R20 Regulations

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

SRI KRISHNADEVARAYA UNIVERSITY: ANANTAPUR
College of Engineering & Technology
Academic Regulations 2020 (R20) for
B. Tech (Regular-Full time)
(With effect from the Academic Year 2021-22 for the students admitted into I year I semester)

1. Award of the Degree:

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

i. Pursues a course of study in not less than four and not more than eight academic years.

ii. After eight academic years from the year of their admission, he/she shall forfeit their seat in B. Tech. course and their admission stands cancelled.

iii. Registers for 163 credits and must secure all the 163 credits.

iv. A student shall be eligible for the award of B.Tech degree with Honors or Minor if he/she earns 20 credits in addition to the 163 credits. A student shall be permitted to register either for Honors or for Minor and not for both simultaneously.

2. Programs offered by the College:

The following programs are offered at present as specializations for the B. Tech. course from 2020-2021.

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

and any other course as approved by the authorities of the University from time to time.

The entire course of study is of four academic years in semester pattern (for regular students)and of three academic years in semester pattern (for lateral entry students).

3. Medium of Instructions:

The medium of instruction is **English** for all courses, examinations, seminar presentations and project work. The curriculum will comprise courses of study as given in course structure, in accordance with the prescribed syllabi.

4. Minimum Qualification for Admission:

A candidate seeking admission to the first semester of the eight semester B. Tech. Degree Program should have passed the Intermediate Examination of the Board of Intermediate Education of Andhra Pradesh with Mathematics and Physical Sciences (Physics and Chemistry) as optional courses or any other equivalent examination there to recognized by Govt. of Andhra Pradesh, as per AICTE guidelines. For admissions into the third semester of B. Tech Degree Program under lateral entry scheme a candidate should have passed diploma in the respective branch of study as per AICTE guidelines.

5. Structure of the Program:

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Every course of B. Tech. Program shall be placed in one of the nine categories as listed in table below:

Table 2: Category wise distribution of credits

S.No.	Category	Code	Suggested breakup of Credits (APSCHE)	Suggested breakup of Credits (AICTE)
1	Humanities and social science including Management courses	HSMC	13.5*	15
2	Basic Science Courses	BSC	21*	25
3	Engineering science courses	ESC	24*	24
4	Professional Core Courses	PCC	51*	48
5	Open Elective Courses	OEC	12*	18
6	Professional Elective Courses	PEC	15*	18
7	Internship, Project Work Seminar	PROJ	16.5*	15
8	Mandatory courses	NCMC	NC	NC
9	Skill Oriented Courses	SOC	10	-
Total Credits			163	163

Minor variation is allowed as per need of the respective disciplines.

There shall be 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., shall be included in the guidelines issued by AICTE.

6. Scheme of Instruction

The scheme of instruction shall be for duration of four academic years for regular students and three academic years for lateral entry students. Each academic year consists of two consecutive semesters (one odd + one even). There shall be 90 working days in each semester, excluding the days allotted for internal examinations, preparation holidays and university examinations. Each working day shall be for duration of six hours of instruction and or seminar/ tutorial work.

Note: Under unavoidable circumstances, the 90 working days can be inclusive of internal examinations.

The details of syllabi and the list of text books and reference books for each branch of study shall be prescribed by the university from time to time on the recommendation of the Board of Studies.

7. Credit Assignment:

Program related terms:

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

ii. *Academic Year:* Two consecutive (one odd + one even) semesters constitute one academic year.

iii. *Choice Based Credit System (CBCS):* The CBCS provides choice for students to select from the prescribed courses.

iv. **Massive Open Online Course (MOOC):** The MOOC course is a Discipline Centric Elective Course and the student shall register for the course offered by authorized Institutions/Agencies, through online with the approval of Head of the Department.

v. Each course is assigned certain number of credits based on following criterion:

	Semester	
	Hours / Week	Credits
Theory (Lecture/Tutorial)	02	02
	03	03
	04	04
Practical	02	01
	03	1.5
	04	02
Summer Internship**	2 Months (or 8 weeks)	1.5
Industrial/Research**	2 Months (or 8 weeks)	3
Non-Credit Mandatory Courses	02 / week	00
Project	6 Months (or 24 weeks)	12

Note:

1. Summer Internship for 2 months (Mandatory) after second year (to be evaluated during V semester).
2. The concerned Board of studies can assign tutorial hours to such courses wherever it is necessary, but without change in the total number of credits already assigned for semester.
3. Industrial/Research Internship 2 Months (Mandatory) after third year (to be evaluated during VII semester.
4. During Project period the student is supposed to report the Internal Departmental Committee periodically.

8. Weights for Course Evaluation:

8.1 **Course Pattern:**

i. The entire course of study is for four academic years. Semester pattern shall be followed in all the academic years.

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

iii.   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 fulfillment of academic regulations. In such case, he/she shall be in the academic regulations into which he/she is readmitted.

8.2 **Evaluation Process:**

The performance of a student in each semester for academic year I,II,III,IV shall be evaluated subject wise with a maximum of 100 marks for theory and 75 marks for practical subject. Project stage-I, Socially relevant project and Internship shall be evaluated for 50 marks each & Project stage-II shall be evaluated for 200 marks whereas mandatory courses with no credits shall be evaluated for 30 internal marks.

1. For theory subjects the distribution shall be 30 marks for Internal Evaluation and 70 marks for the End-Examination.
2. For practical subjects the distribution shall be 25 marks for Internal Evaluation and 50 marks for the End-Examination.

8.3 **Internal Examination Evaluation:**

For theory subjects, during the semester there shall be 2 midterm examinations. Each midterm examination consists of subjective paper for 25 marks with duration of 1hour 30 minutes.

First midterm examination shall be conducted for the first half of the syllabus in the middle of the semester and second midterm examination shall be conducted for the second half of the syllabus towards the end of the semester. A weightage of 0.75 for better score and 0.25 for the other score will be considered for awarding the sessional marks in both the midterm examinations. There shall be two assignments in each semester for award of 05marks so that midterm component will be 30marks (25 for midterm examinations + 05 marks for assignments).

*Note 1:** The subjective paper shall contain Section A with 2 questions of equal weightage of 10 marks and student shall answer any one.Section B shall contain 4 questions equal weightage of 5 marks and student shall answer any three .Any fraction (0.5 & above) shall be rounded off to the next higher mark.
*Note 2:** The assignment shall contains 5 questions of equal weightage of 1 mark each. Which are essay type questions/numerical problems/software development.

If the student is absent for the internal examination, no re-exam shall be conducted and internal marks for that examination shall be considered as zero.
Final Internal marks shall be arrived at by considering the marks secured by the student in both the mid examinations with 75% weightage given to the better mid exam and 25% to the other.
For Example:

Marks obtained in first mid   : 24
Marks obtained in second mid : 20
Final Internal Marks: $(24 \times 0.75) + (20 \times 0.25) = 23$

If the student is absent for any one midterm examination, the final internal marks shall be arrived at by considering 75% 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 : 24

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Final Internal Marks: (24x0.75)+ (0x0.25) =18

8.4 **End Examination Evaluation:**

End examination of theory subjects shall have the following pattern:
   a. There shall be 8 questions and each question carries 14 marks and Student shall answer any five of them.

8.5 For practical subjects there shall be a continuous evaluation during the semester for 25 sessional marks and 50 end examination marks. Day-to-day work in the laboratory shall be evaluated for 25 marks by the concerned laboratory teacher based on the regularity/record/viva/Internal test. The end examination shall be conducted by the concerned laboratory teacher and a senior expert in the subject from the same department.

8.6 There shall be mandatory courses with zero credits. There shall be no external examination. However, attendance in the audit course 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 every six months/semester at a mutually convenient date of college/student satisfying the conditions mentioned in item 1 & 2 of the regulations.

8.7 The Engineering Drawing/Graphics course, offered is to be treated as a Theory Course. Evaluation method adopted shall be same as for any other Theory Course. The Internal evaluation for sessionals will be 15 marks for day-to-day work in the class that shall be evaluated by the concerned subject teacher based on the reports/submissions prepared in the class. And there shall be two midterm exams in a semester for a duration of 2 hrs each, evenly distributed over the syllabi, for 15 marks giving a weightage of 0.75 for the better score and 0.25 for the other score will be considered. The sum of day to day evaluation and the internal tests will be the final sessionals for the subject
.

8.8 The laboratory records and internal test papers shall be preserved for a minimum of 2 years in the respective departments as per the Institution norms and shall be produced to the Committees as and when the same are asked for.

8.9. There shall be 05 Professional Elective courses and 04 Open Elective courses. All the Professional & Open Elective courses shall be offered for 03 credits, wherever lab component is involved it shall be (2-0-2) and without lab component it shall be (3-0- 0). If a course comes with a lab component, that component has to be cleared separately. The concerned BOS shall explore the possibility of introducing virtual labs for such courses with lab component.

8.10 All Open Electives are offered to students of all branches in general. However, a student shall choose an open Elective from the list in such a manner that he/she has not studied the same course in any form during the Programme.

8.11 A student shall be permitted to pursue up to a maximum of TWO Open Elective courses under MOOCs during the Programme. (See the possibility of Min 1 and Max under MOOCs; avoid paid courses; Coursera, NPTEL, TCS ION to be explored). Each of the courses must be of minimum 12 weeks in duration. Attendance will not be monitored for MOOCs. Student has to pursue and acquire a certificate for a MOOC only from the organizations/agencies approved by the BoS in order to earn the 3 credits. The Head of the Department shall notify the list of such courses at the beginning of the semester.

8.12 The college shall invite registration forms from the students at the beginning of the semester for offering professional and open elective courses. There shall be a limit on the minimum and maximum number of registrations based on class/section strength.

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8.13 **Internships:**

Students shall undergo mandatory summer internships for a minimum of 2 months duration at the end of second and third year of the Programme. There shall also be mandatory full internship for 6 months in the final semester of the Programme along with the project work.

8.14 **Skill Oriented Courses:**

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 courses and the remaining one shall be a soft skills course.

8.15.**Honors/Minors:**

Under graduate Degree with Honors/Minor shall be issued by the University to the students who fulfill all the academic eligibility requirements for the B. Tech program and Honors/Minor program. The objective is to provide additional learning opportunities to academically motivated students.

9. Attendance Requirements in Academics:

  i. A student shall be eligible to appear for University examinations if he/she acquires a minimum of 75% of attendance in aggregate of all the subjects in a semester.
 ii. 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.
iii. Shortage of Attendance below 65% in aggregate shall in <u>NO CASE</u> be condoned.
 iv. A stipulated fee shall be payable towards condonation of shortage of attendance to the Institution.
  v. 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.
 vi. 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 when offered next.
vii. The aggregate percentage of attendance can be rounded to next integer for the purpose of considering for condonation/detention.

For example:

A candidate getting ≥ 64.5 may be condoned, may be rounded to 65. No attendance shall be added but for condoning purpose can only be considered.

10. Minimum Academic Requirements and Award of the Degree:

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in section 9.

10.1 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 internal and end examination marks taken together.

10.2 A student shall be promoted from II Year 2nd to III Year I Semester only if he/she fulfils the academic requirement of securing **24 credits** in the subjects that have been studied up to II Year I Semester.

10.3 A student shall be promoted from III Year II Semester to IV Year 1st semester only if he/she fulfils the academic requirements of securing **42 credits** in the subjects that have been studied up to III Year I Semester And in case a student is detained for want of credits for particular academic year by sections 10.2 and 10.3 above, 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 III Year I Semester or IV Year 1st semester as the case may be.

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10.4 A student shall register and put up minimum attendance in all 160 credits and earn all the 160 credits.
105 Students who fail to earn 160 credits as indicated in the course structure within eight academic years from the year of their admission shall forfeit their seat in B.Tech. course and their admission shall stand cancelled.

11. 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 or candidate or student, the result of the candidate shall be withheld and the candidate will not be allowed/promoted into the next higher semester. The issue of awarding degree is liable to be withheld in such cases.

12. Award of Grades:

After each subject is evaluated for 100 marks, the marks obtained in each subject 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	S (Superlative)	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 (Below Average)	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 mandatory courses, "Satisfactory" or "Unsatisfactory" shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA.

12.1. Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):

i. 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.,

$$SGPA = \Sigma\ (C_i \times G_i)/\Sigma\ C_i$$

where, C_i is the number of credits of the ith subject and G_i is the grade point scored by the student in the ith course.

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

$$CGPA = \Sigma\ (C_i \times S_i)/\ \Sigma\ C_i$$

where "S_i" is the SGPA of the ith semester and C_i is the total number of credits upto that semester.

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

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

13. 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	$\geq 4.5 < 5.5$

14. Gap Year Concept:

Gap year concept for Student Entrepreneur in Residence is introduced and outstanding students who wish to pursue entrepreneurship are allowed to take a break of one year at any time after II year to pursue full-time entrepreneurship. This period may be extended to two years at the most and these two years would not be counted for the time for the maximum time for graduation. The Principal of the college shall take the decision on proposals submitted by the students. An evaluation committee constituted by the Principal of the College 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.

15. Transitory Regulations:

Discontinued, detained, or failed candidates are eligible for readmission as and when the
semester is offered after fulfillment 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 rejoining 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.

16. Curricular Framework for Mandatory Internships

i. It is mandatory to undergo Community Service Project during II Year Summer Vacation with a minimum of 2 months duration.

ii. It is mandatory to undergo Internship during III Year Summer Vacation with a minimum of 2 months

duration. The internship can be done by the students at local industries, Govt. Organizations, construction agencies, Industries, Hydel and thermal power projects and also in software MNCs.

iii. 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. The report and the oral presentation shall carry 40% and 60% weightages respectively.

iv. In the final semester, the student should mandatorily undergo internship for 6 Months and parallelly 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 project report on the work carried out during the internship. The project report shall be evaluated with an external examiner.

v. 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.

17. Curricular Framework for Skill oriented

i   For skill oriented/skill advanced course, one theory and 2 practical hours or two theory hours may be allotted as per the decision of concerned BOS.

ii   Out of the five skill courses two shall be skill-oriented courses from the same domain and shall be completed in second year. Of the remaining 3 skill courses, one shall be necessarily be a soft skill course and the remaining 2 shall be skill-advanced courses either from the same domain or Job oriented skill courses, which can be of inter disciplinary nature.

iii   A pool of interdisciplinary job-oriented skill courses shall be designed by a common Board of studies by the participating departments/disciplines and the syllabus along with the pre requisites shall be prepared for each of the laboratory infrastructure requirements. The list of such courses shall be included in the curriculum structure of each branch of Engineering, so as to enable the student to choose from the list.

iv   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/APSSDC or any other accredited bodies as approved by the concerned BoS.

v   The Board of studies of the concerned discipline of Engineering shall review the skill advanced courses being offered by eligible external agencies and prepare a fresh list every year incorporating latest courses based on industrial demand.

vi   If a student chooses to take a Certificate Course offered by industries/Professional bodies/APSSDC or any other accredited bodies, in lieu of the skill advanced course offered by the Department, the credits shall be awarded to the student upon producing the Course Completion Certificate from the agency/professional bodies as approved by the Board of studies.

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

viii   requirements upon producing a valid certificate as approved by the concerned Board of Studies, the student is deemed to have fulfilled the attendance requirement of the course and acquire the credits assigned to the course.

ix   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. The recommended conversions and appropriate grades/marks are to be approved by the University/Academic Council.

18. Curricular Framework for Honors Programme

Students of a Department/Discipline are eligible to opt for Honors Programme offered by the same Department/Discipline.

i A student shall be permitted to register for Honors program at the beginning of 4th

ii semester provided that the student must have acquired a minimum of 8.0 SGPA upto the end of 2nd semester without any backlogs. In case of the declaration of the 3rd semester results after the commencement of the 4th semester and if a student fails to score the required minimum of 8 SGPA, his/her registration for Honors Programme stands cancelled and he/she shall continue with the regular Programme.

iii Students can select the additional and advanced courses from their respective branch in which they are pursuing the degree and get an honors degree in the same. e.g. If a Mechanical Engineering student completes the selected advanced courses from same branch under this scheme, he/she will be awarded B.Tech. (Honors) in Mechanical Engineering.

iv In addition to fulfilling all the requisites of a Regular B.Tech Programme, a student shall earn 20 additional credits to be eligible for the award of B. Tech (Honors) degree. This is in addition to the credits essential for obtaining the Under Graduate Degree in Major Discipline (i.e. 160 credits).

v Of the 20 additional Credits to be acquired, 16 credits shall be earned by undergoing specified courses listed as pools, with four courses, each carrying 4 credits. The remaining 4 credits must be acquired through two MOOCs, which shall be domain specific, each with 2 credits and with a minimum duration of 8/12weeks as recommended by the Board of studies.

vi It is the responsibility of the student to acquire/complete prerequisite before taking the respective course. The courses offered in each pool shall be domain specific courses and advanced courses.

vii The concerned BoS shall decide on the minimum enrolments for offering Honors program by the department. If minimum enrolments criteria are not met then the students shall be permitted to register for the equivalent MOOCs as approved by the concerned Head of the department in consultation with BoS.

viii Each pool can have theory as well as laboratory courses. If a course comes with a lab component, that component has to be cleared separately. The concerned BoS shall explore the possibility of introducing virtual labs for such courses with lab component. MOOCs must be of minimum 8 weeks in duration. Attendance will not be monitored for MOOCs. Students have to acquire a certificate from the agencies approved by the BOS with grading or marks or pass/fail in order to earn 4 credits. If the MOOCs is a pass/fail course without any grades, the grade to be assigned will be as decided by the university/academic council.

ix The concerned BoS shall also consider courses listed under professional electives of the respective B. Tech programs for the requirements of B. Tech (Honors). However, a student shall be permitted to choose only those courses that he/she has not studied in any form during the Programme.

x If a student drops or is terminated from the Honors program, the additional credits so far earned cannot be converted into free or core electives; they will remain extra. These additional courses will find mention in the transcript (but not in the degree certificate). In such cases, the student may choose between the actual grade or a "pass (P)" grade and also choose to omit the mention of the course as for the following: All the courses done under the Minors will be shown in the transcript. Courses which are dropped under the Minor will not be shown in the transcript.

xi In case a student fails to meet the CGPA requirement for Degree with Honors at any point after registration, he/she will be dropped from the list of students eligible for Degree with Honors and they will receive

regular B.Tech. Degree only. However, such students will receive a separate grade sheet mentioning the additional courses completed by them.

xii Honors must be completed simultaneously with a major degree program. A student cannot earn Honors after he/she has already earned bachelor's degree.

19. Curricular Framework for Minor Programme:

i Students who are desirous of pursuing their special interest areas other than the chosen discipline of Engineering may opt for additional courses in minor specialization groups offered by a department other than their parent department. For example, If Mechanical Engineering student selects subjects from Civil Engineering under this scheme, he/she will get Major degree of Mechanical Engineering with minor degree of Civil Engineering.

ii Student can also opt for Industry relevant tracks of any branch to obtain the Minor Degree, for example, a B.Tech Mechanical student can opt for the industry relevant tracks like Data Mining track, IOT track, Machine learning track etc.

iii The BOS concerned shall identify as many tracks as possible in the areas of emerging technologies and industrial relevance / demand. For example, the minor tracks can be the fundamental courses in CSE, ECE, EEE,CE,ME etc. or industry tracks such as Artificial Intelligence (AI), Machine Learning (ML), Data Science (DS), Robotics, Electric vehicles, Robotics, VLSI etc.

iv The list of disciplines/branches eligible to opt for a particular industry relevant minor specialization shall be clearly mentioned by the respective BoS.

v There shall be no limit on the number of programs offered under Minor. The University/Institution can offer minor programs in emerging technologies based on expertise in the respective departments or can explore the possibility of collaborating with the relevant industries/agencies in offering the program.

vi The concerned BoS shall decide on the minimum enrolments for offering Minor program by the department. If a minimum enrolments criterion is not met, then the students may be permitted to register for the equivalent MOOCs as approved by the concerned Head of the department in consultation with BoS.

vii A student shall be permitted to register for Minors program at the beginning of 4th semester subject to a maximum of two additional courses per semester, provided that the student must have acquired 8 SGPA (Semester Grade point average) up to the end of 2nd semester without any history of backlogs. It is expected that the 3rd semester results may be announced after the commencement of the 4th semester. If a student fails to acquire 8 SGPA up to 3rd semester or failed in any of the courses, his registration for Minors program shall stand cancelled. An SGPA of 8 has to be maintained in the subsequent semesters without any backlog in order to keep the Minors registration active.

viii A student shall earn additional 20 credits in the specified area to be eligible for the award of B. Tech degree with Minor. This is in addition to the credits essential for obtaining the Under Graduate Degree in Major Discipline (i.e. 160 credits).

ix Out of the 20 Credits, 16 credits shall be earned by undergoing specified courses listed by the concerned BoS along with prerequisites. It is the responsibility of the student to acquire/complete prerequisite before taking the respective course. If a course comes with a lab component, that component has to be cleared separately. A student shall be permitted to choose only those courses that he/she has not studied in any form during the Programme.

x In addition to the 16 credits, students must pursue at least 2 courses through MOOCs. The courses must be of minimum 8 weeks in duration. Attendance will not be monitored for MOOC courses. Student has to acquire a certificate from the agencies approved by the BOS with grading or marks or pass/fail in order to

earn 4 credits. If the MOOC course is a pass/fail course without any grades, the grade to be assigned as decided by the university/academic council.

xi Student can opt for the Industry relevant minor specialization as approved by the concerned departmental BoS. Student can opt the courses from Skill Development Corporation (APSSDC) or can opt the courses from an external agency recommended and approved by concerned BOS and should produce course completion certificate. The Board of studies of the concerned discipline of Engineering shall review such courses being offered by eligible external agencies and prepare a fresh list every year incorporating latest skills based on industrial demand.

xii A committee should be formed at the level of College/Universities/department to evaluate the grades/marks given by external agencies to a student which are approved by concerned BoS. Upon completion of courses the departmental committee should convert the obtained grades/marks to the maximum marks assigned to that course. The controller of examinations can take a decision on such conversions and may give appropriate grades.

xiii If a student drops (or terminated) from the Minor program, they cannot convert   the earned credits into free or core electives; they will remain extra. These additional courses will find mention in the transcript (but not in the degree certificate). In such cases, the student may choose between the actual grade or a "pass (P)" grade and also choose to omit the mention of the course as for the following: All the courses done under the dropped Minors will be shown in the transcript. None of the courses done under the dropped Minor will be shown in the transcript.

xiv In case a student fails to meet the CGPA requirement for B.Tech degree with Minor at any point after registration, he/she will be dropped from the list of students eligible for degree with Minors and they will receive B. Tech degree only. However, such students will receive a separate grade sheet mentioning the additional courses completed by them.

20. General Instructions:

a. The academic regulations should be read as a whole for purpose of any interpretation.

b. Malpractices rules-nature and punishments are appended.

c. Where the words "he", "him", "his", occur in the regulations, they also include "she", "her", "hers", respectively.

d. In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Principal is final.

e. The Principal may change or amend the academic regulations of common B.o.S 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 Principal.

f. The above rules and regulations are to be approved/ratified by the College Academic Council as and when any modifications are to be done.

21. MOOCs through SWAYAM Platform:

There shall be five professional elective courses and four open elective courses, which are Choice Based Credit Courses (CBCC), offered from V semester onwards. Among them, one elective course shall be pursued through MOOCs. The student shall register for the course (Minimum of 12 weeks) offered by SWAYAM with the approval of Head of the Department. The Head of the Department shall appoint one mentor to monitor the student's assignment submissions given by SWAYAM. 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. Examination fee, if any, will be borne by the student.

A Student must complete the SWAYAM MOOC course in all respects on or before 5 / 6 / 7 semester. Students' MOOC

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course score in terms of marks/grade/credits will be counted in their 5/6/7 semester marks sheet as the case may be. Students who have qualified in the proctored examinations conducted by the SWAYAM and apply for credit transfer as specified are exempted from appearing internal as well as external examination (for the specified equivalent credit course only) conducted by the university.

Necessary amendments in rules and regulations regarding adoption of SWAYAM MOOCS courses would be proposed from time to time.

Credit Equivalence for SWAYAM MOOCs Courses: Courses of 04 weeks duration: 01 Credit Courses of 08 weeks duration: 02 Credits Courses of 12 weeks duration: 03 Credits Courses of 16 weeks duration: 04 Credits.

22.Credit Transfer Policy

Adoption of MOOCs is mandatory for all students, 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 40% of the total courses being offered in a particular Programme in a semester through the Online Learning courses through SWAYAM platform (www.swayam.gov.in).

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 through SWAYAM platform.

ii. The online learning courses available on the SWAYAM platform will be considered for credit transfer. SWAYAM course credits are as specified in the platform.

iii. Student registration for the MOOCs shall be only through the institution, it is mandatory for the student to share necessary information with the institution

iv. Credit transfer policy will be applicable to the Professional & Open Elective courses offered by the university under Choice Based Credit System (CBCS).

v. The institution shall select the courses to be permitted for credit transfer through SWAYAM. However, while selecting courses in the online platform institution would essentially avoid the courses offered through the curriculums it may otherwise lead to duplication and repetition of the same course

vi. The University/institution shall notify at the beginning of semester the list of the online learning courses eligible for credit transfer in the forthcoming Semester.

vii. The institution shall also ensure that the student must complete the course and produce the course completion certificate as per the academic schedule given for the regular courses in that semester

viii. 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.

ix. The university shall ensure no overlap of SWAYAM MOOC exams with that of the university examination schedule. In case of delay in SWAYAM results, the university will re-issue the marks sheet for such students.

x. Student 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.

xi. 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 certificates of completion.
   b. Undertaking form filled by the students for credit transfer.

xii. The university 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 also be permitted to register for MOOCs offered through online platforms other than SWAYAM / NPTEL. In such cases, credit transfer shall be permitted only after seeking approval of the

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University at least three months prior to the commencement of the semester.

ACADEMIC REGULATIONS FOR B. TECH.(R20)
(LATERAL ENTRY SCHEME)
(Effective for the students getting admitted into II year through Lateral Entry Scheme from the Academic Year 2022-2023 and onwards)

1. **Award of B.Tech. Degree**

   A student admitted in Lateral Entry Scheme (LES) will be declared eligible for the award of the B.Tech degree if the student fulfills the following academic regulations:

   a)Pursues a course of study for not less than three academic years and not more than six academic years.

   b)   Registers for *124* credits and secures all *124*credits from II to IV year of Regular B. Tech. program.

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

3. All The regulations except 8.1 are to be adopted as that of B. Tech. (Regular).

4. **Minimum Academic Requirements:**

   The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item no.9

   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 internal evaluation and end examination taken together.

   ii   A student shall be promoted from III Year II Semester to IV year 1st Semester only if the student fulfills the academic requirements of securing **25 credits** of the subjects that have been studied up to III Year I 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.

   5. Course Pattern
   5.1. The entire course of study is three academic years on semester pattern.
   5.2. 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.
   5.3. 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 fulfillment of academic regulations, the student shall be in the academic regulations into which he/she is readmitted.

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RULES FOR DISCIPLINARY ACTION FOR MALPRACTICES / IMPROPER CONDUCT IN EXAMINATIONS

S. No.	Nature of Malpractices/Improper conduct	Punishment
	If the Candidate:	
1 (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
1 (b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The Hall Ticket of the candidate is to be cancelled.
3	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred for four consecutive semesters from class work and all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for four consecutive semesters from class work and all examinations, if his involvement is established. Otherwise, the candidate is debarred for two consecutive semesters from class work and all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already

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	additional sheet, during or after the examination.	appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject only.
6	Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. If the candidate physically assaults the invigilator/ officer-in-charge of the Examinations, then the candidate is also debarred and forfeits his/her seat. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7	Leaves the exam hall taking away answer script or Intentionally tears of the script or any part there of inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all the examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.
9	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other

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	malpractice or improper conduct mentioned in clause 6 to 8.	subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person (s) who do not belong to the College will be handed over to police and, a police case will be registered against them.
10	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.
11	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject only or in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester / year examinations, depending on the recommendation of the committee.
12	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the Institution for further action to award suitable punishment.	

Note: -
   Whenever the performance of a student is cancelled in any subject/subjects due to Malpractice, he has to register for End Examinations in that subject/subjects consequently and has to fulfill all the norms required for the award of Degree.

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SKUCET Curriculum
B. Tech Course Structure – R20
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	0-0-12-0
2		Career Counseling	MC	4-0-4-0
3		Orientation to all branches – career options, tools, etc.	MC	6-0-0-0
4		Orientation on admitted Branch – corresponding labs, tools and platforms	EC	4-0-6-0
5		Proficiency Modules & Productivity Tools	ES	4-2-4-0
6		Assessment on basic aptitude and mathematical skills	MC	4-0-6-0
7		Remedial Training in Foundation Courses	MC	4-2-4-0
8		Human Values & Professional Ethics	MC	6-0-0-0
9		Communication Skills – focus on Listening, Speaking, Reading, Writing skills	BS	4-2-4-0
10		Concepts of Programming	ES	4-0-4-0
		Total		40-6-44-0

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S.No	Course Code	Course Name	Category	L-T-P	Credits
Sri Krishnadevaraya University College of Engineering & Technology
Dept. of Civil Engineering
I Year I Semester
1.		Linear Algebra & Calculus	BS	3-0-0	3
2.		Engineering Chemistry	BS	3-0-0	3
3.		Basic Electrical and Electronics Engineering	ES	3-0-0	3
4.		Problem Solving & Programming	ES	3-0-0	3
5.		Basic Engineering Workshop	ES	0-0-3	1.5
6.		IT Workshop	ES	0-0-3	1.5
7.		Basic Electrical & Electronics Engineering Lab	ES	0-0-3	1.5
8.		Engineering Chemistry Lab	BS	0-0-3	1.5
9		Problem Solving & Programming Lab	ES	0-0-3	1.5
				Total	**19.5**

Category	CREDITS
Basic Science course	7.5
Engineering Science Courses	12
TOTAL CREDITS	**19.5**

S.No	Course No	Course Name	Category	L-T-P	Credits
Sri Krishnadevaraya University College of Engineering & Technology
Dept. of Civil Engineering
I Year II Semester
1.		Differential Equations & Vector Calculus	BS	3-0-0	3
2.		Engineering Physics	SBS	3-0-0	3
3.		Engineering Mechanics	ES	3-0-0	3
4.		Communicative English	HS	3-0-0	3
5.		Engineering Graphics	ES	1-0-4	3
6.		Basic Civil and Mechanical Engineering Lab	ES	0-0-3	1.5
7.		Engineering Physics Lab	BS	0-0-3	1.5
8.		Communicative English Lab	HS	0-0-3	1.5
9.		Environmental Studies	MC	2-0-0	0
				Total	**19.5**

Category	CREDITS
Basic Science course	7.5
Engineering Science Courses	7.5
Humanities and social science	4.5
TOTAL CREDITS	**19.5**

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S.No	Course Code	Course Name	Category	L-T-P	Credits
		Sri Krishnadevaraya University College of Engineering & Technology			
		Dept. of Civil Engineering			
		II Year Ist Semester			
1.		Probability and Statistics for Civil Engineering	BS	3-0-0	3
2.		Solid Mechanics	PC	3-0-0	3
3.		Fluid mechanics and Hydraulics Machinery	PC	3-0-0	3
4.		Surveying	PC	3-0-0	3
5.		Building Materials and Planning	PC	3-0-0	3
6		UHV-II: Universal Human Values – Understanding harmony and Ethical Human Conduct	HS	2-1-0	3
7.		Strength of Materials LAB	PC	0-0-3	1.5
8.		Fluid Mechanics and Hydraulics Machinery Lab	PC	0-0-3	1.5
9.		Surveying Lab	PC	0-0-3	1.5
10.		**Skill oriented course** Application Development with Python	SC	1-0-2	2
				Total	**24.5**

Category	CREDITS
Basic Science course	3
Humanities and Social Science	3
Professional Core Courses	16.5
Skill oriented course	2
TOTAL CREDITS	**24.5**

S.No	Course Code	Course Name	Category	L-T-P	Credits
		Sri Krishnadevaraya University College of Engineering & Technology			
		Dept. of Civil Engineering			
		II Year IInd Semester			
1.		Mathematical Modeling & Optimization Techniques	BS	3-0-0	3
2.		Engineering Geology	ES	3-0-0	3
3.		Environmental Engineering	PC	3-0-0	3
4.		Concrete Technology	PC	3-0-0	3
5.		Managerial Economics and Financial Analysis	HS	3-0-0	3
6.		Engineering Geology Lab	ES	0-0-3	1.5
7.		Concrete Technology Lab	PC	0-0-3	1.5
8.		Environmental Engineering Lab	PC	0-0-3	1.5
9.		**Skill Oriented Course –II** Soft Skills	SC	1-0-2	2
				Total	**21.5**
		Community Service Project (Mandatory) for 2 Months duration during summer vacation			

Category	CREDITS
Basic Science course	3
Engineering Science Courses	4.5
Professional Core Courses	9
Humanities and Social Sciences	3
Skill Oriented Course	2
TOTAL CREDITS	**21.5**

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S.No	Course Code	Course Name	Category	L-T-P	Credits
Sri Krishnadevaraya University College of Engineering & Technology				
Dept. of Civil Engineering				
III Year I Semester				
1.		Geotechnical Engineering	PC	3-0-0	3
2.		Design of Reinforced Concrete Structures	PC	3-0-0	3
3.		Structural Analysis- 1	PC	3-0-0	3
4.		**Open Elective – I**	OE	3-0-0	3
5.		**Professional Elective – I**	PE	3-0-0	3
6.		Geotechnical Lab	PC	0-0-3	1.5
7.		Survey Field Work Lab (Survey Camp)	PC	0-0-3	1.5
8.		**Skill advanced course/ soft skill course***	SC	1-0-2	2
		Mandatory course (AICTE suggested)		2-0-0	
9.		Evaluation of Community Service Project	PR		1.5
				Total	**21.5**

List of Professional Electives-I	List of Open Electives-I
1. Water resource Engineering 2. Building service and Maintenance 3. Expansive soils	1. Candidate should select the subject from list of subjects offered by other departments

Category	CREDITS
Professional core Courses	12
Professional Elective courses	3
Open Elective Course/Job oriented elective	3
Skill advanced course/ soft skill course*	2
Summer Internship	1.5
TOTAL CREDITS	**21.5**
Category	**CREDITS**

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S.No	Course Code	Course Name	Category	L-T-P	Credits
		Sri Krishnadevaraya University College of Engineering & Technology			

S.No	Course Code	Course Name	Category	L-T-P	Credits
		Sri Krishnadevaraya University College of Engineering & Technology			
		Dept. of Civil Engineering			
		III Year II Semester			
1.		Design of Steel Structures	PC	3-0-0	3
2.		Structural Analysis- II	PC	3-0-0	3
3.		Highway Engineering	PC	3-0-0	3
4.		**Professional Elective-II**	PE	3-0-0	3
5.		**Open Elective-II**	OE	3-0-0	3
6.		Irrigation Engineering Drawing Lab	PC	0-0-3	1.5
7.		Highway Engineering Lab	PC	0-0-3	1.5
8.		CAD Lab		0-0-3	1.5
9.		**Skill advanced course/ soft skill course*** STAAD	SC	1-0-2	2
10.		**Mandatory Non-Credit Course-III** Constitution of India	MC	2-0-0	0
				Total	**21.5**
		Industrial/Research Internship (Mandatory) for 2 months duration during summer vacation			

List of Professional Electives-II	List of Open Electives-II
1. Irrigation Engineering 2. Repairs and rehabilitation of Structures 3. Urban Hydrology	Candidate should select the subject from list of subjects offered by other departments

Category	CREDITS
Professional Core Courses	13.5
Professional Elective Courses	3
Open Elective Course/Job Oriented Elective	3
Skill oriented course	2
TOTAL CREDITS	**21.5**

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S.No	Course Code	Course Name	Category	L-T-P	Credits
Sri Krishnadevaraya University College of Engineering & Technology					
Dept. of Civil Engineering					
IV Year I Semester					
1.		Foundation Engineering	PC	3-0-0	3
2.		**Professional Elective – III**	PE	3-0-0	3
3.		**Professional Elective – IV**	PE	3-0-0	3
4.		**Professional Elective – V**	PE	3-0-0	3
5.		**Open Elective-III**	OE	3-0-0	3
6.		**Open Elective – IV**	OE	3-0-0	3
7.		**Skill oriented course– V**	SC	1-0-2	2
8.		Evaluation of Industrial Internship	PR	0-0-0	3
				Total	**23**

List of Professional Electives-III	**List of Professional Electives-IV**
1. Pre-stressed Concrete 2. Finite Element Analysis in Civil Engineering 3. Advanced Structural Design	1. Experimental Stress Analysis 2. Geo-informatics 3. Earthquake Engineering
List of Professional Electives-V	
1. Estimation, Costing and Valuation 2. Bridge Engineering 3. Ground Improvement Techniques	**List of Open Electives-III & IV** Candidate should select the subject from list of subjects offered by Civil Department to other departments.

Category	CREDITS
Professional Elective Courses	12
Open Elective Course/Job Oriented Elective	6
Skill oriented course	2
Industrial Internship	3
TOTAL CREDITS	**23**

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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		Credits
1.		Full Internship / Project work	PROJ		12
				Total	**12**

Category	CREDITS
Full Internship/Project work	12
TOTAL CREDITS	**12**

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LIST OF OPEN ELECTIVES

Open Electives offered by Dept. of Civil (Offered to other Departments)

Open Elective-I

1. Engineering Material
2. Dister Mitigation and Management
3. Environmental Economics

Open Elective-II

1. Traffic Engineering
2. Ground Improvement Techniques
3. Environmental Pollution Control

Open Elective-III

1. Environmental Impact Assessment
2. Low Cost Effective Housing Techniques
3. Water shed Management

Open Elective-IV

1. Construction Planning and Project Management
2. Noise and Air Pollution
3. Geographic Information System GIS

Out of Open elective courses at least one course should be completed through MOOCs

Open Electives offered by Dept. of E.C.E(Offered to other Departments)
1. Fundamentals of Digital Electronics
2. Basics of Signals and Systems
3. Fundamentals of Communication Systems
4. Fundamentals of Microprocessors and Microcontrollers
5. Microcontroller & Applications
6. Electronic Sensors
7. Electronic Instrumentation
8. Principles of Signal Processing
9. Embedded System Design
10. Introduction to Image Processing
11. Introduction to Internet of things
12. Consumer Electronics

Out of Open elective courses at least one course should be completed through MOOCs

Open Electives offered by Dept. of C.S.E(Offered to other Departments)
1. Principles of Software Engineering (OE-1)
2. Java Programming (OE-2)
3. Fundamentals of Operating Systems (OE-3)
4. Fundamentals of Computer Networks (OE-4)
5. Principles of Database Management Systems
6. Web Technologies
7. Cyber Security

Out of Open elective courses at least one course should be completed through MOOCs

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Open Electives offered by Dept. of E.E.E(Offered to other Departments)

1. Electrical circuit Theory (OE-1)
2. Generation of Electric Power (OE-2)
3. Renewable Energy Sources (OE-3)
4. Basics of Power Electronics (OE-4)

Out of Open elective courses at least one course should be completed through MOOCs

Open Electives offered by Dept. of Mech. Engineering (Offered to other Departments)

1. Manufacturing Process
2. IC Engines
3. Automobile Engineering
4. Non-Conventional Sources of Energy
5. Non-Destructive Evaluation
6. Workshop Technology
7. Total Quality Management

Out of Open elective courses at least one course should be completed through MOOCs

Skill Oriented Courses

1. Skill Oriented Course – I (III Sem)
2. Skill Oriented Course – II (IV Sem)
3. Skill Oriented Course –III
4. Skill Oriented Course – IV
5. Skill Oriented Course – V

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Civil Engineering

Honors Degree in Civil Engineering

Note
1. A student can opt any Four subjects @ 4 credits per subject
2. Concerned BoS can add or delete the subjects as per the decision of the board.
3. Prerequisites to be defined by the board for each course.
4. Compulsory MOOC/NPTEL Courses for 04 credits (02 courses@ 2 credits each

S.No.	Course No.	CourseName	L	T	P	Credits
1.		Advanced Structural Design	3	1	0	4
2.		Advanced Concrete Technology	3	1	0	4
3.		Stability of Structures	3	1	0	4
4.		Repairs and Rehabilitation of Structures	3	1	0	4
5.		MOOC course (8 weeks duration)				2
6.		MOOC course (12 weeks duration)				2

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Civil Engineering

Minor Degree in Civil Engineering

Note

1. A student can opt any Four subjects @ 4 credits per subject
2. Concerned BoS can add or delete the subjects as per the decision of the board.
3. Prerequisites to be defined by the board for each course.
4. Compulsory MOOC/NPTEL Courses for 04 credits (02 courses@ 2 credits each)

S.No	Course Code	CourseName	L	T	P	Credits
1.		Building Materials	3	1	0	4
2.		Construction Technology	3	1	0	4
3.		Building planning and Drawing	3	1	0	4
4.		Surveying	3	1	0	4
5.		MOOC course				2
6.		MOOC course				2

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Note:

1. Eligible and interested students can register either for Honors or for a Minor in IV Semester as per the guidelines issued by the University
2. Students shall register for NCC/NSS/NSO activities and will be required to participate in an activity for two hours in a week during third semester.
3. Lateral entry students shall undergo a bridge course in Mathematics during third semester

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S.No	Course Code	Course Name	Category	L-T-P	Credits
		**Sri Krishnadevaraya University College of Engineering & Technology**			

S.No	Course Code	Course Name	Category	L-T-P	Credits
\multicolumn		Sri Krishnadevaraya University College of Engineering & Technology			

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Dept. of Civil Engineering
I Year I Semester

S.No	Course Code	Course Name	Category	L-T-P	Credits
1.		Linear Algebra & Calculus	BS	3-0-0	3
2.		Engineering Chemistry	BS	3-0-0	3
3.		Basic Electrical and Electronics Engineering	ES	3-0-0	3
4.		Problem Solving & Programming	ES	3-0-0	3
5.		Basic Engineering Workshop	ES	0-0-3	1.5
6.		IT Workshop	ES	0-0-3	1.5
7.		Basic Electrical & Electronics Engineering Lab	ES	0-0-3	1.5
8.		Engineering Chemistry Lab	BS	0-0-3	1.5
9		Problem Solving & Programming Lab	ES	0-0-3	1.5
				Total	**19.5**

Category	CREDITS
Basic Science course	7.5
Engineering Science Courses	12
TOTAL CREDITS	**19.5**

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Course Code	LINEAR ALGEBRA & CALCULUS	L	T	P	C
	(Common to all branches of Engineering)	3	0	0	3
	I Year I Semester				

Course Objectives:
- This course will illuminate the students in the concepts of calculus and linear algebra.
- 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.

  Bridge Course: Limits, continuity, Types of matrices .

Course Outcomes (CO): Student will be able to
- develop the use of matrix algebra techniques that is needed by engineers for practical applications
- Utilize mean value theorems to real life problems
- familiarize with functions of several variables which is useful in optimization
- Students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2- dimensional coordinate systems
- Students will become familiar with 3- dimensional coordinate systems and also learn the utilization of special functions

UNIT - I	**Matrix Operations and Solving Systems of Linear Equations**	

Rank of a matrix by echelon form, solving system of homogeneous and non-homogeneous equations linear equations. Eigen values and Eigen vectors and their properties, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem, diagonalisation of a matrix, quadratic forms and nature of the quadratic forms, reduction of quadratic form to canonical forms by orthogonal transformation

UNIT - II	**Mean Value Theorems**	

Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Taylor's and Maclaurin's theorems with remainders (without proof);

UNIT - III	**Multivariable calculus**	

Partial derivatives, total derivatives, chain rule, change of variables, Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers

UNIT - IV	**Multiple Integrals**	

Double integrals, change of order of integration, change of variables. Evaluation of triple integrals, change of variables between Cartesian, cylindrical and spherical polar co-ordinates. Finding areas and volumes using double and triple integrals.

UNIT - V	**Beta and Gamma Functions**	

Beta and Gamma functions and their properties, relation between beta and gamma functions, evaluation of definite integrals using beta and gamma functions.

Textbooks:
1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.   2. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017
Reference Books:
1. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.   2. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.   3. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 201.   4. T.K.V Iyengar, B. Krishn Gandhi, S. Ranganatham and M.V.S.N. Prasad., S. chand Publishers.

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Civil Engineering

Course Code	ENGINEERING CHEMISTRY	L	T	P	C
	(CIV. & MECH. Branches)	3	0	0	3
	I Year I Semester				

Course Objectives:
- To familiarize engineering chemistry and its applications
- To impart the concept of source and hard waters, softening methods of hard water
- To train the students on the principle and applications of electrochemistry, polymers chemistry, cement and surface chemistry

Course Outcomes (CO):

At the end of the course, the students will be able to
- **Demonstrate:** The corrosion prevention methods and factores affecting corrosion
- **Explain:** The preparation, properties, and applications of thermosetting and thermoplastics
- **Discuss:** Hydrogen-Oxygen fuel cell
- **Explain:** The setting and hardening of cement and concrete phase

UNIT - I	**Water technology**

Water: Source of water**,** impurities in water, hardness of water by using EDTA method, temporary and permanent hardness and its units. **Water for industrial purpose**: steam generation, boiler troubles–carry over (priming & foaming) boiler corrosion–scales and sludge.
Water internal and external treatment: Permutit or zeolite process. deminera- lization of brackish water, reverse-osmosis and electro dialysis.

UNIT - II	**Polymer Chemistry**

Polymers: Basic concepts of polymerization, types of polymerization addition and condensation polymerization. **Plastomers:** thermosetting and theromoplastics composition properties and engineering applications of PVC, teflon, bakelite and nylons. **Rubber:** rubber-processing of natural rubber and Vulcanisation of rubber, compounds of rubber, elastomers-buna **S**, buna **N** preparation, properties and its applications. **Conducting polymers:** Polyacetylene, polythiphene, polyphenylene and poly aniline, classifications of conducting polymers.Synthesis mechanism of conducting polymers and its applications

UNIT - III	**Fuel and Combustion**

Fuels: Metallurgical coke–characteristics and manufacture(**Otto-Halfmann's**). **Liquid Fuels**: synthetic refining petroleum (**Fischer-Tropsch's, Bergiue's**) process, fuel for IC engines, knocking and anti-knocking agent. Octane and cetane values. Cracking of oils: alternative fuels-hydrogen-oxygen and methane-oxygen fuel cells advantages, disadvantages and its applications.
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UNIT - IV	**Electrochemistry and Corrosion and its Control**

Electrochemical cells: galvanic cells, types of electrodes (standard hydrogen, calomel and quinhydrone), EMF of cells. **Batteries:** Nickel-cadmium, lithium ion batteries advantages, disadvantages and its applications. **Corrosion and its Control:** Theories (dry-wet, chemical and electrochemical corrosion) of corrosion and mechanism. Factors affecting the corrosion. Types of corrosions and control methods-cathode protection sacrificial anodic, impressed current method.

UNIT - V	**Advanced Engineering Materials**

Building materials: Portland cement composition, classification, preparation (dry and wet processes).Constituents, phases and reactivity of clinker, Setting and hardening of cement. **Refractories:**Criteries of refracteries,Classification,properties,Factors affecting the refractory materials and applications.Failures of refractories
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Textbooks:
1.A text book of engineering chemistry., Jain and Jain, Dhanpat Rai Publishing Company., 15th edition, New Delhi,**2008**.   **2**. Chemistry of engineering., Prof. K.N. Jayaveera, Dr. G.V. Subba Reddy and Dr. C. Ramachandraiah. McGraw hill higher education. Hyderabad, **2009.**   **3**. Peter Atkins, Julio de Paula and James Keeler, Atkin's Physical Chemistry, 10/e, Oxford University Press, 2010.
Reference Books:
1.D.J. Shaw, Introduction to Colloids and Surface Chemistry, Butterworth- Heineman,1992.   **2**.H.F.W. Taylor, Cement Chemistry, 2/e, Thomas Telford Publications, 1997.   **3**.Engineering chemistry 3e,B.Rama Devi et al., Cengage Learning.

Subjects	Web Sites
Organic Chemistry Help	p://www.chemhelper.com
Model ChemLab	p://modelscience.com/products.html?source=google
Virtual Library	p://www.liv.ac.uk/Chemistry/Links/links.html
The World Wide Club for the chemical community	p://www.chemweb.com/
International Chemistry Departments	p://www.liv.ac.uk/Chemistry/Links/international.html
Chemistry Software for Chemists	p://www.chemistry-software.com/
Guide to academic and research jobs in Europe	p://www.academicjobseu.com/
Guide to PhD studentships and chemical sciences	p://www.findaphd.com/firstmain.asp
Guide to postdoctoral positions	p://www.findapostdoc.com/firstmain.asp
Wiley InterScience	p://www.interscience.wiley.com/cgi-bin/home

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Civil Engineering

Course Code	BASIC ELECTRICAL & ELECTRONICS ENGINEERING (Common to Civil, CSE and Mechnical.)	L	T	P	C
		3	0	0	3
	I Year I Semester				

Course Objectives:

- To introduce basics of electric circuits.
- To teach DC and AC electrical circuit analysis.
- To explain working principles of transformers and electrical machines.
- To impart knowledge on low voltage electrical installations
- To provide comprehensive idea about working principle, operation and applications of PN junction & zener diodes, BJT and operational amplifier
- To introduce fundamentals of digital electronics.

Course Outcomes (CO):

- Apply concepts of KVL/KCL in solving DC circuits
- Choose correct rating of a transformer for a specific application
- Illustrate working principles of induction motor - DC Motor
- Understand working operation of transformer
- Describe operation and characteristics of diodes and transistors and basic opamps

UNIT - I	**DC & AC Circuits**	

Electrical circuit elements (R - L and C) - Kirchhoff laws -Series and parallel connection of resistances with DC excitation. Superposition Theorem -Representation of sinusoidal waveforms -peak and rms values - phasor representation -   real power - reactive power - apparent power - power factor - Analysis of single-phase ac circuits consisting of RL - RC - RLC series circuits.

UNIT - II	**DC Machines:**	

DC-Generators: Working Principle and construction of DC Generator– Generated emf equation – types of DC Generators-simple problems regarding EMF.

DC Motors : Working Principle of DC Motor-types of DC Motors -back emf -torque equation –speed control of DC Shunt Motor – applications of DC machines -losses in DC machines- Swinburne's test and efficiency calculation –simple problems.

UNIT - III	**Transformers:**	

Principle of operation of single phase transformers –Constructional features –Theory of an Ideal Transformer- EMF equation –Practical Transformer on no load and load–Equivalent circuit- Impedance Ratio-Shifting of Impedances – losses- regulation -OC & SC test- efficiency –simple problems.

UNIT - IV	**Analog Electronics**	

Diode and its Characteristics: Formation of n- type and p-type semiconductor –Construction of P-n junction diode, symbol - V-I Characteristics- Diode Applications-Rectifiers – Half wave-Full wave-mid point and bridge type-simple Problems. Formation of PNP and NPN transistors – CE configuration of NPN and PNP transistors- applications -Transistor as an amplifier-SCR characteristics and applications-construction and Principle of CRO(operation only)-Applications..

UNIT - V	**Operational Amplifiers and Digital Electronics**	

Operational Amplifiers: Introduction, block diagram, basic op-amp circuits: Inverting, Non Inverting, summer, subtractor, voltage follower.
Introduction, Switching and Logic Levels, Digital Waveform, characteristics of digital ICs, logic gates, number systems.

Civil Engineering

Textbooks:
1. 1. D. P. Kothari and I. J. Nagrath - "Basic Electrical Engineering" - Tata McGraw Hill - 2010.
2. V.K. Mehta & Rohit Mehta, "Principles of Power System" – S.Chand – 2018
3. D.P. Kothari, I.J.Nagrath, Basic Electronics, 2nd edition, McGraw Hill ducation(India)Private Limited
4. S.K. Bhattacharya, Basic Electrical and Electronics Engineering, 2nd edition, Pearson India Private Limited.

Reference Books:
1. R. Muthusubramanian, S. Salivahanan, "Basic Electrical and Electronics Engineering", Tata McGraw-Hill Education, Reprint 2012.
2. David Bell, Electronic Devices and Circuits: Oxford University Press, 5th EDn., 2008.
3. L. S. Bobrow - "Fundamentals of Electrical Engineering" - Oxford University Press - 2011.
4. E. Hughes - "Electrical and Electronics Technology" - Pearson - 2010.
5. C.L. Wadhwa – "Generation Distribution and Utilization of Electrical Energy", 3rd Edition, New Age International Publications.

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Civil Engineering

Course Code	PROBLEM SOLVING AND PROGRAMMING	L	T	P	C
	(Common to all Branches Of Engineering)	3	0	0	3
	I Year I Semester				

Course Objectives:

- To illustrate the basic concepts of C programming language.
- To discuss the concepts of Functions, Arrays, Pointers and Structures.
- To familiarize with Stack, Queue and Linked lists data structures.
- To explain the concepts of non-linear data structures like graphs and trees.
- To learn different types of searching and sorting techniques

Course Outcomes (CO):

- Analyse the basic concepts of C Programming language.
- Design applications in C, using functions, arrays, pointers and structures.
- Apply the concepts of Stacks and Queues in solving the problems.
- Explore various operations on Linked lists.
- Demonstrate various tree traversals and graph traversal techniques.
- Design searching and sorting methods

UNIT - I	**Introduction to C Language** -

C language elements, variable declarations and data types, operators and expressions, decision statements - If and switch statements, loop control statements - while, for, do-while statements, arrays

UNIT - II	**Functions**

Functions, types of functions, Recursion and argument passing, pointers, storage allocation, pointers to functions, expressions involving pointers, Storage classes – auto, register, static, extern, Structures, Unions, Strings, string handling functions, and Command line arguments.

UNIT - III	**Data Structures**,

Overview of data structures, stacks and queues, representation of a stack, stack related terms, operations on a stack, implementation of a stack, evaluation of arithmetic expressions, infix, prefix, and postfix notations, evaluation of postfix expression, conversion of expression from infix to postfix, recursion, queues - various positions of queue, representation of queue, insertion, deletion, searching operations.

UNIT - IV	**Linked Lists**

Singly linked list, dynamically linked stacks and queues, polynomials using singly linked lists, using circularly linked lists, insertion, deletion and searching operations, doubly linked lists and its operations, circular linked lists and its operations.

UNIT - V	**Trees, Graphs, Searching & Sorting**

Trees - Tree terminology, representation, Binary trees, representation, binary tree traversals. binary tree operations, **Graphs** - graph terminology, graph representation, elementary graph operations, Breadth First Search (BFS) and Depth First Search (DFS), connected components, spanning trees. **Searching and Sorting** – sequential search, binary search, exchange (bubble) sort, selection sort, insertion sort.

Textbooks:

1. The C Programming Language, Brian W Kernighan and Dennis M Ritchie, Second Edition, Prentice Hall Publication.
2. Fundamentals of Data Structures in C, Ellis Horowitz, SartajSahni, Susan Anderson-Freed, Computer Science Press.
3. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. AnandaRao, Pearson Education.
4. B.A. Forouzon and R.F. Gilberg, "COMPUTER SCIENCE: A Structured Programming Approach Using C", Third edition, CENGAGE Learning, 2016.
5. Richard F. Gilberg & Behrouz A. Forouzan, "Data Structures: A Pseudocode Approach with C", Second Edition, CENGAGE Learning, 2011.

Reference Books:
1. Pradip Dey and Manas Ghosh, Programming in C, Oxford University Press, 2nd Edition 2011.
2. E. Balaguruswamy, "C and Data Structures", 4th Edition, Tata Mc Graw Hill.
3. A.K. Sharma, Computer Fundamentals and Programming in C, 2nd Edition, University Press.
4. M.T. Somashekara, "Problem Solving Using C", PHI, 2nd Edition 2009.

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Civil Engineering

Course Code	BASIC ENGINEERING WORKSHOP	L	T	P	C
		0	0	3	1.5
	I Year I Semester				

Course Objectives:

- To familiarize students with wood working, sheet metal operations, fitting and electrical house wiring Skills

Course Outcomes (CO):

After completion of this lab the student will be able to

- Apply wood working skills in real world applications.
- Build different objects with metal sheets in real world applications.
- Apply fitting operations in various applications.
- Apply different types of basic electric circuit connections.
- Use soldering and brazing techniques

List of Topics

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
a) 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:
Familiarities 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

   Note: In each section a minimum of three exercises are to be carried out.

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Civil Engineering

Course Code	IT WORKSHOP	L	T	P	C
		0	0	3	1.5
	I Year I Semester				

Course Objectives:

- To make the students know about the internal parts of a computer, assembling and dissembling a computer from the parts, preparing a computer for use by installing the operating system
- To provide Technical training to the students on Productivity tools like Word processors, Spreadsheets, Presentations and LAteX
- To learn about Networking of computers and use Internet facility for Browsing and Searching
- To learn about Google Forms and Google Sites

Course Outcomes (CO):

- Disassemble and Assemble a Personal Computer and prepare the computer ready to use.
- Prepare the Documents using Word processors and Prepare spread sheets for calculations
- .using excel and also the documents using LAteX.
- Prepare Slide presentations using the presentation tool.
- Interconnect two or more computers for information sharing.
- Access the Internet and Browse it to obtain the required information

List of Experiments:

Week l

Preparing your Computer

Task 1: Learn about Computer: Identify the internal parts of a computer, and its peripherals. Represent the same in the form of diagrams including Block diagram of a computer. Write specifications for each part of a computer including peripherals and specification of Desktop computer. Submit it in the form of a report.

Task 2: Assembling a Computer: Disassemble and assemble the PC back to working condition. Students should be able to trouble shoot the computer and identify working and non-working parts. Student should identify the problem correctly by various methods

Task 3: Install Operating system: Student should install Linux on the computer. Student may install another operating system (including proprietary software) and make the system dual boot or multi boot. Students should record the entire installation process.

Task 4: **Operating system features**: Students should record the various features that are supported by the operating system(s) installed. They have to submit a report on it. Students should be able to access CD/DVD drives, write CD/DVDs, access pen drives, print files, etc. Students should install new application software and record the installation process.

Networking and Internet

Task 5: Networking: Students should connect two computers directly using a cable or wireless connectivity and share information. Students should connect two or more computers using switch/hub and share information. Crimpling activity, logical configuration etc. should be done by the student. The entire process has to be documented.

Task 6: Browsing Internet: Student should access the Internet for Browsing. Students should search the Internet for required information. Students should be able to create e-mail account and send email. They should get acquaintance with applications like Facebook, skype etc. If Intranet mailing facility is available in the organization, then students should share the information using it. If the operating system supports sending messages to multiple users (LINUX supports it) in the same network, then it should be done by the student. Students are expected to submit the information about different browsers available, their features, and search process using different natural languages, and creating e-mail account.

Task 7: Antivirus: Students should download freely available Antivirus software, install it and use it to check for threats to the computer being used. Students should submit information about the features of the antivirus used, installation process, about virus definitions, virus engine etc.

Productivity tools

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Task 8: Word Processor: Students should be able to create documents using the word processor tool. Some of the tasks that are to be performed are inserting and deleting the characters, words and lines, Alignment of the lines, Inserting header and Footer, changing the font, changing the colour, including images and tables in the word file, making page setup, copy and paste block of text, images, tables, linking the images which are present in other directory, formatting paragraphs, spell checking, etc. Students should be able to prepare project cover pages, content sheet and chapter pages at the end of the task using the features studied. Students should submit a user manual of the word processor considered, Image Manipulation tools.

Task 9: Presentations: creating, opening, saving and running the presentations, selecting the style for slides, formatting the slides with different fonts, colours, creating charts and tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyperlinking, running the slide show, setting the timing for slide show.

Task 10: Spreadsheet: Students should be able to create, open, save the application documents and format them as per the requirement. Some of the tasks that may be practiced are Managing the worksheet environment, creating cell data, inserting and deleting cell data, format cells, adjust the cell size, applying formulas and functions, preparing charts, sorting cells. Students should submit a user manual of the Spreadsheet

Note: Use open source tools for implementation of the following exercises.

Reference Books:
1. Introduction to Computers, Peter Norton, McGraw Hill
2. MOS study guide for word, Excel, Powerpoint& Outlook Exams, Joan Lambert, Joyce Cox, PHI.
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
4. Networking your computers and devices, Rusen, PHI
5. Trouble shooting, Maintaining & Repairing PCs, Bigelows, TMH

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Civil Engineering

Course Code	BASIC ELECTRICAL & ELECTRONICS ENGINEERING LAB	L	T	P	C
		0	0	3	1.5

I Year I Semester

Course Objectives:
- To Verify Kirchoff's laws
- To verify Superposition theorem.
- To learn performance characteristics of DC Machines.
- To perform open circuit & Short Circuit test on 1- Phase Transformer.
- To Study the I – V Characteristics of Solar PV Cell

Course Outcomes (CO):
- Verify Kirchoff's Laws & Superposition theorem.
- Perform testing on AC and DC Machines.
- Study I – V Characteristics of PV Cell
- Describe construction, working and characteristics of diodes, transistors and operational amplifiers
- Demonstrate how electronic devices are used for applications such as rectification, switching and amplification
- Build different building blocks in digital electronics using logic gates
- Explain functionality of flip-flops, shift registers and counters for data processing applications

List of Experiments:

Part-A
Electrical Engineering Lab

List of experiments: -

1. Verification of Kirchhoff laws.
2. Verification of Superposition Theorem.
3. Open circuit characteristics of a DC Shunt Generator.
4. Speed control of DC Shunt Motor.
5. OC & SC test of 1 – Phase Transformer.
6. Brake test on 3 - Phase Induction Motor.
7. I – V Characteristics of Solar PV cell
8. Brake test on DC Shunt Motor.

Part-B
Electronics Engineering Lab

List of Experiments:

1. Study of CRO
2. Draw and study the characteristics of Semi-conductor diode
3. Draw and study the characteristics of Zener Diode
4. Draw and study the static and transfer characteristics of NPN and PNP transistors in CE configuration.
5. Construct half wave and full wave rectifier circuits. Find ripple factor and plot their output waveforms with and without filters
6. Study the application of Op-amp as an Inverting amplifier, Non-inverting amplifier, Voltage follower, Summer and Subtractor
7. Realization of logic gates, AND, OR, NOT, NAND, NOR, XOR

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Civil Engineering

Course Code	ENGINEERING CHEMISTRY LAB	L	T	P	C
	(Common to Civil & Mechanical Engineering)	0	0	3	1.5
	I Year I Semester				

Course Objectives:

- Verify the fundamental concepts with experiments

Course Outcomes (CO):

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

- **Determination:** Hardness of water by using EDTA
- **Estimation:** Amount of dissolved oxygen given water sample
- **Analysis:** Difference between the UV-Visible and IR spectroscopy
- **Explain:** Verification of Beer-Lambert's law I
- **Identify:** Acid -base buffer solution pH meter
- applications

List of Experiments:

Chemical methods: Volumetric analysis

1. Estimation of Ferrous (Fe^{2+}) Ion using Standard Potassium Dichromate

Iodometry Titrations:

2. Estimation of Copper (Cu^{2+}) Ion using Standard Potassium Dichromate
(i) Part-I : Standardization of sodium thiosulphate ($Na_2S_2O_3$) solution with standard $K_2Cr_2O_7$
(ii) Part-II: Estimation of Copper

Complexometry Titrations:
3. Estimation of Calcium hardness of water using Standard EDTA solution
4. Estimation of Copper by using Standard EDTA solution
5. Dissolved Oxygen: To test the amount of dissolved oxygen present in the given water sample.

Physical methods: Instrumental Analysis
6. pH metric titration of (i) strong acid vs strong base, (ii) weak acid vs strong base
7. Determination of cell constant and conductance of solutions
8. Determination of colorimetric titration with $KMnO_4$ solution
9. Verification of Beer-Lambert's law by $K_2Cr_2O_7$ solution.
10. Viscosity determination of Kerosin and Petrol by Red-wood viscometer.

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Course Code	PROBLEM SOLVING AND PROGRAMMING LAB	L	T	P	C
	(Common to All Branches of Engineering)	0	0	3	1.5
	I Year I Semester				

Course Objectives:
- To get familiar with the basic concepts of C programming.
- To design programs using arrays, strings, pointers and structures.
- To illustrate the use of Stacks and Queues
- To apply different operations on linked lists.
- To demonstrate Binary search tree traversal techniques.
- To design searching and sorting techniques.

Course Outcomes (CO):
- Demonstrate basic concepts of C programming language.
- Develop C programs using functions, arrays, structures and pointers.
- Illustrate the concepts Stacks and Queues.
- Design operations on Linked lists.
- Apply various Binary tree traversal techniques.
- Develop searching and sorting methods.

List of Experiments:

Week 1
Write C programs that use both recursive and non-recursive functions
   (i)To find the factorial of a given integer.
   (ii)To find the GCD (greatest common divisor) of two given integers.

Week 2
a) Write a C program to find both the largest and smallest number in a list of integers.
b) Write a C program that uses functions to perform the following:
   i) Addition of Two Matrices ii) Multiplication of Two Matrices

Week 3
 a) Write a C program that uses functions to perform the following operations:
     i) To insert a sub-string in to a given main string from a given position.
     ii) To delete n characters from a given position in a given string.

Week 4
 a) Write a C program that displays the position or index in the string S where the string T
   begins, or – 1 if S doesn't contain T.
 b) Write a C program to count the lines, words and characters in a given text.

Week 5
   a)Write a C Program to perform various arithmetic operations on pointer variables.
   b)Write a C Program to demonstrate the following parameter passing mechanisms:
   i) call-by-value   ii) call-by-reference

Week 6
Write a C program that uses functions to perform the following operations:
   (i)Reading a complex number
   (ii)Writing a complex number
   (iii)Addition of two complex numbers
   (iv)Multiplication of two complex numbers
   (Note: represent complex number using a structure.)

Week 7
Write C programs that implement stack (its operations) using
   (i)Arrays (ii) Pointers

Week 8
Write C programs that implement Queue (its operations) using
   (i)Arrays (ii) Pointers

R20 Regulations

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Week 9
Write a C program that uses Stack operations to perform the following:
(i) Converting infix expression into postfix expression
(ii) Evaluating the postfix expression

Week 10
Write a C program that uses functions to perform the following operations on singly linked list.
i) Creation   ii) Insertion   iii) Deletion   iv) Traversal

Week 11
Write a C program that uses functions to perform the following operations on Doubly linkedlist.
i) Creation   ii) Insertion   iii) Deletion   iv) Traversal

Week 12
Write a C program that uses functions to perform the following operations on circular linkedlist.
i) Creation   ii) Insertion   iii) Deletion   iv) Traversal

Week 13
Write a C program that uses functions to perform the following:
i) Creating a Binary Tree of integers
ii) Traversing the above binary tree in preorder, inorder and postorder.

Week 14
Write C programs that use both recursive and non-recursive functions to perform the following searching operations for a key value in a given list of integers:
(i)Linear search (ii) Binary search

Week 15
Write a C program that implements the following sorting methods to sort a given list of integers in ascending order
     (i)Bubble sort
     (ii)Selection sort
     (iii)Insertion sort
     (iv)Description Language

Text Books
1. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. Ananda Rao, Pearson Education.
2. B.A. Forouzon and R.F. Gilberg, "COMPUTER SCIENCE: A Structured Programming Approach Using C", Third edition, CENGAGE Learning, 2016.
3. Richard F. Gilberg & Behrouz A. Forouzan, "Data Structures: A Pseudocode Approach with C", Second Edition, CENGAGE Learning, 2011.

Reference Books:
1. PradipDey and ManasGhosh, Programming in C, Oxford University Press, 2nd Edition 2011.
2. E.Balaguruswamy, "C and Data Structures", 4th Edition, Tata Mc Graw Hill.
3. A.K.Sharma, Computer Fundamentals and Programming in C, 2nd Edition, University Press.
4. M.T.Somashekara, "Problem Solving Using C", PHI, 2nd Edition 2009.

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		Sri Krishnadevaraya University College of Engineering & Technology			
		Dept. of Civil Engineering			
		I Year II Semester			
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1.		Differential Equations & Vector Calculus	BS	3-0-0	3
2.		Engineering Physics	SBS	3-0-0	3
3.		Engineering Mechanics	ES	3-0-0	3
4.		Communicative English	HS	3-0-0	3
5.		Engineering Graphics	ES	1-0-4	3
6.		Basic Civil and Mechanical Engineering Lab	ES	0-0-3	1.5
7.		Engineering Physics Lab	BS	0-0-3	1.5
8.		Communicative English Lab	HS	0-0-3	1.5
9.		Environmental Studies	MC	2-0-0	0
				Total	**19.5**

Category	**CREDITS**
Basic Science course	7.5
Engineering Science Courses	7.5
Humanities and social science	4.5
TOTAL CREDITS	**19.5**

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Civil Engineering

Course Code	DIFFERENTIAL EQUATIONS & VECTOR CALCULUS (Common to ECE, EEE ,Civil & Mechanical Branches)	L	T	P	C
		3	0	0	3
	I Year II Semester				

Course Objectives:

- 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):

- solve the differential equations related to various engineering fields
- Identify solution methods for partial differential equations that model physical processes
- interpret the physical meaning of different operators such as gradient, curl and divergence
- estimate the work done against a field, circulation and flux using vector calculus

UNIT - I	**Linear Differential Equations of Higher Order**

Definitions, complete solution, operator D, rules for finding complimentary function, inverse operator, rules for finding particular integral, method of variation of parameters.Simultaneous linear equations with constant coefficients, Applications: Mass spring system and L-C-R Circuit problems.

UNIT - II	**Partial Differential Equations – First order**

Introduction and formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, solutions of first order equations using Lagrange's method and non-linear PDEs (Standard Forms).

UNIT - III	**Applications of Partial Differential Equations**

Classification of PDE, method of separation of variables for second order equations. Applications of Partial Differential Equations: One dimensional Wave equation, One dimensional Heat equation

UNIT - IV	**Multivariable Calculus (Vector differentiation)**

Scalar and vector point functions, vector operator del, del applies to scalar point functions- Gradient, del applied to vector point functions-Divergence and Curl, vector identities.

UNIT - V	**Multivariable Calculus (Vector integration)**

Line 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.

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Textbooks:
1. 1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.
2. 2. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna publishers, 2017.

Reference Books:
1. 1. Dennis G. Zill and Warren S. Wright, Advanced Engineering Mathematics, Jones and Bartlett, 2011.
2. 2. Michael Greenberg, Advanced Engineering Mathematics, 2/e, Pearson, 2018
3. 3. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
4. 4. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
5. 5. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 2011.
6. 6.T.K.V Iyengar, B. Krishn Gandhi, S. Ranganatham and M.V.S.N. Prasad., S. chand Publishers.

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Civil Engineering

Course Code	ENGINEERING PHYSICS (Common CIVIL and MECH. Branches)	L	T	P	C
		3	0	0	3
	I Year II Semester				

Course Objectives:

- To identify the importance of the optical phenomenon i.e. interference, diffraction and polarization.
- To explain the significant concepts of dielectric and magnetic materials this leads to potential applications in the emerging micro devices.
- To impart knowledge in basic concepts of optical fibers and LASERs along with its Engineering applications.
- To familiarize the basic concepts of acoustics and ultrasonics with their Engineering applications.

Course Outcomes (CO):

- Study the different realms of physics and their applications in both scientific and technological systems through physical optics.
- Identify the wave properties of light and the interaction of energy with the matter
- Asses the electromagnetic wave propagation and its power in different media
- Understands the response of dielectric and magnetic materials to the applied electric and magnetic fields.
- Explain the basic concepts of acoustics and ultrasonics.
- Apply the concept of NDT to material testing.
- Study the important properties of crystals like the presence of long-range order

UNIT - I	**Wave Optics**	

Interference: Principle of Superposition-Interference of light-Conditions for sustained Interference -Interference in thin films (reflected light)-Newton's Rings-Determination of Wavelength.
Diffraction: Introduction-Fresnel and Fraunhofer diffraction-Fraunhofer Diffraction-Single and Double slits - Diffraction Grating.
Polarisation: Introduction-Types of polarization- Polarisation by reflection and double refraction-Nicol's Prism-Half wave and Quarter wave plate.

UNIT - II	**Lasers & Fiber Optics**	

Lasers: Introduction-Spontaneous and Stimulated emission of radiation-Einstein's coefficients-Population inversion -Pumping Mechanisms-He-Ne laser- Semiconductor laser- Applications of laser.
Fibre optics: Introduction to Optical Fibers-Total Internal Reflection-Critical angle of propagation-Acceptance Angle-Numerical Aperture-Classification of fibers based on Refractive index profile – Propagation of electromagnetic wave through optical fiber–modes-Block Diagram of Fiber optic Communication -Medical Applications.

UNIT - III	**Dielectric & Magnetic Materials**	

Dielectric: Introduction--Dielectric Polarization-Dielectric polarizability, Susceptibility and Dielectric constant- Types of polarizations: Electronic, Ionic and Orientation polarisations (Qualitative) - Lorentz (internal) field-Clausius -Mossotti equation.
Magnetic Materials: Introduction-Magnetic dipole moment-Magnetization-Magnetic susceptibility and permeability-Classification of Magnetic Materials-Hysteresis-soft and hard magnetic materials

UNIT - IV	**Acoustics & Ultrasonics**	

Acoustics: Introduction of Acoustics-Reverberation – Reverberation time – Sabine's formula-derivation using growth and decay method – Absorption coefficient and its determination –factors affecting acoustics of buildings and their remedies.
Ultrasonic: Introduction to ultrasonic-Properties of ultrasonic-Production of ultrasonic by magnetostriction and piezoelectric methods- Detection of ultrasonic-Applications of ultrasonic.

UNIT - V	**Crystallography & X-ray diffraction**	

Crystallography: Space lattice, Basis, Unit cell and lattice parameters- Bravais lattice-Crystal Systems-Packing fraction- Coordination Number-Packing fraction of SC, BCC and FCC-Miller indices-Separation between successive(hkl) planes.

X-ray diffraction: X-ray diffraction by crystal planes-Bragg's law-Crystal structure determination by Laue method- Merits and demerits-Powder method.

Schrodinger wave equation (Eigen-value and Eigen-function). **Crystal field theory:** Crystal field theory and the energy level diagrams for transition metal ions, Salient features –splitting in octahedral and tetrahedral geometry**,** magnetic properties and colours.

Textbooks:

1. M. N. Avadhanulu, P.G. Kshirsagar& TVS Arun Murthy" AText book of Engineering Physics"- S. Chand Publications, 11th Edition 2019.
2. B.K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning, 2012.

Reference Books:

1. Shatendra Sharma, Jyotsna Sharma, "Engineering Physics", Pearson Education,2018.
2. David J.Griffiths, "Introduction to Electrodynamics"- 4/e, Pearson Education,2014.
3. Applied Physics – P.K.Palanisamy SciTech Publications Pvt. Ltd.,
4. Engineering Physics- K. Vijay Kumar, S. Chand Publications.

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Civil Engineering

Course Code	ENGINEERING MECHANICS	L	T	P	C
		3	0	0	3
	I Year II Semester				

Course Objectives:
- To make the student understand how to resolve forces and moments in a given system
- To demonstrate the student to determine the centroid and second moment of area
- To impart procedure for drawing shear force and bending moment diagrams for beams.
- To make the student able to analyse flexural stresses in beams due to different loads.
- To enable the student to apply the concepts of strength of materials in engineeringapplications and design problems.

Course Outcomes (CO):

On completion of the course, the student will be able to:
- Understand the different types of couples and force systems
- Determine the centroid and moment of inertia for different cross-sections
- Understand the concepts of stress, strain, generalized Hooke's law, elastic moduli and strainenergy.
- Develop shear force and bending moment diagrams for different load cases.
- Compute the flexural stresses and shear stresses for different loading cases and differentcross-sections.

UNIT - I	**Introduction to Mechanics**:

Basic Concepts, system of Forces Coplanar Concurrent Forces - Components in Space Resultant - Moment of Forces and its Application - Couples and Resultant of Force Systems. Equilibrium of system of Forces: Free body diagrams, Equations of Equilibrium of Coplanar Systems and Spatial systems-

Center of Gravity and moment of inertia: Introduction – Centroids of rectangular, circular, I, L andT sections - Centroids of built up sections.

Area moment of Inertia: Introduction – Definition of Moment of Inertia of rectangular, circular, I, L and T sections - Radius of gyration. Moments of Inertia of Composite sections.

UNIT - II	**Simple Stresses 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 – Temperature stresses. Strain energy – Resilience – Gradual, Sudden, impact and shock loadings – simple applications.

UNIT - III	**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 changing 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 - IV	**Flexural Stresses:**

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

UNIT - V	**Shear Stresses**

Derivation of formula-Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T and angle sections. Combined bending and shear.
Analysis of trusses by Method of Joints & Sections.

R20 Regulations

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Textbooks:
1. S. Timoshenko, D.H. Young and J.V. Rao, "Engineering Mechanics", Tata McGraw-HillCompany.   2. Sadhu Singh, "Strength of Materials", 11th edition 2015, Khanna Publishers.
Reference Books:
1. S.S.Bhavikatti, "Strength of materials", Vikas publishing house Pvt. Ltd.   2. R. Subramanian, "Strength of Materials", Oxford University Press.   3. R. K. Bansal, "Strength of Materials", Lakshmi Publications House Pvt. Ltd.   4. Advanced Mechanics of Materials – Seely F.B and Smith J.O. John wiley & Sons inc.,New York.

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Course Code	COMMUNICATIVE ENGLISH (Common to All Branches of Engineering)	L	T	P	C
		3	0	0	3
	I Year II Semester				

Course Objectives:

- Facilitate effective listening skills for better comprehension of academic lectures and English spoken by native speakers
- Focus on appropriate reading strategies for comprehension of various academic texts and authentic materials
- Help improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations
- Impart effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays, record and report useful information
- Provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing
  - .

Course Outcomes (CO):

- Retrieve the knowledge of basic grammatical concepts
- Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English
- Apply grammatical structures to formulate sentences and correct word forms
- Analyze discourse markers to speak clearly on a specific topic in informal discussions
- Evaluate reading/listening texts and to write summaries based on global comprehension of these texts.
- Create a coherent paragraph interpreting a figure/graph/chart/table

UNIT - I	**On the Conduct of Life: William Hazlitt**	

Lesson: 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. Reading for Writing: Beginnings and endings of paragraphs - introducing the topic, summarizing the main idea and/or providing a transition to the next paragraph. Grammar and Vocabulary: Parts of Speech, Content words and function words; word forms: verbs, nouns, adjectives and adverbs; nouns: countable and uncountable; singular and plural; basic sentence structures; simple question form - wh- questions; word order in sentences.

UNIT - II	**The Brook: Alfred Tennyson**	

Lesson: Listening: Answering a series of questions about main idea and supporting ideas after listening to audio texts. Speaking: Discussion in pairs/small groups on specific topics followed by short structured talks. Reading: Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together. Writing: Paragraph writing (specific topics) using suitable cohesive devices; mechanics of writing - punctuation, capital letters. Grammar and Vocabulary: Cohesive devices - linkers, sign posts and transition signals; use of articles and zero article; prepositions.

UNIT - III	**The Death Trap: Saki**	

Lesson: 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, Paragraph Writing Grammar and Vocabulary: Verbs - tenses; subject-verb agreement; direct and indirect speech, reporting verbs for academic purposes.

UNIT - IV	**Innovation: Muhammad Yunus**	

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Lesson: Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video. Speaking: Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions. Reading: Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data. Writing: Letter Writing: Official Letters/Report Writing Grammar and Vocabulary: Quantifying expressions - adjectives and adverbs; comparing and contrasting; Voice - Active & Passive Voice.		
UNIT - V	**Motivation: The Dancer with a White Parasol: Ranjana Dave**	
Lesson: Listening: Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension. Speaking: Formal oral presentations on topics from academic contexts - without the use of PPT slides. Reading: Reading for comprehension. Writing: Writing structured essays on specific topics using suitable claims and evidences. Grammar and Vocabulary: Editing short texts –identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)		

Textbooks:
1. Language and Life: A Skills Approach- I Edition 2019, Orient Black Swan

Reference Books:
1. Bailey, Stephen. Academic writing: A handbook for international students. Routledge, 2014.
2. Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking. Heinley ELT; 2nd Edition, 2018.
3. Raymond Murphy's English Grammar in Use Fourth Edition (2012) E-book
4. Hewings, Martin. Cambridge Academic English (B2). CUP, 2012.
5. Oxford Learners Dictionary, 12th Edition, 2011
6. Norman Lewis Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary (2014)
7. Speed Reading with the Right Brain: Learn to Read Ideas Instead of Just Words by David Butler
8. A Remedial English Grammar For Foreign Students by Frederick T Wood.
9. Oxford English Grammar Course by Michael Swan & Catherine Walter

Web links

www.englishclub.com
www.easyworldofenglish.com
www.languageguide.org/english/
www.bbc.co.uk/learningenglish
www.eslpod.com/index.html www.myenglishpages.com

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Civil Engineering

Course Code	ENGINEERING GRAPHICS (Common to CIV & MECH.)	L	T	P	C
		1	0	4	3

I Year II Semester

Course Objectives:

- Bring awareness that Engineering Drawing is the Language of Engineers.
- Familiarize how industry communicates technical information.
- Teach the practices for accuracy and clarity in presenting the technical information.
- Develop the engineering imagination essential for successful design.
- Instruct the utility of drafting & modeling packages in orthographic and isometric drawings.
- Train the usage of 2D and 3D modeling.
- Instruct graphical representation of machine components.

Course Outcomes (CO):

- draw various curves applied in engineering.
- show projections of solids and sections graphically.
- draw the development of surfaces of solids.

UNIT - I	**Introduction to Engineering graphics**	

:Principles of Engineering Graphics and their significance-Conventions in drawing-lettering - BIS conventions.a) Conic sections including the rectangular hyperbola- general method only, b) Cycloid, epicycloids and hypocycloid - Normal and Tangent. c) Involutes –Normal and Tangent.

UNIT - II	**Projection of points, lines:**	

Projection of points in any quadrant, lines inclined to one or both planes, finding true lengths, angle made by lines.

UNIT - III	**Projections of regular planes and Solids**	

Projections of regular planes: inclined to one plane and both planes by rotational method.

Projections of solids: Projections of regular solids inclined to one plane by rotational or Auxiliary views method. – Prism, Cylinder, Pyramid, Cone.

UNT - IV	**Sections of solids and Development of surfaces**	

Sections of solids: Section planes and sectional view of right regular solids- prism, cylinder, Pyramid and cone. True shapes of the sections.

Development of surfaces: Development of surfaces of right regular solids-prism, cylinder, Pyramid, cone and their sectional parts.

UNIT-V	**Orthographic, Isometric Projections and Perspective projections**

Orthographic Projections: Systems of projections, conventions and application to orthographic projections.
Isometric Projections: Principles of isometric projection- Isometric scale; Isometric views: lines, planes, simple solids.
Perspective projections: Visual Ray Method.
Basic Definitions of Force – Stress – Strain – Elasticity. Shear force – Bending Moment –Torsion. Simple problems on Shear force Diagram and Bending moment Diagram for cantilever and simply supported beams.

Civil Engineering

Text Books

1. K.L.Narayana & P.Kannaiah, Engineering Drawing, 3/e, Scitech Publishers, Chennai, 2012.
2. N.D.Bhatt, Engineering Drawing, 53/e, Charotar Publishers, 2016.

References

1. Venugopal, Engineering Drawing and Graphics, 3/e, New Age Publishers, 2000.
2. Shah and Rana, Engineering Drawing, 2/e, Pearson Education, 2009
3. K.C.John, Engineering Graphics, 2/e, PHI, 2013
4. Basant Agarwal & C.M.Agarwal, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2008.

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Note:

1. Manual (part A) and Computer Aided Drafting (part B) classes can be held in alternative weeks for optimal utilization of computer facilities.
2. External examinations to be conducted both manual and computer mode with equal weight of marks.

Additional Sources

1. Youtube: http-sewor,Carleton.cag,kardos/88403/drawings.html conic sections-online, red woods.edu

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Civil Engineering

Course Code	BASIC CIVIL & MECHANICAL ENGINEERING LAB	L	T	P	C
		0	0	3	1.5
	I Year II Semester				

Course Objectives:

- Impart basic principles of stress, strain, shear force, bending moment and torsion.
- To teach principles of strain measurement using electrical strain gauges
- Describe technical details of power plants, gas turbines, hydro power plants and nonconventional energy sources.
- Teach different types of drives for power transmission
- Familiarize the sources of energy, power plant economics and environmental aspects.
- Outline the working components of different power plant.
- To teach working principle of hydraulic machinery.
- To familiarize the developments in IC engines.
- Explain the principles of refrigeration and air conditioning.

Course Outcomes (CO):

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

- Conducting bending tests on Cantilever beam and simply supported beam.
- Finding the Use of electrical resistance strain gauges
- Conducting Compression test and Water absorption test on Bricks
- Explain different working cycles of engine.
- Illustrate the working of refrigeration systems
- Evaluate heat balance sheet of IC engine.

List of Experiments

Any 10 of the following experiments are to be conducted:

1. Bending test on (Steel/Wood) Cantilever beam.
2. Bending test on (Steel/Wood) simply supported beam.
3. Use of electrical resistance strain gauges.
4. Compression test on Bricks
5. Water absorption test on Bricks
6. Torsion test.
7. Tests on closed coiled and open coiled helical springs

Basic Mechanical Engineering Laboratory Experiments

1. Load test on four stroke Diesel Engine with mechanical loading.
2. Load test on four stroke Diesel Engine with DC Generator loading.
3. Heat balance test on Four Stroke Diesel Engine.
4. Load test on two stroke petrol engine.
5. A) Study of Valve & Port diagram.   B) Study of boilers.
6. Performance test on vapour compression refrigeration system.
7. Performance test on vapour absorption refrigeration system.

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Civil Engineering

Course Code	ENGINEERING PHYSICS LAB	L	T	P	C
		0	0	3	1.5
	I Year II Semester				

Course Objectives:

- Understands the concepts of interference and diffraction and their applications.
- Understand the role of optical fiber parameters in communication.
- Recognize the importance of energy gap in the study of conductivity and hall effect in a semiconductor.
- Apply the principles of semiconductors in various electronic devices.
- Understand the role of Optical fiber parameters in engineering applications.
- Recognize the significance of laser by studying its characteristics and its applicationin finding the particle size.

List of Experiments

Note: - In the following list of experiments, out of 15 experiments any 12 experiments must be performed in a semester.

List of Physics Experiments:

1. Determination of wavelength of LASER light using diffraction grating.
2. Determine the thickness of the wire using wedge shape method.
3. Determination of the radius of curvature of the lens by Newton's ring method.
4. Determination of Dispersive power of a prism.
5. Magnetic field along the axis of a circular coil carrying current-Stewart Gee's method.
6. Rigidity modulus of material of a wire-dynamic method (Torsional pendulum).
7. To determine the numerical aperture of a given optical fiber and hence to find its acceptance angle.
8. To determine the energy gap of a semiconductor.
9. Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall effect.
10. Determination of spring constant of springs using Coupled Oscillator.
11. Sonometer: Verification of the three laws of stretched strings.
12. Resolving power of a grating.
13. Determination of hysteresis loss by tracing B-H Curve of ferromagnetic material.
14. Determination of ultrasonic velocity in liquid (Acoustic grating).
15. Resistivity of semiconductor by four probe method.

References Books:

1. S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S Chand Publishers, 2017.

2. http://vlab.amrita.edu/index.php -Virtual Labs, Amrita University.

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Civil Engineering

Course Code	COMMUNICATIVE ENGLISH LAB	L	T	P	C
	(Common to All Branches of Engineering)	0	0	3	1.5
	I Year II Semester				

Course Objectives:

- students will be exposed to a variety of self-instructional, learner friendly modes of language
- learning
- students will learn better pronunciation through stress, intonation and rhythm
- students will be trained to use language effectively to face interviews, group discussions,
- public speaking
- students will be initiated into greater use of the computer in resume preparation, report writing, format making etc

Course Outcomes (CO):

- Retrieve and reminisce the sounds of English Language
- Understand the different aspects of the English language
- Apply communication skills through various language learning activities
- Analyze the English speech sounds, stress, rhythm, intonation and syllable
- Evaluate and exhibit acceptable etiquette essential in social and professional settings
- Create awareness on mother tongue influence and neutralize it

List of Topics

1. Phonetics
2. Reading comprehension
3. Describing objects/places/persons
4. Role Play or Conversational Practice
5. JAM
6. Etiquettes of Telephonic Communication
7. Information Transfer
8. Note Making and Note Taking
9. E-mail Writing
10. Group Discussions-1
11. Resume Writing
12. Debates
13. Oral Presentations
14. Poster Presentation
15. Interviews Skills-1

Suggested Software

Orel, Walden Infotech, Young India Films

Reference Books

1. Bailey, Stephen. Academic writing: A handbook for international students. Routledge, 2014.
2. Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking. Heinley ELT; 2nd Edition, 2018.
3. Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
4. Hewings, Martin. Cambridge Academic English (B2). CUP, 2012.
5. A Textbook of English Phonetics for Indian Students by T.Balasubramanyam

Web Links

www.esl-lab.com
www.englishmedialab.com
www.englishinteractive.net

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Civil Engineering

Course Code	ENVIRONMENTAL SCIENCE	L	T	P	C
		2	0	0	0
	I Year II 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):

Students should be able to
- Grasp multidisciplinary nature of environmental studies and various renewable and nonrenewable resources
- Understand flow and bio-geo- chemical cycles and ecological pyramids.
- Understand various causes of pollution and solid waste management and related preventive measures.
- About the rainwater harvesting, watershed management, ozone layer depletion and waste land reclamation.
- Casus of population explosion, value education and welfare programmes

UNIT – I:	**Multidisciplinary Nature of Environmental Studies**

Definition, Scope and Importance – Need for Public Awareness.

NATURAL RESOURCES : Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. – Energy resources:

UNIT – II:	**Ecosystems, Biodiversity, and its Conservation**

ECOSYSTEMS: Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem:
    a.   Forest ecosystem.
    b.   Grassland ecosystem
    c.   Desert ecosystem
    d.   Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

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

UNIT – III:	**Environmental Pollution and Solid Waste Management**

ENVIRONMENTAL POLLUTION: Definition, Cause, effects and control measures of :
    a.   Air Pollution.
    b.   Water pollution
    c.   Soil pollution
    d.   Marine pollution
    e.   Noise pollution
    f.   Thermal pollution
    g.   Nuclear hazards

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

UNIT – IV:	Social Issues and the Environment

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

UNIT – V:	Human Population and the Environment

HUMAN POPULATION AND THE ENVIRONMENT: Population growth, variation among nations. Population explosion – Family Welfare Programmed. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.
FIELD WORK : Visit to a local area to document environmental assets River/forest grassland/hill/mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds – river, hill slopes, etc..

TEXT BOOKS :

1. Text book of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission, Universities Press.
2. Environmental Studies by Palaniswamy – Pearson education
3. **Environmental Studies by Dr.S.Azeem Unnisa, Academic Publishing Company**

REFERENCES :

1. Textbook of Environmental Science by Deeksha Dave and E.Sai Baba Reddy, Cengage Publications.
2. Text book of Environmental Sciences and Technology by M.Anji Reddy, BS Publication.
3. Comprehensive Environmental studies by J.P.Sharma, Laxmi publications.
4. Environmental sciences and engineering – J. Glynn Henry and Gary W. Heinke – Prentice hall of India Private limited.
5. A Text Book of Environmental Studies by G.R.Chatwal, Himalaya Publishing House
6. **Introduction to Environmental engineering and science by Gilbert M. Masters and Wendell P. Ela - Prentice hall of India Private limited.**

Sri Krishnadevaraya University College of Engineering & Technology
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Civil Engineering

S.No	Course Code	Course Name	Category	L-T-P	Credits
		Sri Krishnadevaraya University College of Engineering & Technology			

S.No	Course Code	Course Name	Category	L-T-P	Credits
		Sri Krishnadevaraya University College of Engineering & Technology			
		Dept. of Civil Engineering			
		II Year I Semester			
1.		Probability and Statistics for Civil Engineering	BS	3-0-0	3
2.		Solid Mechanics	PC	3-0-0	3
3.		Fluid mechanics and Hydraulics Machinery	PC	3-0-0	3
4.		Surveying	PC	3-0-0	3
5.		Building Materials and Planning	PC	3-0-0	3
6		UHV-II: Universal Human Values – Understanding harmony and Ethical Human Conduct	HS	2-1-0	3
7.		Strength of Materials LAB	PC	0-0-3	1.5
8.		Fluid Mechanics and Hydraulics Machinery Lab	PC	0-0-3	1.5
9.		Surveying Lab	PC	0-0-3	1.5
10.		**Skill oriented course** Application Development with Python	SC	1-0-2	2
				Total	**24.5**

Category	CREDITS
Basic Science course	3
Humanities and Social Science	3
Professional Core Courses	16.5
Skill oriented course	2
TOTAL CREDITS	**24.5**

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Civil Engineering

Course Code	PROBABILITY AND STATISTICS	L	T	P	C
	(Common to Civil & Mec)	3	0	0	3
	II Year I Semester				

Course Objectives:

- The theory of Probability and random variables.
- Usage of statistical techniques like testing of hypothesis, testing of significance, chi-square test and basic concepts of least square methods.

Course Outcomes (CO): Student will be able to

- Understand the concepts of probability, sampling distributions, test of hypothesis and Curve fitting.
- Explain the characteristics through correlation and regression tools.
- Apply Probability theory to find the chances of happening of events.
- Understand various probability distributions and calculate their statistical moments.
- Solve the problems on testing of hypothesis on large samples and small samples and fitting of the curves.

UNIT - I	**Probability Theory**	

Probability, probability axioms, addition law and multiplicative law of probability, conditional probability, Baye's theorem, random variables (discrete and continuous), probability density functions, properties, mathematical expectation.

UNIT - II	**Elementary Statistics**	

Introduction to statistics- definition-advantages-limitations-frequency distribution tables-Arithmetic mean, median, mode for grouped and ungrouped data-variance, standard deviation, co-efficient of variation. Correlation –properties, correlation co-efficient-Regression-properties-Regression co-efficient- relation between correlation co-efficient and Regression co-efficient

UNIT - III	**Random variables & Distributions**	

Probability distribution - Binomial, Poisson approximation to the binomial distribution and normal distribution-their properties.

UNIT - IV	**Testing of Hypothesis**	

Estimation-parameters, statistics, sampling distribution, 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	**Testing of significance & Curve fitting**	

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 . Curve Fitting: Fitting of Linear, Quadratic, Exponential curves, Least squares method.
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Civil Engineering

Textbooks:
1. S.C.Gupta and V.K.Kapoor, Fundamentals of Mathematical Statistics, 11th Edition, Sultan Chand & Sons
2. Vijay K Rohatgi, Statistical Inference, Aug 2003, Dover Publications Inc.
Reference Books:
1. S.P.Gupta, Statistical Methods, 33rd Edition, Sultan Chand & Sons. 2. M.K.Jain, S.R.K.Iyengar and R.K.Jain,
2. Numerical Methods for Science and Engineering Computation, 6th Edition, New Age International Publishers.
Online Learning Resources:
1. nptel.ac.in/courses/111107056
2. onlinelibrary.wiley.com
3. https://onlinecourses.nptel.ac.in/noc18ma12.

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Civil Engineering

Course Code	SOLID MECHANICS	L	T	P	C
		3	0	0	3
	II Year I Semester				

Course Objectives:

- 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.

UNIT - I	**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 simply supported and overhanging beams- analysis of propped cantilever beams under UDL and point loads.

UNIT - II	**Torsion**

Theory of pure torsion – Assumptions and Derivation of Torsion formula for circular shaft – Torsional moment of resistance – Polar section modulus – power transmission through shafts – Combined bending and torsion –Springs - Types of springs – deflection of close coiled helical springs under axial pull and axial couple – Carriage or leaf springs.

UNIT - III	**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 – Equivalent length – Slenderness ratio – Euler's critical stress – Limitations of Euler's theory – Rankine – Gordon formula – eccentric loading and Secant formula – Prof. Perry's formula.

UNIT - IV	**Compound Stresses and Strains**:

Two dimensional system, stress at a point on a plane, principal stresses and principal planes, Mohr circle of stress, and its applications. Two dimensional stress-strain system, principal strains and principal axis of strain, circle of strain.

UNIT - V	**THINAND THICK CYLINDERS:**

THIN CYLINDERS: Thin seamless cylindrical shells, Derivation of formula for longitudinal and circumferential stresses, hoop, longitudinal and volumetric strains, changes in dia, and volume of thin cylinders, Thin spherical shells. **THICK CYLINDERS:** Introduction Lame's theory for thick cylinders – Derivation of Lame's formulae –distribution of hoop and radial stresses across thickness, design of thick cylinders, compound cylinders, Necessary difference of radii for shrinkage, Thick spherical shells.

Textbooks:
1. R.S.Khurmi and N.Khurmi, "Strength of Materials (Mechanics of Solids)", S Chand And Company Limited, Ramnagar, New Delhi-110 055 2. R. K. Bansal, "Strength of Materials", Laxmi Publications (P) Ltd., New Delhi. 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.
Reference Books:
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. Schaum's outline series Strength of Materials, Mc Graw hill International Editions. 4. L.S. Srinath, Strength of Materials, Macmillan India Ltd., New Delhi.

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Civil Engineering

Course Code	FLUID MECHANICS AND HYDRAULICS MACHINERY	L	T	P	C
		3	0	0	3
	II Year I Semester				

Course Objectives:

- 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):

CO1: Understand the principles of fluid statics, kinematics and dynamics
CO2: Familiarize basic terms used in fluid mechanics
CO3: Understand flow characteristics and classify the flows
CO4: Apply the continuity, momentum and energy principles
CO5: 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 & Dynamics**	

Classification of fluid flow, Stream line, path line, streak line and stream tube; stream function, velocity potential function. One, two and three -dimensional continuity equations in Cartesian coordinates. **Fluid Dynamics**: Surface and body forces; 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	**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.

UNIT - IV	**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. Uniform Flow-Continuity Equation, Energy Equation and Momentum Equation, Characteristics of uniform flow, Chezy's formula, Manning's formula. Computation of Uniform flow. Specific energy, critical flow, discharge curve, Specific force, Specific depth, and Critical depth.

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;

R20 Regulations

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Civil Engineering

Textbooks:
1. P. M. Modi and S. M. Seth, "Hydraulics and Fluid Mechanics", Standard Book House 2. C. S. P. Ojha, R. Berndtsson and P. N. Chadramouli, "Fluid Mechanics and Machinery", Oxford University Press, 2010.
Reference Books:
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. 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.

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Civil Engineering

Course Code	SURVEYING	L	T	P	C
		3	0	0	3
	II Year I Semester				

Course Objectives:

- 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):

CO1: Calculate angles, distances and levels

CO2: Identify data collection methods and prepare field notes

CO3: Understand the working principles of survey instruments

CO4: Estimate the volumes of earth work

CO5: 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, indirect methods

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, interpolation and sketching of Contours.

Computation of Areas and Volumes: Areas - Determination of areas consisting of irregular boundary and regular boundary, Planimeter. Volumes - Computation of areas for level section and two level sections with and without transverse slopes, determination of volume of earth work in cutting and embankments, volume of borrow pits, capacity of reservoirs.

UNIT - III	Theodolite Surveying:

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

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

UNIT - IV	Tacheometric Surveying

Principles of Tacheometry, stadia and tangential methods of Tacheometry.

Curves: Types of curves and their necessity, elements of simple 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 - electromagnetic distance measuring system – Introduction to Global positioning System GPS.

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Textbooks:
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. 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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Civil Engineering

Course Code	BUILDING MATERIALS AND PLANNING	L	T	P	C
		3	0	0	3
	II Year I Semester				

Course Objectives:

This subject provides the knowledge of building by laws, registration, planning of various types of buildings different sign convention of various Civil Engineering Materials, Doors, windows, tiles of roof, drawing of building plans etc.

Course Outcomes (CO):

- Understand the construction, project managements
- To prepare the bar charts, schedules using CPM and PERT
- Understand the role and responsibilities of various engineers in work site and Department
- Understand the types of works and contract/ consultant systems.

UNIT - I	**STONES & BRICKS**:

PART-A

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

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 roofs-king and queen post trusses

UNIT - III	**Business Organizations and Markets**

UNIT III : 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.

UNIT - IV	**Capital Budgeting**

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.

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Civil Engineering

UNIT - V	
Given line diagram with specification to draw, plan, sections section and elevation	

Textbooks:
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
   1.

Reference Books:
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

Final Exam Pattern and Exam Time 04 Hrs

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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Civil Engineering

Course Code	UHV-II: UNIVERSAL HUMAN VALUES – UNDERSTANDING HARMONY AND ETHICAL HUMAN CONDUCT	L	T	P	C
		2	1	0	3
	II Year II Semester				

Course Objectives
- To help the students appreciate the essential complementarily 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 a 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 behaviour and mutually enriching interaction with Nature.

Thus, this course is intended to provide a much needed orientational input in value education to the young enquiring minds.

Course Methodology
1. The methodology of this course is explorational and thus universally adaptable. It involves a systematic and rational study of the human being vis-à-vis the rest of existence.
2. The course is in the form of 28 lectures (discussions) and 14 practice sessions.
3. It is free from any dogma or value prescriptions.
4. It is a process of self-investigation and self-exploration, and not of giving sermons. Whatever is found as truth or reality is stated as a proposal and the students are facilitated to verify it in their own right, based on their Natural Acceptance and subsequent Experiential Validation – the whole existence is the lab and every activity is a source of reflection.
5. This process of self-exploration takes the form of a dialogue between the teacher and the students to begin with, and then to continue within the student in every activity, leading to continuous self-evolution.
6. This self-exploration also enables them to critically evaluate their pre-conditionings and present beliefs.

Catalogue Description
Every human being has two sets of questions to answer for his/her life: a) what to do? and, b) how to do? The first set pertains to the value domain, and the other to the skill domain. Both are complimentary, but value domain has a higher priority. Today, education has become more and more skill biased, and hence, the basic aspiration of a human being, that is to live with happiness and prosperity, gets defeated, in spite of abundant technological progress. This course is aimed at giving inputs that will help to ensure the right understanding and right feelings in the students in their life and profession, enabling them to lead an ethical life. In this course, the students learn the process of self-exploration, the difference between the Self and the Body, the naturally acceptable feelings in relationships in a family, workplace and society, the comprehensive human goal in the society, the mutual fulfillment in the nature and the co-existence in existence. As a natural outcome of such inputs, they are able to evaluate an ethical life and profession ahead.

Course Syllabus
Module 1: Introduction-Basic Human Aspiration, its fulfillment through All-encompassing Resolution
The basic human aspirations and their fulfillment through Right understanding and Resolution, Right understanding and Resolution as the activities of the Self, Self being central to Human Existence; All-encompassing Resolution for a Human Being, its details and solution of problems in the light of Resolution
Module2: Right Understanding (Knowing)- Knower, Known & the Process
The domain of right understanding starting from understanding the human being (the knower, the experiencer and the doer) and extending up to understanding nature/existence – its interconnectedness and co-existence; and finally understanding the role of human being in existence (human conduct).
Module 3: Understanding Human Being
Understanding the human being comprehensively as the first step and the core theme of this course; human being as co-existence of the self and the body; the activities and potentialities of the self; Basis for harmony/contradiction in the self
Module 4: Understanding Nature and Existence
A comprehensive understanding (knowledge) about the existence, Nature being included; the need and process of inner evolution (through self-exploration, self-awareness and self-evaluation), particularly

awakening to activities of the Self: Realization, Understanding and Contemplation in the Self (Realization of Co-Existence, Understanding of Harmony in Nature and Contemplation of Participation of Human in this harmony/ order leading to comprehensive knowledge about the existence).

Module 5: Understanding Human Conduct, All-encompassing Resolution & Holistic Way of Living
Understanding Human Conduct, different aspects of All-encompassing Resolution (understanding, wisdom, science etc.), Holistic way of living for Human Being with All-encompassing Resolution covering all four dimensions of human endeavor viz.,
realization, thought, behavior and work (participation in the larger order) leading to harmony at all levels from Self to Nature and entire Existence

Textbook
1. R R Gaur, R Asthana, G P Bagaria, 2019 (2nd Revised Edition), A Foundation Course inHuman Values and Professional Ethics. ISBN 978-93-87034-47-1, Excel Books, New Delhi.

References
1. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and Harper Collins, USA
2. E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.
3. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
4. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome's report, Universe Books.
5. A Nagraj, 1998, Jeevan Vidya EkParichay, Divya Path Sansthan, Amarkantak.
6. P L Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers.
7. A N Tripathy, 2003, Human Values, New Age International Publishers.
8. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen (Vaidik) Krishi Tantra Shodh, Amravati.
9. E G Seebauer& Robert L. Berry, 2000, Fundamentals of Ethics for Scientists &Engineers, Oxford University Press
10. M Govindrajran, S Natrajan& V.S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.
11. B P Banerjee, 2005, Foundations of Ethics and Management, Excel Books.
12. B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008.

Mode of Evaluation:
Based on participation of student in classroom discussions/Self-assessment/Peer assessment/Assignments/ Seminar/Continuous Assessment Test/Semester End Exam
Socially relevant project/Group Activities/Assignments may be given importance in this course

Course Outcomes
At the end of the course, the students will be able to
1. Evaluate the significance of value inputs in formal education and start applying them in their life and profession
2. Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.
3. Analyze the value of harmonious relationship based on trust and respect in their life and profession
4. Examine the role of a human being in ensuring harmony in society and nature.
5. Apply the understanding of ethical conduct to formulate the strategy for ethical life and profession.

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Course Code	STRENGTH OF MATERIALS LABORATORY	L	T	P	C
		0	0	3	1.5
	II Year I Semester				

Course Objectives:

By performing this laboratory, the student will be able to know the structural behavior 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 Open coiled springs
- Compression test on Closely coiled springs
- 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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Civil Engineering

Course Code	SURVEYING LABORATORY	L	T	P	C
		0	0	3	1.5
	II Year I 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, thedolite surveying and total station.

Experiments

- 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.

- Total Station Determination of area using total station. Traversing and Contouring

- Total Station: Determination of Remote height.

- Developing a Contour map

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Course Code	FLUID MECHANICS AND	L	T	P	C
	HYDRAULIC MACHINERY LAB	0	0	3	1.5
II Year I 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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Course Code	APPLICATION DEVELOPMENT WITH PYTHON	L	T	P	C
		1	0	2	2
	II Year I Semester				

Course Objectives:
- To learn the basic concepts of software engineering and life cycle models
- To explore the importance of Databases in application Development
- Acquire programming skills in core Python
- To understand the importance of Object-oriented Programming

Course Outcomes (CO):

Students should be able to
- Identify the issues in software requirements specification and enable to write SRS documents for software development problems
- Explore the use of Object-oriented concepts to solve Real-life problems
- Design database for any real-world problem
- Solve mathematical problems using Python programming language

Module 1. Basic concepts in software engineering and software project management

Basic concepts: abstraction versus decomposition, the evolution of software engineering techniques, Software development life cycle
Software project management: project planning and project scheduling

Task:
1. Identifying the Requirements from Problem Statements

Module 2. Basic Concepts of Databases
Database systems applications, Purpose of Database Systems, view of Data, Database Languages, Relational Databases, Data Definition Language(DDL) Statements: (Create table, Alter table, Drop table), Data Manipulation Language(DML) Statements
Task:
1. Implement Data Definition Language(DDL) Statements: (Create table, Alter table, Drop table)
2. Implement Data Manipulation Language(DML) Statements

Module 3. Python Programming:
Introduction to Python: Features of Python, Data types, Operators, Input and output, Control Statements, Looping statements
Python Data Structures: Lists, Dictionaries, Tuples.

Strings: Creating strings and basic operations on strings, string testing methods.

Functions: Defining a function- Calling a function- Types of functions-Function Arguments-Anonymous functions- Global and local variables

OOPS Concepts; Classes and objects- Attributes- Inheritance- Overloading- Overriding- Data hiding

Modules and Packages: Standard modules-Importing own module as well as external modules Understanding Packages Powerful Lamda function in python Programming using functions, modules and external packages

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Working with Data in Python: Printing on screen- Reading data from keyboard- Opening and closing file- Reading and writing files- Functions-Loading Data with Pandas-Numpy

Tasks:
1. OPERATORS
a. Read a list of numbers and write a program to check whether a particular element is present or not using membership operators.
b. Read your name and age and write a program to display the year in which you will turn 100 years old.
c. Read radius and height of a cone and write a program to find the volume of a cone.
d. Write a program to compute distance between two points taking input from the user (Hint: use Pythagorean theorem)

2. CONTROL STRUCTURES
a. Read your email id and write a program to display the no of vowels, consonants, digits and white spaces in it using if…elif…else statement.
b. Write a program to create and display a dictionary by storing the antonyms of words. Find the antonym of a particular word given by the user from the dictionary using while loop.
c. Write a Program to find the sum of a Series $1/1! + 2/2! + 3/3! + 4/4! + \ldots\ldots + n/n!$. (Input :n = 5, Output : 2.70833)
d. In number theory, an abundant number or excessive number is a number for which the sum of its proper divisors is greater than the number itself. Write a program to find out, if the given number is abundant. (Input: 12, Sum of divisors of $12 = 1 + 2 + 3 + 4 + 6 = 16$, sum of divisors 16 > original number 12)

3: LIST
a. Read a list of numbers and print the numbers divisible by x but not by y (Assume x = 4 and y = 5).
b. Read a list of numbers and print the sum of odd integers and even integers from the list.(Ex: [23, 10, 15, 14, 63], odd numbers sum = 101, even numbers sum = 24)
c. Read a list of numbers and print numbers present in odd index position. (Ex: [10, 25, 30, 47, 56, 84, 96], The numbers in odd index position: 25 47 84).
d. Read a list of numbers and remove the duplicate numbers from it. (Ex: Enter a list with duplicate elements: 10 20 40 10 50 30 20 10 80, The unique list is: [10, 20, 30, 40, 50, 80])

4: TUPLE
a. Given a list of tuples. Write a program to find tuples which have all elements divisible by K from a list of tuples. test_list = [(6, 24, 12), (60, 12, 6), (12, 18, 21)], K = 6, Output : [(6, 24, 12), (60, 12, 6)]
b. Given a list of tuples. Write a program to filter all uppercase characters tuples from given list of tuples. (Input: test_list = [("GFG", "IS", "BEST"), ("GFg", "AVERAGE"), ("GfG",), ("Gfg", "CS")], Output : [(„GFG", „IS", „BEST")]).
c. Given a tuple and a list as input, write a program to count the occurrences of all items of the list in the tuple. (Input : tuple = ('a', 'a', 'c', 'b', 'd'), list = ['a', 'b'], Output : 3)

5: SET
a. Write a program to generate and print a dictionary that contains a number (between 1 and n) in the form (x, x*x).
b. Write a program to perform union, intersection and difference using Set A and Set B.
c. Write a program to count number of vowels using sets in given string (Input : "Hello World", Output: No. of vowels : 3)
d. Write a program to form concatenated string by taking uncommon characters from two strings using set concept (Input : S1 = "aacdb", S2 = "gafd", Output : "cbgf").

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6: DICTIONARY
a. Write a program to do the following operations:
i. Create a empty dictionary with dict() method
ii. Add elements one at a time
iii. Update existing key"s value
iv. Access an element using a key and also get() method
v. Deleting a key value using del() method
b. Write a program to create a dictionary and apply the following methods:
i. pop() method
ii. popitem() method
iii. clear() method
c. Given a dictionary, write a program to find the sum of all items in the dictionary.
d. Write a program to merge two dictionaries using update() method.

7: STRINGS
a. Given a string, write a program to check if the string is symmetrical and palindrome or not. A string is said to be symmetrical if both the halves of the string are the same and a string is said to be a palindrome string if one half of the string is the reverse of the other half or if a string appears same when read forward or backward.
b. Write a program to read a string and count the number of vowel letters and print all letters except 'e' and 's'.
c. Write a program to read a line of text and remove the initial word from given text. (Hint: Use split() method, Input : India is my country. Output : is my country)
d. Write a program to read a string and count how many times each letter appears. (Histogram).

8: USER DEFINED FUNCTIONS
a. A generator is a function that produces a sequence of results instead of a single value. Write a generator function for Fibonacci numbers up to n.
b. Write a function merge_dict(dict1, dict2) to merge two Python dictionaries.
c. Write a fact() function to compute the factorial of a given positive number.
d. Given a list of n elements, write a linear_search() function to search a given element x in a list.

9: BUILT-IN FUNCTIONS
a. Write a program to demonstrate the working of built-in statistical functions mean(), mode(), median() by importing statistics library.
b. Write a program to demonstrate the working of built-in trignometric functions sin(), cos(), tan(), hypot(), degrees(), radians() by importing math module.
c. Write a program to demonstrate the working of built-in Logarithmic and Power functions exp(), log(), log2(), log10(), pow() by importing math module.
d. Write a program to demonstrate the working of built-in numeric functions ceil(), floor(), fabs(), factorial(), gcd() by importing math module.

10. CLASS AND OBJECTS
a. Write a program to create a BankAccount class. Your class should support the following methods for
i) Deposit
   ii) Withdraw
   iii) GetBalanace
   iv) PinChange
b. Create a SavingsAccount class that behaves just like a BankAccount, but also has an interest rate and a method that increases the balance by the appropriate amount of interest (Hint:use Inheritance).

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c. Write a program to create an employee class and store the employee name, id, age, and salary using the constructor. Display the employee details by invoking employee_info() method and also using dictionary (dict).

d. Access modifiers in Python are used to modify the default scope of variables. Write a program to demonstrate the 3 types of access modifiers: public, private and protected.

11. FILE HANDLING

a. . Write a program to read a filename from the user, open the file (say firstFile.txt) and then perform the following operations:
   i. Count the sentences in the file.
   ii. Count the words in the file.
   iii. Count the characters in the file.

b. . Create a new file (Hello.txt) and copy the text to other file called target.txt. The target.txt file should store only lower case alphabets and display the number of lines copied.

c. Write a Python program to store N student"s records containing name, roll number and branch. Print the given branch student"s details only.

References:

1. Rajib Mall, "Fundamentals of Software Engineering", 5th Edition, PHI, 2018.
2. RamezElmasri, Shamkant, B. Navathe, "Database Systems", Pearson Education, 6th Edition, 2013.
3.Reema Thareja, "Python Programming - Using Problem Solving Approach", Oxford Press, 1st Edition, 2017.
4. Larry Lutz, "Python for Beginners: Step-By-Step Guide to Learning Python Programming", CreateSpace Independent Publishing Platform, First edition, 2018

Online Learning Resources/Virtual Labs:

1. http://vlabs.iitkgp.ernet.in/se/
2. http://vlabs.iitb.ac.in/vlabs-dev/labs/dblab/index.php
3. https://python-iitk.vlabs.ac.in

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Dept. of Civil Engineering					
II Year IInd Semester					
S.No	Course Code	Course Name	Category	L-T-P	Credits
1.		Mathematical Modeling & Optimization Techniques	BS	3-0-0	3
2.		Engineering Geology	ES	3-0-0	3
3.		Environmental Engineering	PC	3-0-0	3
4.		Concrete Technology	PC	3-0-0	3
5.		Managerial Economics and Financial Analysis	HS	3-0-0	3
6.		Engineering Geology Lab	ES	0-0-3	1.5
7.		Concrete Technology Lab	PC	0-0-3	1.5
8.		Environmental Engineering Lab	PC	0-0-3	1.5
9.		**Skill Oriented Course –II** Soft Skills	SC	1-0-2	2
				Total	**21.5**
Community Service Project (Mandatory) for 2 Months duration during summer vacation					

Category	CREDITS
Basic Science course	3
Engineering Science Courses	4.5
Professional Core Courses	9
Humanities and Social Sciences	3
Skill Oriented Course	2
TOTAL CREDITS	**21.5**

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Course Code	Mathematical Modeling & Optimization Techniques	L	T	P	C
		3	0	0	3
	II Year II Semester				

Course Objectives:

This course enables the students to classify and formulate real-life problem for modeling as optimization problem

Course Outcomes (CO):

CO1: Know about the classifications and stages of mathematical modeling
CO2: Understand building of mathematical models
CO3: Study the behavior of mathematical models
CO4: Formulate a linear programming problem and solve it by various methods
CO5: Give an optimal solution in assignment jobs, give transportation of items from sources to destinations.

UNIT - I	**Introduction to Modelling, Building Models, Studying Models**

What is mathematical modelling? What objectives can modelling achieve? Classifications of models Stages of modelling . Systems analysis- Making assumptions- Flow diagrams- Choosing mathematical equations.

UNIT - II	**Studying Models**

Equations from the literature- Analogies from physics-Data exploration,
Dimensionless form - Asymptotic behaviour- Sensitivity analysis - Modelling model output

UNIT - III	**Linear programming problems(LPP)**

Linear programming problems (LPP)-Graphical method-Simplex method-Big M Method-Dual simplex method

UNIT - IV	**Transportation&Assignment Problem**

Formulation of transportation model, Basic feasible solution using different methods, Optimality Methods, Unbalanced transportation problem, Degeneracy in transportation problems, Applications of Transportation problems. Assignment Problem: Formulation, unbalanced assignment problem, Travelling salesman problem-

UNIT - V	**Game Theory**

Formulation of games, Two person-Zero sum game, Mini max and Max min Principle, games with and without saddle point, Rules of dominance, Solving a 2/2 game using graphical method.

Textbooks:
1. Mathematical Modeling: by Majid Jaberi-Douraki and Seyed M. Moghadas
2. Operations Research , S.D. Sharma.

Reference Books:
1. Mathematical Models in Applied Mechanics A.B. Tayler
2. Operations Research, An Introduction, Hamdy A. Taha, Pearson publishers.

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Civil Engineering

Course Code	ENGINEERING GEOLOGY	L	T	P	C
		3	0	0	3
	II Year II Semester				

Course Objectives:

The objective of this course is to give the basic knowledge of Geology that is required for construction of various Civil Engineering Structures. It includes basics of Geology.

Course Outcomes (CO):

CO1: Get the knowledge of principles of engineering geology.

CO2:Understand the properties of soil, various rocks and minerals

CO3: Judge the suitability of sites for various civil engineering structures.

CO4: Use the knowledge of geological strata in the analysis and design the civil engineering structures.

CO5: Acquire the knowledge of deciding the suitability of water and soil conservation projects

UNIT - I	INTRODUCTION	

Importance of geology from Civil Engineering point of view. Brief study of case histories of failure of some Civil Engineering constructions due to geological draw backs. Importance of Physical geology, Petrology and Structural geology. **WEATHERING OF ROCKS:** Its effect over the properties of rocks importance of weathering with reference to dams, reservoirs and tunnels weathering of common rock like "Granite"

UNIT - II	MINERALOGY	

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 , Quartiz , Flint , Jasper, Olivine , Augite , Hornblende , Muscovite , Biotite , Asbestos, Chlorite , Kyanite , Garnet, Talc , Calcite. Study of other common economics minerals such as Pyrite, Hematite, Magnetite, Chrorite , 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:** Out crop, strike and dip study of common geological structures associating with the rocks such as folds, faults un conformities, and joints – their important types. Their importance Insitu and drift soils, common types of soils, their origin and occurrence in India

UNIT - IV	EARTH QUAKE &LAND SLIDES	

Earth quakes, 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 earth quakes 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	GEOLOGY OF DAMS AND RESERVOIRS	

Types of dams and bearing of Geology of site in their selection, Geological Considerations in the selection of a dam site. 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. **TUNNELS**: Purposes of tunneling, Effects of Tunneling on the ground Role of Geological Considerations. Structural and ground water in tunneling over break and lining in tunnels.

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Textbooks:
1. Engineering Geology by N.Chennkesavulu, Mc-Millan, India Ltd. 2005 2. Engineering Geology by D.Venkata Reddy, Vikas Publications, New Delhi.
Reference Books:
1. Engineerring geology by Prabin singh 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

Civil Engineering

Course Code	ENVIRONMENTAL ENGINEERING	L	T	P	C
		3	0	0	3

II Year II Semester

Course Objectives:

- To teach requirements of water and its treatment.
- To impart knowledge on sewage treatment methodologies.
- To provide facts on Air pollution and control.
- To enable with design concepts of wastewater treatment UNITs
- To throw light on importance of plumbing.

Course Outcomes (CO):

CO1: Understand about quality of water and purification process
CO2: Select appropriate technique for treatment of waste water.
CO3: Assess the impact of air pollution
CO4: Understand consequences of solid waste and its management.
CO5: Design domestic plumbing systems.

UNIT - I	Water quality and treatment:

Water quality: Sources of Water and quality issues, water quality requirement for different beneficial uses, Water quality standards, water quality indices, water safety plans, Water Supply systems, Need for planned water supply schemes, Water demand industrial and agricultural water requirements, Components of water supply system; Transmission of water, Distribution system, Various valves used in W/S systems, service reservoirs and design.
Water Treatment: aeration, sedimentation, coagulation flocculation, filtration, disinfection, advanced treatments like adsorption, ion exchange, membrane processes

UNIT - II	Sewage and Treatment:

Domestic and Storm water, Quantity of Sewage, Sewage flow variations. Conveyance of sewage- Sewers, shapes design parameters, operation and maintenance of sewers, Sewage pumping; Sewerage, Sewer appurtenances, Design of sewerage systems. Small bore systems, Storm Water- Quantification and design of Storm water; Sewage and Sullage, Pollution due to improper disposal of sewage, National River cleaning plans, Wastewater treatment – COD & BOD- aerobic and anaerobic treatment systems, suspended and attached growth systems, recycling of sewage – quality requirements for various purposes.

UNIT - III	Air Pollution

Composition and properties of air, Quantification of air pollutants, Monitoring of air pollutants, Air pollution- Occupational hazards, Urban air pollution automobile pollution, Chemistry of combustion, Automobile engines, quality of fuel, operating conditions and interrelationship. Air quality standards, Control measures for Air pollution, construction and limitations

UNIT - IV	**Solid Waste Management**

Municipal solid waste-Composition - chemical and physical parameters - Collection, transport, treatment and disposal. waste from commercial establishments and other urban zones- construction activities - biomedical wastes, Effects of solid waste on environment. Disposal of solid waste- Disposal methods- Integrated solid waste management

UNIT - V	**Domestic Plumbing**

Types of home plumbing systems for water supply and waste water disposal, high rise building plumbing-Pressure reducing valves, Break pressure tanks, Storage tanks, Building drainage for high rise buildings, various kinds of fixtures and fittings. Role of Government authorities in water supply, sewerage disposal.

Textbooks:

1. G. S. Birdi, "Water supply and sanitary Engineering", Dhanpat Rai & Sons Publishers.
2. Peavy, H.S, Rowe, D. R. Tchobanoglous, "Environmental Engineering", Mc-Graw – Hill International Editions, New York 1985.

Reference Books:

1. B.C. Punmia, Ashok Jain & Arun Jain, "Water Supply Engineering", Vol. 1, Waste water Engineering, Vol. II, Laxmi Publications Pvt. Ltd, New Delhi.
2. MetCalf and Eddy, "Wastewater Engineering", Treatment, Disposal and Reuse, Tata McGraw- Hill, New Delhi.
3. S. M. Patil, "Plumbing Engineering Theory, Design and Practice",1999.
4. K. N. Duggal, "Elements of Environmental Engineering", S. Chand Publishers.

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Course Code	CONRETE TECHNOLOGY	L	T	P	C
		3	0	0	3

| **II Year II Semester** | | | | | |

Course Objectives:

- 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:

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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Course Code	MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS	L	T	P	C
		3	0	0	3
	II Year II Semester				

Course Objectives:
- To inculcate the basic knowledge of micro economics and financial accounting
- To make the students learn how demand is estimated for different products
- To know the input- output relationship for optimizing production and cost
- 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 (COs):

CO1: Understand the fundamentals of Economics viz., Demand, Production, cost and revenue.
CO2: Apply concepts of production , cost and revenues for effective business decisions.
CO3: Students can analyze how to invest their capital and maximize returns.
CO4: Evaluate the capital budgeting techniques
CO5: Prepare the accounting statements and evaluate the financial performance of
business entity.

UNIT - I	INTRODUCTION TO MANAGERIAL ECONOMICS

Introduction to Economics and Managerial Economics – Definitions-Nature and Scope of Managerial Economics–Demand Analysis- Demand determinants- Law of Demand – Exceptions of law of demand

UNIT - II	ELASTICITY AND FORECASTING DEMAND

Elasticity of Demand- Definition-Types-Measurement - Significance of Elasticity of Demand Demand Forecasting- Factors governing demand forecasting- Methods of demand forecasting (survey methods- statistical methods- expert opinion method- test marketing- controlled experiments-judgmental approach to demand forecasting)

UNIT - III	THEORY OF PRODUCTION AND COST ANALYSIS

Production Function – Iso-quants, Iso-costs, MRTS- least cost combination of inputs- Cobb-Douglas production function -laws of returns - Internal and External economies of scale. Cost concepts- opportunity cost- fixed Vs variable costs-explicit costs Vs Implicit costs- out of pocket costs Vs Imputed costs- Break-Even Analysis (BEA)- Determination of Break Even Point -Simple Problems- Managerial significance and limitations of BEA.

UNIT - IV	FORMS OF BUSINESS ORGANIZATIONS AND NEW ECONOMIC ENVIRONMENT

Business & New Economic Environment- Forms of business organizations-Factors affecting the choice of form of business organization- Features and evaluation of Sole Proprietorship- Partnership- Joint Stock Company- Public Enterprises and their types- Liberalization- Privatization-Globalization - Changing Business Environment in Post-liberalization scenario

UNIT - V	CAPITAL BUDGETING AND FINACIAL ACCOUNTING

Concept of Capital - Significance - Types of Capital - Components of Working Capital - Sources of Short-term and Long-term Capital - Estimating Working capital requirements – Cash Budget - Capital Budgeting – Features of Capital Budgeting Proposals – Methods and Evaluation of Capital Budgeting Projects : Pay Back Method – Accounting Rate of Return (ARR) – Net Present Value (NPV) method (simple problems)-Introduction to Financial Accounting-Double-Entry Book Keeping- preparation of Journal- Ledger-Trial Balance- Final Accounts (Trading & Profit and Loss Account and Balance Sheet with simple adjustments).

Textbooks:
1. Varshney & Maheswari: "Managerial Economics", Sultan Chand, 2013.
2. Aryasri: "Business Economics and Financial Analysis", 4th edition, MGH, 2019

Reference Books:
1. Ahuja Hl "Managerial economics" 3rd edition, Schand, ,2013
2. S.A. Siddiqui and A.S. Siddiqui: "Managerial Economics and Financial Analysis", New Age International,. 2013.
3. Joseph G. Nellis and David Parker:"Principles of Business Economics", 2nd edition, Pearson, New Delhi.
4. Domnick Salvatore: "Managerial Economics in a Global Economy", Cengage, 2013

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Course Code	CONCRETE TECHNOLOGY LAB	L	T	P	C
		0	0	3	1.5
	II Year II Semester				

Course Objectives:

- To learn laboratory tests and their procedures cement, fine aggregate, course aggregates and bitumen
- To evaluate fresh concrete properties.

List of Experiments:

Test on Cement

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

Test on Aggregates (Coarse and Fine)

1. Specific gravity (Pycnometer and wire basket),water absorption
2. Shape (Flakiness and elongation indices)
3. Impact and abrasion value tests
4. Crushing resistance and durability tests
5. 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

1. Slump test
2. CF (compact factor stress)
3. Vee-bee Test
4. Flow Table Test

Test on hardened concrete and Non Destructive Testing

1. Compression test on cubes & Cylinders
2. Flexure test
3. Modulus of Elasticity
4. Rebound Hammer Test
5. Ultra-Sonic Pulse Velocity Test.

IS CODES:

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. 1S 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. 1S 1201 -1220 (1978) "Methods for testing tars and bituminous materials"

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Civil Engineering

Course Code	ENVIRONMENTAL ENGINEERING LAB	L	T	P	C
		0	0	3	1.5
	II Year II Semester				

List of Experiments:

1.Determination of pH and Turbidity
2. Determination of Conductivity and Total dissolved solids.
3. Determination of Alkalinity/Acidity.
4. Determination of Chlorides.
5. Determination and Estimation of total solids, organic solids and inorganic solids.
6. Determination of iron.
7. Determination of Dissolved Oxygen.
8. Determination of Nitrogen.
9. Determination of total Phosphorous.
10. Determination of B.O.D
11. Determination of C.O.D
12. Determination of Optimum coagulant dose.
13. Determination of Chlorine demand.
14. Presumptive coliform test.
NOTE: At least 8 of the above experiments are to be conducted

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Civil Engineering

Course Code	**ENGINEERING GEOLOGY LAB**	L	T	P	C
		0	0	3	1.5
	II Year II 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:

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

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Course Code	SOFT SKILLS	L	T	P	C
		1	0	2	2
	II Year II 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 develop leadership skills and organizational skills through group activities
- To function effectively with heterogeneous teams

Course Outcomes (CO):

By the end of the program students should be able to
- Memorize various elements of effective communicative skills
- Interpret people at the emotional level through emotional intelligence
- apply critical thinking skills in problem solving
- analyse the needs of an organization for team building
- Judge the situation and take necessary decisions as a leader
- Develop social and work-life skills as well as personal and emotional well-being

UNIT – I	Soft Skills & Communication Skills	10 Hrs

Introduction, meaning, significance of soft skills – definition, significance, types of communication skills - Intrapersonal & Inter-personal skills - Verbal and Non-verbal Communication

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	10 Hrs

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

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 –
Methods of decision making – 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

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UNIT – IV	Emotional Intelligence & Stress Management	10 Hrs

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	Leadership Skills	10 Hrs

Team-Building – Decision-Making – Accountability – Planning – Public Speaking – Motivation – Risk-Taking - Team Building - Time Management

Activities:

Forming group with a consensus among the participants- choosing a leader- encouraging the group members to express views on leadership- democratic attitude- sense of sacrifice – sense of adjustment – vision – accommodating nature- eliciting views on successes and failures of leadership using the past knowledge and experience of the participants, Public Speaking, Activities on Time Management, Motivation, Decision Making, Group discussion etc.

NOTE-:

1. 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.

2. Case studies may be given wherever feasible for example for Decision Making- The decision of King Lear or for good Leadership – Mahendar Singh Dhoni etc.

Textbooks:

1. Personality Development and Soft Skills (English, Paperback, Mitra Barun K.)Publisher: Oxford University Press; Pap/Cdr edition (July 22, 2012)
2. Personality Development and Soft Skills: Preparing for Tomorrow, Dr Shikha KapoorPublisher : I K International Publishing House; 0 edition (February 28, 2018)

Reference Books:

1. Soft skills: personality development for life success by Prashant Sharma, BPB publications 2018.
2. Soft Skills By Alex K. Published by S.Chand
3. Soft Skills: An Integrated Approach to Maximise Personality Gajendra Singh Chauhan, Sangeetha Sharma Published by Wiley.
4. Communication Skills and Soft Skills (Hardcover, A. Sharma) Publisher: Yking books
5. SOFT SKILLS for a BIG IMPACT (English, Paperback, RenuShorey) Publisher: Notion Press
6. Life Skills Paperback English Dr. Rajiv Kumar Jain, Dr. Usha Jain Publisher: Vayu Education of India

Online Learning Resources:

1. https://youtu.be/DUlsNJtg2L8?list=PLLy_2iUCG87CQhELCytvXh0E_y-bOO1_q
2. https://youtu.be/xBaLgJZ0t6A?list=PLzf4HHlsQFwJZel_j2PUy0pwjVUgj7KlJ
3. https://youtu.be/-Y-R9hDl7lU
4. https://youtu.be/gkLsn4ddmTs
5. https://youtu.be/2bf9K2rRWwo
6. https://youtu.be/FchfE3c2jzc

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Civil Engineering

	Sri Krishnadevaraya University College of Engineering & Technology				
	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.		Structural Analysis- 1	PC	3-0-0	3
4.		**Open Elective – I**	OE	3-0-0	3
5.		**Professional Elective – I**	PE	3-0-0	3
6.		Geotechnical Lab	PC	0-0-3	1.5
7.		Survey Field Work Lab (Survey Camp)	PC	0-0-3	1.5
8.		**Skill advanced course/ soft skill course***	SC	1-0-2	2
		Mandatory course (AICTE suggested)		2-0-0	
9.		Evaluation of Community Service Project	PR		1.5
				Total	**21.5**

List of Professional Electives-I	**List of Open Electives-I**
4. Water resource Engineering 5. Building service and Maintenance 6. Expansive soils	2. Candidate should select the subject from list of subjects offered by other departments

Category	CREDITS
Professional core Courses	12
Professional Elective courses	3
Open Elective Course/Job oriented elective	3
Skill advanced course/ soft skill course*	2
Summer Internship	1.5
TOTAL CREDITS	**21.5**

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Course Code	GEOTECHNICAL ENGINEERING	L	T	P	C
		3	0	0	0

III Year I Semester

Course Objectives:

- The knowledge of this subject is essential to use basics in Soil Mechanics and knowledge of classification of soils, seepage analysis and stress distribution in soils etc

Course Outcomes (CO):

- Ability to understand the soil classification and properties of soils.
- Ability to know seepage analysis, compaction and consolidation of soils.
- Ability to understand the shear strength of soils.
- Ability to design Mohrs Circle

UNIT - I	Introduction	

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, Grain size analysis, Sieve and Hydrometer methods, consistency limits and indices – I.S. Classification of soils

UNIT - II	PERMEABILITY	

PERMEABILITY: Soil water, capillary rise, flow of water through soils, Darcy's law- permeability, Factors affecting – laboratory determination of coefficient of permeability, Permeability of layered systems. **SEEPAGE THROUGH SOILS:** Total, neutral and effective stresses, quick sand condition, Seepage through soils, Flownets: Characteristics and Uses.

UNIT - III	STRESS DISTRIBUTION IN SOILS	

STRESS DISTRIBUTION IN SOILS: Boussinesq's and Wester gaard's theories for point loads and areas of different shapes, Newmark's influence chart, construction and uses.

UNIT - IV	COMPACTION	

COMPACTION: Mechanism of compaction, factors affecting, effect of compaction on physical and engineering properties of soils. field compaction Equipment. **CONSOLIDATION:** Stress history of clay; e-p and e-log p curves – magnitude and rate of 1-D consolidation Terzaghi's Theory

UNIT - V	SHEAR STRENGTH OF SOILS	

SHEAR STRENGTH OF SOILS: Stress at a point, Mohr circle of stress, Mohr-Coulomb Failure theories –Types of laboratory strength tests, strength tests based on drainage conditions – Shear strength of sands – Critical Void Ratio, Liquefaction-shear strength of clays

Textbooks:

1. Basic and Applied Soil Mechanics by Gopal Ranjan & ASR Rao, New age International Pvt . Ltd, New Delhi.
2. Soil Mechanics and Foundation Engg. By K.R. Arora, Standard Publishers and Distributors, Delhi.
3. Soil Mechanics and Foundation by by B.C.Punmia, Ashok Kumar Jain and Arun Kumar
4. Geotechnical Engineering V.N.S.Murthy, CRC Press, Newyork, Special Indian Edition.

Reference Books:

1. Geotechnical Engineering by C. Venkataramiah, New age International Pvt . Ltd, (2002).
2. Soil Mechanics – T.W. Lambe and Whitman, Mc-Graw Hill Publishing Company, Newyork.
3. Geotechnical Engineering by Brije.M.Das, Cengage Publications, New Delhi.
4. Geotechnical Engineering by Purushotham Raj.
5. Geotechnical Engineering by Manoj Dutta & Gulati S.K – Tata Mc.Grawhill Publishers New Delhi.

Course Code	DESIGN OF REINFORCED CONCRETE STRUCTURES	L	T	P	C
		3	0	0	3

III Year I Semester

Course Objectives:

- To introduce the need for reinforced concrete structures, different method to design the members. To design beams, columns, footings, slabs and serviceability requirements

Course Outcomes (CO):

On successful completion of the course, the students will have the:

1. Methods to design reinforced structural members
2. Able to design various structural members in reinforced concrete.

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 footing

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:

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:

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 Delhi.

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Course Code	STRUCTURAL ANALYSIS-I	L	T	P	C
		3	0	0	3
	III Year I Semester				

Course Objectives:

The objective of the course is to make the student to understand about structural analysis for fixed, continuous beams with and without supports using different methods.

UNIT - I			

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 - II			

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 - III			

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

UNIT - IV			

MOMENT DISTRIBUTION METHOD: Introduction, application to continuous beams with and without settlement of supports.

UNIT - V			

MOVING LOADS: Introduction maximum SF and BM at a given section and absolute maximum S.F. and B.M due to single concentrated load U.D load longer than the span, U.D load shorter than the span, two point loads with fixed distance between them and several point loads

INFLUENCE LINES: Definition of influence line for SF, Influence line for BM- load position for maximum SF at a section- U.D. load longer than the span, U.D.load shorter than the span.

Textbooks:

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
3. Basic structural Analysis by C.S. Reddy, Tata Mc Graw Hill, New Delhi

Reference Books:

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- Laxmi publications pvt. Ltd., New Delhi.

Course Code	WATER RESOURCES ENGINEERING (Professional Elective-I)	L	T	P	C
		3	0	0	3
	III Year I Semester				

Course Objectives:

It deals with hydrology, rainfall measurements, hydrograph concept and irrigation and its method of application and canals.

Course Outcomes (CO):

1. Understand about the concept of hydrology, rainfall measurements.etc and its applications.
2. Understand the rainfall evaporation and its measurements, runoff and various factors influencing on runoff.
3. Understand the ground water concept, and its terminology.
4. Understand the necessity of irrigation and concepts.
5. Understand about canals and its classifications

UNIT - I

INTRODUCTION: Introduction to engineering hydrology and its applications, Hydrologic cycle, types and forms of precipitation, rainfall measurement, types of rain gauges, computation of average rainfall over a basin, processing of rainfall data

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'slaw, 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 of canals, design of Irrigation canals by Kennedy's and Lacey's theories, balancing depth of cutting, canal lining-classification of lining.

Textbooks:

1. Engineering Hydrology by Jayarami Reddy, Laxmi publications pvt. Ltd., New Delhi
2. Irrigation and water power engineering by Punmia & Lal, Laxmi publications pvt. Ltd., New Delhi
3. Engineering Hydrology by K.Subramanya, The Tata Mcgraw Hill Company, Delhi.

Reference Books:

1. Irrigation and Water Resources & Water Power by P.N.Modi, Standard Book House.
2. Irrigation Water Management by D.K. Majundar, Printice Hall of India.
3. Engineering Hydrology by c.s.p.ojha ,Oxford Pubilishers, New Delhi
4. Applied Hydrology by Ven Te Chow, David R.maidment and Larry W.Mays, The Tata Mcgraw Hill Edition, New Delhi.

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5. Applied Hydrology by Ven Te Chow, David R.maidment and Larry W.Mays, The Tata Mcgraw Hill Edition, New Delhi

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Course Code	BUILDING SERVICES AND MAINTANEANCE (Professional Elective-I)	L	T	P	C
		3	0	0	3
III Year I Semester					

Course Objectives:

It deal with concepts of building maintenance, various practices of good building maintenance, safety, use of ventilation, different types of machineries in buildings

Course Outcomes (CO):

1. Understand the concept of Environmental Hazards and Disasters.
2. Understand the concept of atmospheric hazards and disasters.
3. Understand the Earthquake Hazards, causes and its effects.
4. Understand the concept of soil erosion, factors and conservation measures of soil erosion.

UNIT - I

PLUMBING SERVICES: Water supply system, fixing of pipes in buildings, maintenance of buildings, water meters-sanitary fittings, design of building drainage, gas supply systems

UNIT - II

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

UNIT - III

THERMAL INSULATION: Heat transfer system-thermal insulating materials, methods of thermal insulation-economics of thermal insulation-thermal insulation of exposed walls, doors, windows and roofs.

UNIT - IV

FIRE SAFETY: Causes of fire in buildings-fire safety regulations-characteristics of fire resisting materials, fire resistant construction-heat and smoke detectors, fire alarms-fire fighting pump and water storage.

UNIT - V

MACHINERIES IN BUILDINGS: Lifts, essential requirements, design considerations, escalators-essential requirements-electrical installations in buildings-lighting in buildings-methods of electrical wiring-earthing

Textbooks:

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
3. Building construction – Rangwala, Charothar publishing house

Reference Books:

1. Building services engineering – David V Chaddrton, Outledge
2. Building construction – P.C Varghees – Printice hall india Design of Steel structures, by B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi Publications, New Delhi.

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Course Code	EXPANSIVE SOILS (Professional Elective-I)	L	T	P	C
		3	0	0	3
	III Year I Semester				

Course Objectives:

It deals with concepts of Nature of Soils and Soil Structure Equip, Swelling and methods of determination. Different materials and techniques for stabilization

Course Outcomes (CO):

1. To understand Nature of Soils and Soil Structure.
2. To understand foundation practices in expansive soils.
3. To understand the different materials and techniques for stabilization of soils.
4. To understand procedure to improve shear strength of expansive soils

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

Reference Books:

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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Civil Engineering

Course Code	**GEOTECHNICAL ENGINEERING LAB**	0	0	3	1.5

III Year I Semester

Course Objectives:
The object of the course is to enable the students to know the various characteristics of soils. To carry out laboratory tests and to identify soil as per IS codal procedures. To perform laboratory tests to determine index properties of soil. To perform tests to determine shear strength. To perform consolidation test to determine the characteristics of soils

Course Outcomes (CO):
At the end of the course, the student must be able to:
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:
1. Specific gravity
2. Grain size analysis by sieving
3. Field density-Core cutter and Sand replacement methods
4. Atterberg's Limits.
5. Proctor Compaction test
6. Permeability of soil - Constant and Variable head tests
7. CBR Test
8. Direct Shear test
9. Unconfined Compression test
10. Triaxial Compression test (UU Test)
11. Differential free swell (DFS)
12. Hydrometer Analysis Test (Demonstration)
13. Consolidation test (Demonstration)
14. Vane Shear test

References:
1. Soil Mechanics and Foundation Engg by K. R. Arora, Standard Publishers and Distributors, Delhi 7 th edition 2009.
2. Geotechnical Engineering by C. Venkataramiah, New age International Pvt . Ltd, (2002).
3. Soil Mechanics and Foundation by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi publications Pvt. Ltd., New Delhi 17 th edition 2017.
4. Basic and Applied Soil Mechanics by Gopal Ranjan & A. S. R. Rao, New age International Pvt . Ltd, New Delhi 3 rd edition 2016.
5. Principles of Geotechnical Engineering by Braja M. Das Cengage Learning

Online Learning Resources/Virtual Labs:
https://www.vlab.co.in/

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Civil Engineering

	Sri Krishnadevaraya University College of Engineering & Technology				
	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.		Structural Analysis- II	PC	3-0-0	3
3.		Highway Engineering	PC	3-0-0	3
4.		**Professional Elective-II**	PE	3-0-0	3
5.		**Open Elective-II**	OE	3-0-0	3
6.		Irrigation Engineering Drawing Lab	PC	0-0-3	1.5
7.		Highway Engineering Lab	PC	0-0-3	1.5
8.		CAD Lab		0-0-3	1.5
9.		**Skill advanced course/ soft skill course*** STAAD	SC	1-0-2	2
10.		**Mandatory Non-Credit Course-III** Constitution of India	MC	2-0-0	0
				Total	**21.5**
	Industrial/Research Internship (Mandatory) for 2 months duration during summer vacation				

List of Professional Electives-II	List of Open Electives-II
4. Irrigation Engineering 5. Repairs and rehabilitation of Structures 6. Urban Hydrology	Candidate should select the subject from list of subjects offered by other departments

Category	CREDITS
Professional Core Courses	13.5
Professional Elective Courses	3
Open Elective Course/Job Oriented Elective	3
Skill oriented course	2
TOTAL CREDITS	**21.5**

Sri Krishnadevaraya University College of Engineering & Technology
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Civil Engineering

Course Code	DESIGN OF STEEL STRUCTURES	L	T	P	C
		3	0	0	3

III Year II Semester

Course Objectives:
To understand design specifications, loading and design procedures of different steel structures as per BIS specifications.

Course Outcomes (CO):
Upon the successful completion of this course, the students will be able to:
1. Apply the IS code of practice for the design of steel structural elements
2. Design compression and tension members using simple and built-up sections
3. Explain the behaviour and modes of failure of tension members and different connections.
4. Analyze and design tension members, bolted connections, welded connections, compression members and beams.
5. Design welded connections for both axial and eccentric forces.

UNIT - I		

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.

UNIT - II		

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.

UNIT - III		

CONNECTIONS: Design of eccentric connections with brackets, Beam end connections, Un-stiffened and stiffened seated connections (bolted and welded types) Design of truss joints.

UNIT - IV		

PLATE GIRDER: Plate Girder: Design consideration, I S Code recommendations Design of plate girder-Welded – Curtailment of flange plates stiffeners, splicing and connections.

UNIT - V		

GANTRY GIRDER: Gantry girder impact factors – longitudinal forces, Design of Gantry girders.
Note: The students should prepare the following plates.
Plate 1 Detailing of simple beams
Plate 2 Detailing of Compound beams including curtailment of flange plates.
Plate 3 Detailing of Column including lacing and battens.
Plate 4 Detailing of Column bases – slab base and gusseted base
Plate 5 Detailing of steel roof trusses including particulars at joints.
Plate 6 Detailing of Plate girder including curtailment, splicing and stiffeners

Textbooks:
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:

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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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Civil Engineering

Course Code	STRUCTURAL ANALYSIS - II	L	T	P	C
		3	0	0	3

III Year II Semester

Course Objectives:

1. Ability the behaviour of arches and their methods of analysis
2. To ability various classical methods for analysis of indeterminate structures
3. Ability to analyse the beam and frames for vertical and horizontal loads and draw SFD and BMD
4. To ability the effect of support settlements for indeterminate structures. Able to calculate forces in members of truss due to load by stiffness method.
5. Ability to analyse and perform plastic analysis on various structural elements.

Course Outcomes (CO):

1. To demonstrate the behaviour of arches and their methods of analysis
2. To use various classical methods for analysis of indeterminate structures
3. Ability to analyse the beam and frames for vertical and horizontal loads and draw SFD and BMD
4. To determine the effect of support settlements for indeterminate structures. Able to
5. Calculate forces in members of truss due to load by stiffness method.
6. Ability to analyse and perform plastic analysis on various structural elements.

UNIT - I	

ARCHES: Three hinged arches, Determination of horizontal thrust, bending moment, normal thrust and radial shear – effect of temperature.

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

UNIT - II	

MOMENT DISTRIBUTION METHOD: Stiffness and carry over factors – Distribution factors – Analysis of continuous beams with and without sinking of supports – storey portal frames.

UNIT - III	

KANI'S METHOD: Basic concepts- Analysis of continuous beams – including settlement of supports and single bay portal frames without side sway and with side sway by Kani's method.

UNIT - IV	

Approximate method of structural analysis, application to building frames. (I) Portal method (ii) Cantilever method.(Two span or two bays)

UNIT - V	

INTRODUCTION TO MATRIX METHODS (Flexibility and Stiffness Methods): Introduction, application to continuous beams including support settlements

Textbooks:

1. Analysis of Structures – Vol. I & 2 by Bhavikathi, Vikas publications
2. Analysis of structures by Vazrani & Ratwani – Khanna Publications.
3. Strength of Materials and mechanics of solids Vol-2 by B.C. Punmia, Laxmi Publications, New Delhi
4. Comprehensive Structural Analysis-Vol.I&2 by Dr. R. Vaidyanathan & Dr. P.Perumal- Laxmi publications pvt. Ltd., New Delhi.

Reference Books:

1. Structural Analysis (Matrix Approach) by Pundit and Gupta – Tata Mc.Graw Hill publishers.
2. Theory of structures by Ramamuratam
3. Structural Analysis by C.S. Reddy, Tata McGraw-Hill, New Delhi
4. Structural Analysis(Level – 5) – By SR Mangalagiri – Longman Group Ltd (Longman Technical Series – Construction and Civil Engineering)

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Course Code	HIGHWAY ENGINEERING	L	T	P	C
		3	0	0	3

III Year II Semester

Course Objectives:

It deals with different components, materials and geometric design in Transportation Engineering. Emphasis different elements in Transportation Engineering.

Course Outcomes (CO):

1. Carry out surveys involved in planning and highway alignment
2. Design cross section elements, sight distance, horizontal and vertical alignment
3. Implement traffic studies, traffic regulations and control, and intersection design
4. Determine the characteristics of pavement materials
5. Design flexible and rigid pavements as per IRC

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	**FLEXIABLE 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, Triaxial metho

RIGID PAVEMENT DESIGN: 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:

1. Highway Engineering – S.K.Khanna & C.E.G.Justo, Nemchand & Bros., 7th edition (2000)
2. Highway Engineering Design – L.R.Kadiyali and Lal- Khanna Publications.
3. Text book of Highway Engineering by R.Srinivasa Kumar, Universities Press, Hyderabad

Reference Books:

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Civil Engineering

Course Code	IRRIGATION ENGINEERING (Professional Elective-II)	L	T	P	C
		3	0	0	3

III Year II Semester

Course Objectives:

- To study various head works canal structures and their design principles the subject also covers the river structures, their classifications, designs, etc.

Course Outcomes (CO):

1. To know about various channel systems, head and cross regulator structures
2. To identify various types of reservoir and their design aspects
3. To understand cross drainage works, different types of dams and its design
4. To understand the concept of canal systems

UNIT - I	

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.

UNIT - II	

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.

UNIT - III	

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. **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.

UNIT - IV	

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. **EARTH DAMS:** Introduction; Types of earth dams; Causes of failure of earth dams; Criteria for safe design of earth dams; Seepage control measures.

UNIT - V	

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.

Textbooks:

1. Irrigation and Water Power Engineering by Dr. B.C.Punmia & Dr. Pande B.B. Lal; Laxmi.
2. Publications pvt. Ltd., New Delhi. 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.

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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Civil Engineering

Course Code	REPAIRS AND REHABILITATION OF STRUCTURES (Professional Elective-II)	L	T	P	C
		3	0	0	3

III Year II Semester

Course Objectives:

- To bring awareness on rehabilitation, retrofitting and health monitoring of structures

Course Outcomes (CO):

1. The student will be able to understand different methods of experimental stress analysis
2. The student will be able to understand the use of strain gauges for measurement of strain.
3. The student will be exposed to different Non destructive methods of concrete.
4. The student will be able to understand the theory of photo elasticity and its applications in analysis of structures

UNIT - I		

Introduction: Deterioration of Structures, Distress in Structures – Causes and Prevention. Mechanism of Damage – Types of Damage

UNIT - II		

Corrosion of Steel Reinforcement, Causes, Mechanism and Prevention. Damage of Structures due to Fire – Fire Rating of Structures – Phenomena of Desiccation.

UNIT - III		

Inspection and Testing – Symptoms and Diagnosis of Distress – Damage assessment – NDT

UNIT - IV		

Repair of Structure, Common Types of Repairs, Repair in Concrete Structures – Repairs in Under Water Structures, Guniting, Shot Create – Underpinning. Strengthening of Structures – Strengthening Methods, Retrofitting – Jacketing.

UNIT - V		

Health Monitoring of Structures – Use of Sensors – Building Instrumentation

Textbooks:

1. Concrete Technology by A.R. Santakumar, Oxford University press.
2. Maintenance and Repair of Civil Structures, B.L. Gupta and Amit Gupta, Standard Publications

Reference Books:

1. Defects and Deterioration in Buildings, EF & N Spon, London.
2. Non-Destructive Evaluation of Concrete Structures by Bungey – Surrey University Press
3. Concrete Repair and Maintenance Illustrated, RS Means Company Inc W.H. Ranso, (1981)
4. Building Failures : Diagnosis and Avoidance, EF & N Spon, London, B.A. Richardson, (1991).

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Civil Engineering

Course Code	Urban Hydrology	L	T	P	C
	(Professional Elective-II)				
		3	0	0	3

III Year II Semester

Course Objectives:

To impart urbanization on catchment hydrology. Narrate the importance of rainfall runoff data for urban hydrology. Teach techniques for peak flow estimation for storm water drainage system design. Explain the design concepts of components in urban drainage systems. Train for preparation of master urban drainage system.

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:

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

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.
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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Civil Engineering

Cou rse Code	HIGHWAY ENGINEERING LAB	L	T	P	C
		0	0	3	1.5
	III Year II Semester				

Course Outcomes (CO):
To make the students familiar with principles and procedures of testing of highway materials. To provide hands-on experience for the students on different Tests needed to be conducted on Aggregates and Bitumen to find out their suitability for Road Works.

List of Experiments:
TESTS ON ROAD AGGREGATES: • Aggregate Crushing value Test.   • Aggregate Impact Test.   • Abrasion Test.   • Shape tests   TESTS ON BITUMINOUS MATERIALS: • 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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Civil Engineering

Course Code	CAD LAB	L	T	P	C
		0	0	3	1.5
	III Year II Semester				

Course Objectives:

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 videos
4. Create, manipulate and edit 2D drawings and figure
5. Convert 3D solid models into 2D drawing-different views, sections

Course Outcomes (CO):

1. Achieve skill sets to prepare computer aided engineering drawings
2. Utilize the power and precision of AutoCAD as a drafting and design tool
3. Apply basic CAD concepts to develop and construct accurate 2D geometry through creation of basic geometric constructions
4. 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:

1. Introduction to computer aided drafting
2. Software for CAD – Introduction to different software's
3. Practice exercises on CAD software
4. 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

Course Code	IRRIGATION ENGINEERING DRAWING LAB	L	T	P	C
		0	0	3	1.5

III Year II Semester

Course Outcomes (CO):

1. To know the design and drawing aspects of Sloping glacis weir,
2. To know the design and drawing aspects Tank sluice with tower head,
3. To know the design and drawing aspects Type III Siphon aqueduct,
4. To know the design and drawing aspects Surplus weir,
5. To know the design and drawing aspects Trapezoidal notch fall and Canal regulator.

Course Outcomes (CO):

1. Design and draw the plan and cross section of Sloping glacis weir.
2. Design and draw the plan and cross section of Tank sluice with tower head
3. Design and draw the plan and cross section of   Type III Syphon aqueduct
4. Design and draw the plan and cross section of Surplus weir.
5. Design and draw the plan and cross section of Trapezoidal notch fall and Canal regulator.

List of Experiments:

Design and draw the plan and cross sectional view of following irrigation structures

- Sloping glacis weir.
- Tank sluice with tower head
- Type III Siphon aqueduct.
- Trapezoidal notch fall.
- Canal regulator.

Final Examination pattern: Any two questions of the above six designs may be asked out of which the candidate has to answer one question. The duration of examination will be three hours.

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Civil Engineering

Course Code	CONSITUTION OF INDIA (Mandatory Course)	L	T	P	C
		2	0	0	0

III Year II 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):

- At the end of the semester/course, the student will be able to have a clear knowledge on the following:
- Understand 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.
- Know the sources, features, and principles of Indian Constitution.
- Learn about Union Government, State government and its administration.
- 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

Reference Books:

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

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Civil Engineering

		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.		Foundation Engineering	PC	3-0-0	3
2.		Professional Elective – III	PE	3-0-0	3
3.		Professional Elective – IV	PE	3-0-0	3
4.		Professional Elective – V	PE	3-0-0	3
5.		Open Elective-III	OE	3-0-0	3
6.		Open Elective – IV	OE	3-0-0	3
7.		**Skill oriented course– V** System Verilog	SC	1-0-2	2
8.		Evaluation of Industrial Internship	PR	0-0-0	3
				Total	**23**

List of Professional Electives-III	**List of Professional Electives-IV**
1. Pre-stressed Concrete 2. Finite Element Analysis in Civil Engineering 3. Advanced Structural Design	1. Experimental Stress Analysis 2. Geo-informatics 3. Earthquake Engineering
List of Professional Electives-V	
1. Estimation, Costing and Valuation 2. Bridge Engineering 3. Ground Improvement Techniques	
List of Open Electives-III & IV Candidate should select the subject from list of subjects offered by Dept.of Civil to other Departments.	

Category	**CREDITS**
Professional Elective Courses	12
Open Elective Course/Job Oriented Elective	6
Skill oriented course	2
Industrial Internship	3
TOTAL CREDITS	**23**

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Civil Engineering

Course Code	FOUNDATION ENGINEERING	L	T	P	C
		3	0	0	3
	IV Year 1ˢᵗ Semester				

Course Objectives:

The knowledge of this subject is essential to use the principles of Soil Mechanics to design the foundations, Earth retaining structures and slope stability safely and economically.

Course Outcomes (CO):

1. On successful completion of the course, the students will have the:
2. Ability to apply the principle of shear strength and settlement analysis for foundation system.
3. Ability to design shallow and deep foundations
4. Ability to design problems associated with black cotton soils.
5. Estimate bearing capacity using IS code methods

UNIT - I	

SHALLOW FOUNDATIONS: General requirements of foundations. Types of shallow foundations and the factors governing the selection of a type of shallow foundation. Bearing capacity of shallow foundations by Terzaghi's theory and Meyerhof's theory, Local shear and general shear failure and their identification. Bearing capacity of isolated footing resting on stratified soils.

UNIT - II	

DEEP FOUNDATIONS-I: Pile foundations-types of pile foundations- Estimation of bearing capacity of pile foundation by dynamic and static formulae- Bearing capacity and settlement analysis of pile groups-principle of functioning of under reamed pile. **DEEP FOUNDATIONS – II:** Well foundations – elements of well foundation- Forces acting on a well foundation- Depth and bearing capacity of well foundation- Problems associated with well sinking.

UNIT - III	

ANALYSIS AND STRUCTURAL DESIGN OF R.C.C. FOOTINGS: Analysis and structural design of R.C.C. isolated, combined and strap footings

UNIT - IV	

SHEET PILE WALLS: Cantilever sheet piles, Earth Pressure diagram, Determination of depth of embedment in sands and clays – Forces in struts.

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:

1. Analysis and Design of Foundations and Retaining Structures- Shamsher Prakash, Gopal Ranjan and Swami Saran.
2. Foundation Design-Teng.
3. Geotechnical Engg. – C.Venkatramaiah.
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:

1. Analysis and Design of Foundations – E.W.Bowles.
2. Foundation engineering by Brije.M.Das, Cengage pubilications,New Delhi.
3. Foundations Design and Construction –Tomlinson

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Civil Engineering

Course Code	PRE-STRESSEDCONCRETE	L	T	P	C
	(Professional Elective-III)	**3**	**0**	**0**	**3**
	IV Year 1ˢᵗSemester				

Course Objectives:

To introduce the need for prestressing as well as the methods, types and advantages of prestressing to the students. Students will be introduced to the design of pre-stressed concrete structures subjected to flexure and shear.

Course Outcomes (CO):

1. On successful completion of the course, the students will have the:
2. Methods of prestressing and able to design various pre-stressed concrete structural elements.
3. Analysis of sections to withstand shear and flexure.

Note: BIS code on prestressed concrete, IS 1343 to be permitted into the examination Hall.

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:

1. Prestressed Concrete by Krishna Raju; - Tata Mc.Graw Hill Publications.
2. Prestressed Concrete by N.Rajasekharan; - Narosa publications.
3. Prestressed Concrete by Ramamrutham,Dhanpatrai Publications.

Reference Books:

1. Prestressed Concrete by Ramamrutham; Dhanpatrai Publications.
2. Design of Prestressed concrete structures (Third Edition) by T.Y. Lin & Ned H.Burns, John Wiley & Sons.
3. Prestressed Concrete By Pandit.G.S. And Gupta.S.P., CBS Publishers And Distributers Pvt. Ltd.
4. Prestressed Concrete By Rajagopalan.N, Narosa Publishing House.
5. Prestressed Concrete Structures By Dayaratnam.P., Oxford And IBH

Course Code	FINITE ELEMENT METHODS IN CIVIL ENGINEERING (Professional Elective-III)	L	T	P	C
		3	0	0	3
	IV Year 1st Semester				

Course Objectives:

To familiarize the student with the latest developments in analysis for Civil Engineering

Course Outcomes (CO):

1. On successful completion of the course, the students will have the:
2. To demonstrate the differential equilibrium equations and their relationship.
3. To apply numerical methods to FEM.
4. To demonstrate the displacement models and load vectors.
5. To compute the stiffness matrix for isoperimetric elements.
6. To analyze plane stress and plane strain problems

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:

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:

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.
Ernest O. Doebelin and Dhanesh N Manik, Measurement Systems, 6th Ed., TMH,2010

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Civil Engineering

Course Code	ADVANCED STRUCTURAL DESIGN	L	T	P	C
	(Professional Elective-III)	3	0	0	3
	IV Year 1st Semester				

Course Objectives:

- To impart design of RCC concrete members and to understand the concept of chimney, Silos and Concrete Bridge Design

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 loading and design

UNIT - V		

Introduction to concrete bridges, IRC loading, slab bridges and T - beam bridges design concepts.

Textbooks:

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:

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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Civil Engineering

Course Code	EXPERIMENTAL STRESS ANALYSIS	L	T	P	C
	(Professional Elective-IV)	3	0	0	3
	IV Year 1st Semester				

Course Objectives:

To bring awareness on experimental method of finding the response of the structure to different types of load.

Course Outcomes (CO):

1. On successful completion of the course, the students will have the:
2. The student will be able to understand different methods of experimental stress analysis
3. The student will be able to understand the use of strain gauges for measurement of strain.
4. The student will be exposed to different Non destructive methods of concrete.
5. The student will be able to understand the theory of photo elasticity and its applications in analysis of structures.

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, Isochramic Fringe patterns – Isoclinic Fringe patterns passage of light through plane Polariscope and Circular polariscope, Materials for photo – Elasticity Properties of Photo elastic Materials.

Textbooks:

1. Experimental stress analysis by J.W.Dally and W.F.Riley.
2. Experimental stress analysis by Dr.Sadhu Singh.
3. Experimental stress analysis by Vazrani & Ratwani.

Reference Books:

1. Experimental stress analysis by U.C.Jindal, Pearson Pubilishers,New delhi.

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Course Code	GEO INFORMATICS	L	T	P	C
	(Professional Elective-IV)	**3**	**0**	**0**	**3**
	IV Year 1ˢᵗ Semester				

Course Objectives:

To understand the basic concepts of photogrammetric, remote sensing, data representation and GIS Applications.

Course Outcomes (CO):

- Understand the aerial, scales, ground control photogrammetry
- Understand the GIS Concept
- Understand the data collection, input and output, procedure for data representation.
- To understand Remote Sensing and GIS Application

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:

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:

1. Concepts & Techniques of GIS by C.P.Lo Albert, K.W. Yonng, Prentice Hall (India) Publications.
2. Basics of Remote sensing & GIS by S.Kumar, Laxmi Publications.
3. The GIS book by Korte,cengage pubilications,New Delhi.
4. Fundamental of GIS by Mechanical designs John Wiley & Sons.
5. Remote sensing and GIS by M.Anji reddy ,B.S.Pubiliications,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 Delh

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Civil Engineering

Course Code	EARTHQUAKE ENGINEERING	L	T	P	C
	(Professional Elective-IV)	3	0	0	3
	IV Year 1ˢᵗSemester				

Course Objectives:
To make student to acquire the knowledge on Earthquake Engineering, its phenomenon, theory of vibration, to know the SDOF and MDOF. Latest Codal provisions.

Course Outcomes (CO):		
• Understand the earthquake causes and effects and its phenomenon. • Understand the Theory of vibration and concept of response spectrum. • To understand the concept of SDOF and MDOF. • To know the latest codal provisions.		
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-storyed 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:		
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:		
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		

Course Code	ESTIMATION, COSTING AND VALUATION (Professional Elective-V)	L	T	P	C
		3	0	0	3
	IV Year 1ˢᵗ Semester				

Course Objectives:

The objective of the course is to make the student to understand about estimation of quantities and valuations of different types of structures as per standard schedule of rates.

Course Outcomes (CO):

1. On successful completion of the course, the students will have the:
2. Apply different types of estimates for different building elements
3. Carry out analysis of rates and bill preparation different building elements
4. Understand the concepts of specification writing
5. To carry out valuation of assets.

Note: Standard schedule of rates is permitted in the examination hall

UNIT - I	

INTRODUCTION: General items of work in Building – Standard Units Principles of working out quantities for detailed and abstract estimates – Approximate method of Estimating. **STANDARDS SPECIFICATIONS:** Standard specifications for different items of building construction

UNIT - II	

ESTIMATION OF BUILDINGS: Detailed Estimates of Buildings by using centerline & long wall and short wall method.

UNIT - III	

EARTHWORK ESTIMATION: Estimation of Earthwork for roads and canals. **REINFORCEMENT ESTIMATION:** Reinforcement bar bending and bar requirement schedules.

UNIT - IV	

RATE ANALYSIS: Working out data for various items of work over head and contingent charges.

UNIT - V	

CONTRACTS AND TENDERS: Contracts – Types of contracts, Contract Documents – Conditions of contract – Types of Tenders – Requirement of Tendering. **VALUATION:** Valuation of buildings.

Textbooks:

1. Estimating and Costing by B.N. Dutta, UBS publishers, 2000.
2. M. Chakraborti, Estimation Costing Specifications and Valuation in Civil Engineering.

Reference Books:

1. Standard schedule of rates and standard data book by public works department.
2. G.S. Birdie, Textbook of Estimating and Costing in Civil Engineering, 2014.
3. IS 1200-1992 "Methods of Measurements of Building and Civil Engineering Works".

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Course Code	GROUND IMPROVEMENT TECHNIQUES	L	T	P	C
	(Professional Elective-V)	3	0	0	3

IV Year 1st Semester

Course Objectives:

The knowledge on the problems posed by the problematic soils and the remedies to build the various structures in problematic soils.

Course Outcomes (CO):

- On successful completion of the course, the students will have the:
- Understand the concept of dewatering and grouting, grouting techniques.
- Understand the densification methods in granular and cohesive soils.
- Understand the concept of stabilization and its methods.
- Understand the Geosynthetic and various materials its applications.
- Understand the behavior of expansive soil and related problems, methods etc.

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:

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:

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 Jercy, USA.

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Civil Engineering

Course Code	BRIDGE ENGINEERING	L	T	P	C
	(Professional Elective-V)	3	0	0	3
	IV Year 1st Semester				

Course Objectives:

It deal with different types of Bridges like deck slab bridge, T – Beam Bridge etc and gives a good knowledge on different components of bridges.

Course Outcomes (CO):

- On successful completion of the course, the students will have the:
- Understand various types of Bridges, IRC Specifications for road bridges.
- To design of RC Slab Culvert, Design simply supported
- Design of Abutment, Design of elastomeric pad bearing
- To design of Piers, abutments and wing walls.

UNIT - I	INTRODUCTION	

Importance of site investigation in Bridge design. Highway Bridge loading standards. Impact factor Railway Bridge loading standards (B.G. ML Bridge) various loads in bridges. **BRIDGE BEARINGS**: General features, Types of Bearings, Design principles of steel Rocker & Roller Bearings, Design of a steel Rocker Bearing, Design of elastometric pad Bearing

UNIT - II		

DECK SLAB BRIDGE: Introduction, Effective width method of Analysis Design of deck Slab Bridge (Simply supported) subjected to class AA Tracked Vehicle only**. BOX CULVERT:** General aspects. Design loads, Design of Box culvert subjected to RC class AA tracked vehicle only.

UNIT - III		

BEAM & SLAB BRIDGE (T-BEAM BRIDGE) General features, Design of interior panel of slab Pigeauds method – Design of a T-beam bridge subjected to class AA tracked vehicle only.

UNIT - IV		

PLATE GIRDER BRIDGE: Introduction, elements of a plate girder and their design. Design of a Deck type welded plate girder, Bridge of single line B.G.

COMPOSITE BRIDGES: Introduction, Advantages, Design of Composite Bridges consisting of RCC slabs over steel girders' including shear connectors**.**

UNIT - V		

PIERS & ABUTMENTS: General features, Bed Block, Materials piers & Abutments Types of piers, Forces acting on piers, Stability analysis of piers, General features of Abutments, forces acting on abutments, Stability analysis of abutments Types of wing walls, Approaches, Types of Bridge foundations (excluding Design).

Textbooks:

1. Bridge Engineering by Ponnu Swamy, TATA Mcgraw Hill Company, New Delhi.
2. Design of Bridges by N.Krishnam Raju, Oxford & IBH, Publishing Company Pvt.ltd., Delhi.
3. Relevant – IRC & Railway bridge Codes.

Reference Books:

1. Design of Steel structures, by B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi Publications, New Delhi.
2. Design of Bridges Structure by D.J.Victor
3. Design of Steel structures by Ramachandra.
4. Design of R.C.C. structures B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi Publications, New Delhi.
5. Design of Bridges Structure by T.R.Jagadish & M.A.Jayaram Prentice Hall of India Pvt., Delhi.

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Civil Engineering

Course Code	ENVIRNOMENTAL IMPACT ASSESSMENT	L	T	P	C
	(Open Elective-III)	3	0	0	3
	IV Year 1ˢᵗSemester				

Course Objectives:
This course is aimed at exposing the student to the concept of environmental impact assessment and methodologies used for the same. The student will also be imparted the knowledge about the various laws related to EIA and also methods of EIA audit.

Course Outcomes (CO):
• 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 protocel, 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 Preventation Act, The Air (Prevention & Control of pollution Act.), Wild life Act. Case studies and preparation of Environmental Impact assessment statement for various Industries.		

Textbooks:
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:
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	LOW COST-EFFECTIVE HOUSING TECHNIQUES	L	T	P	C
	(Open Elective-III)	3	0	0	3
	IV Year 1ˢᵗ Semester				

Course Objectives:

- To understand the requirements of structural safety for future construction.
- To know about the housing scenario, housing financial systems land use and physical planning for housing and housing the urban poor
- To know the traditional practices of rural housing
- To know the different innovative cost effective construction techniques
- To know the alternative building materials for low cost housing.

Course Outcomes (CO):

- To know the repair and restore action of earthquake damaged non engineered buildings and ability to understand the requirements of structural safety for future construction
- To know about the housing scenario, housing financial systems land use and physical planning for housing and housing the urban poor
- Apply the traditional practices of rural housing
- Understand the different innovative cost effective construction techniques
- Suggest the alternative building materials for low cost housing

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 prefatroices - Adopting of total prefactcation of mass housing in India- General remarks on pre cast rooting/flooring systems -Economical wall system - Single Brick thick loading 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 join 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 wall - 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 Railways of non-engineered buildings - Repair and restore action of earthquake- Damaged non-engineered buildings recommendations for future constructions. Requirement's 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

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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.

3. Modern trends in housing in developing countries – A.G. Madhava Rao, D.S. Rama chandra Murthy & G.Annamalai. E. & F. N. Spon Publishers

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Civil Engineering

Course Code	WATER SHED MANAGEMENT (Open Elective-III)	L	T	P	C
		3	0	0	3
	IV Year 1ˢᵗSemester				

Course Objectives:
The subject is aimed at elaborating the concepts of integrated water shed development and management involving land, water and ecosystem management.

Course Outcomes (CO):
• On successful completion of the course, the students will have the: • Understand the concept of watershed development.   • Understand the socio-economic characteristics data on watershed.   • Understand the concept of erosion and its control measures,   • To prepare the plan for developing the watershed and water harvesting.   • Understand the land and ecosystem management.

UNIT - I	**INTRODUCTION**	

Concept of watershed development, objectives of watershed development, need for watershed development in India, Integrated and multi-disciplinary approach for watershed management.
CHARACTERISTICS OF WATERSHED: Size, shape, physiography, slope, climate, drainage, land use, vegetation, geology and soils, hydrology and hydrogeology, socio-economic characteristics, basic data on watersheds.

UNIT - II		

PRINCIPLES OF EROSION: Types of erosion, factors affecting erosion, effects of erosion on land fertility and land capability, estimation of soil loss due to erosion, Universal soil loss equation.
MEASURES TO CONTROL EROSION: Contour techniques, ploughing, furrowing, trenching, bunding, terracing, gully control, rock fill dams, brushwood dam, Gabion.

UNIT - III		

PLANNING OF WATERSHED MANAGEMENT ACTIVITIES: people participation, preparation of action plan, administrative requirements.
WATER HARVESTING: Rainwater Harvesting, catchment harvesting, harvesting structures, soil moisture conservation, check dams, artificial recharge, farm ponds, percolation tanks.

UNIT - IV		

LAND MANAGEMENT: Land use and Land capability classification, management of forest, agricultural, grassland and wild land. Reclamation of saline and alkaline soils.

UNIT - V		

ECOSYSTEM MANAGEMENT: Role of Ecosystem, crop husbandry, soil enrichment, Inter, mixed and strip cropping, cropping pattern, sustainable agriculture, bio-mass management, dry land agriculture, Silvi pasture, horticulture, social forestry and afforestation..

Textbooks:
1. Watershed Management by JVS Murthy, - New Age International Publishers.   **2.** Water Resource Engineering by R.Awurbs and WP James, - Prentice Hall Publishers

Reference Books:
1. Land and Water Management by VVN Murthy, - Kalyani Publications.   **2.** Irrigation and Water Management by D.K.Majumdar, Printice Hall of India.

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Civil Engineering

Course Code	CONSTRUCTION PLANNING AND PROJECT MANAGEMENT (Open Elective-IV)	L	T	P	C
		3	0	0	3
	IV Year 1ˢᵗ Semester				

Course Objectives:

The objective of the course is to train the students to have a comprehensive knowledge of planning, construction and project management. The course focuses on cost effective construction materials and methods. Emphasis is given on the principles of construction planning and management.

Course Outcomes (CO):

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

1. Understand the construction, project managements
2. To prepare the bar charts, schedules using CPM and PERT
3. Understand the role and responsibilities of various engineers in work site and Department
4. Understand the types of works and contract/ consultant systems

UNIT - I

Construction Organization And Its Management: 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:

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:

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	NOISE AND AIR POLLUTION (Open Elective-IV)	L	T	P	C
	Civil Engineering	3	0	0	3

IV Year 1ˢᵗ Semester

Course Objectives:

It deal with noise and air pollution control mechanism sources and it effects. Understand pollution measurement methods and Air Pollution Act

Course Outcomes (CO):

- On successful completion of the course, the students will have the:
- Understand the sources, classification and effect of Air pollution.
- Understand the Air sampling, pollution measurement methods and Air Pollution Act
- Understand the Air pollution control techniques.
- Understand the sources, classification and effect of Noise pollution.

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:

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 Kvsg Murali Krishna Published by Kaushal & Co

Reference Books:

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.
5. Enivronmental meteorology by S.Padmanabham murthy , I.K.Internationals Pvt Ltd,New Delhi.

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Civil Engineering

Course Code	GEOGRAPHIC INFORMATION SYSTEM (GIS)	L	T	P	C
	(Open Elective-IV)	3	0	0	3
	IV Year 1ˢᵗ Semester				

Course Objectives:

To teach basic principles of Remote Sensing and GIS techniques, types of satellite, sensors and platforms, impart concepts of visual and digital image analyses. Teach concepts of principles of spatial analysis; teach application of RS and GIS to Civil engineering

Course Outcomes (CO):

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

● Comparing with ground, air and satellite based sensor platforms.

● Interpret the aerial photographs and satellite imageries.

● Create and input spatial data for GIS application.

● Apply RS and GIS concepts in water resources engineering.

● Applications of various satellite data.

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, fiducially 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:

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:

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.

R20 Regulations

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Civil Engineering

Open Electives offered by Dept. of Civil Engineering
(Offered to other Departments)

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Civil Engineering

Open Electives offered by Dept. of Civil Engineering (Offered to other Departments)

Open Elective-I

4. Engineering Material
5. Dister Mitigation and Management
6. Environmental Economics

Open Elective-II

4. Traffic Engineering
5. Ground Improvement Techniques
6. Environmental Pollution Control

Open Elective-III

4. Environmental Impact Assessment
5. Low Cost-Effective Housing Techniques
6. Water shed Management

Open Elective-IV

4. Construction Planning and Project Management
5. Noise and Air Pollution
6. Geographic Information System GIS

Out of Open elective courses at least one course should be completed through MOOCs

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Civil Engineering

Course Code	ENGINEERING MATERIALS	L	T	P	C
	(Open Elective-I)	3	0	0	3
	III Year I Semester				

Course Objectives:

The course intends to provide basic information on the structure and properties of construction materials to students. Acquire basic knowledge on building materials. Understanding of typical and potential applications of common building materials

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, Basalt 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:

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.

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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Civil Engineering

Course Code	DISASTER MITIGATION AND MANAGMENT (Open Elective-I)	L	T	P	C
		3	0	0	3
	III Year I Semester				

Course Objectives:

It deal with disaster mitigation and its management. Environmental hazards, types of Environmental hazards and soil erosion. Understand the concept of cumulative atmospheric hazards.etc.

Course Outcomes (CO):

5. Understand the concept of Environmental Hazards and Disasters.
6. Understand the concept of atmospheric hazards and disasters.
7. Understand the Earthquake Hazards, causes and its effects.
8. Understand the concept of soil erosion, factors and conservation measures of soil erosion.

UNIT - I

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

UNIT - II

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

UNIT - III

ENDOGENOUS HAZARDS: 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- 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, Universiters Press, India, 2003.
4. Dr.Satender,Disaster Management t in Hills, Concept Publishing Co., New Delhi, 2003.

Civil Engineering

Course Code	ENVIRONMENTAL ECONOMICS (Open Elective-I)	L	T	P	C
		3	0	0	3
	III Year I Semester				

Course Objectives:

- To impart knowledge on sustainable development and economics of energy
- To teach regarding environmental degradation and economic analysis of degradation
- To inculcate the knowledge of economics of pollution and their management
- To demonstrate the understanding of cost benefit analysis of environmental resources

Course Outcomes (CO):

- After the completion of the course, the students will be able to know
- The information on sustainable development and economics of energy
- The information regarding environmental degradation and economic analysis of degradation
- The identification of economics of pollution and their management
- The cost benefit analysis of environmental resources

UNIT - I

Sustainable Development: Introduction to sustainable development - Economy-Environment inter-linkages - Meaning of sustainable development - Limits to growth and the environmental Kuznets curve – The sustainability debate - Issues of energy and the economics of energy – Nonrenewable energy, scarcity, optimal resources, backstop technology, property research, externalities, and the conversion of uncertainty

UNIT - II

Environmental Degradation: Economic significance and causes of environmental degradation - The concepts of policy failure, externality and market failure - Economic analysis of environmental degradation – Equi –marginal principle

UNIT - III

Economics of Pollution: Economics of Pollution - Economics of optimal pollution, regulation, monitoring and enforcement - Managing pollution using existing markets: Bargaining solutions – Managing pollution through market intervention: Taxes, subsidies and permits.

UNIT - IV

Cost – Benefit Analysis: Economic value of environmental resources and environmental damage - Concept of Total Economic Value - Alternative approaches to valuation – Cost-benefit analysis and discounting..

UNIT - V

Economics of biodiversity: Economics of biodiversity conservation - Valuing individual species and diversity of species -Policy responses at national and international levels. Economics of Climate Change – stern Report

Textbooks:

1. An Introduction to Environmental Economics by N. Hanley, J. Shogren and B. White Oxford University Press.(2001)

2. Blueprint for a Green Economy by D.W. Pearce, A. Markandya and E.B. Barbier Earthscan, London.(1989)

3. Environmental Economics: An Elementary Introduction by R.K. Turner, D.W. Pearce and I. Bateman Harvester Wheatsheaft, London. (1994),

Reference Books:

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Civil Engineering

Course Code	TRAFFIC ENGINEERING (OPEN ELECTIVE-II)	L	T	P	C
		3	0	0	3
	III Year II Semester				

Course Objectives:

It deals with different components of Transportation Engineering like highway. Emphasis is a
Geometric Design of different elements in Traffic Engineering.

Course Outcomes (CO):

On successful completion of the course, the students will have the:

1. Understand about the Traffic Forecast.
2. Understand about the Demand relationships, methods for future projection
3. Understand the Current road projects in India highway alignment and project preparation
4. Understand the Traffic Characteristics and use of materials in pavements
5. Understand about the Formulation of system models

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- Channelisation: 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:

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:

1. Transportation Engineering an introduction Kristy Lal, Pearson Pubilications
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.Chandola, S.Chand Publications, New *Delhi*.

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Civil Engineering

Course Code	Ground Improvement Techniques (OPEN ELECTIVE-II)	L	T	P	C
		3	0	0	3
	III Year II Semester				

Course Objectives:

The objective of this course is to understand different ground improvement methods adopted for improving the properties of re-moulded and in-situ soils by adopting different techniques. To know geo-textiles and geo-synthetics can to improve the performance of soils

Course Outcomes (CO):

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

Perceive the knowledge of various methods of ground improvement and their suitability to different field situations.

Design a reinforced earth embankment and check its stability.

Understand the functions of Geo-synthetics and their applications in Civil Engineering practice.

Understand the concepts and applications of grouting.

UNIT - I	

In situ densification methods- in situ densification of granular soils- vibration at ground surface and at depth, impact at ground and at depth – in situ densification of cohesive soils – pre loading – vertical drains – sand drains and geo drains – stone columns.

UNIT - II	

Dewatering – sumps and interceptor ditches – single and multi stage well points – vacuum well points – horizontal wells – criteria for choice of filler material around drains – electro osmosis.

UNIT - III	

Stabilization of soils – methods of soil stabilization – mechanical – cement – lime – bitumen and polymer stabilization – use of industrial wastes like fly ash and granulated blast furnace slag.

UNIT - IV	

Reinforce earth – principles – components of reinforced earth – design principles of reinforced earth walls – stability checks – soil nailing.

UNIT - V	

Geo-synthetics, Geo-textiles – types – functions, properties and applications – Geo-grids, Geo-membranes and gabions, properties and applications.

Grouting. objectives of grouting – grouts and their applications – methods of grouting – stage of grouting, hydraulic fracturing in soils and rocks – post grout tests

Textbooks:

1. Manfred R. Haussmann, Engineering Principles of Ground Modification, McGraw Hill Pub. Co.,NewYork, 1990
2. Purushotham Raj, Ground Improvement Techniques, Laxmi Publications, New Delhi.

Reference Books:

1. G. L. Siva Kumar Babu, An introduction to Soil Reinforcement and Geosynthetics, Universities Press.
2. M. P. Moseley, Ground Improvement, Blackie Academic and Professional, USA.
3. Nihar Ranjan Patro, Ground Improvement Techniques, Vikas Publishing House (p) Limited, New Delhi.
4. R. M. Koerner, Designing with Geo-synthetics, Prentice Hall.

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Civil Engineering

Course Code	Environmental Pollution Control (OPEN ELECTIVE-II)	L	T	P	C
		3	0	0	3
	III Year II Semester				

Course Objectives:

The objective of this course is to understand different types of pollutions and remedial measures to control the pollution.

Course Outcomes (CO):

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

1. To understand the necessity of water supply system.
2. To understand the types of pollutants etc.
3. To understand the control methods of pollution.

UNIT - I		

Introduction:

Importance and Necessity of Protected Water Supply systems, Objectives of Protected water supply system, Flow chart of public water supply system, Role of Environmental Engineer.

UNIT - II		

WATER DEMAND AND QUANTITY STUDIES : Estimation of water demand for a town or city, Types of water demands, Per capita Demand, Factors affecting the Per Capita Demand.

UNIT - III		

WASTE WATER TREATMENT: Layout and general outline of various units in a waste water treatment plant – primary treatment: design of screens – grit chambers – skimming tanks – trickling filters – standard and high rate – Construction and design of Oxidation ponds.

UNIT - IV		

SOLID WASTE MANAGEMENT: Characteristics, generation, collection and transportation of solid wastes, engineered systems for solid waste management.

UNIT - V		

AIR POLLUTION: Types of pollutants, their sources and impacts, air pollution control, air quality standards and limits.

NOISE POLLUTION: Impacts of noise, permissible limits of noise pollution, measurement of noise and control of noise pollution.

Textbooks:

1. Water supply and sanitary Engineering by G.S. Birdi, Dhanpat Rai & Sons Publishers.

2. Water Supply Engineering, Vol. 1, waste water Engineering, Vol. II, B.C.Punmia, Ashok Jain & Arun Jain, Laxmi Publications Pvt.Ltd, New Delhi

3. Water supply and sanitary Engineering by S.K.Garg

Reference Books:

1. Water and Waste Water Technology by Mark J Hammar and Mark J. Hammar Jr
2. Waste water treatment- concepts and design approach by G.L. Karia and R.A. Christian, Prentice Hall of India

R20 Regulations

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Civil Engineering

HONOURS IN CIVIL ENGINEERING

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Civil Engineering

HONOURS IN CIVIL ENGINEERING

Note
1.A student can opt any Four subjects @ 4 credits per subject
2.Concerned BoS can add or delete the subjects as per the decision of the board.
3.Prerequisites to be defined by the board for each course.
4.Compulsory MOOC/NPTEL Courses for 04 credits (02 courses@ 2 credits each

S.No.	Course Code	Course Name	L	T	P	Credits
1.		Advanced Structural Design	3	1	0	4
2.		Advanced Concrete Technology	3	1	0	4
3.		Stability of Structures	3	1	0	4
6		Repairs and Rehabilitation of Structures	3	1	0	4
7		MOOC course (8 weeks duration)				2
8		MOOC course (12 weeks duration)				2

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Civil Engineering

Course Code	ADVANCED STRUCTURAL DESIGN	L	T	P	C
		3	1	0	4

HONOURS IN CIVIL ENGINEERING

COURSE OBJECTIVE:
- 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

COURSE OUTCOMES:
- 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

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:

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.

Course Code	ADVANCED CONCRETE TECHNOLOGY	L	T	P	C
		3	1	0	4
	HONOURS IN CIVIL ENGINEERING				

Course Objectives:

- 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):

At the end of the course student is able to

- 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 – Draying 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 Reinforced Concrete – Different Types Of Fibers - Factories 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

Civil Engineering

2. Concrete Technology By M.S.Shetty. – S.Chand & Co. ; 2004
3. Design Of Concrete Mix By Krishna Raja, CBS Publishers.
4. Concrete: Micro Structure, Properties And Materials – P.K.Mehta And J.M.Monteiro, Mc-Graw 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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Civil Engineering

Course Code	STABILITY OF STRUCTURES	L	T	P	C
		3	1	0	4

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 Trignometric 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 Metalic 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 Almorth., 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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Civil Engineering

Course Code	REPAIR AND REHABILITATION OF STRUCTURES	L	T	P	C
		3	1	0	4
	HONOURS IN CIVIL ENGINEERING				

Course Objectives:

- To learn various distress and damages to concrete and masonry structures
- To understand the importance of maintenance of structures
- To asses 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):

- 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:

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:

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

R20 Regulations

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

MINOR DEGREE IN

CIVIL ENGINEERING

Minors Degree in Civil Engineering

Note

1.A student can opt any Four subjects @ 4 credits per subject
2.Concerned BoS can add or delete the subjects as per the decision of the board.
3.Prerequisites to be defined by the board for each course.
4.Compulsory MOOC/NPTEL Courses for 04 credits (02 courses@ 2 credits each)

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S.No	Course Code	Course Name Civil Engineering	L	T	P	Credits
1.		Building Materials	3	1	0	4
2.		Construction Technology	3	1	0	4
3.		Building planning and Drawing	3	1	0	4
4.		Surveying	3	1	0	4
6		MOOC Course				2
7		MOOC Course				2

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Civil Engineering

Course Code	Building Materials	L	T	P	C
		3	1	0	4
	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:
. 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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Civil Engineering

Course Code	CONSTRUCTION TECHNOLOGY	L	T	P	C
		3	1	0	4
	Minors in Civil Engineering				

Course Objectives:

- 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:

1. Prefab Architecture, a guide to modular design & construction Ryan E Smith, John Wiley Publishers.
2. Building Construction by Pc Varghese, Prentice Hall Of India

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Civil Engineering

Course Code	BUILDING PLANNING AND DRAWING	L	T	P	C
		3	1	0	4
	Minors in Civil Engineering				

UNIT - I	PART A				

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

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 roofs-king and queen post trusses.

UNIT - III	

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.

UNIT - IV	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	

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)

Textbooks:
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 Books:
6. Building materials by P.C. Varghese, Prentice-Hall of India private Ltd, New Delhi
7. Building material by S K Duggal – New Age International Publishers; Second Edition
8. Building by laws bye state and Central Governments and Municipal corporations.
9. 'A' Series & 'B' Series of JNTU Engineering College, Anantapur
10. 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	1	0	4

Minors in Civil Engineering

Course Objectives:
- 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", 2nd edition, Dreamtech press, Wiley distributors.
2. C.Venkatramaiah, "Text book of surveying", 2nd edition, Universities press, 2018.

Civil Engineering

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.