building maintenance practices. • To gain knowledge of water supply, ventilation, and lighting systems used in buildings. • To understand fire safety measures and their design requirements in buildings. • To learn about the various electrical systems and their installations in buildings. 					
Course Outcomes (CO):					
<p>On successful completion of the course, students will be able to:</p> <ul style="list-style-type: none"> • Comprehend the concepts of building maintenance and water supply systems. • Analyze the necessity and design of ventilation and modern lighting systems. • Understand and apply knowledge of electrical systems in building structures. • Evaluate and design fire safety systems and installations in buildings. 					
UNIT - I					
INTRODUCTION: Need for maintenance, objectives for maintenance, maintenance operations, and factors influencing the maintenance. WATER SUPPLY SYSTEM: Water supply system, waste water system, fixing of pipes in buildings, water pump meters and control-sanitary fittings, design of building drainage. Gas piping, supply, pipe sizes, and gas pipe materials.					
UNIT - II					
MAINTENANCE OF BUILDINGS:					
White washing, Colour washing and Distempering, painting, Replacement of glass panels, Re-polishing of terrazo and mosaic flooring, Easing of doors and windows, Repairs to damaged part of the flooring, Cleaning of fire chimneys and gutters, Removal of stains from concrete and terrazzo floor, Anti termite treatment (in building, foundations, floors and wood work) Repairing of Plumbing, Drain and Sanitary fixtures. Repair of water storage sumps and tanks, Repair of any joints i.e. wall-beam joint leak, beam column, and slab beam, joints.					
UNIT - III					
VENTILATION:					
Necessity of ventilation, functional requirements, systems of ventilation, natural ventilation, artificial ventilation, air conditioning, systems of air conditioning, essentials of air conditioning, protection against fire caused by air conditioning systems. Design of modern lighting: Lighting for stores, offices, schools, hospitals and house lighting. Elementary idea of special features required and minimum level of illumination required for physically handicapped and elderly in building types.					
UNIT - IV					
FIRE SAFETY INSTALLATION:					
Causes of fire in buildings – Safety regulations – NBC – Planning considerations in buildings like non-combustible materials in construction of staircases and lift lobbies. Special features required for physically handicapped and elderly in buildings – Heat and smoke detectors – Fire alarm system, Snorkel ladder – Fire lighting pump and water storage – Dry and wet risers – Automatic sprinklers.					
UNIT - V					
ELECTRICAL SYSTEMS IN BUILDINGS					
Basics of electricity – Single / Three phase supply – Protective devices in electrical installations – Earthing for safety – Types of earthing – ISI specifications – Types of wires, wiring systems and their choice – Planning electrical wiring for building – Main and distribution boards, Transformers and switch gears – Layout of substations.					
Textbooks:					
<ol style="list-style-type: none"> 1. Building construction – B.C.Punmia, Er. Ashok K jain, Arun K Jain - Laxmi publications pvt.ltd. New Delhi. 2. Building construction – Janardhan Jah, S.K Sinha, Khanna publishers and Rangwala, Charohtar publishing house. 3. V.N. Vazirani and S.P. Chandola, Building Construction by KhannaPublishers. 4. BRE Building elements, Building service by H.W. Harrison and P.M. Trotman. 5. Building repair and maintenance and management by B.S. Gahlot and Sanjay Sharma, CBS Publications. 					
Reference Books:					



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1. Building services engineering – David V Chaddrton, Outledge
2. Building construction – P.C Varghees – Printice hall India.



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Course Code	SUSTAINABLE CONSTRUCTION MATERIALS (Professional Elective-I)	L	T	P	C
		3	0	0	3
III Year I Semester					
Course Objectives:					
<ul style="list-style-type: none"> To understand the concept and principles of sustainability in Civil Engineering. To explore the role of construction materials in developing sustainable and green infrastructure. To evaluate energy use and embodied energy in materials and construction. To promote the use of innovative and eco-efficient materials for sustainable development. 					
Course Outcomes (CO):					
After successful completion of the course, students will be able to: <ul style="list-style-type: none"> Understand the definition, scope, and principles of sustainability in construction. Calculate embodied energy and assess life-cycle energy use of construction materials Analyze productivity, economics, and techniques in sustainable construction. Adopt modular construction practices and select appropriate sustainable materials. 					
UNIT - I	INTRODUCTION TO SUSTAINABILITY				
Definition and principles of sustainability, Environmental, Social and Economic pillars. Sustainability in the built Environment, Benefits and challenges in Construction Sector. Resources and Reserves in Construction materials, Greenhouse Effect and Global warming, Carbon Footprint of Materials and Calculations.					
UNIT - II	ENERGY CALCULATION				
Components of embodied energy - calculation of embodied energy for construction materials - Energy concept and primary energy - Embodied energy and operational energy in conditioned building - Life Cycle energy use.					
UNIT - III	SUSTAINABLE CONSTRUCTION MATERIALS				
Definition and Classification of Sustainable Materials - Natural vs. Engineered Sustainable Materials – Eco efficient Materials - Bamboo, Recycled Concrete, Fly Ash, etc. Role of Material: Carbon from Cement, alternative cements and cementitious material, Alternative fuel for cements for reduction in carbon emission. Sustainability issues for concrete.					
UNIT - IV	SUSTAINABILITY CONSTRUCTION TECHNIQUES				
Sustainable Construction Techniques, Energy-Efficient Construction Practices – MIVAN and Tunnel Forming Techniques - Prefabrication and Modular Construction - Low Carbon Concrete and Alternative Construction Methods - Waste Management during Construction. Case Studies and Student presentations.					
UNIT - V	GREEN BUILDING RATING SYSTEM				
Introduction to Green Building Certifications - Comparative Analysis: LEED, BREEAM, GRIHA Certification Process and Criteria. Economics of Sustainability: Cost vs. Benefit Analysis of Sustainable Construction - Return on Investment (ROI) in Green Construction - Incentives and Policies for Sustainable Construction.					
Textbooks:					
<ol style="list-style-type: none"> 1. Design and Control of Concrete Mixtures, Kosmatka, S.H and Wilson, M.L., 16th Edition, Portland Cement Association, 2015. 2. Hand Book of Green Chemistry and Technology, by James Clarke and Duncan Macquarrie, Blakwell Publishing. 3. Sustainable Construction - Green Building Design and Delivery by Charles J. Kibert, John Wiley & Sons, 2nd edition, 2008. 4. Sustainable Construction and Design by Regina Leffers, Prentice Hall, 2009. 					
Reference Books:					
<ol style="list-style-type: none"> 1. Anastas, P. T Warner, J. C .Green Chemistry, Theory and practice, Oxford University Press Inc., New York, 1998. 2. Matlack, A.S Introduction to Green Chemistry Marcel Dekker, New York, NY, 2001. 					



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Course Code	URBAN HYDROLOGY (PROFESSIONAL ELECTIVE-I)	L	T	P	C
	III Year I Semester	3	0	0	3
Course Objectives:					
<ul style="list-style-type: none"> • Explain the impact of urbanization on hydrologic processes and the urban water cycle. • Develop an understanding of rainfall–runoff relationships and their significance in urban drainage design. • Introduce methods for estimating peak flows and designing urban stormwater drainage systems. • Provide knowledge of hydrological modeling techniques for planning and management of urban water systems. • Enable students to design and evaluate sustainable urban drainage and flood management systems. 					
Course Outcomes					
<p>Upon successful completion of the course, the students will be able to:</p> <ul style="list-style-type: none"> • Analyze the influence of urbanization on hydrologic and hydraulic characteristics of catchments. • Apply rainfall–runoff relationships and design parameters for urban stormwater drainage systems. • Design stormwater networks and implement best management practices for runoff control and quality improvement. • Develop and interpret urban drainage master plans integrating hydrologic data and urban planning principles. • Utilize various hydrological models for simulation, calibration, and management of urban water systems. 					
UNIT - I	Introduction:				
Urbanization and its effect on water cycle – urban hydrologic cycle – Effect of urbanization on hydrology. Precipitation Analysis: Importance of short duration of rainfall and runoff data, methods of estimation of time of concentration and design of urban drainage systems, Intensity-Duration -Frequency (IDF) curves, design storms for urban drainage systems.					
UNIT - II	Methods of Urban Drainage:				
Time of concentration, peak flow estimation approaches, rational method, NRCS curve number approach, runoff quantity and quality, wastewater and storm water reuse , major and minor systems. Drainage systems: Open channel, underground drains, appurtenances, pumping, source control					
UNIT - III	Analysis and Management:				
Storm water drainage structures, design of storm water network- Best Management Practices–detention and retention facilities, swales, constructed wetlands, models available for storm water management.					
UNIT - IV	Master drainage plans:				
Issues – typical urban drainage master plan, interrelation between water resources investigation and urban planning processes, planning objectives, comprehensive planning , use of models in planning.					
UNIT - V	Hydrological models:				
General principles of hydrological modelling - The Rational Method - The time-area method - The unit hydrograph method - Physically based distributed models - Physically based partially distributed models - Hydraulic modelling - Model calibration and validation - Probabilistic models - Expert systems					
Textbooks:					
<ol style="list-style-type: none"> 1. Akan A.O and R.L. Houghtalen, Urban Hydrology, Hydraulics and Stormwater Quality: Engineering Applications and Computer Modelling (2006), Wiley International. 2. Hall M. J., Urban Hydrology (1984), Elsevier Applied Science Publisher 					
<ol style="list-style-type: none"> 1. Geiger W. F., J Marsalek, W. J. Rawls and F. C. Zuidema, Manual on Drainage in Urbanised area’ (1987 – 2 volumes), UNESCO. 2. Wanielista M. P. and Eaglin, Hydrology – Quantity and Quality Analysis (1997), Wiley and Sons. 					



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3. Stahre P. and Urbonas B., Stormwater Detention for Drainage (1990), Water Quality and CSO Management, Prentice Hall.
4. Maksimovic C. and J. A. Tejada-Guibert, Frontiers in Urban Water Management – Deadlock or Hope (2001), IWA Publishing



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Course Code	CIVIL ENGINEERING MATERIALS	L	T	P	C
	(Open Elective-I)	3	0	0	3
III Year I Semester					
Course Objectives:					
<p>The course is designed to:</p> <ul style="list-style-type: none"> • Impart fundamental knowledge of the structure, properties, and classification of various building materials used in civil engineering. • Develop an understanding of the characteristics and quality requirements of materials essential for durable and sustainable construction. • Familiarize students with manufacturing processes, testing procedures, and applications of key materials such as stones, bricks, timber, cement, and aggregates. • Introduce modern materials and finishing products like plastics, paints, and reinforcement materials used in contemporary construction practices. 					
Course Outcomes					
<p>Upon successful completion of this course, students will be able to:</p> <ul style="list-style-type: none"> • Classify and describe the properties of different building materials used in civil engineering. • Evaluate the quality and suitability of materials for various construction applications. • Understand the manufacturing processes and testing procedures for stones, bricks, timber, cement, and aggregates. • Identify and apply modern construction materials and finishing products, including plastics, paints, and reinforcement materials, in building projects. 					
UNIT - I					
STONES: Classifications of stones, uses of stones as building materials, characteristics of good building stones - General characteristics of stones – Marble, Kota stone, Granite, Sand, Trap, Basal stone, Lime stone and Slate.					
UNIT - II					
BRICKS: Composition of brick clay. Raw materials for brick manufacturing and properties of good brick making earth - Process of manufacturing bricks. Characteristics of good building bricks classification of bricks. Testing of common building bricks as per BIS: 3495 - Introduction to light weight bricks.					
UNIT - III					
TIMBER: Timber as a building material and its uses. Various types of timber -Identification and uses of different types of timber: Teak, Deodar, Shisham, Sal, Mango, Kail, Chir, Fir, Hollock Champ - Seasoning and its importance - Defects in timber, decay in timber - Preservation of wood Other wood based products- manufacture and uses: laminated board, gypsum board, block board fibre board, hard board, sunmica, plywood, veneers					
UNIT - IV					
CEMENT: Cement: Chemical composition of cement, manufacturing process. Specifications for Ordinary Portland Cement, Types of cements. Fine Aggregate: Characteristics of good sand and its classifications, bulking of sand. Quarry sand. Coarse Aggregate: Characteristics of good coarse aggregates for manufacture of concrete.					
UNIT - V					
REINFORCEMENT: Types of reinforcement, specifications - M.S., HYSD, TMT. Paints Constituents, characteristics of good paints, varnishes- Plastics – Introduction and uses of various plastic products in buildings such as doors, water tanks and PVC pipes					
Textbooks:					
<ol style="list-style-type: none"> 1. Building Materials: Products, Properties and Systems, Gambhir M.L., Neha Jamwal, McGraw Hill Education (India) Private Limited, 2014. 2. Building Materials, by Varghese P.C., PHI Learning Pvt. Ltd., Delhi, 2015. 3. Advances in Building Materials and Construction, Central Building Research Institute, Roorkee, 2004. 					



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Reference Books:

1. Building Materials, by Duggal S.K., New Age Publishers, 2012.
2. Engineering Materials, by Rangwala Charotar Publishers, 2015.



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Course Code	NOISE AND AIR POLLUTION	L	T	P	C
	(Open Elective-I)	3	0	0	3
III Year I Semester					
Course Objectives:					
The course is designed to: <ul style="list-style-type: none"> • Introduce the fundamental concepts of noise and air pollution, including their sources and effects on the environment. • Explain methods for measuring air and noise pollution and the regulatory frameworks governing pollution control. • Discuss techniques for controlling air and noise pollution in urban and industrial environments. • Provide knowledge of air pollution due to automobiles and its mitigation strategies. 					
Course Outcomes (CO):					
Upon successful completion of this course, students will be able to: <ul style="list-style-type: none"> • Identify and classify the sources of air and noise pollution and understand their effects on the environment and human health. • Apply appropriate air and noise sampling and measurement methods, and interpret results in compliance with regulatory standards. • Evaluate and implement effective air and noise pollution control techniques. • Understand automobile-related air pollution and apply mitigation measures following legal and technical standards. 					
UNIT - I					
NOISE POLLUTION: Sources of noise pollution in urban areas, effect of noise pollution on urban environment, status of noise pollution in major cities.					
UNIT - II					
ACOUSTICAL CONCEPTS: Nature of sound, sound propagation characteristics, Propagation of sound in air absorption of sound in air, Hearing mechanics. Measurement scale, Equal loudness contours. NOISE CHARACTERISTICS AND SOURCES OF NOISE: Noise characterization – Sources of noise.					
UNIT - III					
NOISE CONTROL TECHNIQUES: Mechanism of noise generation- Control methodology, Noise control at source – Noise control along the path- Control on the receiver end. Noise Strategy. FUTURE GUIDELINES: Current trend, Noise control measures – Environmental noise management – Noise labelling – Diagnostics – Noise strategy, Problems for future investigations.					
UNIT - IV					
AIR POLLUTION SOURCES: Sources and classification of air pollution, natural and manmade primary, secondary pollutants, and various classifications of air pollutant standards as per Central Pollution Control Board CPCB.					
UNIT - V					
AIR POLLUTION DUE TO AUTOMOBILES: Exhaust emissions, crank case emission, evaporative emissions, air-fuel ratio. Spark timing, control of exhaust emissions. Air quality and emission standards, air pollution legislations and regulations.					
Textbooks:					
<ol style="list-style-type: none"> 1. M.N. Rao and H.V.N. Rao, Air Pollution, Tata McGraw. 2. C.S. Rao, Environmental Pollution Control, 2/e, Wiley Eastern. 3. Air Pollution & Control Kvsq Murali Krishna Published by Kaushal & Co 					
Reference Books:					
<ol style="list-style-type: none"> 1. A.C. Stern, Air Pollution, Vol, I-Viii, Academic Press, 1984. 2. K.V.G.S. Murali Krishna Air Pollution and control, Kakinada, 1995. 3. An introduction to Air pollution by R.K. Trivedy and P.K. Goel, B.S. Publications. 4. Air Pollution and Control by K.V.S.G.Murali Krishna, Kousal & Co. Publications, New Delhi. 					



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Course Code	DISASTER MITIGATION AND MANAGEMENT	L	T	P	C
	(Open Elective-I)	3	0	0	3
III Year I Semester					
Course Objectives:					
<p>The course is designed to:</p> <ul style="list-style-type: none"> • Introduce the concepts of disaster mitigation and management, including environmental hazards and associated risks. • Explain different types of natural, man-made, and cumulative atmospheric hazards and disasters. • Discuss earthquake, volcanic, and other endogenous hazards, their causes, effects, and mitigation strategies. • Describe soil erosion processes, factors influencing erosion, and techniques for conservation and environmental management. 					
Course Outcomes (CO):					
<p>Upon successful completion of this course, students will be able to:</p> <ul style="list-style-type: none"> • Understand the fundamental concepts of environmental hazards, disasters, and their impacts on human and ecological systems. • Identify and analyze atmospheric and other cumulative hazards and disasters, including floods, droughts, cyclones, and heat/cold waves. • Explain the causes, distribution, and effects of earthquakes, volcanic eruptions, and other endogenous hazards, and assess mitigation approaches. • Understand soil erosion mechanisms, contributing factors, and implement effective conservation and corrective measures. 					
UNIT - I					
Environmental Hazards & Disasters: Meaning of Environmental hazards, Environmental Disasters and Environmental stress. Concept of Environmental Hazards, Environmental stress & Environmental Disasters. Different approaches & relation with human Ecology, Landscape Approach, Ecosystem Approach, Perception approach - Human ecology & its application in geographical research.					
UNIT - II					
Types of Environmental Hazards & Disasters: Natural Hazards and Disasters, Man-induced Hazards & Disasters, Natural Hazards- Planetary Hazards/ Disasters, Extra Planetary Hazards/ Disasters, Planetary Hazards, Endogenous Hazards - Exogenous Hazards.					
UNIT - III					
ENDOGENOUS HAZARDS: Endogenous Hazards - Volcanic Eruption, Earthquakes, Landslides, Volcanic Hazards/ Disasters, Causes and distribution of Volcanoes - Hazardous effects of volcanic eruptions Environmental impacts of volcanic eruptions - Earthquake Hazards/ disasters - Causes of Earthquakes, Distribution of earthquakes, Hazardous effects of earthquakes, Earthquake Hazards in India, Human adjustment, perception & mitigation of earthquake.					
UNIT - IV					
EXOGENOUS HAZARDS: Exogenous hazards/ disasters, Infrequent events- Cumulative atmospheric hazards/ disasters Infrequent events: Cyclones, Lightning, Hailstorms Cyclones: Tropical cyclones & Local storms - Destruction by tropical cyclones & local storms (causes, distribution human adjustment, perception & mitigation) Cumulative atmospheric hazards/ disasters: Floods, Droughts, Cold waves, Heat waves, Floods, Causes of floods- Flood hazards India- Flood control measures (Human adjustment, perception & mitigation).Droughts:- Impacts of droughts- Drought hazards in India- Drought control measures- Extra Palnetary Hazards/ Disasters- Man-induced Hazards /Disasters- Physical hazards/ Disasters-Soil Erosion.					
UNIT - V					
Soil Erosion: Mechanics & forms of Soil Erosion, Factors & causes of Soil Erosion, Conservation measures of Soil Erosion. Chemical hazards/ disasters, Release of toxic chemicals, nuclear explosion, Sedimentation processes. Sedimentation processes, Global Sedimentation problems-					



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Regional Sedimentation problems-Sedimentation & Environmental problems- Corrective measures of Erosion & Sedimentation. Biological hazards/ disasters, Population Explosion

Textbooks:

1. Disaster Management by Rajib Shah, Universities Press, India, 2003
2. Disaster Mitigation: Experiences And Reflections by [Pardeep Sahni](#)
3. Natural Hazards & Disasters by Donald Hyndman & David Hyndman – Cengage Learning

Reference Books:

1. Kates, B.I & White, G.F The Environment as Hazards, Oxford, New York, 1978.
2. R.B. Singh (Ed) Disaster Management, Rawat Publication, New Delhi, 2000.
3. H.K. Gupta (Ed) Disaster Management, Universities Press, India, 2003.
4. Dr. Satender, Disaster Management in Hills, Concept Publishing Co., New Delhi, 2003.



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Course Code	SOIL MECHANICS LAB	L	T	P	C
		0	0	3	1.5
III Year I Semester					
Course Objectives:					
<p>The course is designed to:</p> <ul style="list-style-type: none"> • Enable students to identify and classify soils based on their physical and engineering properties. • Conduct laboratory experiments to determine index properties of soils such as specific gravity, moisture content, and particle size distribution. • Perform tests to evaluate permeability, compaction, and shear strength characteristics of soils. • Analyze consolidation behavior to predict settlement and other soil performance parameters. • Familiarize students with standard laboratory procedures as per IS codal provisions. 					
Course Outcomes (CO):					
<p>At the end of the course, the student must be able to:</p> <ol style="list-style-type: none"> 1. Identify various soils based on their characteristics. 2. Evaluate permeability and seepage of soils. 3. Determine plasticity characteristics of various soils. 4. To perform tests to determine shear strength 5. Understand the consolidation process and thereby predicting the settlement of soils. 					
List of Experiments:					
<ol style="list-style-type: none"> 1. Determination of Index Properties <ol style="list-style-type: none"> a. Specific Gravity of Soil b. Grain Size Distribution – Sieve Analysis c. Grain Size Distribution - Hydrometer Analysis d. Liquid Limit and Plastic Limit Tests e. Shrinkage Limit and Differential Free Swell Tests 2. Determination of In-Situ Density and Compaction Characteristics <ol style="list-style-type: none"> a. Field Density Test (Sand Replacement Method) b. Determination of Moisture–Density Relationship Using Standard Proctor Compaction Test. 3. Determination of Engineering Properties <ol style="list-style-type: none"> a. Permeability Determination (Constant Head Method) b. Permeability Determination (Falling Head Methods) c. Determination of Co-Efficient of Consolidation d. Direct Shear Test in Cohesion Less Soil e. Unconfined Compression Test in Cohesive Soil f. Laboratory Vane Shear Test in Cohesive Soil g. Tri-Axial Compression Test in Cohesion Less Soil h. California Bearing Ratio Test 					
References:					
<ol style="list-style-type: none"> 1. Soil Mechanics and Foundation Engg by K. R. Arora, Standard Publishers and Distributors, Delhi 7 th edition 2009. 2. IS Code of Practice (2720) Relevant Parts, as amended from time to time, Bureau of Indian Standards, New Delhi. 3. Geotechnical Engineering by C. Venkataramiah, New age International Pvt . Ltd, (2002). 4. Lambe T.W., “Soil Testing for Engineers”, John Wiley and Sons, New York, 1951. Digitized 2008. 					
Online Learning Resources/Virtual Labs:					
https://www.vlab.co.in/					



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Course Code	SURVEY CAMP LAB	L	T	P	C
			0	0	3
III Year I Semester					
Course Objectives:					
<ol style="list-style-type: none">1. To perform accurate traversing with a Total Station or Compass or chain and generate contour maps using radial and block methods for land surveys.2. Execute longitudinal and cross-sectional levelling and accurately offset and map the location of buildings on site plans.3. Estimate sunrise/sunset timings and determine azimuth angles for navigation and surveying applications.4. Proficient in using GPS for accurate traversing and curve setting for infrastructure projects.5. Identify positions and create maps using triangulation and trilateration methods effectively.					
Course Outcomes (CO):					
<ol style="list-style-type: none">1. To develop proficiency in using Total Station or Compass or Chain for traversing and to understand contouring methods for representing topographical features.2. To gain skills in levelling techniques for road and canal projects and learn to offset and plot building locations with precision.3. To understand astronomical observations for calculating sunrise and sunset times and determine azimuths using ex-meridian observations.4. To acquire skills in GPS-based traversing and to lay out curves on roads or railways using the deflection angle method.5. To learn and apply the principles of triangulation and trilateration for establishing control points and mapping areas.					
List of Experiments:					
<ol style="list-style-type: none">1. Traversing using Total Station.2. Contouring – Radial and Block.3. Longitudinal and Cross Sectional Levelling of Road /Canal.4. Offset of Buildings and Plotting the Location.5. Estimation of Sun Rise/ Sun Set time using Sun Observations.6. Determination of Azimuth by Ex-Meridian observation.7. Traversing using GPS.8. Curve setting by deflection angle method.9. Triangulation.					



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Course Code	CAD LAB	L	T	P	C
	Skill Oriented Course	0	0	3	1.5
III Year II Semester					
Course Objectives:					
<ol style="list-style-type: none">1. Introduces Autodesk's AutoCAD software as a design and drafting tool.2. Provide lectures using AutoCAD software, demonstrating commands via user interface and typed commands.3. Demonstrate AutoCAD commands and workflow through lecture and videos4. Create, manipulate and edit 2D drawings and figure5. Convert 3D solid models into 2D drawing-different views, sections					
Course Outcomes (CO):					
<ol style="list-style-type: none">1. Achieve skill sets to prepare computer aided engineering drawings2. Utilize the power and precision of AutoCAD as a drafting and design tool3. Apply basic CAD concepts to develop and construct accurate 2D geometry through creation of basic geometric constructions4. A student will know what is plan and how it should be drawn in auto CAD software.5. Able to Convert 3D solid models into 2D drawing-different views, sections					
List of Experiments:					
<ol style="list-style-type: none">1. Introduction to computer aided drafting2. Software for CAD – Introduction to different software's3. Practice exercises on CAD software4. Detailing of Building Components using CAD Software.5. Drawing of Line diagram of Residential Building Using CAD software.6. Drawing of Plan, Section & Elevation for Residential Buildings Using CAD Software.7. Drawing Line diagram for Multi Storey Residential Buildings.8. Drawing of Plan, Section & Elevation for Residential Multi Storey Buildings Using CAD Software.9. Drawing of Plan, Section & Elevation for Hospital Building Using CAD Software.10. Drawing of Plan, Section & Elevation for Industrial Buildings Using CAD Software.					
Textbooks:					
Engineering graphics with Auto CAD - R.B. Choudary , Anuradha Publishes					



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Course Code	TINKERING LAB	L	T	P	C
		1	0	2	2
III Year I Semester					
Course Outcomes (CO):					
The aim of tinkering lab for engineering students is to provide a hands-on learning environment where students can explore, experiment, and innovate by building and testing prototypes. These labs are designed to demonstrate practical skills that complement theoretical knowledge.					
Course Objectives:					
<ol style="list-style-type: none"> 1. Encourage Innovation and Creativity 2. Provide Hands-on Learning and Impart Skill Development 3. Foster Collaboration and Teamwork 4. Enable Interdisciplinary Learning, Prepare for Industry and Entrepreneurship 5. Impart Problem-Solving mind-set 					
These labs bridge the gap between academia and industry, providing students with the practical experience. Some students may also develop entrepreneurial skills, potentially leading to start-ups or innovation-driven careers. Tinkering labs aim to cultivate the next generation of engineers by giving them the tools, space, and mind-set to experiment, innovate, and solve real-world challenges.					
List of experiments:					
<ol style="list-style-type: none"> 1. Make your own parallel and series circuits using breadboard for any application of your choice. 2. Demonstrate a traffic light circuit using breadboard. 3. Build and demonstrate automatic Street Light using LDR. 4. Simulate the Arduino LED blinking activity in Tinkercad. 5. Build and demonstrate an Arduino LED blinking activity using Arduino IDE. 6. Interfacing IR Sensor and Servo Motor with Arduino. 7. Blink LED using ESP32. 8. LDR Interfacing with ESP32. 9. Control an LED using Mobile App. 10. Design and 3D print a Walking Robot 11. Design and 3D Print a Rocket. 12. Build a live soil moisture monitoring project, and monitor soil moisture levels of a remote plan in your computer dashboard. 13. Demonstrate all the steps in design thinking to redesign a motor bike. 					
Students need to refer to the following links:					
Course Outcomes: The students will be able to experiment, innovate, and solve real-world challenges.					
<ol style="list-style-type: none"> 1) https://aim.gov.in/pdf/equipment-manual-pdf.pdf 2) https://atl.aim.gov.in/ATL-Equipment-Manual/ 3) https://aim.gov.in/pdf/Level-1.pdf 4) https://aim.gov.in/pdf/Level-2.pdf 5) https://aim.gov.in/pdf/Level-3.pdf 					



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Dept. of Civil Engineering					
III Year II Semester					
S.No	Course Code	Course Name	Category	L-T-P	Credits
1.		Design of Steel Structures	PC	3-0-0	3
2.		Highway Engineering	PC	3-0-0	3
3.		Environmental Engineering	PC	3-0-0	3
4.		1. Design of Irrigation Structures 2. Repairs and Rehabilitation of Structures. 3. Expansive Soil	PE-II	3-0-0	3
5.		1. Earthquake Resistance Structures 2. Foundation Engineering 3. Advanced Structural Design	PE-III	3-0-0	3
6.		1. Green Buildings 2. Environmental Pollution Control. 3. Environmental Impact Assessment.	OE-II	3-0-0	3
7.		Environmental Engineering Lab	PC	0-0-3	1.5
8.		Highway Engineering Lab	PC	0-0-3	1.5
9.		STAAD	SC	1-0-2	2
10.		Technical paper writing & IPR	AC	2-0-0	0
Total					23
Industrial/Research Internship (Mandatory) for 8 weeks duration during summer vacation					

Category	CREDITS
Professional core courses	12
Professional Elective courses	6
Open Elective Course/Job oriented elective	3
Skill Enhancement course/soft skill course*	2
Audit course	0
TOTAL CREDITS	23



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Course Code	DESIGN OF STEEL STRUCTURES	L	T	P	C
		3	0	0	3
III Year II Semester					
Course Objectives:					
<ul style="list-style-type: none"> • To introduce the fundamental design concepts and specifications for steel structures as per BIS codes. • To familiarize students with different types of steel members and their behavior under various loading conditions. • To impart knowledge on the design of tension, compression, and flexural members including their connections. • To enable students to design plate girders, gantry girders, and other steel components used in structural systems. • To develop competency in interpreting and detailing steel structures according to IS 800:2007. 					
Course Outcomes (CO):					
<p>On successful completion of this course, the students will be able to:</p> <ul style="list-style-type: none"> • Apply the relevant Indian Standard codes in the analysis and design of steel structural elements. • Design tension and compression members using both simple and built-up sections. • Understand the behavior and modes of failure of steel members and connections. • Analyze and design welded and bolted connections, plate girders, beams, and columns for various loading conditions. • Design welded and bolted joints subjected to both axial and eccentric loads with due consideration of safety and stability. 					
UNIT - I					
<p>INTRODUCTION: Fundamental concepts of design of structures, different types of rolled steel sections available to be used in steel structures, stress strain relationship for steel. Concept of limit State Design Different Limit States as per IS 800 -2007. Design Strengths- deflection limits, serviceability. DESIGN OF BEAMS: Plastic moment – Bending and shear strength laterally supported beams design – Built-up sections – large plates Web buckling Crippling and Deflection of beams, Design of Purlin.</p>					
UNIT - II					
<p>TENSION & COMPRESSION MEMBERS: Bolted connections, Welded connections, Design Strength, Efficiency of joint –Prying action Types of Welded joints, Design of Tension members – Design Strength of members. Design of compression members, Buckling class, slenderness ratio / strength design, laced – battened columns, column splice, and column base, slab base.</p>					
UNIT - III					
<p>CONNECTIONS: Design of eccentric connections with brackets, Beam end connections, Un-stiffened and stiffened seated connections (bolted and welded types) Design of truss joints.</p>					
UNIT - IV					
<p>PLATE GIRDER: Plate Girder: Design consideration, I S Code recommendations Design of plate girder-Welded – Curtailment of flange plates stiffeners, splicing and connections.</p>					
UNIT - V					
<p>GANTRY GIRDER: Gantry girder impact factors – longitudinal forces, Design of Gantry girders.</p> <p>Note: The students should prepare the following plates.</p> <p>Plate 1 Detailing of simple beams</p> <p>Plate 2 Detailing of Compound beams including curtailment of flange plates.</p> <p>Plate 3 Detailing of Column including lacing and battens.</p> <p>Plate 4 Detailing of Column bases – slab base and gusseted base</p> <p>Plate 5 Detailing of steel roof trusses including particulars at joints.</p> <p>Plate 6 Detailing of Plate girder including curtailment, splicing and stiffeners</p>					
Textbooks:					



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1. Design of steel structures by S.K. Duggal, Tata Mcgraw Hill, New Delhi
2. Design of Steel Structures by Ramachandra. Vol – 1, Universities Press. Hyderabad
3. Steel Structures by Subramanyam.N, Oxford University press, New Delhi
4. Structural Design and Drawing by N.Krishna Raju; University Press, Hyderabad.
5. Design of Steel Structures by S S Bhavikatti. I.K Publications.

Reference Books:

1. Comprehensive Design of Steel structures, by B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi Publications, New Delhi.
2. Structural design in steel by Sarwar Alam Raz, New Age International Publishers, New Delhi
3. Design of Steel Structures by P.Dayaratnam; S. Chand Publishers
4. Design of Steel Structures by M.Raghupathi, Tata Mc. Graw-Hill



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Course Code	HIGHWAY ENGINEERING	L	T	P	C
		3	0	0	3
III Year II Semester					
Course Objectives:					
<ul style="list-style-type: none"> To provide knowledge on the planning, alignment, and design of highways as per IRC standards. To familiarize students with the properties, testing, and suitability of highway construction materials. To introduce principles of geometric design and elements influencing highway performance and safety. To develop understanding of pavement design concepts, including both flexible and rigid pavements. To expose students to modern construction methods and stabilization techniques used in highway engineering. 					
Course Outcomes (CO):					
<p>On successful completion of this course, the students will be able to:</p> <ul style="list-style-type: none"> Conduct surveys and planning for the selection and alignment of highways. Design geometric elements such as cross-sections, sight distances, and horizontal and vertical alignments. Analyze traffic data, interpret traffic control measures, and design intersections effectively. Evaluate the engineering properties of pavement materials and apply design methods for both flexible and rigid pavements. Understand highway construction procedures and implement soil stabilization techniques for durable pavement performance. 					
UNIT - I	HIGHWAY DEVELOPMENT AND PLANNING				
Highway development in India – Necessity for Highway Planning- Different Road Development Plans-Classification of Roads- Road Network Patterns – Highway Alignment- Factors affecting Alignment-Engineering Surveys.					
UNIT - II	HIGHWAY MATERIALS				
Soil, Aggregate and Bitumen- Tests on aggregates – Aggregate Properties and their Importance. Tests on Bitumen – Bituminous Concrete- Requirements of Design Mix- Marshall’s Method of Bituminous Mix design					
UNIT - III	HIGHWAY GEOMETIC DESIGN				
Importance of Geometric Design- Design controls and Criteria- Highway Cross Section Elements- Sight Distance Elements- Stopping sight Distance, Overtaking Sight Distance and intermediate Sight Distance-Design of Horizontal Alignment- Design of Super elevation and Extra widening- Design of Transition Curves-Design of Vertical alignment-Gradients- Vertical curves.					
UNIT - IV	PAVEMENT DESIGN				
Types of Pavements – Difference Between Flexible and Rigid Pavements – Pavement Components – Sub Grade, Sub Base, Base and Wearing Course – Functions of Pavement Components – Design Factors – Flexible Pavement Design Methods – G.I Method, CBR Method, (As Per IRC 37-2002) –Design of Rigid Pavements – Critical Load Positions - Westergaard’S Stress Equations – Computing Radius of Relative Stiffness and Equivalent Radius of Resisting Section – Stresses in Rigid Pavements – Design of Expansion and Contraction Joints in CC Pavements. Design of Dowel Bars and Tie Bars.					
UNIT - V	HIGHWAY CONSTRUCTION				
Construction of Earth Roads- Gravel Roads – WBM Roads- Bituminous Pavements- Cement Concrete Roads- Steps in Construction- Reinforced Concrete Pavements – Soil Stabilization – Methods and Objectives- Soil-cement Stabilization and Soil-lime Stabilization.					
Textbooks:					
<ol style="list-style-type: none"> Highway Engineering – S.K.Khanna & C.E.G.Justo, Nemchand & Bros., 7th edition (2000) Highway Engineering Design – L.R.Kadiyali and Lal- Khanna Publications. 					



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3. Text book of Highway Engineering by R.Srinivasa Kumar, Universities Press, Hyderabad

Reference Books:

1. Traffic Engineering and Transportation planning by L.R.Kadiyali and Lal- Khanna Publications.
2. Highway Engineering – S.P.Bindra , Dhanpathi Rai & Sons. – 4th Edition (1981)
3. Introduction to Transportation Engineering by James.H.Banks, Tata Mc.Grawhill Edition, NewDelhi
4. Highway Engineering by Paul .H.Wright & Karen K.Dixon,wiley india limited
5. A Text book of Transportation Engineering by S.P.Chandola, S.Chand Publications.



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Course Code	ENVIRONMENTAL ENGINEERING	L	T	P	C
	III Year II Semester	3	0	0	3
Course Objectives:					
<ul style="list-style-type: none"> To enable students to estimate sanitary sewage and stormwater flow, and design efficient sewer systems. To develop understanding of the design, construction, operation, and maintenance of primary treatment units. To impart knowledge of water demand forecasting, sources, and water quality standards for public water supply systems. To provide insights into advanced sewage treatment methods, disposal techniques, and recent developments in wastewater management. 					
Course Outcomes (CO):					
Upon successful completion of the course, the students will be able to: <ul style="list-style-type: none"> Estimate water demand, forecast population, and interpret water quality characteristics and standards. Design water transmission pipelines and understand their laying, jointing, and testing procedures. Calculate sanitary sewage flow, stormwater flow, and design sewers with knowledge of materials, appurtenances, and corrosion control. Design and manage primary treatment units with a focus on operation and maintenance. Apply principles of sewage treatment, reclamation, and sludge disposal to ensure environmental compliance. 					
UNIT - I	SOURCE OF WATER, WATER QUALITY & COLLECTION				
Public water supply system – Planning, Objectives, Design period, Population forecasting; Water demand, factors affecting per capita demand, Fire Demand, Sources of water, Criteria for selection of Source water quality parameters, Drinking Water quality standards, intakes, pipe materials and appurtenance. Selection of pipe materials- laying, jointing and testing of pipes.					
UNIT - II	WATER TREATMENT AND DISTRIBUTION				
Water treatment: Working principles and design of water treatment units, screening, plain sedimentation, sedimentation aided with coagulation, filtration, and disinfection. Water distribution system, methods of distribution, systems of supply of water, distribution reservoirs, layout of distribution system, design of distribution system, analysis of pipe networks appurtenances in distribution system.					
UNIT - III	PLANNING AND DESIGN OF SEWERAGE SYSTEM				
Characteristics and Composition of Sewage - Population Equivalent - Sanitary Sewage Flow Estimation - Sewer Materials - Hydraulics of Flow in Sanitary Sewers - Sewer Design - Storm Drainage-Storm Runoff Estimation - Sewer Appurtenances - Corrosion in Sewers - Prevention and Control – Sewage Pumping-Drainage in Buildings - Plumbing Systems for Drainage.					
UNIT - IV	PRIMARY TREATMENT OF SEWAGE				
Objectives – Unit Operations and Processes – Selection of treatment processes - Onsite sanitation – Septic tank- Grey water harvesting – Primary treatment – Principles, functions and design of sewage treatment units - screens - grit chamber-primary sedimentation tanks – Construction, Operation and Maintenance aspects.					
UNIT - V	SEWAGE TREATMENT & DISPOSAL				
Objectives - Selection of Treatment Methods - Principles, Functions, - Activated Sludge Process and Extended Aeration Systems - Trickling Filters - Sequencing Batch Reactor(SBR) - UASB - Waste Stabilization Ponds - Other Treatment Methods - Reclamation and Reuse of Sewage - Recent Advances in Sewage Treatment - Construction, Operation and Maintenance Aspects. - Discharge Standards-Sludge Treatment -Disposal of Sludge.					
Textbooks:					
1. Environmental Engineering by H. S Peavy, D. R. Rowe, G. Tchobanoglous, McGraw Hill Education (India) Pvt Ltd, 2014.					



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2. Punmia, B.C., Jain, A.K., and Jain, A.K., Wastewater Engineering (Including Air Pollution), Environmental Engineering, Vol. II, Laxmi Publications, 2016
3. Garg S.K. 'Water Supply Engineering, Environmental Engineering, Vol.I', Khanna Publishers, New Delhi, 2022.

Reference Books:

1. Environmental Engineering, I and II by SK Garg, Khanna Publications.
2. Environmental Pollution and Control Engineering CS Rao, Wiley Publications
3. Waste water engineering by Metcalf and Eddy, McGraw Hill, 2015.
4. Environmental Engineering by D. P. Sincero and G.A Sincero, Pearson 2015.
5. Water and Waste Water Technology by Mark J Hammar and Mark J. Hammar Jr. Wiley, 2007.



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Course Code	DESIGN OF IRRIGATION STRUCTURES (Professional Elective-II)	L	T	P	C
	III Year II Semester	3	0	0	3
Course Objectives:					
<p>The course is designed to:</p> <ul style="list-style-type: none"> • Impart knowledge on the design principles of various irrigation structures including headworks, canal structures, and river engineering works. • Develop understanding of reservoir planning, dam types, and their design considerations. • Introduce cross-drainage works, canal regulation, and associated hydraulic structures. • Enable students to analyze spillways and other safety-related hydraulic structures in irrigation systems. 					
Course Outcomes (CO):					
<p>On successful completion of the course, students will be able to:</p> <ul style="list-style-type: none"> • Explain and design canal regulation structures, including falls, head regulators, and cross regulators. • Plan and evaluate reservoirs, including site selection, storage zoning, sedimentation control, and flood routing. • Analyze and design gravity and earth dams ensuring stability and safety. • Identify and design suitable cross-drainage structures for irrigation systems. • Design spillways and stilling basins in accordance with Indian standards 					
UNIT - I					
<p>CANAL REGULATION WORKS: Canal falls: Necessity and location of falls; Types of falls; Canal regulators: off-take alignment; head regulators and cross-regulators. CROSS DRAINAGE WORKS: Introduction; types of cross drainage works, selection of suitable type of cross drainage work; classification of aqueducts and siphon aqueducts.</p>					
UNIT - II					
<p>STREAM GAUGING: Necessity, Selection of gauging sites, Area-Velocity method; Slope-Area method. RIVER ENGINEERING: Classification of rivers; Meandering; Causes of meandering; Basic factors controlling process of meandering; Aggrading type of river; Degrading type of River; River training: objectives, Classification of river training works.</p>					
UNIT - III					
<p>RESERVOIR PLANNING: Introduction; Investigations for reservoir planning; Selection of site for a reservoir; Zones of storage in a reservoir; Mass inflow curve and demand curve; Sediment flow in streams: Reservoir sedimentation; Life of reservoir, Reservoir sediment control: Flood routing: Methods of flood routing.</p> <p>DAMS : Introduction; Classification according to use; classification according to material- Gravity dams, Arch dams, Earth dams -advantages and disadvantages; Physical factors governing selection of type of dam ; selection of site for a dam.</p>					
UNIT - IV					
<p>GRAVITY DAMS: Introduction; Forces acting on a gravity dam; Combination of loading for design; Modes of failure: stability requirements; Stability analysis; Elementary profile of a gravity dam; High and low gravity dams; Stability analysis of non-overflow section of Gravity dam.</p> <p>EARTH DAMS: Introduction; Types of earth dams; Causes of failure of earth dams; Criteria for safe design of earth dams; Seepage control measures.</p>					
UNIT - V					
<p>SPILLWAYS: Introduction; Types of spillways; Profile of ogee spillway, stilling basins, Indian standards on criteria for design of hydraulic jump type stilling basins with horizontal aprons.</p>					
Textbooks:					
<ol style="list-style-type: none"> 1. Irrigation and Water Power Engineering by Dr. B.C. Punmia & Dr. B.B. Lal Pande; Laxmi Publications Pvt. Ltd., New Delhi. 2. Irrigation Engineering and Hydraulic Structure by S. K. Garg; Khanna Publishers, Delhi. 3. Irrigation, Waterpower and Water Resources Engineering by K.R. Arora; Standard Publication, New Delhi. 					



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Reference Books:

1. Irrigation and Water Resources Engineering by G.L. Asawa, New Age International Publishers.
2. Theory and Design of Hydraulic Structures by Varshney, Gupta & Gupta.
3. Water Resources Engineering by Satyanarayana Murthy Challa, New Age International Publishers.
4. Irrigation Engineering by R.K. Sharma and T.K. Sharma, S. Chand Publishers.
5. Irrigation and Water Power Engineering by Punmia and Lal, Laxmi Publications.



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Course Code	REPAIRS AND REHABILITATION OF STRUCTURES (Professional Elective-II)	L	T	P	C
	III Year II Semester	3	0	0	3
Course Objectives:					
The course is designed to: <ul style="list-style-type: none"> • To create awareness about maintenance, rehabilitation, and retrofitting of structures. • To introduce methods for structural health monitoring and assessment of damaged structures. • To explain techniques for repair, protection, and strengthening of concrete structures. • To provide knowledge of experimental stress analysis and non-destructive testing methods. • To familiarize students with structural failures due to corrosion, fire, earthquakes, and other factors, and preventive measures. 					
Course Outcomes (CO):					
On successful completion of the course, students will be able to: <ul style="list-style-type: none"> • Explain and design canal regulation structures, including falls, head regulators, and cross regulators. • Plan and evaluate reservoirs, including site selection, storage zoning, sedimentation control, and flood routing. • Analyze and design gravity and earth dams ensuring stability and safety. • Identify and design suitable cross-drainage structures for irrigation systems. • Design spillways and stilling basins in accordance with Indian standards 					
UNIT - I					
Repair and Rehabilitation - Facts of Maintenance - Importance of Maintenance - Various aspects of Inspection - Assessment procedure for evaluating a damaged structure - causes of deterioration-surface deterioration - efflorescence - Causes and preventive measures.					
UNIT - II					
Corrosion of Steel Reinforcement, Causes, Mechanism and Prevention. Damage of Structures due to Fire – Fire Rating of Structures – Phenomena of Desiccation.					
UNIT - III					
TECHNIQUES FOR REPAIR AND PROTECTION METHODS					
Non-destructive Testing Techniques, Load test for Stability - Epoxy injection, Shoring, Underpinning - Autogenous healing - Pre-packed concrete- Protective surface coating.					
UNIT - IV					
Repair of Structure, Common Types of Repairs, Repair in Concrete Structures – Repairs in Under Water Structures, Guniting, Shotcrete – Underpinning. Strengthening of Structures – Strengthening Methods, Retrofitting – Jacketing.					
UNIT - V					
REPAIR, REHABILITATION AND RETROFITTING OF STRUCTURES					
Strengthening of Structural elements, Repair of structures distressed due to corrosion, fire, leakage, earthquake-Transportation of Structures from one place to other –Structural Health Monitoring- demolition techniques-Engineered demolition methods-Case studies.					
Textbooks:					
<ol style="list-style-type: none"> 1. Concrete Technology by A.R. Santakumar, Oxford University Press. 2. B. VidiVELLI, Rehabilitation of Concrete Structures, Standard Publisher, 2021 edition. 3. Maintenance and Repair of Civil Structures, B.L. Gupta and Amit Gupta, Standard Publications. 					
Reference Books:					
<ol style="list-style-type: none"> 1. Bhattacharjee, J. (2017), Concrete Structures Repair Rehabilitation and Retrofitting, CBS Publishers & Distributors, New Delhi. 2. Non-Destructive Evaluation of Concrete Structures by Bungey – Surrey University Press. 					



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3. Concrete Repair and Maintenance Illustrated, RS Means Company Inc W.H. Ranso, (1981).
4. Ravishankar, K. & Krishnamoorthy, T.S., Structural Health Monitoring, Repair And Rehabilitation of Concrete Structures, Allied Publishers, 2004.



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Civil Engineering

Course Code	EXPANSIVE SOIL	L	T	P	C
	(Professional Elective-II)	3	0	0	3

III Year II Semester

Course Objectives:

- To introduce the nature and classification of soils and their structural characteristics.
- To explain swelling behavior of soils, methods for determining swell potential, and associated factors.
- To provide knowledge on foundation practices specifically designed for expansive soils.
- To familiarize students with stabilization techniques and materials for improving soil performance.
- To teach methods to enhance shear strength and control expansive soil behavior.

Course Outcomes (CO):

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

- Understand the nature of soils, clay mineralogy, soil structure, and soil-water interaction.
- Analyze swelling characteristics, heave potential, and perform determination of swell pressure and heave.
- Apply appropriate foundation practices in expansive soils, including under-reamed piles, sand cushions, and granular pile anchors.
- Evaluate different materials and techniques for stabilization of expansive soils, such as lime columns, admixtures, and moisture barriers.
- Understand procedures to improve shear strength of expansive soils using concepts like bilinear envelope, stress-state variables, and field suction measurement techniques.

UNIT - I

Clay Mineralogy: Nature of Soils, Clay mineral structure, diffused double layer theory, Cation exchange and Soil water- Soil Structure-Soil water interaction

UNIT - II

Swelling Characteristics: Swelling, Factors effecting swelling, swelling Potential, Swell Pressure- Methods of Determination, Factors effecting Swelling potential and swell pressure- Heave- Factors effecting Heave- Methods of determination of heave.

UNIT - III

Foundation Practices in Expansive Clays: Sand Cushion-Belled Piers, CNS layer technique, Under reamed Pile foundation- Construction Techniques, Design Specifications- Load-carrying capacity in compressive and uplift of single and multi under reamed piles in clays and sands- Granular pile Anchors.

UNIT - IV

Lime Soil columns and Lime Slurry pressure injection- Stabilization with admixtures-Propounding- Vertical and Horizontal Moisture barriers.

UNIT - V

Shear strength of expansive soils- Katti's concept of bilinear envelope- Stress –state variables in partly saturated soils- Frelend's strength parameters- Determination of matrix suction by filter paper method- axis translation technique and field suction measurement.

Textbooks:

1. F. C. Chen, Foundation on Expansive Soils, Elsevier Scientific Publishing Company, Newyork
2. J. D. Nelson and D. I. Miller, Expansive soils- Problems and Practice in Foundation and pavement Engineering, John Wiley & Sons Inc

References

1. D. G. Fredlund and H. Rhardjo, Soil Mechanics for Unsaturated Soils, WILEY Inter Science Publication, John Wiley & Sons, Inc
2. D. R. Katti, A. R. Katti, Behavior of Saturated Expansive Soils and Control Methods, Taylor and Francis.
3. Malcolm D Bolton , Guide to Soil Mechanics, Universities Press, 2003.Manfred R. Haussmann, Engineering Principles of Ground Modification, McGraw Hill Pub. Co.,New, York, 1990.



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Course Code	EARTHQUAKE RESISTANT STRUCTURES	L	T	P	C
	(Professional Elective-III)	3	0	0	3
III Year II Semester					
Course Objectives:					
<ul style="list-style-type: none"> • To provide fundamental knowledge on earthquake engineering, its causes, and effects. • To introduce the theory of vibrations and response spectrum concepts. • To enable students to analyze SDOF and MDOF systems under seismic loads. • To familiarize students with the latest codal provisions for earthquake-resistant design. 					
Course Outcomes (CO):					
<ul style="list-style-type: none"> • Understand the causes, effects, and phenomena of earthquakes. • Explain the theory of vibrations and response spectrum concept. • Analyze structural behavior using SDOF and MDOF systems. • Apply the latest IS code provisions in earthquake-resistant design. 					
UNIT - I					
Earthquake Engineering: Engineering Seismology, Earthquake phenomenon, Causes and effects of earthquakes, Faults, Structure of earth, Plate Tectonics, Elastic Rebound Theory, Earthquake Terminology, Source, Focus, Epicenter etc - Earthquake size – Magnitude and intensity of earthquakes Classification of earthquakes.					
UNIT - II					
Introduction to Structural Dynamics: Theory of vibrations, Lumped mass and continuous mass systems, Single Degree of Freedom (SDOF) Systems – Formulation of equations of motion Undamped and damped free vibration, Damping, Response to harmonic excitation, Concept of response spectrum.					
UNIT - III					
Earthquake Analysis : Introduction, Rigid base excitation, Formulation of equations of motion for SDOF and MDOF Systems, Earthquake response analysis of single and multi-storied buildings, Use of response spectra.					
UNIT - IV					
Multi-Degree of Freedom (MDOF) Systems: - Formulation of equations of motion – Free vibration, Determination of natural frequencies of vibration and mode shapes, Orthogonal properties of normal modes, Mode superposition method of obtaining response.					
UNIT - V					
Codal Design Provisions: Review of the latest Indian seismic code IS:1893 – 2002 (Part-I) provisions for buildings, Earthquake design philosophy, Assumptions, Design by seismic coefficient method, Displacements and drift requirements, Provisions for torsion.					
Textbooks:					
<ol style="list-style-type: none"> 1. Dynamics of Structures – Clough & Penzien, McGraw Hill – International Edition. 2. Earthquake Resistant Design of Structures – Pankaj Agarwal & Manish Shrikhande – Printice Hall of India, New Delhi 					
Reference Books:					
<ol style="list-style-type: none"> 1. Dynamics of Structures by A.K.Chopra – Pearson Education, Indian Branch, Delhi. 2. Earthquake Tips by C.V.R.Murty, I.I.T. Kanpur. 3. Structural Dynamics by Mario Paaz 					



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Course Code	FOUNDATION ENGINEERING (Professional Elective-III)	L	T	P	C
	III Year II Semester	3	0	0	3
Course Objectives:					
<ul style="list-style-type: none"> • To provide knowledge on soil exploration, field testing, and soil investigation reporting. • To analyze slope stability using different failure theories and numerical methods. • To apply earth pressure theories for retaining wall design. • To evaluate the bearing capacity and settlement of shallow and deep foundations. • To understand the design and analysis of pile and well foundations. 					
Course Outcomes (CO):					
<ul style="list-style-type: none"> • Explain the principles of soil exploration, field testing, and reporting. • Analyze slope stability using various failure theories and numerical techniques. • Determine earth pressures and assess the stability of retaining walls. • Evaluate the bearing capacity and settlement of shallow foundations. • Analyze pile and well foundations for load-carrying capacity and settlement. 					
UNIT - I	SOIL EXPLORATION				
Need – Methods of Soil Exploration – Boring and Sampling Methods – Field Tests – Penetration Tests – Plate Load Test – Pressure Meter – Planning of Programme and Preparation of Soil Investigation Report.					
UNIT - II	SHALLOW FOUNDATIONS				
Types – Choice of Foundation – Location of Depth – Safe Bearing Capacity – Terzaghi’s, Meyerhoff’s and Skempton’s Methods. ALLOWABLE BEARING PRESSURE: Safe Bearing Pressure Based On N- Value – Allowable Bearing Pressure; Safe Bearing Capacity and Settlement From Plate Load Test – Allowable Settlements of Structures – Settlement Analysis.					
UNIT - III	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					
WELL FOUNDATIONS: Types – Different Shapes of Wells – Components of Wells – Functions and Design Criteria – Sinking of Wells – Tilts and Shifts.					
UNIT - IV	EARTH PRESSURE THEORIES				
Rankine’s Theory of Earth Pressure – Earth Pressures in Layered Soils – Coulomb’s Earth Pressure Theory – Rebhann’s and Cullman’s Graphical Method					
RETAINING WALLS: Types of Retaining Walls – Stability of Retaining Walls.					
UNIT - V	FOUNDATIONS IN PROBLEMATIC SOILS				
Foundations in black cotton soils- basic foundation problems associated with black cotton soils- Use of Cohesive Non-Swelling (CNS) layer below shallow foundations.					
Textbooks:					
<ol style="list-style-type: none"> 1. Geotechnical Engineering by C.Venkataramaiah, New Age Publications(2002). 2. Soil Mechanics and Foundation Engineering by Arora, Standard Publishers and Distributors, Delhi 7th edition 2009 3. Soil Mechanics and Foundations by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi publications Pvt. Ltd., New Delhi 17th edition 2017. 4. Geo technical engineering by V.N.S.Murthy, CRC Press, New Delhi Design of Reinforced concrete Foundations by P.C. Varghese, PHI Publications, New Delhi 					
Reference Books:					
<ol style="list-style-type: none"> 1. Soil Mechanics and Foundation Engineering by Purushtoma Raj, Pearson Publications 2nd edition 2013 2. Principles of Foundation Engineering by Das, B.M., - (1999)–6th edition (Indian edition) Thomson Engineering 3. Foundation Engineering by Varghese, P.C., Prentice Hall of India., New Delhi. 4. Foundation Engineering by V.N.S.Murthy, CRC Press, New Delhi. 					



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Course Code	ADVANCED STRUCTURAL DESIGN (Professional Elective-III)	L	T	P	C
		3	0	0	3
III Year II Semester					
Course Objectives:					
<ul style="list-style-type: none"> • To impart advanced knowledge in the design of reinforced concrete (RCC) members. • To develop an understanding of the design principles of chimneys, silos, and concrete bridges. 					
Course Outcomes (CO):					
<ul style="list-style-type: none"> • Design RCC retaining walls such as cantilever and counterfort types. • Design circular and rectangular RCC water tanks. • Understand the concepts and design of silos and chimneys. • Apply design concepts for slab and T-beam concrete bridges as per IRC standards. 					
UNIT - I					
Design of RCC Retaining walls such as cantilever and counter fort					
UNIT - II					
Design of RCC water tanks, Circular and rectangular types.					
UNIT - III					
Introduction to silos concepts of loading and Design.					
UNIT - IV					
Introduction to Chimney concept of oading and design.					
UNIT - V					
Introduction to concrete bridges, IRC loading, slab bridges and T - beam bridges design concepts.					
Textbooks:					
<ol style="list-style-type: none"> 1. Advanced Reinforced concrete structures by Vargheesh, Pranties Hall of India Pvt. Ltd. 2. Design drawing of concrete and steel structures by N.Krishna Raju University Press 2005. 3. Reinforced concrete structures Vol-2 by by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi 					
Reference Books:					
<ol style="list-style-type: none"> 1. Essentials of Bridge Engineering by D.John son Victor, Oxford and IBM publication Co., Pvt. Ltd. 2. Reinforced concrete design by S.U, Pillai and D.Menon, Tata Mc.Ghrawhill Publishing Company 3. Advanced Reinforced Concrete Design by P.C. Varghese, Prentice Hall India 					



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Course Code	GREEN BUILDINGS (OPEN ELECTIVE-II)	L	T	P	C
		3	0	0	3
III Year II Semester					
Course Objectives:					
Course Objectives: <ul style="list-style-type: none"> • To introduce the concepts, benefits, and principles of green building design. • To provide knowledge on energy-efficient, pollution-free, and low-energy construction methods. • To explore lighting systems, passive solar design, and renewable energy integration. • To understand construction, maintenance, and economic aspects of sustainable buildings. 					
Course Outcomes (CO):					
<ul style="list-style-type: none"> • Explain the key principles of green building design and energy conservation strategies. • Understand the concept and rating systems of IGBC. • Apply renewable energy and passive ventilation techniques for sustainable buildings. • Analyze the economic feasibility and long-term benefits of green homes. 					
UNIT - I					
INTRODUCTION TO GREEN BUILDINGS: Green Buildings, Global warming, requirement of Green Building, Benefits of Green Buildings, Requisites for Constructing a Green Building, sustainable construction focus point: site, water, energy, material, indoor air quality, construction procedures.					
UNIT - II					
INDIAN GREEN BUILDING COUNCIL: Introduction to IGBC green homes, Benefits of IGBC, IGBC green home rating system, introduction to USGBC, LEED rating system, procedure to get IGBC certification.					
UNIT - III					
GREEN BUILDING DESIGN: Site Issues: site analysis and design, site development and layout. Water Issues: watershed protection, drainage of concentrated Runoff, water efficiency and conservation, rain water harvesting, water reclamation. Sustainable Materials: Reduce / Reuse / Recycle, Natural Sources, concrete, masonry, metals, wood and plastic, finishes.					
UNIT - IV					
PASSIVE SOLAR DESIGN: Passive solar design, Day lighting, Building envelope, Renewable energy. Construction Process and Maintenance of Green Building: Environmental construction guidelines, building operations and maintenance.					
UNIT - V					
INDOOR ENVIRONMENTAL QUALITY: Significance, design principle, ventilation control, occupant activity control, significance of acoustics. Economics of Green Homes: Economics of green buildings, Selecting environmentally and economically balanced building materials, Project cost, Income and expenses.					
Textbooks:					
<ol style="list-style-type: none"> 1. Sustainable building technical manual- Green building design, constructions and operation; Produced by Public Technology Inc., US Green Building Council. 2. Green homes by R.K .Gautham, BS publications. 3. IGBC Green homes rating system Version 1.0 – A bridged reference guide. 					
Reference Books:					
<ol style="list-style-type: none"> 1. Green Building A Basic Guide to Building and Remodeling Sustainably; Tree Hugger Consulting. 2. Green Building Handbook, Volume 1, Tom Woolley, Sam Kimmins, Paul Harrison and Rob Harrison; E & FN Spon, an imprint of Thomson Science & Professional. 3. Green BIM: Successful Sustainable Design with Building Information Modeling, Eddy Krygiel BradleyNies, Willy publishing inc. 					



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Course Code	ENVIRONMENTAL POLLUTION CONTROL (OPEN ELECTIVE-II)	L	T	P	C
		3	0	0	3
III Year II Semester					
Course Objectives:					
<p>Course Objectives:</p> <ul style="list-style-type: none"> • To understand various types of pollution and their environmental impacts. • To study air and noise pollution, their measurement, and control technologies. • To examine environmental management systems and legislative frameworks. 					
Course Outcomes (CO):					
<p>At the end of the course the student will be able to</p> <ul style="list-style-type: none"> • Assess the economic, biological, and meteorological impacts of air pollution. • Understand the sources, types, and effects of air and noise pollution. • Recognize the importance of air and noise quality measurement for environmental protection. • Apply suitable control technologies to mitigate air and noise pollution effectively. 					
UNIT - I					
Atmosphere as a place of disposal of pollutants – Air Pollution – Definition -Classification of air pollutants - Man made - Natural sources - Type of air pollutants and Global Climate - Units of measurements of pollutants - Air quality criteria - emission standards - National ambient air quality standards - Air pollution indices - Air quality management in India.					
UNIT - II					
SOURCES AND EFFECTS OF AIR POLLUTANTS					
Pollution due to automobiles - Analysis of air pollutants - Chemical, Instrumental and biological methods. Air pollution and its effects on human beings, plants and animals - Economic effects of air pollution - Effect of air pollution on meteorological conditions - Changes on the Meso scale, Micro scale and Macro scale.					
UNIT - III					
Global Environmental Issues					
Ozone Depletion, Acid Rain, Global Warming-Green House Effects. Administrative Control on Environment: Functions of Central and State Pollution Control Boards; Environmental Clearance Process for Industries and Infrastructural Projects.					
UNIT - IV					
AIR POLLUTION CONTROL AND AIR QUALITY MODELLING					
Elements of atmosphere - Meteorological factors - Wind rose diagram - Lapse rate - Atmospheric stability and turbulence - Plume rise - Effective stack height - Dispersion of pollutants - Dispersion models –Applications.- Concepts of control - Principles and design of control measures - Particulates control by gravitational, centrifugal, filtration, scrubbing, electrostatic precipitation - Selection criteria for equipment - Gaseous pollutant control by adsorption, absorption, condensation, combustion - Pollution control for specific major industries- Air Quality Modeling.					
UNIT - V					
NOISE AND AIR QUALITY MANAGEMENT					
Impacts of noise, permissible limits of noise pollution, measurement of noise and control of noise pollution. Noise and Air quality standards - Quality monitoring - Preventive measures - Pollution control efforts – Noise and Air quality Zoning - Town planning regulation of new industries - Legislation and enforcement - Environmental Impact Assessment on Air and Noise quality.					
Textbooks:					
<ol style="list-style-type: none"> 1. C. S. Rao, “Environmental Pollution Control Engineering”, Wiley Eastern Limited, 2006. 2. Dr. Y. Anjaneyulu, “Air Pollution and Control Technologies”, Allied publishers Pvt. Ltd., 2019. 					
Reference Books:					



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1. Noel De Nevers, "Air pollution control Engineering", McGraw Hill International Edition, McGraw Hill Inc, New Delhi, 2000.
2. Mukherjee, "Environmental Pollution and Health Hazards", causes and effects, 1986.



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Course Code	ENVIRONMENTAL IMPACT ASSESSMENT (Open Elective-II)	L	T	P	C
		3	0	0	3
III Year II Semester					
Course Objectives:					
<ul style="list-style-type: none"> To introduce the concept, scope, and methodologies of Environmental Impact Assessment (EIA). To familiarize students with environmental laws and EIA audit processes. To develop the ability to evaluate environmental effects of development projects. 					
Course Outcomes (CO):•					
<ul style="list-style-type: none"> Understand the concept and objectives of Environmental Impact Assessment. Apply appropriate methodologies for EIA studies. Interpret environmental protection laws and regulations. Prepare and evaluate Environmental Impact Assessment reports for projects. 					
UNIT - I	Introduction:				
Basic concept of EIA, Initial environmental Examination, Elements of EIA, factors affecting EIA. Impact evaluation and analysis, preparation of Environmental Base map. Classification of environmental parameters.					
UNIT - II	EIA METHODOLOGIES				
E I A Methodologies: introduction, Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method, overlay methods and cost/benefit Analysis.					
UNIT - III	IMPACT OF DEVELOPMENTAL ACTIVITIES AND LAND USE				
Introduction and Methodology for the assessment of soil and ground water. Delineation of study area. Identification of activities. Procurement of relevant soil quality, Impact prediction, Assessment of Impact and significance. Identification and Incorporation of mitigation measures. E I A in surface water, Air and Biological environment: Methodology for the assessment of Impacts on surface water environment, Air pollution sources, generalized approach for assessment of Air pollution Impact.					
UNIT - IV	ASSESSMENT OF IMPACT ON VEGETATION AND WILDLIFE				
Introduction - Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation, Causes and effects of deforestation. ENVIRONMENTAL AUDIT : Introduction - Environmental Audit & Environmental legislation objectives of Environmental Audit, Types of environmental Audit, Audit protocol, stages of Environmental Audit, onsite activities, evaluation of Audit data and preparation of Audit report.					
UNIT - V	ENVIRONMENTAL ACTS (PROTECTION AND PREVENTION)				
Post Audit activities, The Environmental protection Act, The water Prevention Act, The Air (Prevention & Control of pollution Act.), Wild life Act. Case studies and preparation of Environmental Impact assessment statement for various Industries.					
Textbooks:					
<ol style="list-style-type: none"> Environmental Impact Assessment Methodologies, by Y. Anjaneyulu, B.S. Publication, Sultan Bazar, Hyderabad. Environmental Science and Engineering, by J. Glynn and Gary W. Hein Ke – Prentice Hall Publishers 					
Reference Books:					
<ol style="list-style-type: none"> Environmental Science and Engineering, by Suresh K. Dhaneja – S.K.,Katari & Sons Publication., New Delhi. Environmental Pollution and Control, by Dr H.S. Bhatia – Galgotia Publication (P) Ltd, Delhi. 					



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Course Code	ENVIRONMENTAL ENGINEERING LAB	L	T	P	C
		0	0	3	1.5
III Year II Semester					
Course Outcomes (CO):					
<ul style="list-style-type: none"> • Apply appropriate sampling and preservation techniques for water and wastewater. • Measure physical and chemical parameters such as turbidity, conductivity, and chlorine content. • Analyze key water and wastewater quality indicators like BOD, COD, and TKN. • Assess the efficiency of water treatment processes through laboratory tests. • Perform microbiological analysis for coli form detection and sludge characterization. 					
List of Experiments:					
<p>I. ANALYSIS of WATER SAMPLE</p> <ol style="list-style-type: none"> 1. Sampling and preservation methods for water and wastewater (Demonstration only) 2. Measurement of Electrical conductivity and turbidity 3. Determination of fluoride in water by spectrophotometric method /ISE 4. Determination of iron in water (Demo) 5. Determination of Sulphate in water 6. Determination of Optimum Coagulant Dosage by Jar test apparatus 7. Determination of available Chlorine in Bleaching powder and residual chlorine in water <p>II. ANALYSIS of WASTEWATER SAMPLE</p> <ol style="list-style-type: none"> 1. Estimation of suspended, volatile and fixed solids 2. Determination of Sludge Volume Index in waste water 3. Determination of Dissolved Oxygen 4. Estimation of B.O.D. 5. Estimation of C.O.D. 6. Determination of TKN and Ammonia Nitrogen in wastewater 7. Determination of total and faecal coliform (Demonstration only) 					
TEXT BOOKS:					
<ol style="list-style-type: none"> 2. Manual on Water Supply and Treatment. Ministry of Urban Development, New Delhi. 3. Manual on Sewerage and Sewage Treatment Systems, Part A, B and C. Central Public Health and Environmental Engineering Organization, Ministry of Urban Development. 4. Environmental Engineering Laboratory Manual by Dr. S.K. Panigrahi, L. Mohanty, S.K. Kataria & Sons. 					



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Course Code	HIGHWAY ENGINEERING LAB	L	T	P	C
			0	0	3
III Year II Semester					
Course Outcomes (CO):					
<ul style="list-style-type: none">• Demonstrate practical knowledge of testing procedures for highway materials.• Conduct various tests on aggregates and bitumen to evaluate suitability for road construction.• Interpret test results for material quality control and pavement design.• Understand the importance of material testing in ensuring road durability and safety.					
List of Experiments:					
TESTS ON ROAD AGGREGATES: <ul style="list-style-type: none">• Aggregate Crushing value Test.• Aggregate Impact Test.• Abrasion Test.• Shape tests					
TESTS ON BITUMINOUS MATERIALS: <ul style="list-style-type: none">• Penetration Test.• Ductility Test.• Softening Point Test.• Flash and fire point tests.• Demo on Marshall Stability Test on Bituminous Mixes					
Highway Material Testing and Quality Control (English, Paperback, G. Venkatappa Rao, K. Ramachandra Rao, Kausik Pahari, D.V. Bhavanna Rao) Dreamtech Press					



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Course Code	STAAD LAB	L	T	P	C
	Skill Oriented Course	0	0	3	1.5
III Year II Semester					
Course Objectives:					
<ol style="list-style-type: none">1. Impart knowledge on modelling, analysis, and design of structures using STAAD Pro.2. Familiarize students with various load applications and support conditions.3. Enable students to analyze and design different structural elements such as beams, columns, slabs, and trusses.4. Introduce seismic and wind load analysis for building structures.5. Develop practical skills for interpreting analysis results and preparing design reports.					
Course Outcomes (CO):					
Upon successful completion of this course, students will be able to:					
<ol style="list-style-type: none">1. Understand and operate the STAAD.Pro interface effectively.2. Model 2D and 3D structural systems.3. Perform analysis and design of RCC and steel structures.4. Apply seismic and wind loads as per relevant IS codes.5. Interpret STAAD.Pro output results and prepare detailed reports.					
List of Experiments:					
<ol style="list-style-type: none">1. Study of STAAD.Pro Interface and Project Setup.2. Creation of Node, Beam, and Plate Elements in STAAD Pro.3. Analysis and Design of a Simply Supported Beam.4. Analysis and Design of a Continuous Beam.5. Analysis and Design of a 2D Portal Frame.6. Analysis and Design of a 3D Truss Structure.7. Modeling and Analysis of a Multi-Storey RCC Frame Building.8. Application of Wind Load on a Building Structure.9. Seismic Load Analysis of a Multi-Storey Building as per IS 1893.10. Design of RCC Slab and Column Elements.11. Analysis and Design of a Steel Roof Truss.12. Design of a Water Tank Structure using STAAD.Pro.13. Comparative Study of Different Support and Load Conditions.14. Report Generation and Interpretation of Analysis Results in STAAD.Pro.					



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Course Code	TECHNICAL REPORT WRITING & IPR	L	T	P	C
		2	0	0	-
III Year II Semester					
Course Objectives:					
<ul style="list-style-type: none"> • To enable the students to practice the basic skills of research paper writing • To make the students understand the importance of IP and to educate them on the basic concepts of Intellectual Property Rights. • To practice the basic skills of performing quality literature review • To help them in knowing the significance of real-life practice and procedure of Patents. • To enable them to learn the procedure of obtaining Patents, Copyrights, & Trademarks 					
Course Outcomes (CO):					
At the end of the course, students will be able to					
<ul style="list-style-type: none"> • Identify key secondary literature related to their proposed technical paper writing. • Explain various principles and styles in technical writing • Use the acquired knowledge in writing a research/technical paper • Analyse rights and responsibilities of holder of Patent, Copyright, Trademark, International Trademark etc. • Evaluate different forms of IPR available at national & international level • Develop skill of making search of various forms of IPR by using modern tools and techniques 					
UNIT – I	Principles of Technical Writing				
Principles of Technical Writing: styles in technical writing; clarity, precision, coherence and logical sequence in writing-avoiding ambiguity- repetition, and vague language -highlighting your findings-discussing your limitations -hedging and criticizing -plagiarism and paraphrasing .					
UNIT – II	Technical Research Paper Writing				
Technical Research Paper Writing: Abstract- Objectives-Limitations-Review of Literature-Problem sand Framing Research Questions- Synopsis					
UNIT – III	Process of research				
Process of research: publication mechanism: types of journals- indexing-seminars- conferences-proof reading –plagiarism style; seminar & conference paper writing; Methodology-discussion-results- citation rules					
UNIT – IV	Introduction to Intellectual property				
Introduction to Intellectual property: Introduction, types of intellectual property, international nizations, agencies and treaties, importance of intellectual property rights Trademarks: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.					
UNIT – V	Law of copy rights				
Law of copy rights: Fundamentals of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer. Patent law, intellectual property audits.					
Textbooks:					
1. Deborah. E. Bouchoux, Intellectual Property Rights, Cengage Learning India, 2013 2. Meenakshi Raman, Sangeeta Sharma. Technical Communication: Principles and practices. Oxford.					
Online Learning Resources:					
1. https://theconceptwriters.com.pk/principles-of-technical-writing/ 2. https://www.ewh.ieee.org/soc/emcs/acstrial/newsletters/summer10/TechPaperWriting.html 3. https://www.ewh.ieee.org/soc/emcs/acstrial/newsletters/summer10/TechPaperWriting.html 4. https://www.manuscriptedit.com/scholar-hangout/process-publishing-research-paper-journal/					



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5. <https://www.icsi.edu/media/website/IntellectualPropertyRightLaws&Practice.pdf>
6. <https://lawbhoomi.com/intellectual-property-rights-notes/>
7. <https://www.extension.purdue.edu/extmedia/ec/ec-723.pdf>



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Sri Krishnadevaraya University College of Engineering & Technology					
Dept. of Civil Engineering					
IV Year I Semester					
S.No	Course Code	Course Name	Category	L-T-P	Credits
1.		Pre-Stressed Concrete	PC	3-0-0	3
2.		Construction Planning and Management	MGT	2-0-0	2
3.		1. Finite Element Methods 2. Geo-Informatics 3. Traffic Engineering	PE-IV	3-0-0	3
4.		1. Experimental Stress Analysis 2. Environmental Impact Assessment 3. Ground Improvement Techniques	PE-V	3-0-0	3
5.		1. Geographic Information System GIS 2. Sustainability in Engineering Practices. 3. Low-cost Effective Housing Techniques.	OE-III	3-0-0	3
6.		1. Solid Waste Management. 2. Construction Technology 3. Intelligent Transport System.	OE-IV	3-0-0	3
9.		Estimation, Specifications and Contracts	SC	1-0-2	2
10.		Constitution of India	AC	2-0-0	0
11		Evaluation of Summer Internship	PR	-	2
				Total	21

Category	CREDITS
Professional Core courses	3
Management Elective	2
Professional Elective courses	6
Open Elective Course/Job oriented elective	6
Skill Enhancement course/soft skill course*	2
Industrial/Research Internship	2
TOTAL CREDITS	21



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Course Code	PRE-STRESSED CONCRETE	L	T	P	C
		3	0	0	3
IV Year I Semester					
Course Objectives:					
<ul style="list-style-type: none"> • To introduce the need, methods, and advantages of prestressing in concrete structures. • To impart knowledge on materials used in prestressed concrete, including high-strength concrete and steel. • To enable students to analyze and design prestressed concrete members subjected to flexure and shear. • To familiarize students with relevant BIS codes and practical applications of prestressed concrete design. 					
Course Outcomes (CO):					
<ul style="list-style-type: none"> • Understand the fundamental principles, methods, and systems of prestressing. • Analyze prestressed concrete sections for flexure and shear using elastic theory. • Design various prestressed concrete structural elements in accordance with IS 1343. • Apply knowledge of losses, deflections, and code provisions in practical design problems 					
UNIT - I					
INTRODUCTION: Historic development, General principles of prestressing pretensioning and post tensioning, Advantages and limitations of pre-stressed concrete, Materials – High strength concrete and high tensile steel their characteristics.					
UNIT - II					
METHODS OF PRESTRESSING: Methods and Systems of Prestressing, Pre-tensioning and post tensioning methods, Analysis of post tensioning, Different systems of prestressing like Hoyer System, Magnel System Freyssinet system and Gifford, Udall System.					
LOSSES OF PRESTRESS: Loss of prestress in pre-tensioned and post-tensioned members due to various causes like elastic shortage of concrete, shrinkage of concrete, creep of concrete, Relaxation of steel, bending of member and frictional losses.					
UNIT - III					
ANALYSIS OF SECTIONS FOR FLEXURE: Elastic analysis of concrete beams pre-stressed with straight, concentric, eccentric, bent and parabolic tendons.					
UNIT - IV					
DESIGN OF SECTIONS FOR FLEXURE AND SHEAR: Allowable stress, Design criteria as per I.S.Code Elastic design of simple rectangular and I-section for flexure, shear, and principal stresses, design for shear in beams, Kern, lines, cable profile.					
UNIT - V					
DEFLECTIONS OF PRESTRESSED CONCRETE BEAMS: Importance of control of deflections, factors influencing deflections, short term deflections of uncracked member's prediction of long term deflections.					
Textbooks:					
<ol style="list-style-type: none"> 1. Prestressed Concrete by N. Krishna Raju, Tata McGraw Hill Publications 6th edition 2018 2. Prestressed concrete by N.Rajagopalan, Narosa Publishing House 2nd edition 2017. 					
Reference Books:					
<ol style="list-style-type: none"> 1. Design of Prestressed Concrete Structures by T.Y. Lin & Ned H. Burns, John Wiley & Sons 3rd edition 2010 2. Prestressed Concrete Design by Praveen Nagrajan, Pearson publications, 2013. 3. Prestressed Concrete by Ramamuratam, Dhanpatrai Publications 2020 edition. 					



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Course Code	CONSTRUCTION PLANNING AND MANAGEMENT	L	T	P	C
		3	0	0	3
IV Year I Semester					
Course Objectives:					
<ul style="list-style-type: none"> • To develop a comprehensive understanding of construction planning, organization, and project management. • To impart knowledge of cost-effective construction methods and materials. • To familiarize students with various roles and responsibilities in construction management. • To introduce modern scheduling techniques like CPM and PERT for project control. 					
Course Outcomes (CO):					
<ul style="list-style-type: none"> • Understand the fundamentals of construction management and project organization. • Prepare bar charts, schedules, and network diagrams using CPM and PERT techniques. • Identify and describe the roles of various professionals and departments involved in construction projects. • Understand the contractual procedures and consultancy roles in construction projects. 					
UNIT - I	INTRODUCTION				
Objective of Building construction organization-Structure of Organization-communication and co-ordination of various Departments-Function of Each Department-Future prospects. Engineering Department And its Management: Introduction objective and scope-Department structure-Function of Individual Divisions-Role and Responsibilities of chief Engineer-Reporting and Meetings.					
UNIT - II					
Site-Set up and Day to Day working: Introduction-General site Rules-Responsibilities of site staff, storekeeper, supervisor, junior Engineer, project Engineer-Submission of Reports to the Head office-Records to be maintained at site-Important points to be considered at site.					
UNIT - III					
Guide Lines to start New Site: Introduction-Basic Requirements to start new site-List of stationary and Material required to start a New site-Collection of Documents and Drawings from various Authorities. Preparation of site:-Site clearing and levelling-plot Boundaries-site office and store-water arrangement Electricity arrangement-compound walls-fencing and security fencing-temporary water storage tank.					
UNIT - IV					
Planning and Programming (of construction Activities): Introduction- construction planning of project material schedule, labour schedule- Methods of preparing construction schedule C.P.M P.E.R.T, Bar Chart.					
UNIT - V					
Importance of consultants (Role in planning and Execution): Introduction- Role and Responsibilities of various consultants such as Architect, structural consultant plumbing consultant- Electrical consultant-Road work, Swimming pool work consultant.					
Textbooks:					
<ol style="list-style-type: none"> 1. Practical Building construction and its management by Sandeep Mantri :New Delhi 2. Construction Technology by Subir K.Sarkar and Subhajit Saraswati – Oxford Higher Education-Univ. Press, Delhi. 3. Project Planning and Control with PERT and CPM by Dr.B.C.Punmia, K.K.Khandelwal, Lakshmi Publications New Delhi. 					
Reference Books:					
<ol style="list-style-type: none"> 1. Optimal design of water distribution networks P.R.Bhave, Narosa Publishing house 2003. 2. Total Project management, the Indian context- by: P.K.JOY- Mac Millan Publishers India Limited. 					



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Course Code	FINITE ELEMENT METHODS IN CIVIL ENGINEERING (Professional Elective-IV)	L	T	P	C
		3	0	0	3
IV Year I Semester					
Course Objectives:					
<ul style="list-style-type: none"> • To familiarize students with the fundamental principles and applications of the Finite Element Method (FEM). • To introduce formulation techniques for various structural elements. • To provide knowledge on stiffness matrix development and numerical analysis. • To enable application of FEM in solving plane stress, strain, and axisymmetric problems 					
Course Outcomes (CO):					
<ul style="list-style-type: none"> • Understand the differential equilibrium equations and energy principles in FEM. • Apply numerical methods for formulating finite element equations. • Develop stiffness matrices and load vectors for different element types. • Compute and analyze stress, strain, and displacement in structural elements. • Utilize FEM for plane stress, plane strain, and isoparametric element analysis. 					
UNIT - I					
Introduction: Concepts of FEM – Steps involved – merits & demerits – energy principles – Discretization –Rayleigh –Ritz method of functional approximation. Principles of Elasticity: Equilibrium equations – strain displacement relationships in matrix form – Constitutive relationships for plane stress, plane strain and Axi-symmetric bodies of revolution with axi-symmetric loading.					
UNIT - II					
One Dimensional FEM: Stiffness matrix for bar element, shape functions for one dimensional elements, one dimensional problems.					
UNIT - III					
Two Dimensional FEM: Different types of elements for plane stress and plane strain analysis Displacement models, generalized coordinates, shape functions, convergent and compatibility requirements – Geometric invariance, Natural coordinate system .					
UNIT - IV					
Generation of element stiffness and nodal load matrices for 3-node triangular element and four node rectangular elements.					
UNIT - V					
Isoparametric formulation, Concepts of isoparametric elements for 2D analysis -formulation of CST element, 4 –noded and 8-noded iso-parametric quadrilateral elements –Lagrangian and Serendipity elements. Formulation of 4-node iso-parametric axi-symmetric element.					
Textbooks:					
<ol style="list-style-type: none"> 1. Finite Elements Methods in Engineering by Tirupati.R. Chandrepatla and Ashok D. Belegundu - Pearson Education Publications. 2. Finite element analysis by S.S. Bhavakatti-New age international publishers. 3. Finite element analysis by David V Hutton, Tata Mcgraw Hill, New Delhi. 					
Reference Books:					
<ol style="list-style-type: none"> 1. D. Helfrick, W.D. Cooper, Modern Electronic Instrumentation and Measurement Techniques, ,1st edition, Pearson Education India, 2015 2. David A. Bell, Electronic Instrumentation and Measurements, Oxford Univ. Press, 2007 3. B.M. Oliver, J.M. Cage, Electronic Measurements and Instrumentation, TMH Reprint 2009. 4. Ernest O. Doebelin and Dhanesh N Manik, Measurement Systems, 6th Ed., TMH,2010 					



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Course Code	GEO INFORMATICS (Professional Elective-IV)	L	T	P	C
	IV Year I Semester	3	0	0	3
Course Objectives:					
<ul style="list-style-type: none"> • To understand the fundamental concepts of photogrammetry, remote sensing, and GIS. • To impart knowledge on data representation, input, and output in GIS. • To familiarize students with applications of remote sensing and GIS in civil engineering. 					
Course Outcomes (CO):					
<ul style="list-style-type: none"> • Understand traffic characteristics such as volume, speed, and density. • Conduct traffic studies and interpret results for engineering applications. • Design intersections, parking facilities, and signal systems using standard methods. • Apply safety principles and accident prevention techniques in traffic management. • Develop system models for effective traffic flow and regulation. 					
UNIT - I	INTRODUCTION TO PHOTOGRAMMETRY				
Principle and types of aerial photographs, scales, stereoscopy, ground control, Parallax measurements for height, determinations.					
UNIT - II					
REMOTE SENSING: Basic concepts and foundation of remote sensing – elements involved in remote sensing, electromagnetic spectrum, remote sensing terminology and units. Energy resources, energy interactions with earth surface features and atmosphere, resolution, sensors and satellite visual interpretation techniques, basic elements, converging evidence, interpretation for terrain evaluation, introduction to digital data analysis.					
UNIT - III					
GEOGRAPHIC INFORMATION SYSTEM: Introduction, GIS definition and terminology, GIS categories, components of GIS, fundamental operations of GIS, A theoretical framework for GIS.					
UNIT - IV					
TYPES OF DATA REPRESENTATION: Data collection and input overview, data input and output. Keyboard entry and coordinate geometry procedure, manual digitizing and scanning, Raster GIS, Vector GIS – File management, Spatial data – Layer based GIS, Feature based GIS mapping.					
UNIT - V					
REMOTE SENSING & GIS APPLICATIONS: Flood management; Reservoir sedimentation; Geomorphology; Monitoring urban growth; Military operations; Watershed management, Satellite surveillance for drought conditions; Estimating forest cover, Water resources management, Land use/Land cover – changes and mapping; Agriculture – crop type mapping, monitoring and damage assessment; Ground Water Targeting, Identification of sites for artificial Recharge structures.					
Textbooks:					
<ol style="list-style-type: none"> 1. Remote Sensing and GIS by B.Bhatta,Oxford University Press,New Delhi. 2. Advanced Surveying: Total station GIS and remote sensing – Satheesh Gopi – Pearson publication. 3. Geographical Information Science by Narayana Panigrahi, University press,New Delhi 4. Principals of Geo physical Information Systems – Peter A Burragh and Rachael Mc Donnell, Oxford Publishers 2004 					
Reference Books:					
<ol style="list-style-type: none"> 1. Concepts & Techniques of GIS by C.P.Lo Albert, K.W. Yongg, Prentice Hall (India) Publications. 2. Basics of Remote sensing & GIS by S.Kumar, Laxmi Publications. 					



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3. The GIS book by Korte, cengage publications, New Delhi.
4. Fundamental of GIS by Mechanical designs John Wiley & Sons.
5. Remote sensing and GIS by M.Anji reddy ,B.S.Publiications, New Delhi.
6. Remote Sensing and its applications by LRA Narayana University Press 1999.
7. Geoinformation for Development by Zeil/Kienberger (Eds) – Univ.Science Press, New Delhi.



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Course Code	TRAFFIC ENGINEERING (Professional Elective-IV)	L	T	P	C
		3	0	0	3
IV Year I Semester					
Course Objectives:					
<ul style="list-style-type: none"> • To introduce the principles and applications of traffic engineering. • To provide knowledge on traffic studies, design, and control measures. • To understand the methods of traffic regulation, management, and safety. • To emphasize the importance of geometric design and traffic system modeling. 					
Course Outcomes (CO):					
<ul style="list-style-type: none"> • Understand traffic characteristics such as volume, speed, and density. • Conduct traffic studies and interpret results for engineering applications. • Design intersections, parking facilities, and signal systems using standard methods. • Apply safety principles and accident prevention techniques in traffic management. • Develop system models for effective traffic flow and regulation. 					
UNIT - I					
TRAFFIC ENGINEERING: Basic Parameters of Traffic-Volume, Speed and Density – Definitions and their inter relation, Traffic Volume Studies- Data Collection and Presentation speed studies- Data Collection and Presentation, Parking Studies and Parking characteristics- Road Accidents-Causes and Preventive measures, Accident Data Recording – Condition Diagram and Collision Diagrams.					
UNIT - II					
TRAFFIC REGULATION AND MANAGEMENT: Road Traffic Signs, Types and Specifications – Road markings, Need for Road Markings-Types of Road Markings, Specifications, Design of Traffic Signals Webster Method -Saturation flow , phasing and timing diagrams – Numerical problems.					
UNIT - III					
PARKING STUDIES: Types of parking facilities, On street and Off Street Parking Facilities Parking Studies, Parking Inventory Study – Parking Survey by Patrolling Method- Analysis of Parking Data and parking characteristics-Multi Story Car Parking Facility-Design standards.					
UNIT - IV					
INTERSECTION DESIGN: Conflicts at Intersections- Channelization: Objectives –Traffic Islands and Design criteria- Types of At-Grade Intersections, Types of Grade Separated Intersections- Rotary Intersection, Concept of Rotary and Design Criteria- Advantages and Disadvantages of Rotary Intersection.					
UNIT - V					
HIGHWAY SAFETY: Problem of Highway Safety, Types of Road accidents, Causes, Engineering Measures to reduce Accidents- Enforcement Measures, Educational Measures- Road Safety Audit-Principles of Road Safety Audit.					
Textbooks:					
<ol style="list-style-type: none"> 1. Traffic Engineering and Transportation planning – LK kadiyali – Khanna publishers 2. Highway Engineering – S.K.Khanna & C.E.G.Justo, Nemchand & Bros. 3. Highway Engineering Design – L.R.Kadiyali and Lal- Khanna Publications. 4. Text book of Highway Engineering by R.Srinivasa Kumar, Universities Press, Hyderabad. 					
Reference Books:					
<ol style="list-style-type: none"> 1. Transportation Engineering an introduction by Khisty Lal, Pearson Publications 2. Highway Engineering – S.P.Bindra , Dhanpathi Rai & Sons. 3. Introduction to Transportation Engineering by James.H.Banks, Tata Mc.Grawhill Edition, New Delhi. 4. Traffic and Highway Engineering Nicholas.J.Garber & Lester A.Hoel, Cengage Learning. 5. High way engineering by Paul .H.Wright & Karen K.Dixon,wiley india limited. 6. A Text book of Transportation Engineering by S.P.C. 7. Ernest O. Doebelin and Dhanesh N Manik, Measurement Systems, 6th Ed., TMH,2010 					



Sri Krishnadevaraya University
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Civil Engineering

Course Code	EXPERIMENTAL STRESS ANALYSIS	L	T	P	C
	(Professional Elective-V)	3	0	0	3
IV Year I Semester					
Course Objectives:					
<ul style="list-style-type: none"> • To introduce experimental methods for stress and strain analysis in structures. • To develop understanding of strain gauge applications and measurement techniques. • To familiarize students with non-destructive testing (NDT) methods. • To impart knowledge on photoelasticity and its applications in stress analysis. 					
Course Outcomes (CO):					
<ul style="list-style-type: none"> • Understand various experimental methods used in stress analysis. • Use strain gauges for accurate measurement of strain. • Apply non-destructive testing techniques to assess material integrity. • Interpret photoelastic patterns for stress distribution analysis. • Correlate experimental findings with theoretical predictions. 					
UNIT - I					
PRINCIPLES OF EXPERIMENTAL APPROACH: Merits of Experimental Analysis Introduction, uses of experimental stress analysis advantages of experimental stress analysis Different methods Simplification of problems.					
UNIT - II					
STRAIN MEASUREMENT USING STRAIN GAUGES: Definition of strain and its relation of experimental Determinations Properties of Strain Gauge Systems-Types of Strain – Gauge Systems- Types of Strain Gauges Mechanical, Acoustic and Optical Strain Gauges					
UNIT - III					
ELECTRICAL STRAIN GAUGES: Inductance strain gauges, LVDT, Resistance strain gauges various types, Gauge factor – Materials of adhesion base etc. STRAIN ROSETTES: Introduction The three elements Rectangular Rosette – The Delta Rosette Corrections for Transverse Strain Gauge.					
UNIT - IV					
NON-DESTRUCTIVE TESTING: Ultrasonic Pulse Velocity method, Application to Concrete- hammer Test Application to Concrete. BRITTLE COATING METHODS: Introduction, Coating Stress, Failure Theories, Brittle Coating Crack Patterns , Crack Detection, Types of Brittle Coating Test Procedures for Brittle Coating Analysis, Calibration Procedures, Analysis of Brittle Coating Data.					
UNIT - V					
THEROY OF PHOTOELASTICITY: Introduction, Temporary Double refraction, The stress Optic Law –Effects of stressed model in a polariscope for various arrangements, Fringe Sharpening Brewster’s Stress Optic law. TWO DIMENSIONAL PHOTOELASTICITY: Introduction Isochromatic Fringe patterns – Isoclinic Fringe patterns passage of light through plane Polariscope and Circular polariscope, Materials for photo – Elasticity Properties of Photo elastic Materials.					
Textbooks:					
<ol style="list-style-type: none"> 1. Experimental stress analysis by J.W.Dally and W.F.Riley, <u>College House Enterprises</u> 2005 2. Experimental stress analysis by Dr.SadhuSingh.khanna Publishers 4th edition. 					
Reference Books:					
<ol style="list-style-type: none"> 1. Experimental Stress analysis by U.C.Jindal, Pearson Publications 2012 edition 2. Experimental Stress Analysis by L.S.Srinath, MC.Graw Hill Company Publishers 					



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Civil Engineering

Course Code	ENVIRONMENTAL IMPACT ASSESSMENT (Professional Elective-V)	L	T	P	C
		3	0	0	3
IV Year I Semester					
Course Objectives:					
<ul style="list-style-type: none"> • Understand the principles and processes involved in environmental impact assessment. • Apply suitable EIA methodologies for evaluating developmental projects. • Identify and analyze the environmental impacts on soil, water, and air. • Understand environmental laws and conduct environmental audits effectively. • Prepare and evaluate EIA reports for various industrial and infrastructural projects. 					
Course Outcomes (CO):					
<ul style="list-style-type: none"> • On successful completion of the course, the students will have the: • Understand the concept of Environmental impact. • Understand the methodologies related to EIA. • Appreciate various laws related to environmental protection. • Prepare the environmental impact assessment statement and to evaluate it. 					
UNIT - I	INTRODUCTION				
Basic concept of EIA, Initial environmental Examination, Elements of EIA, factors affecting EIA Impact evaluation and analysis, preparation of Environmental Base map. Classification of environmental parameters.					
UNIT - II	EIA METHODOLOGIES				
E I A Methodologies: introduction, Criteria for the selection of EIA Methodology, E I A methods Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method overlay methods and cost/benefit Analysis.					
UNIT - III	IMPACT OF DEVELOPMENTAL ACTIVITIES AND LAND USE				
Introduction and Methodology for the assessment of soil and ground water. Delineation of study area, Identification of actives. Procurement of relevant soil quality, Impact prediction, Assessment of Impact and significance. Identification and Incorporation of mitigation measures. E I A in surface water, Air and Biological environment: Methodology for the assessment of Impacts on surface water environment, Air pollution sources, generalized approach for assessment of Air pollution Impact.					
UNIT - IV	ASSEMENT OF IMPACT ON VEGETATION AND WILDLIFE				
Introduction - Assessment of Impact of development Activities on Vegetation and wildlife environmental Impact of Deforestation, Causes and effects of deforestation. ENVIRONEMNTAL AUDIT : Introduction - Environmental Audit & Environmental legislation objectives of Environmental Audit, Types of environmental Audit, Audit protocol, stages of Environmental Audit, onsite activities, evaluation of Audit data and preparation of Audit report.					
UNIT - V	ENVIRONEMENTAL ACTS (PROTECTION AND PREVENTION)				
Post Audit activities, The Environmental protection Act, The water Prevention Act, The Air (Prevention & Control of pollution Act.), Wild life Act. Case studies and preparation of Environmental Impact assessment statement for various Industries.					
Textbooks:					
<ol style="list-style-type: none"> 1. Environmental Impact Assessment Methodologies, by Y. Anjaneyulu, B.S. Publication, Sultan Bazar, Hyderabad. 2. Environmental Science and Engineering, by J. Glynn and Gary W. Hein Ke – Prentice Hall Publishers 					
Reference Books:					
<ol style="list-style-type: none"> 1. Environmental Science and Engineering, by Suresh K. Dhaneja – S.K.,Katari & Sons Publication., New Delhi. 2. Environmental Pollution and Control, by Dr H.S. Bhatia – Galgotia Publication (P) Ltd, Delhi. 					



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Civil Engineering

Course Code	GROUND IMPROVEMENT TECHNIQUES	L	T	P	C
	(Professional Elective-V)	3	0	0	3
IV Year I Semester					
Course Objectives:					
<ul style="list-style-type: none"> • To provide knowledge on ground modification techniques for problematic soils. • To familiarize students with dewatering, grouting, and densification methods. • To introduce stabilization and reinforcement techniques using geosynthetics. • To explain methods for improving expansive and soft soils for construction. 					
Course Outcomes (CO):					
<ul style="list-style-type: none"> • Understand dewatering and grouting principles and applications. • Apply densification methods in both granular and cohesive soils. • Demonstrate various soil stabilization techniques using mechanical and chemical methods. • Design and analyze reinforced earth structures and geosynthetic applications. • Evaluate and mitigate the behavior of expansive soils in foundation engineering. 					
UNIT - I					
DEWATERING: Methods of de-watering- sumps and interceptor ditches, single, multi stage well points - vacuum well points, Horizontal wells-foundation drains-blanket drains- criteria for selection of fill material around drains, Electro osmosis. GROUTING: Objectives of grouting- grouts and their properties- grouting methods- ascending, descending and stage grouting- hydraulic fracturing in soils and rocks- post grout test.					
UNIT - II					
DENSIFICATION METHODS IN GRANULAR SOILS: In – situ densification methods in granular Soils, Vibration at the ground surface, Impact at the Ground Surface, Vibration at depth. Impact at depth. DENSIFICATION METHODS IN COHESIVE SOILS: In – situ densification methods in Cohesive soils, preloading or dewatering, Vertical drains – Sand Drains, Sand wick geodrains, Stone and lime columns – thermal methods.					
UNIT - III					
STABILISATION: Methods of stabilization-mechanical, cement, lime, bituminous-chemical stabilization with calcium chloride, sodium silicate and gypsum.					
UNIT - IV					
REINFORCED EARTH: Principles, Components of reinforced earth, factors governing design of reinforced earth walls, design principles of reinforced earth walls. GEOSYNTHETICS: Geotextiles- Types, Functions and applications, geogrids and geomembranes – functions and applications.					
UNIT - V					
EXPANSIVE SOILS: Problems of expansive soils, tests for identification – methods of determination of swell pressure. Improvement of expansive soils, Foundation techniques in expansive soils, under reamed piles.					
Textbooks:					
<ol style="list-style-type: none"> 1. Haussmann M.R. (1990), Engineering Principles of Ground Modification, McGraw-Hill International Edition. 2. Dr.P.Purushotham Raj. Ground Improvement Techniques, Laxmi Publications, New Delhi / University science press, New Delhi. 3. Nihar Ranajan Patra. Ground Improvement Techniques, Vikas Publications, New Delhi 					
Reference Books:					
<ol style="list-style-type: none"> 1. Moseley M.P. (1993) Ground Improvement, Blackie Academic and Professional, Boca Taton, Florida, USA. 2. Xanthakos P.P, Abramson, L.W and Brucwe, D.A (1994) Ground Control and Improvement, John Wiley and Sons, New York, USA. 3. Robert M. Koerner, Designing with Geosynthetics, Prentice Hall New Jercey, USA. 					



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Civil Engineering

Course Code	GEOGRAPHIC INFORMATION SYSTEM (GIS) (Open Elective-III)	L	T	P	C
		3	0	0	3
IV Year I Semester					
Course Objectives:					
<ul style="list-style-type: none"> To introduce the basic principles of remote sensing and GIS. To provide an understanding of data acquisition, image interpretation, and spatial analysis. To teach the integration of GIS techniques in civil and environmental engineering applications. 					
Course Outcomes (CO): At the end of the course the student will be able to					
<ul style="list-style-type: none"> Differentiate between ground-based, aerial, and satellite-based sensing platforms. Interpret aerial photographs and satellite images for spatial analysis. Create, input, and manage spatial data for GIS applications. Apply GIS and remote sensing techniques in water resource management and planning. Utilize satellite data for land use, mapping, and environmental monitoring. 					
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 fiducially line.					
UNIT - II					
Remote sensing: Basic concepts and foundation of remote sensing – elements involved in remote sensing, electromagnetic spectrum, remote sensing terminology and units. Energy resources, energy interactions with earth surface features and atmosphere, resolution, sensors and satellite visual interpretation techniques, basic elements, converging evidence, interpretation for terrain evaluation, spectral properties of water bodies, introduction to digital data analysis.					
UNIT - III					
Geographic information system: Introduction, GIS definition and terminology, GIS categories, components of GIS, fundamental operations of GIS, A theoretical framework for GIS. Data collection and input overview, data input and output. Keyboard entry and coordinate geometry procedure, manual digitizing and scanning, Raster GIS, Vector GIS – File management, Spatial data – Layer based GIS, Feature based GIS mapping.					
UNIT - IV	GIS spatial analysis				
Computational Analysis Methods (CAM), Visual Analysis Methods (VAM), Data storage-vector data storage, attribute data storage, overview of the data manipulation and analysis. Integrated analysis of the spatial and attribute data.					
UNIT - V					
Water resources applications: Land use/Land cover in water resources, Surface water mapping and inventory -Watershed management for sustainable development and Watershed characteristics - Reservoir sedimentation, Fluvial Geomorphology - Ground Water Targeting, Identification of sites for artificial Recharge structures - Inland water quality survey and management, water depth estimation and bathymetry.					
Textbooks:					
<ol style="list-style-type: none"> 1. B. Bhatta, Remote Sensing and GIS by Oxford University Press, New Delhi. 2. Satheesh Gopi, Advanced surveying: Total station GIS and remote sensing, Pearson publication. 					
Reference Books:					
<ol style="list-style-type: none"> 1. George Joseph, Fundamentals of remote sensing, Universities press, Hyderabad. 2. C. P. Lo Albert, K.W. Yongg, Concepts & Techniques of GIS, Prentice Hall (India) Publications. 3. M. Anji Reddy Remote sensing and GIS, B. S. Publications, New Delhi. 4. L. R. A. Narayana, Remote Sensing and its applications, University Press 1999. 					



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Civil Engineering

Course Code	SUSTAINABILITY IN ENGINEERING PRACTICES (Open Elective-III)	L	T	P	C
	IV Year I Semester	3	0	0	3
Course Objectives:					
<ul style="list-style-type: none"> • To inculcate awareness of environmental and sustainability concepts in engineering practices. • To introduce sustainable technologies and global environmental initiatives. • To promote understanding of environmental laws, pollution control, and green practices. • To highlight renewable energy sources and sustainable resource utilization. 					
Course Outcomes (CO): At the end of the course the student will be able to					
<ul style="list-style-type: none"> • Understand the concept and importance of sustainability and sustainable development. • Identify various environmental pollution problems and propose sustainable solutions. • Interpret environmental management standards and life cycle assessment concepts. • Analyze the role of conventional and renewable energy sources in sustainable engineering. • Apply engineering knowledge for developing eco-friendly and sustainable technologies 					
UNIT - I					
Introduction: Sustainability: Introduction, concept, evolution of the concept; Social, environmental and economic sustainability concepts; Sustainable development, Nexus between Technology and Sustainable development; Millennium Development Goals (MDGs) and Sustainable Development Goals (SDGs), Clean Development Mechanism (CDM).					
UNIT - II					
Environmental Pollution: Air pollution and its effects, Water pollution and its sources, Zero waste concept and 3 R concepts in solid waste management, Greenhouse effects, Global warming, Climate change, Ozone layer depletion, Carbon credits, carbon trading and carbon footprint, legal provisions for environmental protection.					
UNIT - III					
Environmental Management Standards: ISO 14001:2015 framework and benefits, scope and goal of Life Cycle Analysis LCA, Circular economy, Bio-Mimicking, Environmental Impact Assessment EIA, Industrial Ecology and Industrial Symbiosis.					
UNIT - IV					
Resources and their utilization: Basic Concept of Conventional and Non-Conventional energy, General idea about solar energy, Fuel cells, wind energy, small hydro plants, bio-fuels, Energy derived from oceans and Geothermal energy.					
UNIT - V					
Sustainability Practices: Basic Concept of sustainable habitat, Methods for increasing energy efficiency in buildings, Green Engineering, Sustainable Urbanization, Sustainable cities, and Sustainable transport.					
Textbooks:					
<ol style="list-style-type: none"> 1. Allen, D. T. and Shonnard, D. R., Sustainability Engineering: Concepts, Design and Case Studies, Prentice Hall. 2. Bradley. A.S; Adebayo,A.O., Maria, P. Engineering applications in sustainable design and development, Cengage learning 3. Environment Impact Assessment Guidelines, Notification of Government of India, 2006. 					
Reference Books:					
<ol style="list-style-type: none"> 1. Mackenthun, K.M., Basic Concepts in Environmental Management, Lewis Publication, London, 1998. 2. ECBC Code 2007, Bureau of Energy Efficiency, New Delhi Bureau of Energy Efficiency Publications-Rating System, TERI Publications - GRIHA Rating System. 3. Twidell, J. W. and Weir, A. D., Renewable Energy Resources, English Language Book Society (ELBS). 					



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Civil Engineering

Course Code	LOW-COST EFFECTIVE HOUSING TECHNIQUES (Open Elective-III)	L	T	P	C
		3	0	0	3
IV Year I Semester					
Course Objectives:					
<ul style="list-style-type: none"> • To understand the requirements of structural safety for future construction. • To gain knowledge about the housing scenario, housing financial systems, land use, and physical planning for housing and urban poor. • To explore innovative and cost-effective construction techniques. • To identify alternative building materials suitable for low-cost housing. 					
Course Outcomes (CO):					
<ul style="list-style-type: none"> • Demonstrate understanding of structural safety requirements and repair of earthquake-damaged buildings. • Apply traditional practices in rural housing construction. • Analyze and adopt innovative cost-effective construction techniques. • Suggest and utilize alternative building materials for affordable housing solutions. 					
UNIT - I					
a) Housing Scenario :Introducing - Status of urban housing - Status of Rural Housing b) Housing Finance: Introducing - Existing finance system in India - Government role as facilitator - Status at Rural Housing Finance - Impedimently in housing finance and related issues c) Land use and physical planning for housing :Introduction - Planning of urban land - Urban land ceiling and regulation act - Efficiency of building bye laws - Residential Densities d) Housing the urban poor :Introduction - Living conditions in slums – Approaches and strategies for housing urban poor					
UNIT - II	Development and adoption of low cost housing technology				
Introduction - Adoption of innovative cost effective construction techniques - Adoption of precast elements in partial prefabrication - Adopting of total prefabrication of mass housing in India- General remarks on pre cast roofing/flooring systems -Economical wall system - Single Brick thick load bearing wall - 19cm thick load bearing masonry walls - Half brick thick load bearing wall – Fly-ash gypsum thick for masonry - Stone Block masonry - Adoption of precast R.C. plank and joint system for roof/floor in the building					
UNIT - III	Alternative building materials for low cost housing				
Introduction - Substitute for scarce materials – Ferro-cement - Gypsum boards – Timber substitutions - Industrial wastes - Agricultural wastes - alternative building maintenance Low cost Infrastructure services: Introduce - Present status - Technological options - Low cost sanitation - Domestic well - Water supply, energy					
UNIT - IV	Rural Housing				
Introduction traditional practice of rural housing continuous - Mud Housing technology Mud roofs - Characteristics of mud - Fire treatment for thatch roof – Soil stabilization - Rural Housing programs					
UNIT - V	Housing in Disaster prone areas				
Introduction – Earthquake - Damages to houses - Traditional prone areas - Type of Damages and Repairs of non-engineered buildings - Repair and restore action of earthquake- Damaged non-engineered buildings recommendations for future constructions. Requirements of structural safety of thin precast roofing units against Earthquake forces-Status of R &D in earthquake strengthening measures - Floods, cyclone, future safety					
Textbooks:					
Building materials for low – income houses – International council for building research studies and documentation. 2. Hand book of low cost housing by A.K.Lal – Newage international publishers. 3. Low cost Housing – G.C. Mathur by South Asia Books					
Reference Books:					
1. Properties of concrete – Neville A.m. Pitman Publishing Limited, London. 2. Light weight concrete, Academic Kiado, Rudhai.G – Publishing home of Hungarian Academy of Sciences 1963.					



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Civil Engineering

Course Code	SOLID WASTE MANAGEMENT (Open Elective-IV)	L	T	P	C
		3	0	0	3
IV Year I Semester					
Course Objectives:					
<ul style="list-style-type: none"> • To study sources, classification, and regulatory frameworks for solid waste management. • To plan and optimize systems for storage, collection, and transportation of municipal and hazardous wastes. • To understand waste characterization and source reduction techniques. 					
Course Outcomes (CO): At the end of the course the student will be able to					
<ul style="list-style-type: none"> • Analyze sources, classification, and Indian legislations governing solid and hazardous wastes. • Evaluate integrated management strategies, stakeholder roles, and financing mechanisms. • Apply suitable waste processing technologies for solid and hazardous wastes. • Assess biomedical waste management, and its environmental and health impacts. 					
UNIT - I	SOURCES, CLASSIFICATION, AND REGULATORY FRAMEWORK				
Types and Sources of solid and hazardous wastes - Need for solid and hazardous waste management – Salient features of Indian legislations on management and handling of municipal solid wastes, hazardous wastes, biomedical wastes, nuclear wastes - lead acid batteries, electronic wastes, plastics and fly ash – Elements of integrated waste management and roles of stakeholders - Financing and Public Private Participation for waste management.					
UNIT - II	WASTE CHARACTERIZATION AND SOURCE REDUCTION				
Waste generation rates and variation - Composition, physical, chemical and biological properties of solid wastes – Hazardous Characteristics – TCLP tests – waste sampling and characterization plan - Source reduction of wastes –Waste exchange - Extended producer responsibility - Recycling and reuse.					
UNIT - III	STORAGE, COLLECTION AND TRANSPORT OF WASTES				
Handling and segregation of wastes at source – storage and collection of municipal solid wastes – Analysis of Collection systems - Need for transfer and transport – Transfer stations Optimizing waste allocation– compatibility, storage, labeling and handling of hazardous wastes – hazardous waste manifests and transport.					
UNIT - IV	WASTE PROCESSING TECHNOLOGIES				
Objectives of waste processing – material separation and processing technologies – biological and chemical conversion technologies – methods and controls of Composting - thermal conversion technologies and energy recovery – incineration – solidification and stabilization of hazardous wastes - treatment of biomedical wastes - Health considerations in the context of operation of facilities, handling of materials and impact of outputs on the environment.					
UNIT - V	WASTE DISPOSAL				
Waste disposal options – Disposal in landfills - Landfill Classification, types and methods – site selection - design and operation of sanitary landfills, secure landfills and landfill bioreactors – leachate and landfill gas management – landfill closure and environmental monitoring – Rehabilitation of open dumps – landfill remediation.					
Textbooks:					
<ol style="list-style-type: none"> 1. George Tchobanoglous, Hilary Theisen and Samuel A, Vigil, “Integrated Solid Waste Management, Mc-Graw Hill International edition, New York, 1993. 2. Michael D. LaGrega, Philip L Buckingham, Jeffrey C. Evans, “Hazardous waste Management”, Environmental Resources Management, Mc-Graw Hill International edition, New York, 2001. 					
Reference Books:					
<ol style="list-style-type: none"> 1. Paul T Williams, Waste Treatment and Disposal, Wiley, 2005 2. Vesilind P.A., Worrell W and Reinhart, Solid waste Engineering, Thomson Learning Inc., Singapore, 2002. 					



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3. CPHEEO, “Manual on Municipal Solid waste management, Central Public Health and Environmental Engineering Organization , Government of India, New Delhi, 2000.



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Civil Engineering

Course Code	CONSTRUCTION TECHNOLOGY	L	T	P	C
	(Open Elective-IV)	3	0	0	3
IV Year I Semester					
Course Objectives:					
<ul style="list-style-type: none"> • To introduce the fundamental concepts of project management, including network drawing, scheduling, and monitoring. • To familiarize students with various construction equipment such as earthmoving machinery, trucks, and material handling systems. • To provide knowledge of aggregate production techniques and concrete construction processes. • To impart practical understanding of equipment selection, planning, and execution in construction projects. 					
Course Outcomes (CO): At the end of the course the student will be able to					
<ul style="list-style-type: none"> • Appreciate the significance of construction planning, coordination, and scheduling. • Understand the functions and operations of various earthmoving and material handling equipment. • Gain knowledge on methods of aggregate production and concrete placement techniques. • Apply project management principles and construction methodologies effectively in real-world projects. 					
UNIT - I	Introduction				
Construction project management and its relevance – qualities of a project manager – project planning – coordination –scheduling - monitoring – bar charts – milestone charts – critical path method.					
UNIT - II	PROJECT EVALUATION AND TECHNIQUES				
Project evaluation and review technique – cost analysis - updating – crashing for optimum cost – crashing for optimum resources – allocation of resources introduction to software’s for construction management, project management using PRIMAVERA (or) equivalent.					
UNIT - III	CONSTRUCTION EQUIPMENT-I				
Construction equipment – economical considerations – earthwork equipment – Trucks and handling equipment – rear dump trucks – capacities of trucks and handling equipment – calculation of truck production – compaction equipment – types of compaction rollers. Hoisting and earthwork equipment – hoists – cranes – tractors - bulldozers – graders – scrapers– draglines - clamshell buckets.					
UNIT - IV	CONSTRUCTION EQUIPMENT-II				
Concreting equipment — concrete mixers – Batching plants, mobile using plants like “Ajax” etc. mixing and placing of concrete – consolidating and finishing.					
UNIT - V	CONSTRUCTION METHODS				
Construction methods – earthwork – piling – placing of concrete – form work – fabrication and erection – quality control and safety engineering. BIM for Civil Engineers (Building Information Modelling)					
Textbooks:					
<ol style="list-style-type: none"> 1. Construction Planning, Equipment and Methods’ by Peurifoy and Schexnayder, Shapira, Tata McGraw hill. 2. Construction Project Management Theory and Practice’ by Kumar NeerajJha (2011), Pearson. 3. Construction Technology’ by Subir K. Sarkar and Subhajit Sarasvati, Oxford University press. 					
Reference Books:					
<ol style="list-style-type: none"> 1. Construction Project Management - An Integrated Approach’ by Peter Fewings , Taylor and Francis 2. ‘Construction Management Emerging Trends and Technologies’ by Trefor Williams , Cengage learning. 					



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Civil Engineering

Course Code	INTELLIGENT TRANSPORT SYSTEM	L	T	P	C
	(Open Elective-IV)	3	0	0	3
IV Year I Semester					
Course Objectives:					
<ul style="list-style-type: none"> • To provide a comprehensive understanding of Intelligent Transport Systems (ITS) and their application in transportation management. • To familiarize students with ITS architecture, sensors, communication systems, and hardware components like GPS and GPRS. • To explore modern intersection management techniques using advanced technologies such as video detection and ANPR. • To develop an understanding of Advanced Transport Management Systems (ATMS) for route guidance, traffic analysis, and dynamic assignment. 					
Course Outcomes (CO): At the end of the course the student will be able to					
<ul style="list-style-type: none"> • Understand the core concepts and components of Intelligent Transport Systems (ITS) for enhancing traffic safety and efficiency. • Evaluate the architecture and hardware components of ITS and their role in toll collection and traveler information systems. • Apply advanced intersection management and control strategies using technologies like video detection and ANPR. • Analyze and design ATMS and ATIS solutions for real-time traffic management and smart transportation applications. 					
UNIT - I	INTRODUCTION TO INTELLIGENT TRANSPORT SYSTEM				
Introduction -Definition – Role and Responsibilities – Advanced Traveller Information System – Fleet Oriented ITS Services – Electronic Toll Collection – Critical issues – Security – Safety.					
UNIT - II	ITS ARCHITECTURE AND HARDWARE				
Architecture – ITS Architecture Framework – Hardware Sensors – Vehicle Detection – Techniques – Dynamic Message Sign – GPRS – GPS – Toll Collection.					
UNIT - III	INTERSECTION MANAGEMENT				
Video Detection – Virtual Loop - Cameras - ANPR – IR Lighting – Integrated Traffic Management – Control Centre – Junction Management Strategies.					
UNIT - IV	ADVANCED TRANSPORT MANAGEMENT SYSTEM				
ATMS – Route Guidance – Issues – Historical – Current – Predictive Guidance – Data Collection – Analysis – Dynamic Traffic Assignment (DTA) – Components – Algorithm.-Travel Information – Pre Trip and Enroute Methods.					
UNIT - V	ADVANCED TRAVELER INFORMATION SYSTEMS				
Basic ATIS Concepts – Smart Route System – Data Collection – Process – Dissemination to Travelers – Evaluation of Information – Value of Information – Business Opportunities.					
Textbooks:					
<ol style="list-style-type: none"> 1. B. Bhatta, Remote Sensing and GIS by Oxford University Press, New Delhi. 2. Satheesh Gopi, Advanced surveying: Total station GIS and remote sensing, Pearson publication. 					
Reference Books:					
<ol style="list-style-type: none"> 1. George Joseph, Fundamentals of remote sensing, Universities press, Hyderabad. 2. C. P. Lo Albert, K.W. Yonng, Concepts & Techniques of GIS, Prentice Hall (India) Publications. 3. M. Anji Reddy Remote sensing and GIS, B. S. Publications, New Delhi. 4. L. R. A. Narayana, Remote Sensing and its applications, University Press 1999. 					



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Civil Engineering

Course Code	ESTIMATION, SPECIFICATIONS, COSTING AND VALUATION (Skill Oriented Course)	L	T	P	C
		3	0	0	3
IV Year I Semester					
Course Objectives:					
<p>Understand various methods and types of estimates used in civil engineering projects.</p> <ul style="list-style-type: none"> • Develop detailed estimates for single and multi-storey buildings using standard estimation procedures. • Analyze rate analysis, abstract estimation, and bill preparation as per standard engineering practices. • Prepare detailed specifications and tender documents for different types of construction works. • Evaluate valuation methods, cost escalation, and value analysis techniques for building projects. 					
Course Outcomes (CO): At the end of the course the student will be able to					
<p>Upon successful completion of this course, students will be able to:</p> <ul style="list-style-type: none"> • Apply estimation techniques to prepare detailed estimates for diverse construction projects. • Develop abstract estimates and perform rate analysis for various civil engineering works. • Analyze the preparation of measurement books and billing procedures as per A.P. State Government standards. • Create detailed specifications and tender documents for construction projects in compliance with professional norms. • Assess building valuation, cost escalation, and value analysis methods for effective cost management. 					
List of Experiments:					
<ol style="list-style-type: none"> 1. Activity-based learning on methods and types of estimates. 2. Preparation of detailed estimate for a single-storied residential building using the wall-to-wall method. 3. Preparation of detailed estimate for a single-storied residential building using the centre-line method for earthwork, foundations, superstructure, fittings including sanitary and electrical fittings, and painting works. 4. Preparation of detailed estimate for a two-storied residential building using the centre-line method for earthwork, foundations, superstructure, fittings including sanitary and electrical fittings, and painting works. 5. Activity-based learning of estimation data and rate analysis. 6. Preparation of abstract estimate for the detailed estimate prepared in Exercise No. 3. 7. Preparation of abstract estimate for the detailed estimate prepared in Exercise No. 4. 8. Writing of measurement book and bill preparation as per A.P. State Government procedures for the detailed estimate in Exercise No. 3 and abstract estimate in Exercise No. 6. 9. Writing of detailed specifications for various items of work and preparation of a model tender document for the works listed in Exercises No. 3 and 6. 10. Activity-based learning on valuation of buildings, cost escalation procedures, and value analysis for any selected construction project. 					
Text Books & Reference Books:					
<ol style="list-style-type: none"> 1. B. N. Dutta, <i>Estimating and Costing in Civil Engineering</i>, CBS Publishers & Distributors, 28th Revised Edition, 2020. 2. Rangwala, <i>Estimating, Costing and Valuation</i>, Charotar Publishing House, 2023. 3. D. D. Kohli & R. C. Kohli, <i>A Textbook of Estimating and Costing (Civil)</i>, S. Chand Publishing, 2011. <p>Reference Books:</p> <ol style="list-style-type: none"> 1. M. Chakraborti, <i>Estimating, Costing, Specification & Valuation in Civil Engineering</i>, 29th Edition, 2021. 					



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2. Gurcharan Singh, *Estimating, Costing and Valuation*, Standard Publishers, 2018.
3. V. N. Vazirani & S. P. Chandola, *Civil Engineering Estimating & Costing*, Khanna Publishers, 4th Edition, 2001.



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Course Code	CONSTITUTION OF INDIA (Mandatory Course)	L	T	P	C
		2	0	0	0
IV Year I Semester					
Course Objectives:					
To Enable the student to understand the importance of constitution. To understand the structure of executive, legislature and judiciary. To understand philosophy of fundamental rights and duties. To understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of India and election commission of india. To understand the central and state relation financial and administrative.					
Course Outcomes (CO):					
<ul style="list-style-type: none"> • Understand the historical background of the constitution making and its importance for building a democratic India. Understand the functioning of three wings of the government ie., executive, legislative and judiciary. • Understand the value of the fundamental rights and duties for becoming good citizen of India. • Analyze the decentralization of power between central, state and local self-government. • Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy. • Get acquainted with Local administration and Pachayati Raj. • Be aware of basic concepts and developments of Human Rights. • Gain knowledge on roles and functioning of Election Commission 					
UNIT - I					
Introduction to Indian Constitution: Constitution’ meaning of the term, Indian Constitution - Sources and constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.					
UNIT - II					
Union Government and its Administration Structure of the Indian Union: Federalism, Centre- State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions.					
UNIT - III					
State Government and its Administration Governor - Role and Position - CM and Council of ministers, State Secretariat: Organisation, Structure and Functions					
UNIT - IV					
A.Local Administration - District’s Administration Head - Role and Importance, Municipalities - Mayor and role of Elected Representative - CEO of Municipal Corporation PachayatiRaj: Functions PRI: Zila Panchayat, Elected officials and their roles, CEO Zila Panchayat: Block level Organizational Hierarchy - (Different departments), Village level - Role of Elected and Appointed officials - Importance of grass root democracy					
UNIT - V					
Election Commission: Election Commission- Role of Chief Election Commissioner and Election Commissionerate State Election Commission: Functions of Commissions for the welfare of SC/ST/OBC and women					
Text Books and Reference Books:					
<ol style="list-style-type: none"> 1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt. Ltd.. New Delhi 2. Subash Kashyap, Indian Constitution, National Book Trust 3. J.A. Siwach, Dynamics of Indian Government & Politics 4. D.C. Gupta, Indian Government and Politics 5. H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication) 6. J.C. Johari, Indian Government and Politics Hans 7. J. Raj Indian Government and Politics 					



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8. M.V. Pylee, Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd.. New Delhi
9. Noorani, A.G., (South Asia Human Rights Documentation Centre), Challenges to Civil Right), Challenges to Civil Rights Guarantees in India, Oxford University Press 2012



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Sri Krishnadevaraya University College of Engineering & Technology					
Dept. of Civil Engineering					
IV Year II Semester					
S.No	Course Code	Course Name	Category	L-T-P	Credits
1.		Internship	PR	-	4
2.		Project	PR	-	8
Total					12

Category	CREDITS
Internship	4
Project work	8
TOTAL CREDITS	12



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HONOURS IN CIVIL ENGINEERING

S.No	Course Code	Course Title	L-T-P	Credits
1		Advanced Structural Design	3-0-0	3
2		Advanced Concrete Technology	3-0-0	3
3		Stability of Structures	3-0-0	3
4		Repairs and Rehabilitation of Structures	3-0-0	3
5		Road Safety Engineering	3-0-0	3
6		Repairs And Rehabilitation of Structures Lab	0-0-3	1.5
7		Advanced Concrete Technology Lab	0-0-3	1.5
Total				18



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Course Code	ADVANCED STRUCTURAL DESIGN	L	T	P	C
		3	0	0	3
HONOURS IN CIVIL ENGINEERING					
COURSE OBJECTIVE:					
<ul style="list-style-type: none"> • To teach concepts of concrete beams and slabs by following different codes by BS 8110 - Euro code – ACI - IS 456 • To Understand Estimation Of Crack width In -Beams , Shrinkage And Thermal Cracking By IS 456 Of BS 8110 • To impart design procedure of Shear In Flat Slabs And Flat Plates • To impart design Of Plain Concrete Walls And Shear Walls • To demonstrate design of Design Of Reinforced Concrete Members For Fire Resistance by ISO 834 Standard Heating Conditions 					
COURSE OUTCOMES:					
<ul style="list-style-type: none"> • Understand the basic concepts of concrete beams and slabs by different codes • To know the concepts of deep beams by British practice-ACI –IS 456 • Apply design concepts to Shear In Flat Slabs And Flat Plates • Apply design concepts to Plain Concrete Walls And Shear Walls to Understand the basic concepts of fire resistance. Apply design concepts for fire resistance of Reinforced Concrete Members 					
UNIT - I					
Deflection Of Reinforced Concrete Beams And Slabs: Introduction -Short-Term Deflection Of Beams And Slabs -Deflection Due To - Imposed Loads - Short- Term Deflection Of Beams Due To Applied Loads- Calculation Of Deflection By IS 456 - Calculation Of Deflection By BS 8110 - Deflection Calculation By Euro code – ACI Simplified Method - Deflection Of Continuous Beams By IS 456 - Deflection Of Cantilevers - Deflection Of Slabs					
UNIT - II					
Estimation Of Crack Width In Reinforced Concrete Members And Design Of Deep Beams: Introduction - Factors Affecting Crack width In Beams - Mechanism Of Flexural Cracking Calculation Of Crack Widths - Simple Empirical Method - Estimation Of Crack width In -Beams By IS 456 Of BS 8110 - Shrinkage And Thermal Cracking. Deep Beams: Introduction - Minimum Thickness - Steps Of Designing Deep Beams - Design By IS 456 - Design According To British Practice - ACI Procedure For Design Of Deep Beams - Checking For Local Failures - Detailing Of Deep Beams.					
UNIT - III					
Shear In Flat Slabs And Flat Plates: Introduction - Checking For One-Way (Wide Beam) Shear - Two-Way (Punching) Shear Permissible Punching Shear - Shear Due To Unbalanced Moment (Torsional Moments) Calculation Of J Values - Strengthening Of Column Areas For Moment Transfer By Torsion Which Produces Shear - Shear Reinforcement Design - Effect Of Openings In Flat Slabs - Recent Revisions In ACI 318 - Shear In Two – Way Slabs With Beams.					
UNIT - IV					
Design Of Plain Concrete Walls And Shear Walls: Introduction - Braced And Unbraced Walls - Slenderness Of Walls- Eccentricities Of Vertical Loads At Right Angles To Wall - Empirical Design Method For Plane Concrete Walls Carrying Axial Load - Design Of Walls For In-Plane Horizontal Forces - Rules For Detailing Of Steel In Concrete Walls Design Of Shear Walls: Introduction - Classification Of Shear Walls - Classification According To Behavior - Loads In Shear Walls - Design Of Rectangular And Flanged Shear Walls - Derivation Of Formula For Moment Of Resistance Of Rectangular Shear Walls					
UNIT - V					
Design Of Reinforced Concrete Members For Fire Resistance : Introduction - ISO 834 Standard Heating Conditions- Grading Or Classification - Effect Of High Temperature On Steel And Concrete - Effect Of High Temperatures On Different Types Of Structural Members - Fire Resistance By Structural Detailing From Tabulated Data - Analytical Determination Of The Ultimate Bending Moment Capacity Of Reinforced Concrete Beams Under Fire - Other Considerations					
Books:					



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Textbooks:

1. Structural Design and Drawing: Reinforced Concrete and Steel, Fourth Edition, N Krishna Raju, Universities Press, 2022
2. Reinforced Concrete Structural Elements: Behaviour, Analysis and Design, by P.Purushothaman, Tata Mc graw Hill.

References:

1. Reinforced Concrete Designers Hand Book, by C.E. Reynolds And J.C. Steedman, A View Point Publication.
2. Limit State Design Of Reinforced Concrete Structures By P.Dayaratnam, Oxford & Ibh Publishers.
3. Advanced Rcc By N.Krishna Raju, Cbs Publishers & Distributors.
4. Reinforced Cement Concrete Structures – Devdas Menon & Unnikrishna Pillai, Pearson Pu



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Course Code	ADVANCED CONCRETE TECHNOLOGY	L	T	P	C
		3	0	0	3
HONOURS IN CIVIL ENGINEERING					
Course Objectives:					
<ul style="list-style-type: none"> • To explain the functional role of ingredients of concrete and apply this knowledge to mix design philosophy • To develop fundamental knowledge in the fresh and hardened properties of concrete • To inculcate the testing methodology to evaluate the properties of concrete during fresh and hardened stage • To impart the knowledge on the behavior of concrete with response to stresses developed. • To impart the knowledge on the special concretes And design a concrete mix which fulfils the required properties for fresh and hardened concrete 					
Course Outcomes (CO):					
<p>At the end of the course student is able to</p> <ul style="list-style-type: none"> • Understand various ingredients of concrete and their role. • Examine knowledge on the fresh and hardened properties of concrete. • Design concrete mixes using various methods. • Perceive special concretes for accomplishing performance levels. 					
UNIT - I					
Cements And Admixtures: Portland Cement – Chemical Composition - Hydration, Setting And Finenesses Of Cement – Structures Of Hydrated Cement – Mechanical Strength Of Cement Gel - Water Held In Hydrate Cement Paste – Heat Of Hydration Of Cement – Influence Of Compound Composition On Properties Of Cement – Tests On Physical Properties Of Cement – I.S. Specifications – Different Types Of Cements – Admixtures.					
UNIT - II					
Aggregates: Classification Of Aggregate – Particle Shape And Texture – Bond Strength And Other Mechanical Properties Of Aggregate Specific Gravity, Bulk Density, Porosity, Absorption And Moisture In Aggregate – Soundness Of Aggregate – Alkali – Aggregate Reaction, Thermal Properties – Sieve Analysis – Fineness Modulus – Grading Curves – Grading Requirements – Practical Grading – Road Note No.4 Grading Of Fine And Coarse Aggregates Gap Graded Aggregate – Maximum Aggregate Size.					
UNIT - III					
Fresh Concrete: Workability – Factors Affecting Workability – Measurement Of Workability By Different Tests – Effect Of Time And Temperature On Workability – Segregation And Bleeding – Mixing And Vibration Of Concrete – Quality Of Mixing Water. Hardened Concrete: Water/Cement Ratio-Abram’s Law – Gel Space Ratio – Effective Water In Mix – Nature Of Strength Of Concrete – Strength In Tension And Compression- Griffith’s Hypothesis – Factors Affecting Strength – Autogeneous Healing –Relation Between Compression And Tensile Strength – Curing And Maturity Of Concrete Influence Of Temperature On Strength – Steam Curing – Testing Of Hardened Concrete – Compression Tests – Tension Tests – Factors Affecting Strength – Flexure Tests – Splitting Tests – Non Destructive Testing Methods.					
UNIT - IV					
Elasticity, Shrinkage And Creep: Modulus Of Elasticity – Dynamic Modulus Of Elasticity – Poisson’s Ratio – Early Volume Changes – Swelling – Drying Shrinkage - Mechanism Of Shrinkage – Factors Affecting Shrinkage – Differential Shrinkage – Moisture Movement Carbonation Shrinkage-Creep Of Concrete – Factors Influencing Creep – Relation Between Creep And Time – Nature Of Creep – Effect Of Creep.					
UNIT - V					
Mix Design: Proportioning Of Concrete Mixes By Various Methods – Fineness Modulus, Trial And Error, Mix Density, Road Note. No. 4, ACI And ISI Code Methods – Factors In The Choice Of Mix Proportions – Durability Of Concrete – Quality Control Of Concrete – Statistical Methods – High Strength Concrete Mix Design. Special Concrete’s: Light Weight Concretes –Light Weight Aggregate Concrete- Cellular Concrete - No Fines Concrete – High Density Concrete – Fiber					



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Reinforced Concrete – Different Types Of Fibers - Factors Affecting Properties Of FRC – Applications
Polymer Concrete – Types Of Polymer Concrete Properties Of Polymer Concrete and Applications

Textbooks:

1. Properties Of Concrete By A.M.Neville – Pearson Publication – 4th Edition
2. Concrete Technology By M.S.Shetty. – S.Chand & Co. ; 2004
3. Design Of Concrete Mix By Krishna Raju, CBS Publishers.
4. Concrete: Micro Structure, Properties And Materials – P.K.Mehta And J.M.Monteiro, McGraw Hill Publishers

Reference Books:

1. Concrete Technology By A.R. Santha Kumar, Oxford University Press, New Delhi
2. Concrete Technology By A.M.Neville – Pearson Publication
3. Concrete Technology By M.L. Gambhir. – Tata Mc. Graw Hill Publishers, New Delhi
4. Non-Destructive Test And Evaluation Of Materials By J.Prasad & C.G.K. Nair , Tata McGraw Hill Publishers, New Delhi



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Course Code	STABILITY OF STRUCTURES	L	T	P	C
		3	0	0	3
HONOURS IN CIVIL ENGINEERING					
UNIT - I					
Formulations Related To Beam Columns : Concept Of Stability, Differential Equation For Beam Columns –Beam Column With Concentrated Loads –Continuous Lateral Load –Couples -Beam Column With Built In Ends –Continuous Beams With Axial Load –Application Of Trigonometric Series –Determination Of Allowable Stresses.					
UNIT - II					
Elastic Buckling Of Bars: Elastic Buckling Of Straight Columns –Effect Of Shear Stress On Buckling-Eccentrically And Laterally Loaded Columns –Energy Methods –Buckling Of A Bar On Elastic Foundation, Buckling Of A Bar With Intermediate Compressive Forces And Distributed Axial Loads –Buckling Of Bars With Change In Cross Section –Effect Of Shear Force On Critical Load –Built Up Columns					
UNIT - III					
Inelastic Buckling And Torsional Buckling : Buckling Of Straight Bars-Double Modulus Theory –Tangent Modulus Theory. Pure Torsion Of Thin Walled Bar Of Open Cross Section-Non –Uniform Torsion Of Thin Walled Bars Of Open Cross Section-Torsional Buckling –Buckling Under Torsion And Flexure.					
UNIT - IV					
Mathematical Treatment Of Stability Problems: Buckling Problem Orthogonality Relation – Ritz Method-Timoshenko Method, Galerkin Method					
UNIT - V					
Lateral Buckling Of Simply Supported Beams And Rectangular Plates : Beams Of Rectangular Cross Section Subjected For Pure Bending. Derivation Of Equation Of Rectangular Plate Subjected To Constant Compression In Two Directions And One Direction.					
Textbooks:					
1. Stability Of Metallic Structure By Bleich –Mc Graw Hill 2. Theory Of Beam Columns Vol I By Chen & Atsuta Mc.Graw Hill 3. Smitses, Elastic Stability Of Structures, Prentice Hall, 1973. 4. Timoshenko, S., And Gere., Theory Of Elastic Stability, Mc Graw Hill Book Company, 1973. 5. Brush And Almoth., Buckling Of Bars Plates And Shells, Mc Graw Hill Book Company ,1975. 6. Chajes, A., Principles Of Structural Stability Theory, Prentice Hall, 1974 7. Ashwini Kumar, Stability Theory Of Structures, TATA Mc Graw Hill Publishing Company Ltd, New Delhi, 1985					



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Course Code	REPAIR AND REHABILITATION OF STRUCTURES	L	T	P	C
		3	0	0	3
HONOURS IN CIVIL ENGINEERING					
Course Objectives:					
<ul style="list-style-type: none"> • To learn various distress and damages to concrete and masonry structures • To understand the importance of maintenance of structures • To assess the damage to structures using various tests • To study the various types and properties of repair materials • To learn various repair techniques of damaged structures, corroded structures 					
Course Outcomes (CO):					
<ul style="list-style-type: none"> • Understand corrosion effects • Understand the deterioration in structures • Understand non destructive tests • Understand the surface repair of structures • Understand the concepts of Strengthening and stabilization of structural elements 					
UNIT - I					
Introduction, significance of corrosion, and corrosion mechanisms - Embedded metal corrosion					
UNIT - II					
Deterioration of cementations systems – Sulphate and Acid attack - Alkali Silica Reaction (ASR), Shrinkage, and others					
UNIT - III					
Concrete assessment using non-destructive tests (NDT) - Concrete assessment and load effects					
UNIT - IV					
Surface repair – Condition assessment – Analysis, strategy, and design – Material requirement, surface preparation, placement of repair material					
UNIT - V					
Strengthening and stabilization -Strengthening of Structural elements, Repair of structures distressed due to corrosion, fire, leakage, earthquake-Transportation of Structures from one place to other -Structural Health Monitoring- demolition techniques-Engineered demolition methods-Case studies, Study of structural conditions of heritage buildings.					
Textbooks:					
<ol style="list-style-type: none"> 1. Concrete Repair and Maintenance by Peter H. Emmons, R.S. Means Company, Kingston, MA, USA. 2. Maintenance Repair & Rehabilitation & Minor Works of Buildings by P.C. Varghese, PHI Learning Pvt. Ltd., New Delhi. 					
Reference Books:					
<ol style="list-style-type: none"> 1. Concrete Repair to EN1504 – Diagnosis, Design, Principles and Practice by Michael Raupach and Till Buttner, CRC Press., 2. Concrete Structures – Protection, Repair and Rehabilitation by R. Dodge Woodson, Butterworth-Heinemann – Elsevier, UK 					



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Course Code	REPAIR AND REHABILITATION OF STRUCTURES	L	T	P	C
		3	0	0	3
HONOURS IN CIVIL ENGINEERING					
Course Objectives:					
<ul style="list-style-type: none"> • To learn various distress and damages to concrete and masonry structures • To understand the importance of maintenance of structures • To assess the damage to structures using various tests • To study the various types and properties of repair materials • To learn various repair techniques of damaged structures, corroded structures 					
Course Outcomes (CO):					
<ul style="list-style-type: none"> • Understand corrosion effects • Understand the deterioration in structures • Understand non destructive tests • Understand the surface repair of structures • Understand the concepts of Strengthening and stabilization of structural elements 					
UNIT - I					
Introduction, significance of corrosion, and corrosion mechanisms - Embedded metal corrosion					
UNIT - II					
Deterioration of cementations systems – Sulphate and Acid attack - Alkali Silica Reaction (ASR), Shrinkage, and others					
UNIT - III					
Concrete assessment using non-destructive tests (NDT) - Concrete assessment and load effects					
UNIT - IV					
Surface repair – Condition assessment – Analysis, strategy, and design – Material requirement, surface preparation, placement of repair material					
UNIT - V					
Strengthening and stabilization -Strengthening of Structural elements, Repair of structures distressed due to corrosion, fire, leakage, earthquake-Transportation of Structures from one place to other -Structural Health Monitoring- demolition techniques-Engineered demolition methods-Case studies, Study of structural conditions of heritage buildings.					
Textbooks:					
<ol style="list-style-type: none"> 3. Concrete Repair and Maintenance by Peter H. Emmons, R.S. Means Company, Kingston, MA, USA. 4. Maintenance Repair & Rehabilitation & Minor Works of Buildings by P.C. Varghese, PHI Learning Pvt. Ltd., New Delhi. 					
Reference Books:					
<ol style="list-style-type: none"> 3. Concrete Repair to EN1504 – Diagnosis, Design, Principles and Practice by Michael Raupach and Till Buttner, CRC Press., 4. Concrete Structures – Protection, Repair and Rehabilitation by R. Dodge Woodson, Butterworth-Heinemann – Elsevier, UK 					



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Course Code	ROAD SAFETY ENGINEERING	L	T	P	C
		3	0	0	3
HONOURS IN CIVIL ENGINEERING					
<p>Course Objectives:- The objectives of this course are to:</p> <ol style="list-style-type: none"> 1. Provide foundational knowledge about the causes and trends of road accidents and the impact of human, vehicle, and roadway factors on highway safety. 2. Introduce statistical tools and procedures for interpreting and analyzing crash data including black spot and hotspot investigations. 3. Explain the principles and components of road safety management systems and the role of audits and crash investigations. 4. Impart understanding of crash reconstruction techniques using physical evidence, kinematic principles, and accident scenarios. 5. Promote awareness of safety improvement measures in highway planning, design, operation, and enforcement including policy and stakeholder roles. 					
<p>Course Outcomes:- Upon successful completion of this course, the student will be able to:</p> <ol style="list-style-type: none"> 1. Explain road accident trends, human and vehicle factors affecting highway safety, and the Indian scenario of road safety. (L2) 2. Apply statistical methods for crash data analysis and conduct black spot and hotspot identification with case-based insights. (L3) 3. Describe the structure of a road safety management system, road safety audit process, and the data needs for improving intersection and vehicle safety. (L2) 4. Analyze crash reconstruction cases using physical evidence and calculate speed, drag, and impact forces for different accident types. (L4) 5. Evaluate and recommend mitigation measures such as forgiving road design, road signs, public transport safety strategies, and road safety law enforcement. (L5) 					
UNIT – I					
Basics of Road Safety: Road accidents, Trends, Global and Indian level, Crash Causation, Collision diagrams; Highway safety; Human factors and road user limitations; Speed and its effect on road safety; Vehicle factors; Highway safety in India.					
UNIT – II					
Statistical Interpretation and Analysis of Crash Data: Before-after methods in crash analysis, Recording of crash data; Accident Investigation and Analysis; Statistical testing and the role of chance; Black Spot Identification and Investigations, Hot spot analysis, Case Studies					
UNIT – III					
Road Safety Management System: Multi-causal dynamic systems approach to safety; Crash Vs.					



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Accident; Road safety improvement strategies; Elements of a road safety plan, Speed management, Safety data Needs; Intersection Safety, Safe vehicle design. Road Safety Audits: Key elements of a road safety audit, Road Safety Audits & Investigations, Work zone safety audit; Crash investigation and analysis, Methods for identifying hazardous road locations, Case Studies		
UNIT – IV		
Crash Reconstruction: Describe the basic information that can be obtained from the roadway surface, Basic physics related to crash reconstruction, speed for a various skid, friction, drag, and acceleration scenarios, variables involved in jump and flip crashes, variables involved in pedestrian crashes, Case Studies.		
UNIT – V		
Mitigation Measures: Accident prevention by better planning, Accident prevention by better design of roads, Crash Countermeasures, Highway operation, and accident control measures, Highway Safety Measures during construction, Highway geometry, and safety; Design of Forgiving roads and self- explaining roads, Effective Road Signs and Street Lighting, Safety in urban areas; Public transport and safety; Road safety policy-making, Stakeholders involvement; Road safety law.		
Text Books:-		
<ol style="list-style-type: none">1. Ezra Hauer, Observational Before-After Studies in Road Safety, Pergamon Press, 1997 (Reprinted 2002).2. M. Ohidul Haque, Road Safety: Data Collection, Analysis, Monitoring, And Countermeasure Evaluations with Cases, University Press of America, 2008.		
Reference Books: -		
<ol style="list-style-type: none">1. IRC: SP: 88-2019 Manual on Road Safety Audit2. Geetam Tiwari and Dinesh Mohan, Transport Planning and Traffic Safety: Making Cities, Roads, and Vehicles Safer, CRC Press, 1st Edition, 2016.3. Rune Elvik, Alena Hoye, and Truls Vaa, The Handbook of Road Safety Measures, Emerald Group Publishing, 2nd Edition, Sept 2009.4. R. P. Roess, E. S. Prassa, and W. R. Mcshane, Traffic Engineering, Prentice Hall, 2011.		
Online Resources :-		
https://ebrdelearning.com/road-safety-engineering-e-learning-course		



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Course Code	ADVANCED CONCRETE TECHNOLOGY LAB	L	T	P	C
		0	0	3	1.5
HONORS IN CIVIL ENGINEERING					
Course Objectives:					
The course is designed to: <ul style="list-style-type: none">• Examine the properties and behavior of different types of cement, aggregates, and admixtures.• Evaluate the fresh and hardened properties of concrete through standard laboratory tests.• Study the influence of various parameters such as water-cement ratio and curing conditions on concrete performance.• Analyze the strength and durability aspects of advanced and special concretes.					
Course Outcomes					
Upon successful completion of this course, students will be able to: <ul style="list-style-type: none">• Determine the physical and mechanical properties of cement, aggregates, and concrete.• Evaluate workability, setting time, and strength of different concrete mixes.• Perform non-destructive tests (NDT) to assess concrete quality and strength.• Understand the effect of admixtures and curing on the performance of concrete.• Design and test high-performance and self-compacting concrete mixes.					
List of Experiments					
<ol style="list-style-type: none">1. Tests on cement – Fineness, Consistency, Setting Time, and Compressive Strength.2. Tests on fine aggregates – Sieve Analysis, Specific Gravity, and Bulking.3. Tests on coarse aggregates – Crushing Value, Impact Value, and Flakiness Index.4. Determination of workability – Slump Cone, Compaction Factor, and Vee-Bee Tests.5. Preparation of concrete mix and determination of compressive strength at 7 and 28 days.6. Split Tensile Strength Test on Concrete Cylinders.7. Flexural Strength Test on Concrete Beams.8. Study on the effect of water-cement ratio on strength and workability.9. Testing of self-compacting concrete for flow and strength characteristics.10. Non-Destructive Testing – Rebound Hammer and Ultrasonic Pulse Velocity.					
Text Books:					
<ol style="list-style-type: none">1. M. S. Shetty, <i>Concrete Technology – Theory and Practice</i>, S. Chand Publishing.2. A. M. Neville & J. J. Brooks, <i>Concrete Technology</i>, Pearson Education.					



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Course Code	ADVANCED CONCRETE TECHNOLOGY LAB	L	T	P	C
		0	0	3	1.5
HONORS IN CIVIL ENGINEERING					
Course Objectives:					
The course aims to:					
<ul style="list-style-type: none">• Impart knowledge of techniques used for testing, evaluating, and repairing damaged structures.• Provide practical exposure to materials and methods used for rehabilitation.• Familiarize students with durability, corrosion prevention, and retrofitting practices.• Enable understanding of case studies on structural failure and restoration.					
Course Outcomes					
After successful completion of this course, students will be able to:					
<ul style="list-style-type: none">• Identify causes of distress and deterioration in concrete and steel structures.• Conduct visual inspection and non-destructive testing for damage assessment.• Apply suitable repair and rehabilitation techniques based on diagnosis.• Evaluate the effectiveness of repair materials such as epoxy, polymer, and fiber composites.• Propose retrofitting solutions to enhance the structural performance of deteriorated structures.					
List of Experiments					
<ol style="list-style-type: none">1. Visual Inspection and Crack Mapping of Reinforced Concrete Members.2. Rebound Hammer Test for Surface Hardness Assessment.3. Ultrasonic Pulse Velocity Test for Concrete Quality.4. Half-Cell Potential Measurement for Corrosion Activity.5. Carbonation Depth Test and Chloride Penetration Test.6. Mix Design for Polymer-Modified Mortar and Epoxy Repair Materials.7. Repair of Cracks using Epoxy Injection Technique.8. Corrosion Protection using Inhibitors and Coatings.9. Retrofitting of Beam/Column using Fiber Reinforced Polymers (FRP).10. Case Study on Repair and Rehabilitation of a Distressed Structure.					
Text Books					
<ol style="list-style-type: none">1. Denison Campbell, Allen & Harold Roper, <i>Concrete Structures – Materials, Maintenance and Repair</i>, Longman Scientific and Technical.2. B. L. Gupta & Amit Gupta, <i>Repair and Maintenance of Concrete Structures</i>, Standard Publishers.3. P. C. Varghese, <i>Maintenance, Repair and Rehabilitation of Concrete Structures</i>, PHI Learning.					



**LIST OF MINORS OFFERED BY THE CIVIL ENGINEERING
BUILDING PLANNING & CONSTRUCTION TECHNOLOGY**

S.No	Course Code	Course Title	L-T-P	Credits
1		Building Materials	3-0-0	3
2		Construction Technology	3-0-0	3
3		Building Planning And Drawing	3-0-0	3
4		Surveying	3-0-0	3
5		Concrete Technology	3-0-0	3
6		Concrete Technology Lab	0-0-3	1.5
7		Surveying Lab	0-0-3	1.5
Total				18



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Course Code	BUILDING MATERIALS	L	T	P	C
		3	0	0	3
Minors in Civil Engineering					
UNIT - I	Stones, bricks, tiles, lime and cement				
Discussion of different types of rocks formations, properties & classification of good building stones, stone quarrying, precautions in blasting and dressing of stones. Composition of good brick earth, various methods of manufacture of bricks. Comparison of clamp and kiln burning. Qualities of good bricks. types of tiles, manufacturing method. Various ingredients of lime, constituents of lime stone, classification of lime. Manufacturing of cement and various types of cements.					
UNIT - II	Wood				
Structure- properties- seasoning of timber-Defects in timber. Various types of woods used in buildings. Alternative materials for wood, iron steel, aluminum.					
UNIT - III	Masonry				
Types of masonry, discussions on various types of masonry's.Types of bonds and their discussions.					
UNIT - IV					
Foundations and Building components: Shallow foundations. Spread, combined, strap and mat footings. Lintels, arches, staircase types. Different types of floors-concrete, mosaic, terrazzo floors, pitched, flat and curved roofs. Lean to roof, coupled roofs, trussed roofs-king and queen post trusses.					
UNIT - V	Building finishing:				
Discussion on damp proofing and water proofing materials used. Plastering, pointing, white washing and distempering, panting, constituents of paint, types of paints, panting of new and old wood varnish, formwork and scaffolding.					

Textbooks:

1. Building material by S K Duggal – New Age International Publishers; Second Edition
2. Building Construction by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd.,New Delhi
3. Building Construction by P.C. Varghese, Prentice-Hall of India private Ltd, New Delhi

Reference Books:

1. R.Chudly “Construction Technology “– Volumes I and II” 2nd Edition, Longman, UK, 1987.
2. Building materials by P.C. Varghese, Prentice-Hall of India private Ltd, New Delh



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Course Code	CONSTRUCTION TECHNOLOGY				L	T	P	C
					3	0	0	3
Minors in Civil Engineering								
Course Objectives:								
<ul style="list-style-type: none"> Propose suitable type of foundation for building structures. Construction technique to be followed in brick and stone masonry Understanding the concepts involved in flooring and roofing of building structures. To make students familiar with Pre fabricated building technology 								
Course Outcomes:								
Identify components of building structures, Explain the salient characteristics for the given building structure. Select suitable type of masonry for building structures. Identify various types of flooring and roofing materials. Understand the methodology of constructing advances structures								
UNIT - I	Buildings and foundations							
Component parts of a building -Their functions - Classification of buildings according to National building code - Site investigation for foundation as per N.B.C. Classification of buildings according to National building code. - Spread footing foundation for columns and walls - Raft foundation - Pile foundation - RCC Piles - Bearing piles, friction piles and under reamed pile - Causes, effects and prevention of dampness at basement level.								
UNIT - II	Masonry							
Classification of stone masonry - Ashlar, Random rubble and Coursed Rubble Masonry - general principles to be observed while constructing stone masonry - Brick Masonry - Bonds in brick masonry - (English bond only) for various wall thicknesses - General principles to be observed in construction of brick masonry - principles of locating doors, windows and ventilators in buildings - functions of lintels, sunshades, canopy, sun-breakers and porticos.								
UNIT - III	Roofs and Floorings:							
Roof - functions of roofs - Classification of roofs - flat roofs - pitched roofs - Different types of trusses - classification based on material and shape king post truss, queen post truss, fan roof truss, north light roof truss, steel trusses of angular and tubular sections as per IS code - Weather proof course on R.C.C. roof - Decorative ceilings for auditoriums - method of fixing Plaster of Paris -Fibre glass - Parts of flooring - Requirements of a good floor - Methods of constructing flooring - cement concrete flooring, stone slab (Kadapa slab, Shahabad stone) floorings, cement plaster flooring, Tiled flooring, mosaic flooring.								
UNIT - IV								
Pre fabricated building technology: Alternatives for cast in-situ structures - Understand pre fabrication technology - Importance for standardisation and modularisation – pre fabricated structures their utility & advantages - Materials used in pre fabricated elements – suitability for various climatic conditions - Types of pre fabricated systems – large panel systems - frame systems – slab / column systems with walls – mixed systems								
UNIT - V	Solar Energy Utilization in Building:							
Conversion of Solar energy into Electricity - Photovoltaic Effect, Solar photovoltaic cell and its working principle - Active - Passive concepts of solar Heating and cooling - Different types of Solar cells, Series and parallel connections, Photovoltaic applications: Solar energy utilities – water heaters, air heaters, cookers, lighting and water pump sets. - Roof top Solar power generation systems.								
Textbooks:								
<ol style="list-style-type: none"> Prefab Architecture, a guide to modular design & construction Ryan E Smith, John Wiley Publishers. Building Construction by Pc Varghese, Prentice Hall Of India 								
Reference Books:								



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1. A To Z Practical Building Construction & Its Management by [Sandeep Mantri](#) ,[Satya Prakashan](#)
2. Building Construction By S.C.Rangawala, Charitor Publications.
3. Solar Energy Utilization, G. D. Rai, Khanna Publishers
4. N.B.C, National Building code
5. Explanatory handbook on Masonry code, SP20.



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Civil Engineering

Course Code	BUILDING PLANNING AND DRAWING	L	T	P	C
		3	0	0	3
Minors in Civil Engineering					
UNIT - I	PART A				
<p>STONES & BRICKS: Discussion of different types of rocks formations, properties & classification of good building stones, stone quarrying, precautions in blasting and dressing of stones. Composition of good brick earth, various methods of manufacture of bricks. Qualities of good bricks. LIME & TILES: Various ingredients of lime, constituents of lime stone, classification of lime. Types of tiles. Wood: Structure, properties, seasoning and defects in timber. Preservation, various types of woods used in buildings</p>					
UNIT - II					
<p>BUILDING COMPONENTS: Lintels, arches, staircase types. Different types of floors-concrete, mosaic, terrazzo floors, pitched, flat and curved roofs. Lean to roof, coupled roofs, trussed roofs-king and queen post trusses.</p>					
UNIT - III					
<p>BUILDING BYELAWS & REGULATIONS: Introduction, Terminology – Objectives of building byelaws Floor area ratio (FAR), Floor space Index (FSI), Principles underlying building byelaws, classification of bye buildings, Open space requirements, built up area limitations, Height of Buildings, Wall thickness, lighting and ventilation requirement. Residential Buildings: Minimum standards for various parts of buildings, requirements of different rooms and their grouping, characteristics of various types of residential buildings.</p>					
UNIT - IV	PART B				
<p>UNIT – IV: SIGN CONVENTIONS AND BONDS: Brick, Stone, Plaster, Sand filling, Concrete, Glass, Steel, Cast iron, Copper alloys, Aluminium alloys etc., Lead, Zinc, tin, white lead etc., Earth, Rock, Timber and Marble. English bond & Flemish bond odd & even courses for one, one and half, two and two and half brick walls in thickness at the junction of a corner. DOORS, WINDOWS AND ROOFS: Panalled Door paneled and glazed door, glazed windows, paneled windows, Couple roof, Collar roof, King Post truss, Queen post truss.</p>					
UNIT - V					
<p>Given line diagram with specification to draw, plan, sections section and elevation Note: Final examination pattern: Part- A Three questions out of 6 each Question 10 marks from unit I to III Part- B From Unit IV one question out of two 10 Marks. From Unit V one question out of Two Question 30 Marks (Compulsory Question)</p>					

<p>Textbooks:</p> <ol style="list-style-type: none"> 1. S.C. Rangwala, Engineering Materials, 41/e, Charotar Publishing House, 2014. 2. Building Planning & Drawing by Dr N. Kumaraswamy 3. Planning and Designing and Scheduling – Gurucharan singh and Jagadish singh- Standard publishers. 4. PERT and CPM – Project planning and control with by Dr.B.C.Punmia & Khandelwal – Laxmi publications
<p>Reference Books:</p> <ol style="list-style-type: none"> 1. Building materials by P.C. Varghese, Prentice-Hall of India private Ltd, New Delhi 2. Building material by S K Duggal – New Age International Publishers; Second Edition 3. Building by laws bye state and Central Governments and Municipal corporations. 4. ‘A’ Series & ‘B’ Series of JNTU Engineering College, Anantapur 5. Construction Planning, Equipment and methods by R.L. Peurifoy etal. – Tata Mc. Graw Hill Publications



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Civil Engineering

Course Code	SURVEYING	L	T	P	C
		3	0	0	3
Minors in Civil Engineering					
Course Objectives:					
<ul style="list-style-type: none"> • To make the student to get well conversant with the fundamentals of various basic methods and instruments of surveying. • To make the student to use angular measuring instruments for horizontal and vertical control. • To enable the student to set simple horizontal curves. • To introduce the knowledge construction surveys and usage of modern instrument such as total station. 					
Course Outcomes (CO):					
At the end of the course, the student will be able to calculate angles, distances and levels, Identify data collection methods and prepare field notes, to understand the working principles of survey instruments. Able to use modern survey instruments.					
UNIT - I	Introduction and Basic Concepts:				
Introduction, Objectives, classification and principles of surveying, Scales, Conventional symbols and Signs, Surveying accessories, phases of surveying. Measurement of Distances and Directions Linear distances- Approximate methods, Direct Methods- Chains- Tapes, ranging, Tape corrections Prismatic Compass- Working of prismatic & surveyor compass-Temporary & permanent adjustments, Designation of Bearings, Determination of included angles, Local Attraction, Magnetic Declination.					
UNIT - II					
Levelling - Basics definitions, types of levels and levelling staves, temporary adjustments, methods of levelling, booking and Determination of levels- HI Method-Rise and Fall method, Effect of Curvature of Earth and Refraction. Contouring- Characteristics and uses of Contours, Direct & Indirect methods of contour surveying.					
UNIT - III					
Theodolite Surveying: Types of Theodolites, Fundamental Lines, temporary adjustments, measurement of horizontal angles by repetition and reiteration method, measurement of vertical Angle. Trigonometrical levelling when base is accessible and inaccessible. versing: Methods of traversing, traverse computations and adjustments.					
UNIT - IV					
Theometric Surveying: Principles of Tacheometry, stadia and tangential methods of Tacheometry. Curves: Types of curves and their necessity, elements of simple circular curve, setting out of simple horizontal circular curves.					
UNIT - V					
Construction surveys: Introduction- setting out a building, pipelines and sewers-highways-culverts. Surface surveys and tunnel alignment-underground surveys-connection of surface and levelling in tunnels. Total station Surveying: Basic principles, applications, Electromagnetic wave theory, EDM instruments, Introduction to Global positioning System GPS.					
Textbooks:					
1. S.S Bhavikatti, “Surveying theory and Practice”, 2 nd edition, Dreamtech press, Wiley distributors.					



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2. C.Venkatramaiah, “Text book of surveying”, 2nd edition, Universities press, 2018.
3. Hoffman. B, H. Lichtenegga and J. Collins, Global Positioning System – “Theory and Practice”, Springer -Verlag Publishers, 2001.

Reference Books:

1. Arthur R Benton and Philip J Taety, “Elements of Plane Surveying”, McGraw Hill – 2000.
2. Arora K R “Surveying” Vol 1, 2 & 3, Standard Book House, Delhi, 2004.
3. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, “Surveying” (Vol – 1, 2 & 3), - Laxmi Publications (P) ltd., New Delhi.
4. Chandra A M, “Plane Surveying”, New Age International Pvt. Ltd., New Delhi, 2002.
5. Bhavikatti “Surveying” Vikas publishing house ltd.
6. S K Duggal, “Surveying” (Vol – 1 & 2), Tata McGraw Hill Publishing Co. Ltd. New Delhi, 2004.
7. R. Agor Khanna Publishers 2015 “Surveying and leveling”.
8. R. Subramanian, “Surveying and leveling” Oxford university press, New Delhi.
9. Chandra A M, “Higher Surveying”, New age International Pvt. Ltd., Publishers, New Delhi, 2002.
10. S.S Bhavikatti “Surveying and Levelling”, Vol. 1 and 2, Dreamtech press, Wiley distributors.



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Course Code	CONCRETE TECHNOLOGY	L	T	P	C
			3	0	0
MINORS IN CIVIL ENGINEERING					
Course Objectives:					
<ul style="list-style-type: none"> To explain the functional role of ingredients of concrete and apply this knowledge to mix design philosophy To develop fundamental knowledge in the fresh and hardened properties of concrete To inculcate the testing methodology to evaluate the properties of concrete during fresh and hardened stage To impart the knowledge on the behavior of concrete with response to stresses developed. To impart the knowledge on the special concretes And design a concrete mix which fulfils the required properties for fresh and hardened concrete 					
Course Outcomes (CO):					
CO1: Understand various ingredients of concrete and their role. CO2: Examine knowledge on the fresh and hardened properties of concrete. CO3: Design concrete mixes using various methods. CO4: Perceive special concretes for accomplishing performance levels					
UNIT - I		Ingredients of concrete			
Cement -chemical composition-hydration process-Bogue’s compound-Tests on properties of cement-Types of cement - I.S. Specifications. Aggregates- classification of aggregate – tests on properties of aggregates - characteristics of aggregate - I.S. Specifications. Water-quality of water - characteristics of water - I.S. Specifications. Admixtures – classification of chemical admixtures – properties and limitations – classification of mineral admixtures – properties and limitations - I.S. Specifications.					
UNIT - II		Properties of concrete:			
Fresh concrete: Mixing of concrete-workability-factors influencing workability-measurement of workability for conventional concrete (Slump Cone, Compaction Factor and Vee-Bee test) Hardened concrete: Water/Cement Ratio(Abram’s Law)-Gel Space Ratio-tests on hardened concrete-Destructive Tests (Compression, Split Tensile and Flexural)-Semi Destructive Tests (Core Cutter and Pull out test) and Non Destructive Tests (Rebound Hammer-UPV methods) .					
UNIT - III		Elasticity, Shrinkage and Creep:			
Curing of concrete -methods of curing-effects of improper curing-self curing-Modulus of Elasticity-Poisson’s Ratio-Dynamic Modulus of Elasticity- Shrinkage and various types - Factors Affecting Shrinkage-Moisture Movement-Creep of Concrete-Factors Influencing Creep.					
UNIT - IV		Concrete Mix Design			
Proportioning of Concrete Mixes-factors influencing - IS Code Methods- IS 456 provisions on Durability-Quality Control and Statistical Methods – ACI method of Mix Design for High Strength concrete.					
UNIT - V		Special Concretes			
Light Weight Concretes –Light Weight Aggregate Concrete- Cellular Concrete - No Fines Concrete-High Density Concrete – Fiber Reinforced Concrete-Polymer Concrete-Self Compacting Concrete.					
Textbooks:					
1. A. M. Neville, “Properties of Concrete”, Pearson Publication – 4th Edition 2. M.S. Shetty, A. K. Jain, “Concrete Technology Theory and Practice”, S. Chand and Company Limited, New Delhi					
References:					



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1. M. L. Gambhir, “Concrete Technology”, Tata Mc. Graw Hill Publishers, New Delhi
2. N. Krishna Raju, “Design of Concrete Mixes”, CBS Publishers.
3. P. K. Mehta And J. M. Monteiro, “Concrete: Micro Structure, Properties and Materials” Mc-Graw Hill Publishers
4. J. Prasad, C.G.K. Nair, “Non-Destructive Test and Evaluation of Materials”, Tata Mcgraw Hill Publishers, New Delhi



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Civil Engineering

Course Code	CONCRETE TECHNOLOGY LAB	L	T	P	C
		0	0	3	1.5
MINORS IN CIVIL ENGINEERING					
Course Objectives:					
<ul style="list-style-type: none">• To learn laboratory tests and their procedures cement, fine aggregate, coarse aggregates and bitumen• To evaluate fresh concrete properties.					
List of Experiments:					
Test on Cement <ol style="list-style-type: none">1. Normal Consistency and fineness of cement.2. Initial setting time and final setting time of cement.3. Specific gravity of cement4. Soundness of cement5. Compressive strength of cement.					
Test on Aggregates (Coarse and Fine) <ol style="list-style-type: none">1. Specific gravity (Pycnometer and wire basket), water absorption2. Shape (Flakiness and elongation indices)3. Impact and abrasion value tests4. Crushing resistance and durability tests5. Sieve Analysis and gradation charts (Job mix formula using Rothfuch's charts)6. Bulking of sand, Bulk and compact densities of fine and coarse aggregates					
Test on Fresh Concrete <ol style="list-style-type: none">1. Slump test2. CF (compact factor stress)3. Vee-bee Test4. Flow Table Test					
Test on hardened concrete and Non Destructive Testing <ol style="list-style-type: none">1. Compression test on cubes & Cylinders2. Flexure test3. Modulus of Elasticity4. Rebound Hammer Test5. Ultra-Sonic Pulse Velocity Test.					
IS CODES: <ol style="list-style-type: none">1. IS 383-1970 (2nd revision, reaffirmed 2011): Specifications for coarse and fine aggregates from Natural Sources for Concrete.2. IS 2386 (Part3)-1963 (reaffirmed 2011) Methods of Test for Aggregates for Concrete Part3: Specific Gravity, Density, Voids, Absorption and Bulking.2. 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"					



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Civil Engineering

Course Code	SURVEYING LAB	L	T	P	C
			0	0	3
MINORS IN CIVIL ENGINEERING					
Course Objectives:					
<ol style="list-style-type: none">6. To perform accurate traversing with a Total Station or Compass or chain and generate contour maps using radial and block methods for land surveys.7. Execute longitudinal and cross-sectional levelling and accurately offset and map the location of buildings on site plans.8. Estimate sunrise/sunset timings and determine azimuth angles for navigation and surveying applications.9. Proficient in using GPS for accurate traversing and curve setting for infrastructure projects.10. Identify positions and create maps using triangulation and trilateration methods effectively.					
Course Outcomes (CO):					
<ol style="list-style-type: none">6. To develop proficiency in using Total Station or Compass or Chain for traversing and to understand contouring methods for representing topographical features.7. To gain skills in levelling techniques for road and canal projects and learn to offset and plot building locations with precision.8. To understand astronomical observations for calculating sunrise and sunset times and determine azimuths using ex-meridian observations.9. To acquire skills in GPS-based traversing and to lay out curves on roads or railways using the deflection angle method.10. To learn and apply the principles of triangulation and trilateration for establishing control points and mapping areas.					
List of Experiments:					
<ol style="list-style-type: none">10. Traversing using Total Station.11. Contouring – Radial and Block.12. Longitudinal and Cross Sectional Levelling of Road /Canal.13. Offset of Buildings and Plotting the Location.14. Estimation of Sun Rise/ Sun Set time using Sun Observations.15. Determination of Azimuth by Ex-Meridian observation.16. Traversing using GPS.17. Curve setting by deflection angle method.18. Triangulation.					