

# SRI KRISHNADEVARAYA UNIVERSITY :: ANANTAPUR

## College of Engineering & Technology

### Academic Regulations 2019 (R19) for

#### B. Tech (Regular-Full time)

(With effect from the Academic Year 2019-20 for the students admitted into I year I semester)

#### 1. Award of B.Tech. Degree

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

- i. Pursues a course of study for not less than four academic years and not more than eight academic years. However, for the students availing Gap year facility this period shall be extended by two years at the most and these two years would not be counted in the maximum period permitted for graduation.
- ii. Registers for 160 credits and secures all 160 credits.

2. Students, who fail to fulfill all the academic requirements for the award of the degree within eight academic years from the year of their admission, shall forfeit their seat in B.Tech. course and their admission stands cancelled.

#### 3. Programs offered by the College:

The following programs are offered at present as specializations for the B. Tech. course from 2019-2020

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).

#### 4. About 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. 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
Project stage - I	04	02
Project stage – II	14	07

## 5. Weights for Course Evaluation:

### 5.1 Course Pattern:

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

### 5.2 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.

### 5.3 Internal Examination Evaluation:

- i. 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

$$\text{Final Internal Marks: } (24 \times 0.75) + (20 \times 0.25) = 23$$

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

$$\text{Final Internal Marks: } (24 \times 0.75) + (0 \times 0.25) = 18$$

#### 5.4 End Examination Evaluation:

- i. 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.

5.5 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.

5.6 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.

5.7 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

5.8 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.

#### 5.9 Procedure for Conduct and Evaluation of MOOC:

- There shall be a Discipline Centric Elective Course through Massive Open Online Course (MOOC) in IV Year 2<sup>nd</sup> semester as Program Elective course. The student shall register for the course (Minimum of 40 hours) offered by authorized Institutions/Agencies, through online with the approval of Head of the Department. The Head of the Department shall appoint one mentor for each of the MOOC subjects offered and the mentor appointed shall conduct the internal examinations following the guidelines given in 5.3. Further, the external examination for the MOOC subject will be conducted in line with other regular subjects (5.4) based on the syllabi of the respective subject provided in the curriculum. A MOOC course may be studied either in online or in conventional manner (or) MOOC online courses conducted under SWAYAM can be given weightage as per the norms.
- From second year onwards, every student should register at least one online course in each semester as mandatory and audit course. he/she should submit course completion certificate in

each semester.

- 5.10 There shall be two Open Electives and three inter-disciplinary electives which are **Choice Based Credit Courses (CBCC)** from III Year I Semester onwards, wherein the students have to choose inter-disciplinary electives offered by various other departments. These courses can be pursued in MOOC manner or the Conventional manner.

5.11 A **Socially relevant Project** is introduced in II Year 2<sup>nd</sup>, III Year 1<sup>st</sup>, III Year 2<sup>nd</sup> and IV Year 1<sup>st</sup> Semester for 0.5 credits in each semester. The student has to spend 15 Hrs./semester on any socially relevant project and submit a report for evaluation. This shall be evaluated for 50 marks in each of the above semesters by a committee consisting of Head of the department, Project mentor and one senior faculty member of the department. A student shall acquire 0.5 credits assigned, when he/she secures 40% or more marks for the total of 50 marks. In case, if a student fails, he/she shall resubmit the report. There shall be no external evaluation.

5.12 There shall be one **Comprehensive online examination** with zero credits conducted by the institution at the end of III Year 2<sup>nd</sup> semester with 100 objective questions for 100 marks on the subjects studied up to III Year 2<sup>nd</sup> semester.

Student shall be declared to have passed the Comprehensive online examination only when he/she secures 40% or more marks in the examination. In case, the student fails, he/she shall reappear as and when III Year 2<sup>nd</sup> semester supplementary examinations are conducted.

5.13 An **Internship/Industrial Training/Research Projects in National Laboratories/Academic Institutions** is introduced for 2 credits in the curriculum. It is introduced at the end of III Year 2<sup>nd</sup> semester i.e., during summer vacation for a period of 4 weeks. The student shall submit a diary and a technical report for evaluation. This shall be evaluated in the IV Year 1<sup>st</sup> semester for 50 marks by a committee consisting of Head of the Department along with two senior faculty members of the Department. A student shall acquire 2 credits assigned, when he/she secures 40% or more marks for the total of 50 marks. In case, if a student fails, he/she shall reappear as and when the IV Year 1<sup>st</sup> semester supplementary examinations are conducted. There shall be no external evaluation.

**5.14 Procedure for Conduct and Evaluation of Project Stage – I:**

There shall be a presentation of **Abstract of the main project** in the IV Year 1<sup>st</sup> Semester. After selecting the specific topic, the student shall collect the information and prepare a report, showing his/her understanding of the topic and submit the same to the department before presentation. The report and the presentation shall be evaluated by the departmental committee consisting of Head of the Department, Project supervisor and a senior faculty member. It shall be evaluated for 50 marks. A student shall acquire 2 credits assigned to the Project stage-I, when he/she secures 40% or more marks for the total of 50 marks. The Project stage-I shall be evaluated at the end of IV Year 1<sup>st</sup> semester by the department committee. There shall be no external evaluation for Project stage-I.

In case, if a student fails in Project stage-I, a reexamination shall be conducted within a month. In case if he/she fails in the reexamination also, he/she shall not be permitted to register for Project Stage-II. Further, such students shall reappear as and when IV Year 1<sup>st</sup> semester supplementary examinations are conducted.

**5.17 Procedure for Conduct and Evaluation of Project Stage – II:**

Out of a total of 200 marks for the **Project stage - II**, 60 marks shall be for Internal Evaluation and 140 marks for the End Semester Examination (Viva-voce). The Viva-Voce shall be conducted by a committee consisting of HOD, Project Supervisor and an External Examiner nominated by the head of the Institution. Project work shall start in IV Year 1<sup>st</sup> semester and shall continue in the IV Year 2<sup>nd</sup> semester. The evaluation of project work shall be conducted at the end of the IV Year 2<sup>nd</sup> semester. The Internal Evaluation shall be made by the departmental committee (Head of the Department, senior faculty member of the department and Supervisor), on the basis of two seminars given by each student on the topic of his/her project.

## 6. Attendance Requirements in Academics:

- 6.1. 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.
- 6.2. 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.
- 6.3 Shortage of Attendance below 65% in aggregate shall in NO CASE be condoned.
- 6.4 A stipulated fee shall be payable towards condonation of shortage of attendance to the Institution.
- 6.5 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.
- 6.6 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.
- 6.7 The aggregate percentage of attendance can be rounded to next integer for the purpose of considering for condonation/detention.  
For example:
  - A candidate getting  $\geq 64.5$  may be condoned, may be rounded to 65. No attendance shall be added but for condoning purpose can only be considered.

## 7. 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 6.

- 7.1 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.
- 7.2 A student shall be promoted from II Year 2<sup>nd</sup> to III Year 1<sup>st</sup> Semester only if he/she fulfils the academic requirement of securing **24 credits** in the subjects that have been studied up to II Year 1<sup>st</sup> Semester.
- 7.3 A student shall be promoted from III Year 2<sup>nd</sup> semester to IV Year 1<sup>st</sup> semester only if he/she fulfils the academic requirements of securing **42 credits** in the subjects that have been studied up to III Year 1<sup>st</sup> semester  
And in case a student is detained for want of credits for particular academic year by sections 7.2 and 7.3 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 1<sup>st</sup> semester or IV Year 1<sup>st</sup> semester as the case may be.
- 7.4 A student shall register and put up minimum attendance in all 160 credits and earn all the 160 credits.
- 7.5 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.

## 8. 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.

## 9. 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
$\geq 90$	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

- 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.
- 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.

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

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

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

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

- 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  $i^{\text{th}}$  semester and  $C_i$  is the total number of credits upto that semester.

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

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

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

**Letter Grade:** 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.

## 10. 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

<b>Class Awarded</b>	<b>CGPA Secured</b>
First Class with Distinction	$\geq 7.5$
First Class	$\geq 6.5 < 7.5$
Second Class	$\geq 5.5 < 6.5$
Pass Class	$\geq 4.5 < 5.5$

### **11. 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.

### **12. 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.

### **13. Minimum Instruction Days for a Semester:**

The minimum instruction days including exams for each semester shall be 90 days.

### **14. Medium of Instruction:**

The Medium of Instruction is **English** for all courses, laboratories, internal and external examinations, Comprehensive Viva-Voce, seminar presentations and project reports..

### **15. General Instructions:**

- The academic regulations should be read as a whole for purpose of any interpretation.
- Malpractices rules-nature and punishments are appended.
- Where the words “he”, “him”, “his”, occur in the regulations, they also include “she”, “her”, “hers”, respectively.
- 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.

## **ACADEMIC REGULATIONS FOR B. TECH.(R19)** **(LATERAL ENTRY SCHEME)**

*(Effective for the students getting admitted into II year through Lateral Entry Scheme from the Academic Year 2020-2021 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 120 credits and secures all 120 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 six consecutive academic years from the year of admission, shall forfeit their seat.
3. The regulations 3 to 6 except 5.1 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.5

- 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 2<sup>nd</sup> Semester to IV year 1<sup>st</sup> Semester only if the student fulfills the academic requirements of securing **25 credits** of the subjects that have been studied up to III Year 1<sup>st</sup> 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.



**6.** The regulations **8** to **16** are to be adopted as that of B. Tech. (Regular). All other regulations as applicable for B. Tech. Four-year degree course (Regular) will hold good for B. Tech. (Lateral Entry Scheme).

**7. 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 6.

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

S. No.	Nature of Malpractices/Improper conduct	Punishment
	<i>If the Candidate:</i>	
1 (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
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.	<p>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.</p> <p>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.</p> <p>If the imposter is an outsider, he will be handed over to the police and a case is registered against him.</p>

4	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject 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 malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person (s) who do not belong to the College will be handed over to police and, a police case will be registered against them.
10	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.
11	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject 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.**

<b>Sri Krishnadevaraya University College of Engineering &amp; Technology</b>				
<b>Curriculum B. Tech Course Structure – R19</b>				
<b>CIVIL ENGINEERING</b>				

<b>Common for All Branches of Engineering</b>				
<b>S.No</b>	<b>Course No</b>	<b>Course Name</b>	<b>Category</b>	<b>L-T-P-C</b>
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

Sri Krishnadevaraya University College of Engineering & Technology					
Dept. of Civil Engineering					
I Year 1 <sup>st</sup> Semester					
S.No	Course No	Course Name	Category	L-T-P	Credits
1.		Mathematics- I	BS	3-1-0	4
2.		Engineering Chemistry	BS	2-1-0	3
3.		Problem Solving & Programming	ES	3-1-0	4
4.		Communicative English 1	HS	2-0-0	2
5.		Basic Engineering Workshop	LC	0-0-2	1
6.		Engineering Chemistry Lab	BS	0-0-3	1.5
7.		Problem Solving & Programming Lab	ES	0-0-3	1.5
8.		Communicative English Lab-1	HS	0-0-2	1
9.		Environmental Sciences	MC	3-0-0	0
<b>Total</b>					<b>18</b>

Category	CREDITS
Basic Science course	8.5
Engineering Science Courses(Including LC)	6.5
Humanities and Social science	3
<b>TOTAL CREDITS</b>	<b>18</b>

Sri Krishnadevaraya University College of Engineering & Technology					
Dept. of Civil Engineering					
I Year 2 <sup>nd</sup> Semester					
S.No	Course No	Course Name	Category	L-T-P	Credits
1		Mathematics- II	BS	3-1-0	4
2		Engineering Physics	BS	2-1-0	3
3		Basic Electrical & Electronics Engineering	ES	3-0-0	3
4		Data Structures	ES	3-0-0	3
5		Civil Engineering Workshop	LC	0-0-2	1
6		Engineering Graphics	ES	1-0-4	3
7		Basic Electrical & Electronics Engineering Lab	ES	0-0-3	1.5
8		Engineering Physics Lab	BS	0-0-3	1.5
9		Data Structures Lab	ES	0-0-4	2
10		Constitution of India	MC	3-0-0	0
<b>Total</b>					<b>22</b>

Category	CREDITS
Basic Science course	8.5
Engineering Science Courses(Including LC)	13.5
<b>TOTAL CREDITS</b>	<b>22</b>

Sri Krishnadevaraya University College of Engineering & Technology					
Dept. of Civil Engineering					
II Year 1 <sup>st</sup> Semester					
S.No	Course No	Course Name	Category	L-T-P	Credits
1.		Mathematics-III	BS	3-0-0	3
2.		Building Materials and Construction	PC	3-0-0	3
3.		Strength of Materials-I	PC	3-0-0	3
4.		Fluid Mechanics	PC	3-0-0	3
5.		Surveying	PC	3-0-0	3
6.		Managerial Economics & Financial Analysis	HS	3-0-0	3
7.		Strength of Materials Lab	PC	0-0-3	1.5
8.		Surveying Lab	PC	0-0-4	2
9.		Essence of Indian Traditional Knowledge	MC	3-0-0	0
<b>Total</b>					<b>21.5</b>

Category	CREDITS
Basic Science course	3
Professional core Courses	15.5
Humanities and Social science	3
<b>TOTAL CREDITS</b>	<b>21.5</b>

Sri Krishnadevaraya University College of Engineering & Technology					
Dept. of Civil Engineering					
II Year 2 <sup>nd</sup> Semester					
S.No	Course No	Course Name	Category	L-T-P	Credits
1		Life science for Engineers	HS	3-0-0	3
2		Strength of Materials-II	PC	3-0-0	3
3		Concrete Technology	PC	3-0-0	3
4		Hydraulic Engineering	PC	3-0-0	3
5		Environmental Engineering	PC	3-0-0	3
6		Python Programming	ES	3-0-0	3
7		Concrete Technology Lab	PC	0-0-3	1.5
8		Fluid Mechanics and Hydraulic Engineering Lab	PC	0-0-2	1.5
<b>Total</b>					<b>21</b>

Category	CREDITS
Professional core Courses	15
Humanities and Social Sciences	3
Engineering Science Courses	3
<b>TOTAL CREDITS</b>	<b>21</b>

Sri Krishnadevaraya University College of Engineering & Technology					
Dept. of Civil Engineering					
III Year 1 <sup>st</sup> Semester 1					
S.No	Course Code	Course Name	Category	L-T-P	Credits
1.		Soil Mechanics	PC	3-0-0	3
2.		Building Planning and Drawing	PC	3-0-0	3
3.		Structural Analysis	PC	3-0-0	3
4.		Design of Reinforced Concrete Structures	PC	3-0-0	3
5.		Professional Elective-I 1. Building Service and Maintenance 2. Water Resources Engineering 3. Expansive Soils	PE-1	3-0-0	3
6.		Open Elective-I	OE-1	3-0-0	3
7.		Soil Mechanics Lab	PC	0-0-3	1.5
8.		Environmental Engineering Lab	PC	0-0-3	1.5
9.		Socially Relevant Projects (15 Hrs/ Sem)	PR	3-0-0	0.5
<b>Total Credits</b>					<b>21.5</b>

Category	CREDITS
Professional core courses	15
Professional Elective courses	03
Open Elective Course/Job oriented elective	03
Socially Relevant Project(15hrs/Sem)	0.5
TOTAL	21.5



Sri Krishnadevaraya University College of Engineering & Technology					
Dept. of Civil Engineering					
III Year 2 <sup>nd</sup> Semester					
S.No	Course Code	Course Name	Category	L-T-P	Credits
1		Engineering Geology	PC	3-0-0	3
2		Design of Irrigation Structures	PC	3-0-0	3
3		Design of Steel Structures	PC	3-0-0	3
4		Transportation Engineering	PC	3-0-0	3
5		Professional Elective-II 1. Disaster Mitigation and Management 2. Advanced Surveying 3. Urban Hydrology	PE-II	3-0-0	3
6		Open Elective-II (Inter Disciplinary)	OE-II	3-0-0	3
7		Geology Lab	PC	0-0-3	1.5
8		Transportation Engineering Lab	PC	0-0-3	1.5
9		Socially Relevant Projects (15 Hrs/ Sem)	PR	- - -	0.5
10		Industrial Training/ Internship/ Research Projects in National Laboratories/Academic Institutions	- - -	- - -	- - -
Total credits					21.5

Category	CREDITS
Professional Core Courses	15
Professional Elective Courses	03
Open Elective Course/Job oriented elective	03
Socially Relevant Project(15hrs/Sem)	0.5
TOTAL	21.5

Sri Krishnadevaraya University College of Engineering & Technology					
Dept. of Civil Engineering					
IV Year 1 <sup>st</sup> Semester					
S.No	Course No	Course Name	Category	L-T-P	Credits
1.		Foundation Engineering	PC	3-0-0	3
2.		Construction Planning and Management	PC	3-0-0	3
3.		Estimation, Costing and Valuation	PC	3-0-0	3
4.		Pre-stressed Concrete	PC	3-0-0	3
5.		Professional Elective-III 1. Traffic Engineering 2. Bridge Engineering 3. Noise and Air Pollution	PE-III	3-0-0	3
6.		Professional Elective-IV 1. Environmental Impact Assessment 2. Water Shed Management 3. Ground Improvement Techniques	PE-IV	3-0-0	3
7.		Project I	PR	- - -	2
8.		Socially Relevant Project(15hrs/Sem)	PR	- - -	0.5
9.		Survey Camp/Industrial Training/ Internship/ Research Projects in National Laboratories/Academic Institutions	PR	- - -	1
<b>Total</b>					<b>21.5</b>

Category	CREDITS
Professional Core Courses	12
Professional Elective Courses	6
Project I	2
Socially Relevant Project(15hrs/Sem)	0.5
Industrial/Research Internship	1
<b>TOTAL CREDITS</b>	<b>21.5</b>

Sri Krishnadevaraya University College of Engineering & Technology					
Dept. of Electrical and Electronics Engineering					
IV Year 2 <sup>nd</sup> Semester					
S.No	Course No	Course Name	Category	L-T-P	Credits
1		Professional Elective- 1. Finite Element Methods in Civil Engineering 2. Railway and Airport Engineering 3. Earthquake Engineering	PE-V	3-0-0	3
2		Professional Elective- 1. Experimental stress Analysis 2. Advanced Structural Design 3. Rehabilitation and Retrofitting of Structures	OE-III	3-0-0	3
3		Project Phase-II			7
<b>Total</b>					<b>13</b>

Category	CREDITS
Professional Elective courses	3
Open Elective Course/Job oriented elective	3
Project II	7
<b>TOTAL CREDITS</b>	<b>13</b>

### **Open Electives offered by Dept. of Civil Engineering**

1. Environmental Impact Assessment
2. Noise and Air Pollution
3. Disaster Mitigation And Management
4. Ground Improvement Techniques
5. Environmental Pollution Control
6. Remote Sensing and GIS

### **Open Electives offered by Dept. of E.E.E**

1. Introduction to Hybrid Electric Vehicles
2. Electrical Engineering Materials
3. Generation of Electric Power
4. Control Systems
5. Renewable Energy Sources
6. Fundamentals of Power Electronics

### **Open Electives offered by Dept. of E.C.E**

1. Fundamentals of Digital Electronics
2. Fundamentals of Communication Systems
3. Signals and Systems
4. Microprocessors and Microcontrollers
5. Electronic Measurements and Instrumentation
6. Embedded Systems
7. Basics of VLSI
8. Principles of Digital Signal Processing
9. Introduction to Image Processing

### **Open Electives offered by Dept. of C.S.E**

1. Database Management Systems
2. Unix Programming
3. Object Oriented Programming through Java
4. Cyber Security
5. Computer Networks
6. Software Engineering
7. Cloud Computing
8. Introduction to Operations Management
9. Block Chain Technology

### **Open Electives offered by Dept. of Mech. Engineering**

1. Manufacturing Process
2. Entrepreneurship
3. IC Engines
4. Automobile Engineering
5. Non Conventional Sources of Energy
6. Non Destructive Evaluation

Sri Krishnadevaraya University College of Engineering & Technology					
Dept. of Civil Engineering					
I Year 1 <sup>st</sup> Semester					
S.No	Course No	Course Name	Category	L-T-P	Credits
1.		Mathematics- I	BS	3-1-0	4
2.		Engineering Chemistry	BS	2-1-0	3
3.		Problem Solving & Programming	ES	3-1-0	4
4.		Communicative English 1	HS	2-0-0	2
5.		Basic Engineering Workshop	LC	0-0-2	1
6.		Engineering Chemistry Lab	BS	0-0-3	1.5
7.		Problem Solving & Programming Lab	ES	0-0-3	1.5
8.		Communicative English Lab-1	HS	0-0-2	1
9.		Environmental Sciences	MC	3-0-0	0
<b>Total</b>					<b>18</b>

Category	CREDITS
Basic Science course	8.5
Engineering Science Courses(Including LC)	6.5
Humanities and Social science	3
<b>TOTAL CREDITS</b>	<b>18</b>

**Sri Krishnadevaraya University College of Engineering & Technology**

**B.Tech – I Year 1 Sem**

**(Civil Engineering)**

**L T P C**

**Mathematics-I**

**3 1 0 4**

**(Calculus & Algebra)**

(Common to all branches of Engineering)

**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

**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.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- solving systems of linear equations, using technology to facilitate row reduction determine the rank, eigenvalues and eigenvectors, diagonal form and different factorizations of a matrix;
- identify special properties of a matrix, such as positive definite, etc., and use this information to facilitate the calculation of matrix characteristics;

**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);

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Translate the given function as series of Taylor's and Maclaurin's with remainders
- analyze the behaviour of functions by using mean value theorems

**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.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Find partial derivatives numerically and symbolically and use them to analyze and interpret the way a function varies.
- Acquire the Knowledge maxima and minima of functions of several variable
- Utilize Jacobian of a coordinate transformation to deal with the problems in change of variables

**Unit IV: Double Integrals**

Double integrals, change of order of integration, double integration in polar coordinates, areas enclosed by plane curves.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Evaluate double integrals of functions of several variables in two dimensions using Cartesian and polar coordinates
- Apply double integration techniques in evaluating areas bounded by region

**Unit V: Multiple Integrals and Special Functions**

Evaluation of triple integrals, change of variables between Cartesian, cylindrical and spherical polar co-ordinates, Beta and Gamma functions and their properties, relation between beta and gamma functions.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Conclude the use of special function in multiple integrals
- evaluate multiple integrals in Cartesian, cylindrical and spherical geometries

**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.

**References:**

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.

**Course Outcomes:**

At the end of the course, the 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

**Sri Krishnadevaraya University College of Engineering & Technology**

**B.Tech – I Year 1 Sem**

**(Civil Engineering)**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>2</b>	<b>1</b>	<b>0</b>	<b>3</b>

**Engineering Chemistry**  
**(Common to Civil & Mech. Branches)**

**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

**Unit 1 : 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. demineralization of brackish water, reverse-osmosis and electro dialysis.

**Learning Outcomes:**

- List: The differences between temporary and permanent hardness of water
- Explain: The principles of reverse osmosis and electro dialysis
- Compare: Quality of drinking water specifications
- Illustrate: Problems associated with hard water-scale and sludge
- Explain: The working principles of different industrial water treatment processes

**Unit 2 : Polymer Chemistry and Fuel Chemistry**

**Polymers:** Basic concepts of polymerization, types of polymerization addition and condensation polymerization. **Plastomers:** thermosetting and thermoplastics composition properties and engineering applications of PVC, teflon, bakelite and nylons. **Rubber:** rubber-processing of natural rubber and compound elastomers-buna S, buna N preparation, properties and its applications. **Fuel cells:** Hydrogen-oxygen and methane-oxygen fuel cells advantages, disadvantages and its applications

**Learning Out comes:**

- Explain: Different types of polymers and their applications
- Compare: Elastomers Buna-S and Buna-N
- Explain: Hydrogen-oxygen fuel cell
- Compare: Difference between plastomers and elastomers
- Demonstrate: Engineering applications of PVC and Bakelite

**Unit 3: 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.

**Learning Outcomes:**

- Apply: Nernst equation for calculating electrode and cell potentials
- Apply: Corrosion and its corrosion prevention or control
- Demonstrate: The corrosion prevention methods and factors affecting corrosion
- Compare: Different batteries and their applications
- Explain: Primary batteries and secondary batteries

**Unit 4: 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:** Criteria of refractories, Classification, properties, Factors affecting the refractory materials and applications. Failures of refractories

**Learning Outcomes:**

- Identify: The factors affecting the refractory material
- Identify: The constituents of Portland cement
- Enumerate: The reactions at setting and hardening of the cement
- Compare: Dry and wet processes of Portland cement

**Unit 5: Surface Chemistry and Applications**

Introduction to surface chemistry, colloids, micelle formation, synthesis of colloids any two methods with examples. Chemicals and electrochemicals methods (not more than two methods) of preparation of nanometals and metal oxides.

**Learning Outcomes:**

- Explain: The synthesis of colloids with examples
- Outline: The preparation of nanomaterials and metal oxides
- Explain: Synthesis of colloids any two methods

**Text books:**

1. A text book of engineering chemistry., Jain and Jain, Dhanpat Rai Publishing Company., 15<sup>th</sup> 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, Atkins's Physical Chemistry, 10/e, Oxford University Press, 2010.

**Reference books:**

1. D.J. Shaw, Introduction to Colloids and Surface Chemistry, Butterworth-Heinemann, 1992.
2. H.F.W. Taylor, Cement Chemistry, 2/e, Thomas Telford Publications, 1997.
3. Engineering chemistry K.B Chandra Sekhar et.al, SciTech Publications.

**Course Outcomes**

- Demonstrate: The corrosion prevention methods and factors 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

**Useful Links**

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

**Sri Krishnadevaraya University College of Engineering & Technology**

**B.Tech – I Year 1 Sem**

**(Civil Engineering)**

**L T P C**

**3 1 0 4**

**Problem Solving and Programming  
(Common to all Branches Of Engineering)**

**Course Objectives:**

1. Introduce the internal parts of a computer, and peripherals.
2. Introduce the Concept of Algorithm and use it to solve computational problems
3. Identify the computational and non-computational problems
4. Teach the syntax and semantics of a C Programming language
5. Demonstrate the use of Control structures of C Programming language
6. Illustrate the methodology for solving Computational problems

**Unit 1:**

**Computer Fundamentals:** What is a Computer, Evolution of Computers, Generations of Computers, Classification of Computers, Anatomy of a Computer, Memory revisited, Introduction to Operating systems, Operational overview of a CPU.

**Introduction to Programming, Algorithms and Flowcharts:** Programs and Programming, Programming languages, Compiler, Interpreter, Loader, Linker, Program execution, Fourth generation languages, Fifth generation languages, Classification of Programming languages, Structured programming concept, Algorithms, Pseudo-code, Flowcharts, Strategy for designing algorithms, Tracing an algorithm to depict logic, Specification for converting algorithms into programs.

**Unit Outcomes:**

Student should be able to

1. Identify the different peripherals, ports and connecting cables in a PC
2. Illustrate the working of a Computer
3. Select the components of a Computer in the market and assemble a computer
4. Solve complex problems using language independent notations

**Unit 2:**

**Introduction to computer problem solving:** Introduction, the problem-solving aspect, top down design, implementation of algorithms, the efficiency of algorithms, the analysis of algorithms.

**Fundamental algorithms:** Exchanging the values of two variables, counting, summation of a set of numbers, factorial computation, sine function computation, generation of the Fibonacci sequence, reversing the digits of an integer.

**Learning Outcomes:** Student should be able to

1. Solve Computational problems
2. Apply Algorithmic approach to solving problems
3. Analyze the algorithms

**Unit 3:**

**Types, Operators, and Expressions:** Variable names, data types and sizes, constants, declarations, arithmetic operators, relational and logical operators, type conversions, increment and decrement operators, bitwise operators, assignment operators and expressions, conditional expressions precedence and order of evaluation.

**Input and output:** standard input and output, formatted output-Printf, formatted input-Scanf.

**Control Flow:** Statements and blocks, if-else, else-if, switch, Loops-while and for, Loops-Dowhile, break and continue, Goto and labels.

**Functions and Program Structure:** Basics of functions, functions returning non-integers, external variables, scope variables, header variables, register variables, block structure, initialization, recursion, the C processor.

**Learning Outcomes:** Student should be able to

1. Recognize the programming elements of C Programming language
2. Select the control structure for solving the problem
3. Apply modular approach for solving the problem

**Unit 4:**

**Factoring methods:** Finding the square root of a number, the smallest divisor of a number, the greatest common divisor of two integers, generating prime numbers.

**Pointers and arrays:** Pointers and addresses, pointers and function arguments, pointers and arrays, address arithmetic, character pointers and functions, pointer array; pointers to pointers, Multi-dimensional arrays, initialization of arrays, pointer vs. multi-dimensional arrays, command line arguments, pointers to functions, complicated declarations.

**Array Techniques:** Array order reversal, finding the maximum number in a set, removal of duplicates from an order array, finding the kth smallest element

**Learning Outcomes:** Student should be able to

1. Solve mathematical problems using C Programming language
2. Structure the individual data elements to simplify the solutions
3. Facilitate efficient memory utilization

**Unit 5:**

**Sorting and Searching:** Sorting by selection, sorting by exchange, sorting by insertion, sorting by partitioning, binary search.

**Structures:** Basics of structures, structures and functions, arrays of structures, pointers to structures, self-referential structures, table lookup, typedef, unions, bit-fields.

**Learning Outcomes:** Student should be able to

1. Select sorting algorithm based on the type of the data
2. Organize heterogeneous data
3. Design a sorting algorithm

**Text Books:**

1. Pradip Dey, and Manas Ghosh, “Programming in C”, 2018, Oxford University Press.
2. R.G. Dromey, “How to Solve it by Computer”. 2014, Pearson.
3. Brian W. Kernighan, and Dennis M. Ritchie, “The C Programming Language”, 2nd Edition, Pearson.

**Reference Books:**

1. RS Bichkar “Programming with C”, 2012, Universities Press.
2. Pelin Aksoy, and Laura Denardis, “Information Technology in Theory”, 2017, Cengage Learning.
3. Byron Gottfried and Jitender Kumar Chhabra, “Programming with C”, 4th Edition, 2019, McGraw Hill Education.

**Course Outcomes:**

1. Construct his own computer using parts .
2. Recognize the importance of programming language independent constructs
3. Solve computational problems
4. Select the features of C language appropriate for solving a problem
5. Design computer programs for real world problems
6. Organize the data which is more appropriated for solving a problem

**Sri Krishnadevaraya University College of Engineering & Technology**

**B.Tech – I Year 1 Sem**

**(Civil Engineering)**

**Communicative English I**

**(Common to All Branches of Engineering)**

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

**Introduction**

The course is designed to train students in receptive (listening and reading) as well as productive and interactive (speaking and writing) skills by incorporating a comprehensive, coherent and integrated approach that improves the learners' ability to effectively use English language in academic/ workplace contexts. The shift is from learning about the language to using the language. On successful completion of the compulsory English language course/s in B.Tech., learners would be confident of appearing for international language qualification/proficiency tests such as IELTS, TOEFL, or BEC, besides being able to express themselves clearly in speech and competently handle the writing tasks and verbal ability component of campus placement tests. Activity based teaching-learning methods would be adopted to ensure that learners would engage in actual use of language both in the classroom and laboratory sessions.

**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

**Unit 1**

**Lesson : Exploration – A Proposal to Girdle – Explored Avenues**

**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:** 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.

**Learning Outcomes**

At the end of the module, the learners will be able to

- understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information
- ask and answer general questions on familiar topics and introduce oneself/others
- employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information
- recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs
- form sentences using proper grammatical structures and correct word forms

**Unit 2**

**Lesson : On Campus – The District School as It was by One Who Went to It – Strategies to organise ideas**

**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.

### **Learning Outcomes**

At the end of the module, the learners will be able to

- comprehend short talks on general topics
- participate in informal discussions and speak clearly on a specific topic using suitable discourse markers
- understand the use of cohesive devices for better reading comprehension
- write well structured paragraphs on specific topics
- identify basic errors of grammar/ usage and make necessary corrections in short texts

### **Unit 3**

#### **Lesson : Working Together – The future of work – Successful Great Partnership**

**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 - identifying main idea/s and rephrasing what is read; avoiding redundancies and repetitions. **Grammar and Vocabulary:** Verbs - tenses; subject-verb agreement; direct and indirect speech, reporting verbs for academic purposes.

### **Learning Outcomes**

At the end of the module, the learners will be able to

- comprehend short talks and summarize the content with clarity and precision
- participate in informal discussions and report what is discussed
- infer meanings of unfamiliar words using contextual clues
- write summaries based on global comprehension of reading/listening texts
- use correct tense forms, appropriate structures and a range of reporting verbs in speech and writing

### **Unit4**

#### **Lesson : Fabric of Change – H.G.Wells and the Uncertainties of Progress – Diversity in Work Place**

**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:** Information transfer; describe, compare, contrast, identify significance/trendsbased on information provided in figures/charts/graphs/tables.**Grammar and Vocabulary:**Quantifying expressions - adjectives and adverbs; comparing and contrasting; degrees of comparison; use of antonyms

### **Learning Outcomes**

At the end of the module, the learners will be able to

- infer and predict about content of spoken discourse
- understand verbal and non-verbal features of communication and hold formal/informal conversations
- interpret graphic elements used in academic texts
- produce a coherent paragraph interpreting a figure/graph/chart/table
- use language appropriate for description and interpretation of graphical elements

### **Unit 5**

#### **Lesson : Tool For Life – Leaves from the Mental Portfolio of a Eurasian – Learning by Doing**

**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)

### **Learning Outcomes**

At the end of the module, the learners will be able to

- take notes while listening to a talk/lecture and make use of them to answer questions
- make formal oral presentations using effective strategies
- comprehend, discuss and respond to academic texts orally and in writing
- produce a well-organized essay with adequate support and detail

- edit short texts by correcting common errors

**\*Course Materials would be compiled and provided to learners and teachers**

#### **Text Books**

- English All Round - Communication Skills for Undergraduate Learners , Prabavathi Y M Lalitha Sridevi, Orient Black Swan Publishers

#### **Reference Books**

- Bailey, Stephen. Academic writing: A handbook for international students. Routledge, 2014.
- Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking. Heinley ELT; 2nd Edition, 2018.
- Skilful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational. Hewings, Martin. Cambridge Academic English (B2). CUP, 2012.

#### **Course Outcomes:**

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

- 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
- produce a well-organized essay with adequate support and detail
- edit short texts by correcting common errors

#### **Text Books**

- Bailey, Stephen. Academic writing: A handbook for international students. Routledge, 2014.
- Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking. Heinley ELT; 2nd Edition, 2018.

#### **Reference Books**

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- English Around, Communication Skills for Undergraduate Learners ,Prabavathi Y M Lalitha Sridevi, Orient Black Swan Publishers

#### **Course Outcomes:**

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

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- 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

**Sri Krishnadevaraya University College of Engineering & Technology**

**B.Tech – I Year 1 Sem**

**(Civil Engineering)**

**Basic**

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

**Engineering Workshop**  
**(Common to all branches)**

**Course Objective:**

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

**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 phase motor      b) Two way switch      c) Godown lighting      d) Tube light      e) Three f) Soldering of wires

**Course Outcomes:**

After completion of this lab the student will be able to

- 1. apply wood working skills in real world applications.
- 2. build different parts with metal sheets in real world applications.
- 3. apply fitting operations in various applications.
- 4. apply different types of basic electric circuit connections.
- 5. demonstrate soldering and brazing.

**Sri Krishnadevaraya University College of Engineering & Technology**

**B.Tech – I Year 1 Sem**

**(Civil Engineering)**

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

**Engineering Chemistry Lab**  
**(Common to Civil & Mech. Branches)**

**Course Objectives**

- Verify the fundamental concepts with experiments

**List of Experiments:**

**Chemical methods: Volumetric analysis**

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

Iodometry Titrations:

2. Estimation of Copper ( $\text{Cu}^{2+}$ ) Ion using Standard Potassium Dichromate

(i) Part-I : Standardization of sodium thiosulphate ( $\text{Na}_2\text{S}_2\text{O}_3$ ) solution with standard  $\text{K}_2\text{Cr}_2\text{O}_7$

(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  $\text{KMnO}_4$  solution

9. Identification of simple organic compounds by UV, IR and NMR

10. Viscosity determination of Kerosin and Petrol by Red-wood viscometer

**Course Out comes**

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:** Identification of the UV-Visible and IR spectrum
- **Identify:** Acid -base buffer solution pH meter



**Sri Krishnadevaraya University College of Engineering & Technology**

**B.Tech – I Year 1 Sem**

**(Civil Engineering)**

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

**Problem Solving And Programming Lab  
(Common To All Branches Of Engineering)**

**Laboratory Experiments**

1. Assemble and disassemble parts of a Computer
2. Design a C program which reverses the number
3. Design a C program which finds the second maximum number among the given list of numbers.
4. Construct a program which finds the kth smallest number among the given list of numbers.
5. Design an algorithm and implement using C language the following exchanges  
 $a \leftarrow b \leftarrow c \leftarrow d$
6. Develop a C Program which counts the number of positive and negative numbers separately and also compute the sum of them.
7. Implement the C program which computes the sum of the first n terms of the series  
 $\text{Sum} = 1 - 3 + 5 - 7 + 9$
8. Design a C program which determines the numbers whose factorial values are between 5000 and 32565.
9. Design an algorithm and implement using a C program which finds the sum of the infinite series  $1 - x^2/2! + x^4/4! - x^6/6! + \dots$
10. Design a C program to print the sequence of numbers in which each number is the sum of the three most recent predecessors. Assume first three numbers as 0, 1, and 1.
11. Implement a C program which converts a hexadecimal, octal and binary number to decimal number and vice versa.
12. Develop an algorithm which computes the all the factors between 1 to 100 for a given number and implement it using C.
13. Construct an algorithm which computes the sum of the factorials of numbers between m and n.
14. Design a C program which reverses the elements of the array.
15. Given a list of n numbers, Design an algorithm which prints the number of stars equivalent to the value of the number. The stars for each number should be printed horizontally.
16. Implement the sorting algorithms  
a. Insertion sort b. Exchange sort c. Selection sort d. Partitioning sort.
17. Illustrate the use of auto, static, register and external variables.
18. Design algorithm and implement the operations creation, insertion, deletion, traversing on a singly linked list.
19. Develop a C program which takes two numbers as command line arguments and finds all the common factors of those two numbers.
20. Design a C program which sorts the strings using array of pointers.

**Course outcomes:** Student should be able to

1. Construct a Computer given its parts
2. Select the right control structure for solving the problem
3. Analyze different sorting algorithms
4. Design solutions for computational problems
5. Develop C programs which utilize the memory efficiently using programming constructs like pointers.

**Communicative English I Lab**  
**(Common to All Branches of Engineering)**

**Course Objectives**

- Students will be exposed to a variety of self instructional, learner friendly modes of language learning
- Students will cultivate the habit of reading passages from the computer monitor. Thus providing them with the required facility to face computer based competitive exams like GRE, TOEFL, and GMAT etc.
- 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

**Unit 1**

1. Phonetics for listening comprehension of various accents
2. Reading comprehension
3. Describing objects/places/persons

**Learning Outcomes**

At the end of the module, the learners will be able to

- ☐ understand different accents spoken by native speakers of English
- ☐ employ suitable strategies for skimming and scanning on monitor to get the general idea of a text and locate specific information
- ☐ learn different professional registers and specific vocabulary to describe different persons, places and objects

**Unit 2**

1. JAM
2. Small talks on general topics
3. Debates

**Learning Outcomes**

At the end of the module, the learners will be able to

- ☐ produce a structured talk extemporarily
- ☐ comprehend and produce short talks on general topics
- ☐ participate in debates and speak clearly on a specific topic using suitable discourse markers

**Unit 3**

1. Situational dialogues – Greeting and Introduction
2. Summarizing and Note making
3. Vocabulary Building

**Learning Outcomes**

At the end of the module, the learners will be able to

- ☐ Learn different ways of greeting and introducing oneself/others
- ☐ summarize the content with clarity and precision and take notes while listening to a talk/lecture and make use of them to answer questions
- ☐ replenish vocabulary with one word substitutes, homonyms, homophones, homographs to reduce errors in speech and writing

**Unit 4**

1. Asking for Information and Giving Directions
2. Information Transfer
3. Non-verbal Communication – Dumb Charade

**Learning Outcomes**

At the end of the module, the learners will be able to

- ☐ Learn different ways of asking information and giving directions
- ☐ Able to transfer information effectively

- ☐ understand non-verbal features of communication

### **Unit 5**

1. Oral Presentations
2. Précis Writing and Paraphrasing
3. Reading Comprehension and spotting errors

### **Learning Outcomes**

At the end of the module, the learners will be able to

- ☐ make formal oral presentations using effective strategies
- ☐ learn different techniques of précis writing and paraphrasing strategies
- ☐ comprehend while reading different texts and edit short texts by correcting common errors

### **Course Outcomes**

- CO1: Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills
- CO2: Apply communication skills through various language learning activities
- CO3: Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
- CO4: Evaluate and exhibit acceptable etiquette essential in social and professional settings
- CO5: Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.

**Sri Krishnadevaraya University College of Engineering & Technology**

**B.Tech – I Year 1 Sem**

**(Civil Engineering)**

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

**Environmental Science**

**OBJECTIVE:**

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.

**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:

**LEARNING OUTCOMES**

Students will be able to

1. articulate the basic structure, functions, and processes of key social systems affecting the environment.
2. explain how water resources should be used.
3. articulate basic understanding of effects of modern agriculture on environment.
4. explain how various paradigms or world views and their implicit and explicit assumptions and values shape the viewer's perception of environmental problems and solutions.

**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-spots of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

**LEARNING OUTCOMES**

Students will be able to

1. get a clear picture of structure and functions of ecosystems.
2. explain why renewable and non-renewable energy resources are important.
3. get awareness about land degradation, soil erosion & desertification.

4. gain a rigorous foundation in various scientific disciplines as they apply to environmental science, such as ecology, evolutionary biology, hydrology, and human behavior.

### **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.

### **LEARNING OUTCOMES**

Students will be able to

1. demonstrate knowledge and understanding of theories in the field of Biodiversity and Systematics in the broad sense.
2. conduct basic conservation biology research.
3. explain endangered and endemic species of India.
4. identify the threats to biodiversity.

### **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.

### **LEARNING OUTCOMES:**

Students will be able to

1. understand Cause, effects and control measures of air pollution.
2. understand soil, noise & water pollution.
3. explain the enforcement of Environmental legislation
4. understand solid waste management.

### **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..

## **LEARNING OUTCOMES**

Students will have

1. knowledge about watershed management and environmental ethics.
2. explain the reasons for global warming
3. explain principles and impact of disasters on environment.
4. explain disaster management cycle in India.

## **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					
Dept. of Civil Engineering					
I Year 2 <sup>nd</sup> Semester					
S.No	Course No	Course Name	Category	L-T-P	Credits
1		Mathematics- II	BS	3-1-0	4
2		Engineering Physics	BS	2-1-0	3
3		Basic Electrical & Electronics Engineering	ES	3-0-0	3
4		Data Structures	ES	3-0-0	3
5		Civil Engineering Workshop	LC	0-0-2	1
6		Engineering Graphics	ES	1-0-4	3
7		Basic Electrical & Electronics Engineering Lab	ES	0-0-3	1.5
8		Engineering Physics Lab	BS	0-0-3	1.5
9		Data Structures Lab	ES	0-0-4	2
10		Constitution of India	MC	3-0-0	0
<b>Total</b>					<b>22</b>

Category	CREDITS
Basic Science course	8.5
Engineering Science Courses(Including LC)	13.5
<b>TOTAL CREDITS</b>	<b>22</b>

**Sri Krishnadevaraya University College of Engineering & Technology**

<b>B.Tech –I Year 2<sup>nd</sup> Sem</b>	<b>(Civil Engineering)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Mathematics-II</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
	<b>(Differential Equations and Vector Calculus)</b>				
	<b>(Common to ECE,EEE,Civil &amp; Mechanical Branches)</b>				

**Course Objectives:**

- 1) To enlighten the learners in the concept of differential equations and multivariable calculus.
- 2) 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.

**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.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- identify the essential characteristics of linear differential equations with constant coefficients
- solve the linear differential equations with constant coefficients by appropriate method

**UNIT II: Equations Reducible to Linear Differential Equations and Applications**

Cauchy's and Legendre's linear equations, simultaneous linear equations with constant coefficients, Applications: Mass spring system and L-C-R Circuit problems.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- classify and interpret the solutions of linear differential equations
- formulate and solve the higher order differential equation by analyzing physical situations

**UNIT III: Partial Differential Equations – First order**

First order partial differential equations, solutions of first order linear and non-linear PDEs. Solutions to homogenous and non-homogenous higher order linear partial differential equations.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- apply a range of techniques to find solutions of standard PDEs
- outline the basic properties of standard PDEs

**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.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- apply del to Scalar and vector point functions
- illustrate the physical interpretation of Gradient, Divergence and Curl

**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).

**Learning Outcomes:**

At the end of this unit, the student will be able to

- find the work done in moving a particle along the path over a force field
- evaluate the rates of fluid flow along and across curves
- apply Green's, Stokes and Divergence theorem in evaluation of double and triple integrals

**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.



**References:**

1. Dennis G. Zill and Warren S. Wright, Advanced Engineering Mathematics, Jones and Bartlett, 2011.
2. Michael Greenberg, Advanced Engineering Mathematics, 2/e, Pearson, 2018
3. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
4. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
5. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 2011.

**Course Outcomes:**

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

- 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

**Sri Krishnadevaraya University College of Engineering & Technology**

<b>B.Tech –I Year 2<sup>nd</sup> Sem</b>	<b>(Civil Engineering)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Engineering Physics</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>3</b>
	<b>(Common to Civil and Mech. Branches)</b>				

**Course Objectives:**

- To familiarize the basic concepts of Mechanics and oscillations.
- To familiarize the basic concepts of acoustics and ultrasonics with their Engineering applications.
- To identify the importance of the optical phenomenon i.e. interference, diffraction and polarization related to its Engineering applications.
- 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.

**UNIT-1: MECHANICS & OSCILLATION**

Newton's Laws of Motion - Central Forces-Conservative of central force- $F = -\text{grad } V$ - Centripetal acceleration (polar coordinates) – Equation of Motion under central force – Kepler's laws of motion (Qualitative). Simple Harmonic Motion-Equation of motion of a simple oscillator-Characteristics of Simple Harmonic Motion-Kinetic, Potential and Total Energy of Simple Harmonic Motion-Torsional Pendulum-Damped Oscillation-Forced oscillation.

**Learning Outcomes:**

- identify forces and moments in mechanical systems using scalar and vector techniques
- interpret the equation of motion under central force
- explain Kepler's laws of motion
- explain the concepts of simple harmonic motion and its characteristics.
- Recognize the concepts of torsional pendulum and damped oscillation.

**UNIT-2 ACOUSTICS & ULTRASONICS 8HRS**

Introduction of Acoustics, decibel, Weber–Fechner law- 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. Introduction to ultrasonic-Production of ultrasonic by magnetostriction and piezoelectric methods- Detection of ultrasonic-Applications of ultrasonic.

**Learning Outcomes:**

- explain how sound is propagated in buildings
- analyze acoustic properties of typically used materials in buildings
- recognize sound level disruptors and their use in architectural acoustics
- identify the use of ultrasonics in different fields

**UNIT-3: WAVE OPTICS**

Principle of Superposition–Interference of light – Interference in thin films by reflection– Newton's Rings– Determination of the wavelength- Applications.

Diffraction–Fresnel and Fraunhofer Diffraction–Single and Double-slit – Diffraction Grating-Applications.

Polarization–Polarization by reflection and double refraction–Nicol's Prism–Half wave and Quarter wave plate– Applications of Polarization.

**Learning Outcomes:**

- Explain about coherent sources and the conditions for sustained interference
- Identify engineering applications of interference and diffraction
- Analyze the differences between interference and diffraction with applications
- Illustrate the concept of polarization of light and its applications
- Classify ordinary polarized light and extraordinary polarized light

**UNIT-4: DIELECTRIC & MAGNETIC MATERIALS**

Introduction-Dielectric Polarization-Dielectric polarizability, Susceptibility and Dielectric constant- Types of polarizations: Electronic, Ionic, Orientation Polarizations (Qualitative)-Lorentz (internal)field-Clausius -Mossotti equation-Applications of Dielectrics.

Introduction-Magnetic dipole moment-Magnetization-Magnetic susceptibility and permeability Classification of Magnetic materials-Hysteresis-soft and hard magnetic materials.

### **Learning Outcomes:**

**The students will be able to**

- **explain** the concept of dielectric constant and polarization in dielectric materials
- **summarize** Gauss's law in the presence of dielectrics
- **interpret** dielectric loss, Lorentz field and Clausius- Mossotti relation
- **classify** the magnetic materials based on susceptibility and their temperature dependence
- **explain** the applications of dielectric and magnetic materials

### **UNIT-5: LASERS & FIBER OPTICS**

Introduction - Characteristics of Laser - Spontaneous and Stimulated emission of radiation-Einstein's coefficients - Population inversion - Pumping Mechanisms - He-Ne laser- Semiconductor laser - Applications of laser.

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 Outcomes:**

**The students will be able to**

- **Understand** the basic concepts of LASER light Sources
- **Apply** the concepts to learn the types of lasers
- **Identifies** the Engineering applications of lasers
- **explain** the working principle of optical fibers
- **classify** optical fibers based on refractive index profile and mode of propagation
- **identify** the applications of optical fibers in medical, communication and other fields

### **Text Books**

1. D.Kleppner and Robert Kolenkow“An introduction to Mechanics”-II -Cambridge University Press,2015
2. Gaur R.K. and Gupta S.L., “Engineering Physics”-Dhanpat Rai publishers, 2012
3. M.N.Avadhanulu&P.G.Kshirsagar“A Text book of Engineering Physics”-S.Chand Publications,2017
4. Ian R Sinclair, Sensor and Transducers 3rd eds, 2001, Elsevier (Newnes)

### **Reference text books:**

1. M K Varma “Introduction to Mechanics”-Universities Press-2015.
2. D.K. Bhattacharya and A. Bhaskaran, “Engineering Physics”- Oxford Publications-2015

**Sri Krishnadevaraya University College of Engineering & Technology**

**B.Tech –I Year 2<sup>nd</sup> Sem (Civil Engineering)**

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

**Basic Electrical & Electronics Engineering**

**Course Objectives:**

1. To introduce basics of electric circuits.
2. To teach DC and AC electrical circuit analysis.
3. To explain working principles of transformers and electrical machines.
4. To impart knowledge on low voltage electrical installations
5. To provide comprehensive idea about working principle, operation and applications of PN junction & zener diodes, BJT, FET, MOSFET and operational amplifier
6. To introduce fundamentals of digital electronics
7. To educate on principles of various communication systems
8. To teach efficacy of electronic principles which are pervasive in engineering applications

**Unit 1 DC & AC Circuits:**

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

**Unit Outcomes: Able to**

- Recall Kirchhoff laws
- Analyze simple electric circuits with DC excitation
- Apply network theorems to simple circuits
- Analyze single phase AC circuits consisting of series RL - RC - RLC combinations

**Unit 2 DC & AC Machines:**

Principle and operation of DC Generator - EMF equations - OCC characteristics of DC generator – principle and operation of DC Motor – Performance Characteristics of DC Motor - Speed control of DC Motor – Principle and operation of Single Phase Transformer - OC and SC test on transformer - principle and operation of Induction Motor [ Elementary treatment only ]

**Unit Outcomes: Able to**

- Explain principle and operation of DC Generator & Motor.
- Perform speed control of DC Motor
- Explain operation of transformer and induction motor.
- Explain construction & working of induction motor - DC motor

**Unit 3 Basics of Power Systems:**

Layout & operation of Hydro, Thermal, Nuclear Stations - Solar & wind generating stations – Typical AC Power Supply scheme – Elements of Transmission line – Types of Distribution systems: Primary & Secondary distribution systems.

**Unit Outcomes: Able to**

- Understand working operation of various generating stations
- Explain the types of Distribution systems

**Unit 4 Analog Electronics**

Overview of Semiconductors, PN junction diode, Zener diode, Applications of diode as switch and rectifier, Zener diode as regulator, special purpose diodes: schottky diode, tunnel diode, varactor diode, photodiode, phototransistor and LED.

BJT construction, operation, configuration and characteristics, JFET and MOSFET construction, operation, characteristics (CS configuration), applications

Operational Amplifiers: Introduction, block diagram, basic op-amp circuits: Inverting, Non Inverting, summer, subtractor, voltage follower.

#### **Unit Outcomes:**

- ☐ Describe operation and characteristics of diodes and transistors
- ☐ Make use of diodes and transistors in simple, typical circuit applications
- ☐ Understand operation of basic op-amp circuits

#### **Unit 5            Digital Electronics**

Introduction, Switching and Logic Levels, Digital Waveform, characteristics of digital ICs, logic gates, number systems, combinational circuits - adders, multiplexers, decoders; introduction to sequential circuits, flip flops, shift register, binary counter.

#### **Unit Outcomes:**

- ☐ Explain different logic gates using truth table
- ☐ Distinguish combinational and sequential circuits
- ☐ Analyze various combinational circuits such as adders, multiplexers and decoders
- ☐ Understand functionality of flip-flops, shift registers and counters

#### **Course Outcomes:**

- 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
- Identify type of electrical machine based on their operation.
- Describe working principles of protection devices used in electrical circuits.
- Describe operation and characteristics of diodes and transistors and basic opamps
- Analyze various combinational circuits and sequential circuits.

#### **Text Books:**

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, 2<sup>nd</sup> edition, McGraw Hill Education(India)Private Limited
4. S.K. Bhattacharya, Basic Electrical and Electronics Engineering, 2<sup>nd</sup> 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.

**Sri Krishnadevaraya University College of Engineering & Technology**

**B.Tech –I Year 2<sup>nd</sup> Sem (Civil Engineering)**

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

**Data Structures  
(Common to All Branches of Engineering)**

**Course Objectives:**

1. To teach the representation of solution to the problem using algorithm
2. To explain the approach to algorithm analysis
3. To introduce different data structures for solving the problems
4. To demonstrate modelling of the given problem as a graph
5. To elucidate the existing hashing techniques

**Unit – I:** Introduction Algorithm Specification, Performance analysis, Performance Measurement. Arrays: Arrays, Dynamically Allocated Arrays. Structures and Unions. Sorting: Motivation, Quick sort, how fast can we sort, Merge sort, Heap sort

**Learning Outcomes:**

1. Analyze the given algorithm to find the time and space complexities.
2. Select appropriate sorting algorithm
3. Design a sorting algorithm

**Unit – II:** Stack, Queue and Linked lists Stacks, Stacks using Dynamic Arrays, Queues, Circular Queues Using Dynamic Arrays, Evaluation of Expressions, Multiple Stacks and Queues. Linked lists: Singly Linked Lists and Chains, Representing Chains in C, Linked Stacks and Queues, Additional List Operations, Doubly Linked Lists.

**Learning Outcomes:**

1. Evaluate expressions
2. Develop the applications using stacks and queues
3. Construct the linked lists for various applications

**Unit – III:** Trees Introduction, Binary Trees, Binary Tree Traversals, Additional Binary Tree Operations, Binary Search Trees, Counting Binary Trees, Optimal Binary search Trees, AVL Trees. B-Trees: B-Trees, B + Trees

**Learning Outcomes:**

1. Explain the concept of a tree
2. Compare different tree structures
3. Apply trees for indexing

**Unit – IV :** Graphs and Hashing The Graph Abstract Data Type, Elementary Graph Operations, Minimum Cost Spanning Trees, Shortest Paths and Transitive Closure Hashing: Introduction to Hash Table, Static Hashing, Dynamic Hashing.

**Learning Outcomes:**

1. Recognize the importance of Graphs in solving real world problems
2. Apply various graph traversal methods to applications
3. Design a minimum cost solution for a problem using spanning trees
4. Select the appropriate hashing technique for a given application
5. Design a hashing technique

**Unit – V:** Files and Advanced sorting File Organization: Sequential File Organization, Direct File Organization, Indexed Sequential File Organization. Advanced sorting: Sorting on Several keys, List and Table sorts, Summary of Internal sorting, External sorting.

**Learning Outcomes:**

1. Organize data in the form of Files
2. Apply sorting on large amount of data

**Text Books:**

1. Ellis Horowitz and Sartaj Sahni, “Fundamentals of Data Structures in C”, 2nd Edition, Galgotia Book Source, Pvt. Ltd., 2004.
2. Alan L. Tharp, “File Organization and Processing”, Wiley and Sons, 1988.

**Reference Books:**

1. D. Samanta, "Classic Data Structures", 2nd Edition, Prentice-Hall of India, Pvt. Ltd., India, 2012.
3. Peter Bras, "Advanced Data Structures", Cambridge University Press, 2016
2. Richard F. Gilberg, Behrouz A. Forouzan, "Data Structures A Pseudo code Approach with C", Second Edition, Cengage Learning 2005.

**Course Outcomes:**

Students should be able to

1. Select Appropriate Data Structure for solving a real world problem
2. Select appropriate file organization technique depending on the processing to be done
3. Construct Indexes for Databases
4. Analyse the Algorithms
5. Develop Algorithm for Sorting large files of data

**Sri Krishnadevaraya University College of Engineering & Technology**

**B.Tech –I Year 2<sup>nd</sup> Sem                      (Civil Engineering)**

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

**Civil Engineering Workshop**

- 1)        Setting out of a building: The student should set out a building (single room only) as per the given building plan using tape only.
- 2)        Setting out of a building: The student should set out a building (single room only) as per the given building plan using tape and cross staff.
- 3)        Construct a wall of height 50 cm and wall thickness 1½ bricks using English bond (No mortar required) - corner portion – length of side walls 60 cm.
- 4)        Construct a wall of height 50 cm and wall thickness 2 bricks using English bond (No mortar required) - corner portion – length of side walls 60 cm.
- 5)        Computation of Centre of gravity and Moment of inertia of a given rolled steel section by actual measurements.
- 6)        Installation of plumbing and fixtures like Tap, T-Joint, Elbow, Bend, Threading etc;
- 7)        Plastering and Finishing of wall
- 8)        Application of wall putty and painting a wall
- 9)        Application of base coat and laying of Tile flooring of one square meter
- 10)       Preparation of soil cement blocks for masonry and testing for compressive strength
- 11)       Casting and testing of Fly ash Blocks
- 12)       Preparation of cover blocks for providing cover to reinforcement



**Sri Krishnadevaraya University College of Engineering & Technology**

**B.Tech –I Year 2<sup>nd</sup> Sem (Civil Engineering)**

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

**Engineering Graphics  
(Common to All Branches of Engineering)**

**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.

**UNIT-1**

**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) Involute –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:** 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.

**UNIT-IV**

**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.

**Computer Aided Drafting:**

**Introduction to AutoCAD:** Basic drawing and editing commands: line, circle, rectangle, erase, view, undo, redo, snap, object editing, moving, copying, rotating, scaling, mirroring, layers, Templates, polylines, trimming, extending, stretching, fillets, arrays, dimensions.

**UNIT-V**

**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.

**Text Books:**

1. K.L.Narayana & P.Kannaiah, Engineering Drawing, 3/e, Scitech Publishers, Chennai, 2012.
2. Venugopal, Engineering Drawing and Graphics, 3/e, New Age Publishers, 2000

**Reference Books:**

1. Dhanajay A Jolhe, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2009
2. N.D.Bhatt, Engineering Drawing, 53/e, Charotar Publishers, 2016.
3. Shah and Rana, Engineering Drawing, 2/e, Pearson Education, 2009
4. K.C.John, Engineering Graphics, 2/e, PHI, 2013
5. Basant Agarwal & C.M.Agarwal, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2008.

**Course Outcomes:**

After completing the course, the student will be able to

- draw various curves applied in engineering.
- show projections of solids and sections graphically.
- draw the development of surfaces of solids.
- use computers as a drafting tool.
- draw isometric and orthographic drawings using CAD packages.

**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.ca/kardos/88403/drawings.html> conic sections-online, red woods.edu

**Sri Krishnadevaraya University College of Engineering & Technology**

<b>B.Tech –I Year 2<sup>nd</sup> Sem</b>	<b>(Civil Engineering)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Basic Electrical &amp; Electronics Engineering Lab</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>
	<b>Electrical Engineering Lab</b>				

**Course Objectives:**

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

**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.

**Course Outcomes: Able to**

1. Verify Kirchoff's Laws & Superposition theorem.
2. Perform testing on AC and DC Machines.
3. Study I – V Characteristics of PV Cell

**Electronics Engineering Lab**

**Course outcomes:**

- ☐ 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:**

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

**Sri Krishnadevaraya University College of Engineering & Technology**

**B.Tech –I Year 2<sup>nd</sup> Sem**

**(Civil Engineering)**

**Engineering Physics Lab  
(Civil and Mechanical Branches)**

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

**Course Objectives:**

- Understand the role of Optical fiber parameters in engineering applications.
- Recognize the significance of laser by studying its characteristics and its application in finding the particle size.
- Illustrates the magnetic and dielectric materials applications.
- Identifies the various sensor applications.

**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.

Experimental outcomes:

operates various instrument

estimate the wavelength of laser source

Identifies the formation of grating spectrum due diffraction.

2. Determination of particle size using LASER.

Experimental outcomes:

operates various instrument

estimate the Particles size using laser

Identifies the application of laser

3. Determine the thickness of the wire using wedge shape method

Experimental outcomes:

operates optical instrument like travelling microscope.

estimate the thickness of the wire using wedge shape method

Identifies the formation of interference fringes due to reflected light

4. Determination of the radius of curvature of the lens by Newton's ring method

Experimental outcomes:

operates optical instrument like travelling microscope.

estimate the radius of curvature of the lens

Identifies the formation of interference fringes due to reflected light

plots the square of the diameter of a ring with no. of rings

5. Dispersive power of a diffraction grating

Experimental outcomes:

operates optical instrument like spectrometer.

estimate the wavelength of the given source

Identifies the formation of grating spectrum due diffraction.

6. Determination of spring constant of springs using Coupled Oscillator

Experimental outcomes:

Operates various instrument.

estimate the spring constant

Identifies the principle of coupled oscillations.

7. Magnetic field along the axis of a circular coil carrying current.

Experimental outcomes:

Operates various instruments and connect them as per the circuit.

estimate the magnetic field along the axis of a circular coil carrying current.

plots the intensity of the magnetic field of circular coil carrying current with distance

8. Rigidity modulus of material of a wire-dynamic method (Torsional pendulum)

Experimental outcomes:

Operates various instruments.

estimate the rigidity modules of a given wire

plots length of the pendulum (l) with time period T<sub>2</sub>

9. To determine the numerical aperture of a given optical fiber and hence to find its acceptance angle

Experimental outcomes:

Operates various instruments and connect them as per the circuit.

estimate the numerical aperture and acceptance angle of a given optical fiber.

Identifies the significance of numerical aperture and acceptance angle of a optical fiber in various engineering applications.

10. Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall effect.

Operates various instruments and connect them as per the circuit.

estimate the charge carrier concentration and mobility in a semiconductor.

Illustrates the applications of hall effect.

Plots the voltage with current and voltage with magnetic field

11. Determination of Dielectric constant of dielectric material using charging and discharging of capacitor.

Experimental outcomes:

Operates various instruments and connect them as per the circuit.

estimate the dielectric constant of the given substance.

Identifies the significance of dielectric constant in various devices.

12. Determination of hysteresis loss by tracing B-H Curve of ferromagnetic material.

Experimental outcomes:

Operates various instruments and connect them as per the circuit.

estimate the hysteresis loss, coercivity and retentivity of the ferromagnetic material

classifies the soft and hard magnetic material based on B-H curve.

plots the magnetic field H and flux density B

13. Measurement of magnetic susceptibility by Gouy's method

Experimental outcomes:

Operates various instruments and connect them as per the circuit.

estimate the magnetic susceptibility of the given material.

Identifies the significance of magnetic susceptibility in various engineering applications.

14. Determination of pressure variation using Strain Gauge sensor.

Experimental outcomes:

Operates various instruments.

Estimate the pressure variation using strain gauge sensor.

Illustrates the applications of strain gauge sensors.

15. Determination of temperature change using Strain Gauge sensor.

Experimental outcomes:

Operates various instruments.

Estimate the temperature variation using strain gauge sensor.

Illustrates the applications of strain gauge sensors.

### Course Outcomes:

- Operate various optical instruments
- Estimate wavelength of laser and particles size using laser
- estimate the susceptibility and related magnetic parameters of magnetic materials
- plot the intensity of the magnetic field of circular coil carrying current with distance
- evaluate the acceptance angle of an optical fiber and numerical aperture
- determine magnetic susceptibility of the material and its losses by B-H curve
- identify the type of semiconductor i.e., n-type or p-type using hall effect
- Apply the concepts of sensors for various applications

### Reference Books:

1. S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S Chand Publishers, 20172.  
<http://vlab.amrita.edu/index.php> -Virtual Labs, Amrita University

**Sri Krishnadevaraya University College of Engineering & Technology**

**B.Tech –I Year 2<sup>nd</sup> Sem**

**(Civil Engineering)**

**Data Structures Lab**

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

**Course Objectives:**

1. To introduce to the different data structures
2. To elucidate how the data structure selection influences the algorithm complexity
3. To explain the different operations that can be performed on different data structures
4. To introduce to the different search and sorting algorithms.

**Laboratory Experiments**

1. String operations using array of pointers
2. Searching Algorithms (With the Number of Key Comparisons) Sequential, Binary and Fibonacci Search Algorithms.
3. Sorting Algorithms: Insertion Sort, Selection Sort, Shell Sort, Bubble Sort, Quick Sort, Heap Sort, Merge Sort, and Radix Sort. Using the system clock, compute the time taken for sorting of elements. The time for other operations like I/O etc should not be considered while computing time.
4. Implementation of Singly Linked List, Doubly Linked List, Circular Linked List
5. Stack implementation using arrays
6. Stack implementation using linked lists
7. Queue implementation using arrays. Implement different forms of queue. While implementing you should be able to store elements equal to the size of the queue. No positions should be left blank.
8. Queue implementation using linked lists
9. Creation of binary search tree, performing operations insertion, deletion, and traversal.
10. Breadth first search
11. Depth first search
12. Travelling sales man problem
13. File operations
14. Indexing of a file
15. Reversing the links (not just displaying) of a linked list.
16. Consider a linked list consisting of name of a person and gender as a node. Arrange the linked list using 'Ladies first' principle. You may create new linked lists if necessary.
17. An expression can be represented in three ways: infix, prefix and postfix. All the forms are necessary in different contexts. Write modules to convert from one form to another form.
18. A table can be defined as a collection of rows and columns. Each row and column may have a label. Different values are stored in the cells of the table. The values can be of different data types. Numerical operations like summation, average etc can be performed on rows/columns which contain numerical data. Such operations are to be prevented on data which is not numeric. User may like to insert row/columns in the already existing table. User may like to remove row/column. Create table datatype and support different operations on it.

**Course Outcomes:**

At the end of the course students should be able to

1. Select the data structure appropriate for solving the problem
2. Implement searching and sorting algorithms
3. Design new data types
4. Illustrate the working of stack and queue
5. Organize the data in the form of files

**Sri Krishnadevaraya University College of Engineering & Technology**

<b>B.Tech –I Year 2<sup>nd</sup> Sem</b>	<b>(Civil Engineering)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Constitution of India</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>0</b>

**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.

**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.

**LEARNING OUTCOMES:**

After completion of this unit student will

- Understand the concept of Indian constitution
- Apply the knowledge on directive principle of state policy
- Analyze the History, features of Indian constitution
- Evaluate Preamble Fundamental Rights and Duties

**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;

**LEARNING OUTCOMES:-** After completion of this unit student will

- Understand the structure of Indian government
- Differentiate between the state and central government
- Explain the role of President and Prime Minister
- Know the Structure of supreme court and High court

**UNIT-III**

State Government and its Administration Governor - Role and Position - CM and Council of ministers, State Secretariat: Organisation, Structure and Functions

**LEARNING OUTCOMES:-** After completion of this unit student will

- Understand the structure of state government
- Analyze the role Governor and Chief Minister
- Explain the role of state Secretariat
- Differentiate between structure and functions of state secretariate

**UNIT-IV**

A. Local Administration - District's Administration Head - Role and Importance, Municipalities - Mayor and role of Elected Representative - CEO of Municipal Corporation PanchayatiRaj: 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

**LEARNING OUTCOMES:-** After completion of this unit student will

- Understand the local Administration
- Compare and contrast district administration role and importance
- Analyze the role of Myer and elected representatives of Municipalities

- Evaluate Zilla panchayat block level organisation

## 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

**LEARNING OUTCOMES:-** After completion of this unit student will

- Know the role of Election Commission apply knowledge
- Contrast and compare the role of Chief Election commissioner and Commissiononerate
- Analyze role of state election commission
- Evaluate various commissions of viz SC/ST/OBC and women

## REFERENCES:

1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt. Ltd.. New Delhi
2. Subash Kashyap, Indian Constitution, National Book Trust
3. J.A. Siwach, Dynamics of Indian Government & Politics
4. D.C. Gupta, Indian Government and Politics
5. H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication)
6. J.C. Johari, Indian Government and Politics Hans
7. J. Raj Indian Government and Politics
8. M.V. Pylee, Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd.. New Delhi
9. Noorani, A.G., (South Asia Human Rights Documentation Centre), Challenges to Civil Right), Challenges to Civil Rights Guarantees in India, Oxford University Press 2012

## E-RESOURCES:

1. [nptel.ac.in/courses/109104074/8](http://nptel.ac.in/courses/109104074/8)
2. [nptel.ac.in/courses/109104045/](http://nptel.ac.in/courses/109104045/)
3. [nptel.ac.in/courses/101104065/](http://nptel.ac.in/courses/101104065/)
4. [www.hss.iitb.ac.in/en/lecture-details](http://www.hss.iitb.ac.in/en/lecture-details)
5. [www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution](http://www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution)

**Course Outcomes:** 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.
1. Know the sources, features and principles of Indian Constitution.
  2. Learn about Union Government, State government and its administration.
  3. Get acquainted with Local administration and Pachayati Raj.
  4. Be aware of basic concepts and developments of Human Rights.
  5. Gain knowledge on roles and functioning of Election Commission



Sri Krishnadevaraya University College of Engineering & Technology					
Dept. of Civil Engineering					
II Year 1 <sup>st</sup> Semester					
S.No	Course No	Course Name	Category	L-T-P	Credits
1.		Mathematics-III	BS	3-0-0	3
2.		Building Materials and Construction	PC	3-0-0	3
3.		Strength of Materials-I	PC	3-0-0	3
4.		Fluid Mechanics	PC	3-0-0	3
5.		Surveying	PC	3-0-0	3
6.		Managerial Economics & Financial Analysis	HS	3-0-0	3
7.		Strength of Materials Lab	PC	0-0-3	1.5
8.		Surveying Lab	PC	0-0-4	2
9.		Essence of Indian Traditional Knowledge	MC	3-0-0	0
<b>Total</b>					<b>21.5</b>

Category	CREDITS
Basic Science course	3
Professional core Courses	15.5
Humanities and Social science	3
<b>TOTAL CREDITS</b>	<b>21.5</b>

Sri Krishnadevaraya University College of Engineering & Technology					
Dept. of Civil Engineering					
II Year 2 <sup>nd</sup> Semester					
S.No	Course No	Course Name	Category	L-T-P	Credits
1		Life science for Engineers	HS	3-0-0	3
2		Strength of Materials-II	PC	3-0-0	3
3		Concrete Technology	PC	3-0-0	3
4		Hydraulic Engineering	PC	3-0-0	3
5		Environmental Engineering	PC	3-0-0	3
6		Python Programming	ES	3-0-0	3
7		Concrete Technology Lab	PC	0-0-3	1.5
8		Fluid Mechanics and Hydraulic Engineering Lab	PC	0-0-2	1.5
<b>Total</b>					<b>21</b>

Category	CREDITS
Professional core Courses	15
Humanities and Social Sciences	3
Engineering Science Courses	3
<b>TOTAL CREDITS</b>	<b>21</b>

**Sri Krishnadevaraya University College of Engineering & Technology**

**B.Tech – II-I Sem**

**(Civil Engineering)**

**L T P C**

**Mathematics-III**

**3 0 0 3**

**Complex Variables, Transforms & Partial Differential Equations**

(Common to MECH & CIVIL)

**Course Objective:**

This course aims at providing the student to acquire the knowledge on the calculus of functions of complex variables. The aim is to analyze the solutions of partial differential equations.

**Unit-I: Complex Variable – Differentiation:**

Introduction to functions of complex variable-concept of Limit & continuity- Differentiation, Cauchy-Riemann equations, analytic functions (exponential, trigonometric, logarithm), harmonic functions, finding harmonic conjugate-construction of analytic function by Milne Thomson method-Conformal mappings-standard and special transformations ( $\sin z$ ,  $e^z$ ,  $\cos z$ ,  $z^2$ ) Mobius transformations (bilinear) and their properties.

**Unit Outcomes:**

Students will be able to

- Understand functions of Complex variable and its properties.
- Find derivatives of complex functions.
- Understand the analyticity of complex functions .
- Understand the conformal mappings of complex functions.

**Unit-II: Complex Variable – Integration:**

Line integral-Contour integration, Cauchy's integral theorem, Cauchy Integral formula, Liouville's theorem (without proof) and Maximum-Modulus theorem (without proof); power series expansions: Taylor's series, zeros of analytic functions, singularities, Laurent's series; Residues, Cauchy Residue theorem (without proof), Evaluation of definite integral involving sine and cosine, Evaluation of certain improper integrals (around unit circle, semi circle with  $f(z)$  not having poles on real axis).

**Unit Outcomes:**

Students will be able to

- Understand the integration of complex functions.
- Apply Cauchy's integral theorem and Cauchy's integral formula.
- Understand singularities of complex functions.
- Evaluate improper integrals of complex functions using Residue theorem.

**Unit-III: Laplace Transforms**

Definition-Laplace transform of standard functions-existence of Laplace Transform – Inverse transform – First shifting Theorem, Transforms of derivatives and integrals – Unit step function – Second shifting theorem – Dirac's delta function – Convolution theorem – Laplace transform of Periodic function. Differentiation and integration of transform – solving Initial value problems to ordinary differential equations with constant coefficients using Laplace transforms.

**Unit Outcomes:**

Students will be able to

- Understand the concept of Laplace transforms and find the Laplace transforms of elementary functions.
- Find the Laplace transforms of general functions using its properties.
- Understand Laplace transforms of special functions(Unit step function, Unit Impulse & Periodic).
- Apply Laplace transforms to solve Differential Equations.

**Unit-IV: Fourier series**

Determination of Fourier coefficients (Euler's) – Dirichlet conditions for the existence of Fourier series – functions having discontinuity-Fourier series of Even and odd functions – Fourier series in an arbitrary interval – Half-range Fourier sine and cosine expansions- typical wave forms - Parseval's formula- Complex form of Fourier series.

**Unit Outcomes:**

Students will be able to

- Understand finding Fourier series expression of the given function.
- Determine Fourier coefficients (Euler's) and identify existence of fourier series of the given function.
- Expand the given function in Fourier series given in Half range interval.
- Apply Fourier series to establish Identities among Euler coefficients.
- Find Fourier series of wave forms.

**Unit-V: Partial Differential Equations & Applications**

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Solution of first order PDEs by Lagrange's method- Solution of non linear PDEs (Standard forms)-Solution of second order PDEs by Method of separation of variables – Solutions of one dimensional wave equation, one dimensional heat equation under initial and boundary conditions.

**Unit Outcomes:**

At the end of this unit, the students will be able to

- Form Partial Differential Equations.
- Solve Partial Differential Equations of first order.
- Understand the method of separation of variables.
- Solve applications of Partial Differential Equations.
- 

**Course Outcomes:**

After the completion of course, students will be able to

- Understand the analyticity of complex functions and conformal mappings.
- Apply Cauchy's integral formula and Cauchy's integral theorem to evaluate improper integrals along contours.
- Understand the usage of Laplace Transforms.
- Evaluate the Fourier series expansion of periodic functions.
- Formulate/solve/classify the solutions of Partial differential equations and also find the solution of one dimensional wave equation and heat equation.

**Text Books:**

1. B.S.Grewal , "Higher Engineering Mathematics", Khanna publishers.
2. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley India

**Reference Books:**

1. B.V.Ramana, "Higher Engineering Mathematics", Mc Graw Hill publishers.
2. Alan Jeffrey, "Advanced Engineering Mathematics", Elsevier.

## BUILDING MATERIALS AND CONSTRUCTION

### Course objectives:

- To impart knowledge on basic building materials such as stone and clay products.
- To teach properties of binding materials such as gypsum, lime and cement.
- To disseminate knowledge on ferrous and non ferrous materials and its applications.
- To explain basic concepts of building components such as stair case and masonry.
- To describe the properties and applications of plumbing, electrical and sanitary fittings.
- To explain the methodology of surface finishes such as pointing, distempering and painting.

### UNIT – I

#### Basic Building materials

Properties and characteristics of Basic building materials – Stone –characteristics of good building stone-types of stone masonry - bricks –characteristics of good quality bricks- manufacturing of bricks-types of bonds in brick work- tiles-types of tiles- sand.

#### Unit Outcomes:

- To understand the properties of stones,.
- To understand the properties of Bricks.
- To understand the properties of Tiles and sand.

### UNIT – II

#### Binding Materials

Properties and characteristics of Binding materials – **Gypsum:** properties of gypsum, and its uses. **Lime:** Manufacture of lime, classifications of limes, properties of lime. **Cement:** Raw materials used, Process of Manufacturing, Chemical composition, Bouge's Compounds - Types of cement, Tests on cement – Uses of cement.

- To understand the properties of Gypsum.
- To understand the properties of Lime.
- To conduct test on Cement.

### UNIT – III

#### Ferrous & Non-Ferrous Materials

**Steel** – characteristics of reinforcing steel – Hardness, Tensile, Compression and corrosion testing. – **Plastics:** classification, advantages of plastics, Mechanical properties and use of plastic in construction **Glass:** Ingredients, properties, types and use in construction

#### Unit Outcomes:

- To conduct various tests for determining the characteristics of steel
- To understand the properties of Plastics as building material
- To understand the properties of glass as building material.

### UNIT – IV

#### Basics of Building Components:

Components of building, area considerations, Construction Principles, Damp proofing, anti termite treatment in buildings, Vertical circulation means: stair cases and their types. Different types of floors, and flooring materials.

**Unit Outcomes:**

- To understand the construction procedure of staircase.
- To understand the construction procedure of various types of floorings

**UNIT – V:****Internal and External Fittings of a Building:**

Doors and Windows: Construction details, types of doors and windows and their relative advantages & disadvantages. Types of roof – Lintels and Chajjas, Electric Fittings, Mechanical Lifts and Escalators, Fire Fighting and Fire Protection of Buildings. Plastering and its types, pointing, Distempering, Colour washing, Painting.

**Unit Outcomes:**

- To understand the components of doors and windows
- To gain knowledge on plumbing and electrical fittings in building construction
- To learn the procedures for surface finishes such as Plastering, Pointing and Painting

**Course Outcomes:**

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

- To understand the characteristics of various building materials such as stone and clay product.
- To evaluate the properties of the binding materials for their suitability in building construction.
- To apply the ferrous and non-ferrous materials in building construction.
- To understand the construction procedure of various building components such as stair cases, masonry and flooring.
- To understand the installation of electrical, sanitary and plumbing fittings in buildings.

**Text Books:**

1. S K Duggal, “Building Materials” New Age International
2. BC Punmia, “Building Construction” Laxmi Publication.
3. G.C Sahu and Joygopal Jena, “Building materials and construction”, Mc Graw Hill Education

**References:**

1. PC Varghese, “Building Materials” PHI
2. Mehta, “Building Construction Principles, Materials & Systems” 2/e, Pearson Education Noida.
3. Sandeep Mantri, “Practical building Construction and its Management” Satya Publisher, New Delhi.
4. Adams, “Adams’ Building Construction Adams” CRC Press Taylor & Francis

### **STRENGTH OF MATERIALS-I**

#### **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 analyze flexural stresses in beams due to different loads.
- To enable the student to apply the concepts of strength of materials in engineering applications and design problems.

#### **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 and T 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 Outcomes:**

- Understand the basic concepts of forces
- Draw Free body Diagrams for forces
- Determine the centroid and moment of inertia for different cross section areas

#### **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.

#### **Unit Outcomes**

- Understand concepts of stresses, strains, elastic moduli and strain energy.
- Evaluate relations between different moduli
- Understand different type's loadings

#### **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 hanging beams subjected to point loads, uniformly distributed load, uniformly varying loads and combination of these loads – point of contra flexure – Relation between S.F, B.M and rate of loading at section of a beam.

#### **Unit Outcomes**

- Draw the shear force and bending moment diagrams for cantilevers, simply supported beams

- and Overhanging beams with different loads
- Understand the relationship between shear force and bending moments

#### **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 Hollow), I, T, Angle and Channel Sections – Design of simple beam sections.

##### **Unit Outcomes**

- Derive bending equations
- Compute the flexural stresses for different cross sections.
- Design beam sections for flexure

#### **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.

##### **Course Outcomes:**

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 strain energy.
- Develop shear force and bending moment diagrams for different load cases.
- Compute the flexural stresses and shear stresses for different loading cases and different cross-sections.

##### **Text Books:**

1. S. Timoshenko, D.H. Young and J.V. Rao, "Engineering Mechanics", Tata McGraw- Hill Company.
2. Sadhu Singh, "Strength of Materials", 11th edition 2015, Khanna Publishers.

##### **References:**

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. R.S. Khurmi and N.Khurmi, A text book of "Strength of Materials" "(Mechanics of Solids)", S Chand and Company Limited, Ramnagar, New Delhi-110 055

**Sri Krishnadevaraya University College of Engineering & Technology**

**B.Tech – II-I Sem**

**(Civil Engineering)  
FLUID MECHANICS**

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

**Course Objectives:**

To explain concepts of fluid mechanics used in Civil Engineering.

- 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, hydraulic machinery and hydrology in future courses.

**UNIT -I:**

**Basic concepts and definitions:**

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

**Unit Outcomes**

- Understand basic characteristics of fluids
- Understand Newton's Law of Viscosity

**UNIT -II:**

**Fluid statics:**

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

**Unit Outcomes**

- Understand concepts of fluid statics.
- Understand different equipment and their applications.
- Demonstrate stability of floating bodies

**UNIT -III:**

**Fluid kinematics:**

Classification of fluid flow : steady and unsteady flow; uniform and non-uniform flow; laminar and turbulent flow; rotational and irrotational flow; compressible and incompressible flow; ideal and real fluid flow; one, two and three dimensional flows; Stream line, path line, streak line and stream tube; stream function, velocity potential function. One, two and three -dimensional continuity equations in Cartesian coordinates.

**Unit Outcomes**

- Understand fundamentals of fluid kinematics
- Understands different types of fluid flows
- Derivation of Continuity equations of using Cartesian coordinates

**UNIT -IV:**

**Fluid Dynamics:**

Surface and body forces; Equations of motion - Euler's equation; Bernoulli's equation – derivation; Energy Principle; Practical applications of Bernoulli's equation : Venturimeter, orifice meter and



Pitot tube; Momentum principle; Forces exerted by fluid flow on pipe bend; Vortex Flow – Free and Forced; Definitions of Reynolds Number, Froude Number, Mach Number, Weber Number and Euler Number;

#### **Unit Outcomes**

- Demonstrate applications of Bernoulli's equations
- Experiment with different equipments under fluid flow
- Apply principles of fluid dynamics along with governing equations.

#### **UNIT -V:**

**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 Outcomes**

- Estimate Energy losses in pipelines
- Determine flow characteristics through Pipes.

#### **Course Outcomes:**

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

- Understand the principles of fluid statics, kinematics and dynamics
- Familiarize basic terms used in fluid mechanics
- Understand flow characteristics and classify the flows
- Apply the continuity, momentum and energy principles
- Estimate various losses in flow through channels

#### **Text Books:**

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.

#### **References:**

1. S.C.Gupta, “Fluid Mechanics and Hydraulic Machines”, Pearson publication
2. R. K. Bansal, A text of “Fluid Mechanics and Hydraulic Machines”, Laxmi Publications (P) Ltd., New Delhi.
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. 3<sup>rd</sup> Edition 2009.
5. K. Subramanya, Open Channel flow, Tata Mc.Grawhill Publishers.

**Sri Krishnadevaraya University College of Engineering & Technology**  
**(Civil Engineering)**

**B.Tech – II-I Sem**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>2</b>	<b>1</b>	<b>0</b>	<b>3</b>

**SURVEYING**

**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.

**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. **Plane table surveying:** Introduction, advantages and disadvantages.

**Unit Outcomes**

- To impart basic concepts of surveying.
- To introduce the usage and applications of linear and angular measurements through chain, tape, compass and plane table.

**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 Outcomes**

- To impart basic principles in levelling and contouring.
- To calculate the areas of irregular boundaries and volumes of earth work quantities.

### 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 Outcomes

- To impart basic principles in Trigonometric levelling.
- To inculcate the knowledge of traversing.

### 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 Outcomes

- To impart basic principles in Tacheometric surveying.
- To inculcate the knowledge of simple horizontal circular curve setting.

### UNIT - V

**Construction surveys:** Introduction- setting out a building -pipelines and sewers-highways- culverts. Bridge surveys-determining the length of a bridge-locating centres of piers- 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.

#### Unit Outcomes:

- To induce the knowledge of construction surveying.
- To inculcate the knowledge of advanced surveying instrument such as total station.

#### Course Outcomes:

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
- Understand the working principles of survey instruments
- Estimate the volumes of earth work
- Able to use modern survey instruments.

#### Text Books:

1. S.S Bhavikatti, "Surveying theory and Practice", 2<sup>nd</sup> edition, Dreamtech press, Wiley distributors.
2. C.Venkatramaiah, "Text book of surveying", 2<sup>nd</sup> edition, Universities press, 2018

3. Hoffman. B, H. Lichtenegga and J. Collins, Global Positioning System – “Theory and Practice”, Springer -Verlag Publishers, 2001.

**References:**

1. Arthur R Benton and Philip J Taety, “Elements of Plane Surveying”, McGraw Hill – 2000.
2. Arora K R “Surveying” Vol 1, 2 & 3, Standard Book House, Delhi, 2004.
3. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, “Surveying” (Vol – 1, 2 & 3), - Laxmi Publications (P) Ltd., New Delhi.
4. Chandra A M, “Plane Surveying”, New Age International Pvt. Ltd., New Delhi, 2002.
5. Bhavikatti “Surveying” Vikas publishing house ltd.
6. 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

## MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS

### Course Objectives:

- The objective of this course is to inculcate the basic knowledge to the students with the concepts of Economics & Demand to make them effective business decision makers.
- To understand fundamentals of Production & Cost Concepts which is an important subject helps to the Technocrats to take certain business decisions in the processes of optimum utilization of resources.
- To know the various types of Market Structures & pricing methods and its strategies & Trade Blocks.
- 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 about accounting and to explain the process of preparing accounting statements & analysis for effective business decisions

### Unit I: INTRODUCTION TO MANAGERIAL ECONOMICS

Managerial Economics – Definition- Nature- Scope - Contemporary importance of Managerial Economics - Demand Analysis: Concept of Demand-Demand Function - Law of Demand - Elasticity of Demand- Significance - Types of Elasticity - Measurement of elasticity of demand - Demand Forecasting- factors governing demand forecasting- methods of demand forecasting -Relationship of Managerial Economics with Financial Accounting and Management.

### UNIT II: THEORY OF PRODUCTION AND COST ANALYSIS

**Production Function-** Least cost combination- Short-run and Long- run production function- Isoquants and Isocosts, MRTS - Cobb-Douglas production function - Laws of returns - Internal and External economies of scale - **Cost Analysis:** Cost concepts and cost behavior- Break-Even Analysis (BEA) - Determination of Break Even Point (Simple Problems)-Managerial significance and limitations of Break- Even Point.

### UNIT III: INTRODUCTION TO MARKETS AND NEW ECONOMIC ENVIRONMENT

**Market structures:** Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition- Monopoly-Monopolistic Competition-Oligopoly-Price-Output Determination - Pricing Methods and Strategies- Forms of Business Organizations- Sole Proprietorship- Partnership – Joint Stock Companies - Public Sector Enterprises – New Economic Environment- Economic Liberalization – Privatization - Globalization.

### UNIT IV: CAPITAL AND CAPITAL BUDGETING

Concept of Capital - Over and Undercapitalization – Remedial Measures - Sources of Short term and Long term Capital - Estimating Working Capital Requirements – 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) – Internal Rate Return (IRR) Method (simple problems)

### UNIT V: INTRODUCTION TO FINANCIAL ACCOUNTING AND ANALYSIS

Financial Accounting – Concept - Emerging need and Importance - Double-Entry Book Keeping-Journal - Ledger – Trial Balance - Financial Statements - Trading Account – Profit & Loss Account – Balance Sheet (with simple adjustments). Financial Analysis – Ratios – Liquidity, Leverage, Profitability, and Activity Ratios (simple problems).

**Course outcomes:**

CO1: Capable of analyzing fundamentals of Economics such as Demand, Elasticity & Forecasting methods

CO2: To apply production, pricing & supply concepts for effective business administration

CO3: Students can able to identify the influence of various markets, the forms of business organization and its International Economic Environment.

CO4: Analyze how to invest adequate amount of capital in order to get maximum return from selected business activity.

CO5: Prepare and analyze accounting statements like income & expenditure statement, balance sheet apart from the fundamental knowledge, to understand financial performance of the business and to initiate the appropriate decisions to run the business profitably.

**TEXT BOOKS:**

1. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2013.
2. Ahuja H.L Managerial economics. S.Chand, 3/e, 2013

**REFERENCES**

1. Aryasri: Managerial Economics and Financial Analysis, 4/e, TMH, 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, Pearson, 2/e, New Delhi.
4. Domnick Salvatore: Managerial Economics in a Global Economy, Cengage, 2013.

**Sri Krishnadevaraya University College of Engineering & Technology**

**B.Tech – II-I Sem**

**(Civil Engineering)**

**STRENGTH OF MATERIALS LABORATORY**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>2</b>	<b>1.5</b>

**Course objectives:**

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

- 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.

**Course Outcomes:**

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

**Sri Krishnadevaraya University College of Engineering & Technology**

**B.Tech – II-I Sem**

**(Civil Engineering)  
SURVEYING LABORATORY**

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

**Course objectives:**

By performing this laboratory, the student will be able to know the usage of various surveying equipment's and their practical applicability.

- 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

**Course Outcomes:**

By performing the various tests in this laboratory the student will be able to know the principles of surveying in chain surveying, compass surveying, plane table surveying, levelling, theodolite surveying and total station.



## Sri Krishnadevaraya University College of Engineering & Technology

**B.Tech – II-I Sem**

**(Civil Engineering)**

**Essence of Indian Traditional Knowledge**

L	T	P	C
3	0	0	0

### **Objectives:**

To facilitate the students with the concepts of Indian traditional knowledge and to make them understand the Importance of roots of knowledge system.

- The course aim of the importing basic principle of third process reasoning and inference sustainability is at the course of Indian traditional knowledge system
- To understand the legal framework and traditional knowledge and biological diversity act 2002 and geographical indication act 2003.
- The courses focus on traditional knowledge and intellectual property mechanism of traditional knowledge and protection.
- To know the student traditional knowledge in different sector.

### **Unit-I:**

Introduction to traditional knowledge: Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge, the physical and social contexts in which traditional knowledge develop, the historical impact of social change on traditional knowledge systems. Indigenous Knowledge (IK), characteristics, traditional knowledge vis-à-vis indigenous knowledge, traditional knowledge Vs western knowledge traditional knowledge vis-à-vis formal knowledge

### **Learning Outcomes:**

At the end of the unit the student will able to:

- understand the traditional knowledge.
- contrast and compare characteristics importance kinds of traditional knowledge.
- analyze physical and social contexts of traditional knowledge.
- evaluate social change on traditional knowledge.

### **Unit-II:**

Protection of traditional knowledge: the need for protecting traditional knowledge Significance of TK Protection, value of TK in global economy, Role of Government to harness TK.

### **Learning Outcomes:**

At the end of the unit the student will able to:

- know the need of protecting traditional knowledge.
- apply significance of TK protection.
- analyze the value of TK in global economy.
- evaluate role of government

### **Unit-III:**

Legal framework and TK: A: The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, Plant Varieties Protection and Farmers Rights Act, 2001 (PPVFR Act);B:The Biological Diversity Act 2002 and Rules 2004, the protection of traditional knowledge bill, 2016. Geographical indications act 2003.

### **Learning Outcomes:**

At the end of the unit the student will able to:

- Understand legal framework of TK.
- Contrast and compare the ST and other traditional forest dwellers
- Analyze plant variant protections
- Evaluate farmers right act

### **Unit-IV:**

Traditional knowledge and intellectual property: Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Certain non IPR mechanisms of traditional knowledge protection, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge, global legal FORA for increasing protection of Indian Traditional Knowledge.

### **Learning Outcomes:**

At the end of the unit the student will able to:

- Understand TK and IPR
- Apply systems of TK protection.

- Analyze legal concepts for the protection of TK.
- Evaluate strategies to increase the protection of TK.

### **Unit-V:**

Traditional knowledge in different sectors: Traditional knowledge and engineering, Traditional medicine system, TK and biotechnology, TK in agriculture, Traditional societies depend on it for their food and healthcare needs, Importance of conservation and sustainable development of environment, Management of biodiversity, Food security of the country and protection of TK.

### **Learning Outcomes:**

At the end of the unit the student will able to:

- know TK in different sectors.
- apply TK in engineering.
- analyze TK in various sectors.
- evaluate food security and protection of TK in the country.

### **Reference Books:**

1. Traditional Knowledge System in India, by Amit Jha, 2009.
2. Traditional Knowledge System and Technology in India by Basanta Kumar Mohanta and Vipin Kumar Singh, Pratibha Prakashan 2012.
3. Traditional Knowledge System in India by Amit Jha Atlantic publishers, 2002
4. "Knowledge Traditions and Practices of India" Kapil Kapoor, Michel Danino

### **E-Resources:**

1. <https://www.youtube.com/watch?v=LZP1StpYEPM>
2. <http://nptel.ac.in/courses/121106003/>

**Course Outcomes:** After completion of the course, students will be able to:

1. understand the concept of Traditional knowledge and its importance
2. know the need and importance of protecting traditional knowledge
3. know the various enactments related to the protection of traditional knowledge.
4. understand the concepts of Intellectual property to protect the traditional knowledge

<b>Sri Krishnadevaraya University College of Engineering &amp; Technology</b>					
<b>Dept. of Civil Engineering</b>					
<b>II Year 2<sup>nd</sup> Semester</b>					
<b>S.No</b>	<b>Course No</b>	<b>Course Name</b>	<b>Category</b>	<b>L-T-P</b>	<b>Credits</b>
1		Life science for Engineers	HS	3-0-0	3
2		Strength of Materials-II	PC	3-0-0	3
3		Concrete Technology	PC	3-0-0	3
4		Hydraulic Engineering	PC	3-0-0	3
5		Environmental Engineering	PC	3-0-0	3
6		Python Programming	ES	3-0-0	3
7		Concrete Technology Lab	PC	0-0-3	1.5
8		Fluid Mechanics and Hydraulic Engineering Lab	PC	0-0-2	1.5
<b>Total</b>					<b>21</b>

<b>Category</b>	<b>CREDITS</b>
Professional core Courses	15
Humanities and Social Sciences	3
Engineering Science Courses	3
<b>TOTAL CREDITS</b>	<b>21</b>

**Sri Krishnadevaraya University College of Engineering & Technology**

**B.Tech – II-II Sem**

**(Civil Engineering)  
Life Science for Engineers**

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

**(Common to all branches)**

**Course Objectives:** To provide basic understanding about life and life Process. Animal and plant systems. To understand what biomolecules, are, their structures are functions. Application of certain biomolecules in Industry.

- Brief introduction about human physiology and bioengineering.
- To understand hereditary units, i.e. DNA (genes) and RNA and their synthesis in living organism.
- How biology Principles can be applied in our daily life using different technologies.
- Brief introduction to the production of transgenic microbes, Plants and animals.

**Unit I: Introduction to Basic Biology**

Cell as Basic unit of life, cell theory, Cell structure, Chromosomes. Prokaryotic and eukaryotic Cell. Plant Cell, Animal Cell, Cell cycle, Mitosis & meiosis, Brief introduction to five kingdoms of classification.

**Unit Outcomes:**

After completing this unit, the student will be able to

- Summarize the basis of life.
- Understand the difference between lower organisms (prokaryotes) from higher organisms (eukaryotes).
- Understand how organisms are classified.

**Unit II: Introduction to Biomolecules**

Definition, Classification, structure & functions of Carbohydrates, lipids, proteins, Nucleic acids (DNA and RNA) and their types. Enzymes-action, classification and Enzyme application in Industry.

**Unit Outcomes:**

After completing this unit, the student will be able to

- Understand what are biomolecules? Their role in living cells, their structure, function and how they are produced.
- Interpret the relationship between the structure and function of nucleic acids.
- Summarize the applications of enzymes in industry.
- Understand what is fermentation and its applications of fermentation in industry.

**Unit III: Human Physiology**

Nutrition: Nutrients or food substances. Digestive system, Respiratory system,(aerobic and anaerobic Respiration).Respiratory organs, respiratory cycle. Excretory system.

**Unit Outcomes:**

After completing this unit, the student will be able to

- Understand what nutrients are
- Understand the mechanism and process of important human functions

**Unit IV: Introduction to Molecular Biology and recombinant DNA Technology**

Prokaryotic gene and Eukaryotic gene structure & chromosomal organization, Genetic code , DNA replication, Transcription and Translation. rDNA technology. Introduction to gene cloning.

**Unit Outcomes:**

After completing this unit, the student will be able to

- Understand and explain about gene structure and replication in prokaryotes and Eukaryotes
- How genetic material is replicated and also understands how RNA and proteins are synthesized.
- Understand about recombinant DNA technology and its application in different fields.
- Explain what is cloning.

**Unit V: Application of Biology**

Brief introduction to industrial Production of Enzymes, Pharmaceutical and therapeutic Proteins, Vaccines and antibodies. Basics of biosensors, biochips, Bio fuels. Basics of Production of Transgenic plants and animals.

**Unit Outcomes:**

After completing this unit, the student will be able to Understand.

- How biology is applied for production of useful products for mankind.
- What are biosensors, biochips etc.
- Understand transgenic plants and animals and their production

### **Course Outcomes:**

After studying the course, the student will be able to:

- Explain about cells and their structure and function. Different types of cells and basics for classification of living Organisms.
- Explain about biomolecules, their structure and function and their role in the living organisms. How biomolecules are useful in Industry.
- Briefly about human physiology.
- Explain about genetic material, DNA, genes and RNA how they replicate, pass and preserve vital information in living Organisms.
- Know about application of biological Principles in different technologies for the production of medicines and Pharmaceutical molecules through transgenic microbes, plants and animals.
- 

### **Text books:**

1. P.K.Gupta, Cell and Molecular Biology, 5th Edition, Rastogi Publications -
2. U. Satyanarayana. Biotechnology, Books & Allied Ltd 2017

### **Reference Books:**

1. N. A. Campbell, J. B. Reece, L. Urry, M. L. Cain and S. A. Wasserman, "Biology: A Global Approach", Pearson Education Ltd, 2018.
2. T Johnson, Biology for Engineers, CRC press, 2011
3. J.M. Walker and E.B. Gingold, Molecular Biology and Biotechnology 2nd ed.. Panima Publications. PP 434.
4. David Hames, Instant Notes in Biochemistry –2016
5. Phil Tunner, A. Mctennan, A. Bates & M. White, Instant Notes – Molecular Biology.

**STRENGTH OF MATERIALS-II**

**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**

**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 Outcomes:**

- Identify critical planes in two dimensional stress systems
- Estimate principals stresses
- Assess safety of structural elements under principal stresses

**UNIT -II**

**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 Outcomes:**

- Understand types of loads acting on beams
- Compute slopes and deflections of beams with different boundary conditions
- Evaluate effect of different loads on propped cantilever beams

**UNIT -III**

**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 Outcomes**

- Analyze members subjected to torsion, combined torsion and bending moment
- Calculate power transmission through shafts
- Estimate energy absorption in springs.

**UNIT -IV**

**Direct and Bending stresses:**

Introduction-eccentric loading – columns with eccentric loading – symmetrical columns with eccentric loading about one axis –about two axes – Unsymmetrical columns with eccentric loading – limit of eccentricity.

**Theories of failure:**

Maximum Principal stress theory- Maximum shear stress theory- Maximum strain theory- Maximum strain energy theory-Maximum distortion energy theory

**Unit Outcomes:**

- To know about the effect of eccentricity effect in columns

- To know about the various theories of failures.

## **UNIT -V**

### **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.

- Classify columns
- Understand Euler’s theory on columns and assess crippling loads
- Analyze compression members using different theories
- Assess load carrying capacity using different formulae

### **Course Outcomes:**

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

- Understand principal stresses and principal planes.
- Determine deflection at any point on a beam under simple and combined loads
- Analyze members under torsion, deformation in springs,
- Know the effect of eccentricity of load in columns, apply failure criteria to implement in design of structural members.
- Know the crippling load for the columns.

### **Text Books:**

1. R.S.Khurmi and N.Khurmi, “Strength of Materials (Mechanics of Solids)”, S Chand And Company Limited, Ramnagar, New Delhi-110 055
2. R. K. Bansal, “Strength of Materials”, Laxmi Publications (P) Ltd., New Delhi.
3. B. S. Basavarajaiah and P. Mahadevappa, “Strength of Materials” 3<sup>rd</sup> Edition 2010, in SI UNITS, Universities Press Pvt Ltd, Hyderabad.
4. S.S. Bhavikatti, “Strength of Materials”, Fourth edition, Vikas Publishing House, Pvt. Ltd.

### **References:**

1. B. C. Punmia Strength of Materials by.- Laxmi publications.
2. D. S. Prakasa Rao Strength of Materials by, Universities Press Pvt Ltd, Hyderabad.
3. Schaum’s outline series Strength of Materials, Mc Graw hill International Editions.
4. L.S. Srinath, Strength of Materials, Macmillan India Ltd., New Delhi.

**Sri Krishnadevaraya University College of Engineering & Technology**

**B.Tech – II-II Sem**

**(Civil Engineering)**

**CONCRETE TECHNOLOGY**

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

**Course objectives:**

- To 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

**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 Outcomes**

- List different ingredients of concrete
- Conduct tests on materials
- Explain characteristics of water
- Understand conformity to IS Codes

**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) .

- List various properties of fresh concrete
- Conduct experiments for determination of fresh concrete properties
- List various properties of hardened concrete
- Conduct experiments for determination of hardened concrete properties
- Carryout Non Destructive tests on Concrete

**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 Outcomes**

- Understand curing methods and its importance
- Understand phenomenon of shrinkage and creep of concrete.
- Evaluate factors influencing creep and concrete

**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 Outcomes**

- Study properties of concrete mixes
- Design concrete mixes using different methods
- Estimate quantities for target strength of concretes

**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.

- Label different types of special concretes with the objectives
- Understand properties of special concretes.

**Course Outcomes:**

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.

**Text Books:**

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

**References:**

1. M. L. Gambhir, “Concrete Technology”, Tata Mc. Graw Hill Publishers, New Delhi
2. N. Krishna Raju, “Design of Concrete Mixes”, CBS Publishers.
3. 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

**Sri Krishnadevaraya University College of Engineering & Technology**

**B.Tech – II-II Sem**

**(Civil Engineering)**

**HYDRAULIC ENGINEERING**

**Course Objectives:**

- To Introduce concepts of laminar and turbulent flows
- To teach principles of uniform and non-uniform flows through open channel.
- To impart knowledge on design of turbines.
- To impart knowledge on design of pumps.

**UNIT -I:**

**Laminar & Turbulent flow in pipes:**

Laminar Flow- Laminar flow through: circular pipes, annulus and parallel plates. Stoke's law, Measurement of viscosity. Reynolds experiment, Transition from laminar to turbulent flow. Resistance to flow of fluid in smooth and rough pipes-Moody's diagram – Introduction to boundary layer theory.

**Unit Outcomes**

- Understand Laminar Flow through plates
- Understand Turbulent flow and transition
- Apply energy and momentum principles to fluid flow situations
- Solve problems for forces in static and moving fluids

**UNIT -II:**

**Uniform 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.

- Differentiate open and closed channel flows
- Understand different formulae on open channel flow
- Design open-channel flow systems.

**UNIT III:**

**Non-Uniform flow in Open Channels:**

Specific energy, critical flow, discharge curve, Specific force, Specific depth, and Critical depth. Measurement of Discharge and Velocity – Broad Crested Weir. Gradually Varied Flow- Dynamic Equation of Gradually Varied Flow. Hydraulic Jump and classification - Elements and characteristics- Energy dissipation.

**Unit Outcomes**

- Understand the concepts of varying flow in pipes
- Measure discharge and velocity
- Understand gradually varied flow
- Solve introductory problems of forces and dynamics

**UNIT -IV:**

**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: causes and effects.

**Unit Outcomes**

- Understand hydrodynamic force of jets different vanes
- Calculate efficiency of jets
- Understand and design Pelton wheel, Francis and Kaplan turbine

## **UNIT -V:**

### **Pumps:**

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; Cavitation effects; Multistage centrifugal pumps; troubles and remedies – Introduction to Reciprocating Pump.

- Understand principles of centrifugal pumps
- Calculate losses and efficiencies of centrifugal pumps
- Design centrifugal pumps including multi stage pumps.

### **Course Outcomes:**

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

- Understand characteristics of laminar and turbulent flows.
- Analyze characteristics for uniform and non-uniform flows in open channels.
- Design different types of turbines
- Design centrifugal and multi stage pumps.

### **Text Books:**

1. P. M. Modi and S. M. Seth, “Hydraulics and Fluid Mechanics”, Standard Book House
2. K. Subramanya, Open channel Flow, Tata McGraw Hill.

### **References:**

1. Rajput, “Fluid Mechanics and Fluid Machines” , S. Chand & Co
2. D. S. Kumar, “Fluid Mechanics & Fluid Power Engineering”, Kataria & Sons.
3. Srinivasan, Open channel flow by, Oxford University Press
4. Banga & Sharma, “Hydraulic Machines”, Khanna Publishers.
5. S.C.Gupta, “Fluid Mechanics and Hydraulic Machines”, Pearson publications.

**Sri Krishnadevaraya University College of Engineering & Technology**

**B.Tech – II-II Sem**

**(Civil Engineering)**

**ENVIRONMENTAL ENGINEERING**

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

**Course Objectives:**

- To 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.

**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 Outcomes**

- Understand importance of water quality
- Explain water quality standards
- Plan water supply systems in terms of transmission and distribution
- Categorize different water treatment procedures

**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 Outcomes**

- Distinguish characteristics of domestic and storm water
- Plan Sewage treatment and disposal methodologies
- Assess quality of waste water parameters
- Design waste water treatment systems leading to cleaning of rivers

**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 Outcomes**

- Identify causes and types of air pollution
- Understand occupational hazards due to different pollutions
- Assess air quality parameters

- Design methodologies to control air pollution

#### **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 Outcomes**

- Segregate different types of municipal wastes
- Understand stages of handling municipals solid wastes
- Sewage treatment and disposal methodologies
- Design solid waste disposal leading to 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.

##### **Unit Outcomes**

- Understand the importance of plumbing.
- Explain different plumbing techniques

##### **Course Outcomes:**

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

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

##### **Text Books:**

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.

##### **References:**

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.

**Sri Krishnadevaraya University College of Engineering & Technology**

**B.Tech – II-II Sem**

**(Civil Engineering)**

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

**Python Programming**

**Course Objectives:**

- To learn the fundamentals of Python
- To elucidate problem-solving using a Python programming language
- To introduce a function-oriented programming paradigm through python
- To get training in the development of solutions using modular concepts
- To introduce the programming constructs of python

**Unit – I**

**Introduction:** What is a program, Running python, Arithmetic operators, Value and Types.

**Variables, Assignments and Statements:** Assignment statements, Script mode, Order of operations, string operations, comments.

**Functions:** Function calls, Math functions, Composition, Adding new Functions, Definitions and Uses, Flow of Execution, Parameters and Arguments, Variables and Parameters are local, Stack diagrams, Fruitful Functions and Void Functions, Why Functions.

**Unit Outcomes:**

Student should be able to

- List the basic constructs of Python.
- Solve the problems by applying modularity principle.

**Unit – II**

**Case study:** The turtle module, Simple Repetition, Encapsulation, Generalization, Interface design, Refactoring, docstring.

**Conditionals and Recursion:** floor division and modulus, Boolean expressions, Logical operators, Conditional execution, Alternative execution, Chained conditionals, Nested conditionals, Recursion, Infinite Recursion, Keyboard input.

**Fruitful Functions:** Return values, Incremental development, Composition, Boolean functions, More recursion, Leap of Faith, Checking types

**Unit Outcomes:**

Student should be able to

- Apply the conditional execution of the program.
- Apply the principle of recursion to solve the problems.

**Unit - III**

**Iteration:** Reassignment, Updating variables, The while statement, Break, Square roots, Algorithms.

**Strings:** A string is a sequence, len, Traversal with a for loop, String slices, Strings are immutable, Searching, Looping and Counting, String methods, The in operator, String comparison.

**Case Study:** Reading word lists, Search, Looping with indices.

**Lists:** List is a sequence, Lists are mutable, Traversing a list, List operations, List slices, List methods, Map filter and reduce, Deleting elements, Lists and Strings, Objects and values, Aliasing, List arguments.

**Unit Outcomes:**

Student should be able to

- Use the data structure list.
- Design programs for manipulating strings.

**Unit – IV**

**Dictionaries:** A dictionary is a mapping, Dictionary as a collection of counters, Looping and dictionaries, Reverse Lookup, Dictionaries and lists, Memos, Global Variables.

**Tuples:** Tuples are immutable, Tuple Assignment, Tuple as Return values, Variable-length argument tuples, Lists and tuples, Dictionaries and tuples, Sequences of sequences.

**Files:** Persistence, Reading and writing, Format operator, Filename and paths, Catching exceptions, Databases, Pickling, Pipes, Writing modules.

**Classes and Objects:** Programmer-defined types, Attributes, Instances as Return values, Objects are mutable, Copying. Classes and Functions

#### **Unit Outcomes:**

Student should be able to

- Apply object orientation concepts.
- Use data structure dictionaries.
- Organize data in the form of files.

#### **Unit – V**

**Classes and Functions:** Time, Pure functions, Modifiers, Prototyping versus Planning

**Classes and Methods:** Object oriented features, Printing objects, The init method, The `__str__` method, Operator overloading, Type-based Dispatch, Polymorphism, Interface and Implementation

**Inheritance:** Card objects, Class attributes, Comparing cards, decks, Printing the Deck, Add Remove shuffle and sort, Inheritance, Class diagrams, Data encapsulation.

**The Goodies:** Conditional expressions, List comprehensions, Generator expressions, any and all, Sets, Counters, defaultdict, Named tuples, Gathering keyword Args,

#### **Unit Outcomes:**

Student should be able to

- Plan programs using object orientation approach.
- Illustrate the principle of inheritance.

#### **Course Outcomes:**

Student should be able to

- Apply the features of Python language in various real applications.
- Select appropriate data structure of Python for solving a problem.
- Design object oriented programs using Python for solving real-world problems.
- Apply modularity to programs.

#### **TEXT BOOKS:**

1. Allen B. Downey, “Think Python”, 2<sup>nd</sup> edition, SPD/O’Reilly, 2016.

#### **REFERENCE BOOKS:**

1. Martin C. Brown, “The Complete Reference: Python”, McGraw-Hill, 2018.
2. Kenneth A. Lambert, B.L. Juneja, “Fundamentals of Python”, CENGAGE, 2015.
3. R. Nageswara Rao, “Core Python Programming”, 2<sup>nd</sup> edition, Dreamtech Press, 2019

**Sri Krishnadevaraya University College of Engineering & Technology**

**B.Tech – II-II Sem**

**(Civil Engineering)**

**FLUID MECHANICS AND HYDRAULIC MACHINERY  
LAB**

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

**Course Objectives:**

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

**Laboratory 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 mouth piece 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)

**Course Outcomes:**

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



**Sri Krishnadevaraya University College of Engineering & Technology**

**B.Tech – II-II Sem**

**(Civil Engineering)  
CONCRETE TECHNOLOGY LAB**

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

**Course Objectives:**

The objectives of the course are to

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

**List of Experiments:**

**I-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

**II. 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

**III. Test on Fresh Concrete**

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

**IV. 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 (2<sup>nd</sup> revision, reaffirmed 2011): Specifications for coarse and fine aggregates from Natural Sources for Concrete.
2. IS 2386 (Part3)-1963 (reaffirmed 2011) Methods of Test for Aggregates for Concrete Part3: Specific Gravity, Density, Voids, Absorption and Bulking.
2. IS 10262:2009 "Concrete Mix Proportioning – Guidelines"
2. IS 516:2006 "Methods of Tests on Strength of Concrete"
3. IS 383:1993 "Specification For Coarse And Fine Aggregates From Natural Sources For Concrete"
4. IS 1201 -1220 (1978) "Methods for testing tars and bituminous materials"

Sri Krishnadevaraya University College of Engineering & Technology					
Dept. of Civil Engineering					
III Year 1 <sup>st</sup> Semester 1					
S.No	Course Code	Course Name	Category	L-T-P	Credits
1.		Soil Mechanics	PC	3-0-0	3
2.		Building Planning and Drawing	PC	3-0-0	3
3.		Structural Analysis	PC	3-0-0	3
4.		Design of Reinforced Concrete Structures	PC	3-0-0	3
5.		Professional Elective-I 1. Building Service and Maintenance 2. Water Resources Engineering 3. Expansive Soils	PE-1	3-0-0	3
6.		Open Elective-I	OE-1	3-0-0	3
7.		Soil Mechanics Lab	PC	0-0-3	1.5
8.		Environmental Engineering Lab	PC	0-0-3	1.5
9.		Socially Relevant Projects (15 Hrs/ Sem)	PR	3-0-0	0.5
<b>Total Credits</b>					<b>21.5</b>

Category	CREDITS
Professional core courses	15
Professional Elective courses	03
Open Elective Course/Job oriented elective	03
Socially Relevant Project(15hrs/Sem)	0.5
<b>TOTAL</b>	<b>21.5</b>

**Course Objective:**

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:**

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

- 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 Mohr's 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:** 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:** Boussinesq's and Westergaard's theories for point loads and areas of different shapes, Newmark's influence chart, construction and uses.

**Unit-IV:**

**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:** 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.

**TEXT BOOKS:**

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 B.C.Punmia, Ashok Kumar Jain and Arun Kumar
4. Geotechnical Engineering V.N.S.Murthy, CRC Press, Newyork, Special Indian Edition.

**REFERENCES:**

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 Brijendra M.Das, Cengage Publications, New Delhi.
4. Geotechnical Engineering by Purushotham Raj.

## Building Planning and Drawing

### 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:

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

- To understand the objectives of building bye laws.
- To understand the types of residential and public buildings.
- Able to draw signs and conventional symbols and line diagrams

### PART-A

#### UNIT-I

**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.

#### UNIT – II

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

#### UNIT – III

**Public Buildings:** Planning of Educational institutions, hospitals, dispensaries, Office buildings, banks, industrial buildings, hotels and motels, buildings for recreation

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

#### UNIT – V

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

### TEXT BOOK:

1. Building Planning & Drawing by Dr N. Kumaraswamy.
2. Planning and Designing and Scheduling – Gurucharan singh and Jagadish singh- Standard publishers.

### Reference Books:

1. Building by laws bye state and Central Governments and Municipal corporations.
2. 'A' Series & 'B' Series of JNTU Engineering College, Anantapur
3. Construction Planning, Equipment and methods by R.L. Peurifoy etal. – Tata Mc. Graw Hill Publications

**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)**

## Structural Analysis

### Course Objective:

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.

### Course Outcomes:

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

- Able to analysis different beams.
- Understand the concepts of different methods to analysis the beams.
- Understand the concepts of portal frames with and without side way.
- To analysis the frames 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 with and without effect of sinking of support. **CONTINUOUS BEAMS:** Introduction-Clapeyron's theorem of three moments- Analysis of continuous beams with constant moment of inertia with one or both ends fixed. Shear force and bending moment diagrams.

### Unit-II:

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

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

### Unit-III:

**MOVING LOADS:** Introduction maximum SF and BM at a given section and absolute maximum S.F. and B.M due to single concentrated load U.D Load long longer than and 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.

### Unit-IV:

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

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

### Unit-V:

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

**TEXT BOOKS:**

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

**REFERENCES:**

1. Mechanics of Structures by S.B. Junnarkar, Charotar Publishing House, Anand, Gujrat
2. Theory of Structures by Gupta, Pandit & Gupta; Tat 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.

## Design of Reinforced Concrete Structures

### Course Objective:

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:

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

- Methods to design reinforced structural members
- Able to design various structural members in reinforced concrete.

**Note:** IS 456:2000 Plain and Reinforced Concrete code to be permitted into the examination Hall.

### 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 IS Coefficients. **Serviceability:** Limit state design for serviceability for deflection and cracking

### TEXT BOOKS:

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

### REFERENCES:

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.

**Building Services and Maintenance**  
(Professional Elective – I)

**Course Objective:**

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:**

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

- Understand various practices of good building maintenance.
- To understand building maintenance, safety measures etc.
- To understand the types and uses of ventilation.
- To understand the types of machineries used in buildings.

**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

**TEXT BOOKS:**

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.

**REFERENCES:**

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.



**Water Resources Engineering**  
**(Professional Elective –I)**

**Course Objective:**

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

**Course Outcomes:**

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

- Understand about the concept of hydrology, rainfall measurements.etc and its applications.
- Understand the rainfall evaporation and its measurements, runoff and various factors influencing on runoff.
- Understand the ground water concept, and its terminology.
- Understand the necessity of irrigation and concepts.
- 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's law, steady and unsteady unidirectional flow in un-confined and confined aquifers, radial flow to wells in confined and unconfined aquifers.

**Unit-IV:**

**IRRIGATION:** Necessity and Importance of Irrigation, advantages and ill effects of Irrigation, types of Irrigation, methods of application of Irrigation water, Indian agricultural soils, methods of improving soil fertility. Soil-water-plant relationship, vertical distribution of soil moisture, soil moisture constants, consumptive use, estimation of consumptive use, Duty and delta, factors affecting duty, depth and frequency of Irrigation, irrigation efficiencies.

**Unit-V:**

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

**TEXT BOOKS:**

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.

**REFERENCES:**

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

**Expansive Soils**  
**(Professional Elective – I)**

**Course Objective:**

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:**

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

- To understand Nature of Soils and Soil Structure.
- To understand foundation practices in expansive soils.
- To understand the different materials and techniques for stabilization of soils.
- 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.

**TEXT BOOKS:**

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

**REFERENCES:**

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

**Sri Krishnadevaraya University College of Engineering & Technology**

**B.Tech – III-I Sem**

**(Civil Engineering)**

Course Code	SOIL MECHANICS LAB	L	T	P	C
		0	0	3	1.5
III Year 1 <sup>st</sup> Semester					
Course Objectives:					
List of Experiments:					
LIST OF EXPERIMENTS					
1. Atterberg's Limits.					
2. Field density-core cutter and sand replacement method					
3. Grain size analysis					
4. Permeability of soil, constant and variable head test					
5. Compaction test					
6. CBR Test					
7. Consolidation test					
8. Unconfined compression test					
9. Tri-axial Compression test					
10. Direct shear test.					
11. Vane shear test					
NOTE: At least 8 of the above experiments are to be conducted					

**Sri Krishnadevaraya University College of Engineering & Technology**

**B.Tech – III-I Sem**

**(Civil Engineering)**

<b>Course Code</b>	<b>ENVIRONMENTAL ENGINEERING LAB</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>
<b>III Year 1<sup>st</sup> Semester</b>					
<b>Course Objectives:</b>					
<b>List of Experiments:</b>					
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.					
<b>NOTE:</b> At least 8 of the above experiments are to be conducted					

Sri Krishnadevaraya University College of Engineering & Technology					
Dept. of Civil Engineering					
III Year 2 <sup>nd</sup> Semester					
S.No	Course Code	Course Name	Category	L-T-P	Credits
1		Engineering Geology	PC	3-0-0	3
2		Design of Irrigation Structures	PC	3-0-0	3
3		Design of Steel Structures	PC	3-0-0	3
4		Transportation Engineering	PC	3-0-0	3
5		Professional Elective-II 1. Disaster Mitigation and Management 2. Advanced Surveying 3. Urban Hydrology	PE-II	3-0-0	3
6		Open Elective-II (Inter Disciplinary)	OE-II	3-0-0	3
7		Geology Lab	PC	0-0-3	1.5
8		Transportation Engineering Lab	PC	0-0-3	1.5
9		Socially Relevant Projects (15 Hrs/ Sem)	PR	- - -	0.5
10		Industrial Training/ Internship/ Research Projects in National Laboratories/Academic Institutions	- - -	- - -	- - -
Total credits					21.5

Category	CREDITS
Professional Core Courses	15
Professional Elective Courses	03
Open Elective Course/Job oriented elective	03
Socially Relevant Project(15hrs/Sem)	0.5
TOTAL	21.5

**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:**

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

- Get the knowledge of principles of engineering geology.
- Understand the properties of soil, various rocks and minerals
- Judge the suitability of sites for various civil engineering structures.
- Use the knowledge of geological strata in the analysis and design the civil engineering structures.
- 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 drawbacks. Importance of Physical geology, Petrology and Structural geology.

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

**UNIT II:**

**MINERALOGY:** Definition of mineral, Importance of study of minerals, Different methods of study of minerals. Advantages of study of minerals by physical properties. Role of study of physical properties of minerals in the identification of minerals. Study of physical properties of following common rock forming minerals: Feldspar, Quartz, Flint, Jasper, Olivine, Augite, Hornblende, Muscovite, Biotite, Asbestos, Chlorite, Kyanite, Garnet, Talc, Calcite. Study of other common economic minerals such as Pyrite, Hematite, Magnetite, Chalcocite, 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 and unconformities, and joints – their important types. Their importance In situ 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, seismic areas and seismic belts. Seismic waves, Richter scale, precautions to be taken for building construction in seismic areas. Landslides, their causes and effect; measures to be taken to prevent their occurrence. Importance of study of earthquakes and landslides.

**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. Factors 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.

**TEXT BOOKS:**

1. Engineering Geology by N.Chennkesavulu, Mc-Millan, India Ltd. 2005
2. Engineering Geology by D.Venkata Reddy, Vikas Publications, New Delhi.

**REFERENCES:**

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, and CRC Press New Delhi.



## Design of Irrigation Structures

### COURSE OBJECTIVE:

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

### Course Outcomes:

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

- To know about various channel systems, head and cross regulator structures
- To identify various types of reservoir and their design aspects
- To understand cross drainage works, different types of dams and its design
- 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.

**TEXT BOOKS:**

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.

**REFERENCES:**

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, New Delhi.

**Sri Krishnadevaraya University College of Engineering & Technology**

**B.Tech – III-II Sem**

**(Civil Engineering)**

**Design of Steel Structures**

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

**COURSE OBJECTIVE:**

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

**Course Outcomes:**

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

- Apply the IS code of practice for the design of steel structural elements
- Design compression and tension members using simple and built-up sections
- Explain the behavior and modes of failure of tension members and different connections.
- Analyze and design tension members, bolted connections, welded connections, compression members and beams.
- 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.

**TEXT BOOKS**

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.

**REFERENCES**

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.

**Transportation Engineering**

**Course Objective:**

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

**Course Outcomes:**

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

- Carry out surveys involved in planning and highway alignment
- Design cross section elements, sight distance, horizontal and vertical alignment
- Implement traffic studies, traffic regulations and control, and intersection design
- Determine the characteristics of pavement materials
- 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 GEOMETRIC DESIGN:**

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

**UNIT – IV FLEXIBLE 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 method

**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.

**TEXT BOOKS:**

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.
- 4.

**Reference Books:**

1. Traffic Engineering and Transportation planning by L.R.Kadiyali and Lal- Khanna Publications.
2. Transportation Engineering an introduction by Khisty Lal, Pearson Publications
3. Highway Engineering – S.P.Bindra , Dhanpathi Rai & Sons. – 4th Edition (1981)
4. Introduction to Transportation Engineering by James.H.Banks, Tata Mc.Grawhill Edition, NewDelhi
5. Traffic and Highway Engineering Nicholas.J.Garber & Lester A.Hoel, Cengage Learning.
6. High way engineering by Paul .H.Wright & Karen K.Dixon,wiley india limited
7. A Text book of Transportation Engineering by S.P.Chandola, S.Chand Publications, New Delhi.
- 8.

**Disaster mitigation and management**  
(Professional Elective-II)

**COURSE OBJECTIVE:**

The objective of this course is to develop an understanding of why and how the modern disaster manager is involved with pre-disaster and post-disaster activities. Identify the regulatory controls used in hazard management. Describe public awareness and economic incentive possibilities. Understand the tools of post-disaster management

**Course Outcomes:**

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

- Affirm the usefulness of integrating management principles in disaster mitigation work
- Distinguish between the different approaches needed to manage pre- during and post- disaster periods
- Explain the process of risk management
- Relate to risk transfer

**UNIT – I:** Natural Hazards And Disaster Management: Introduction of DM – Inter disciplinary -nature of the subject– Disaster Management cycle – Five priorities for action. Case study methods of the following: floods, draughts – Earthquakes – global warming, cyclones & Tsunamis – Post Tsunami hazards along the Indian coast – landslides.

**UNIT-II :** Man Made Disaster And Their Management Along With Case Study Methods Of The Following: Fire hazards – transport hazard dynamics – solid waste management – post disaster – bio terrorism -threat in mega cities, rail and air craft's accidents, and Emerging infectious diseases & Aids and their management.

**UNIT-III: Risk And Vulnerability:** Building codes and land use planning – social vulnerability – environmental vulnerability – Macroeconomic management and sustainable development, climate change risk rendition – financial management of disaster – related losses.

**UNIT-IV : Role Of Technology In Disaster Managements:** Disaster management for infra structures, taxonomy of infra structure – treatment plants and process facilities-electrical substations- roads and bridges-mitigation programme for earth quakes –flowchart, geospatial information in agriculture drought assessment-multimedia technology in disaster risk management and training- transformable indigenous knowledge in disaster reduction.

**UNIT-V: Education And Community Preparedness:** Education in disaster risk reduction-Essentials of school disaster education-Community capacity and disaster resilience-Community based disaster recovery - Community based disaster management and social capital-Designing resilience- building community capacity for action.

**TEXT BOOKS:**

1. 'Disaster Management – Global Challenges and Local Solutions' by Rajib shah & R R Krishnamurthy(2009),Universities press.
2. 'Disaster Science & Management' by Tushar Bhattacharya, Tata McGraw Hill Education Pvt. Ltd., New Delhi.
3. 'Disaster Management – Future Challenges and Opportunities' by Jagbir Singh (2007), I K International Publishing House Pvt. Ltd.

**REFERENCE BOOKS:**

'Disaster Management' edited by Harsh. K . Gupta (2003), Universities press.

**Course Objectives:**

To make the student to get well conversant with the fundamentals of triangulation surveying, methods of hydrographic surveying, use photogrammetry in surveying and to set simple horizontal curves. To introduce the knowledge construction surveys and usage of modern instrument.

**Course Outcomes:**

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

1. Apply triangulation in surveying
2. Correlate knowledge to frontiers like Hydrography, Electronic Distance Measurement, Global Positioning System, Photogrammetry and Remote Sensing.
3. Identify data collection methods and prepare field notes

**UNIT – I**

**Triangulation:** Geodetic surveying-classification of triangulation system-triangulation figures-strength of figure-reconnaissance- signals and towers.

**Base line measurement-** calculation of length of base line-Selecting a base line site- apparatus for baseline measurement-fieldwork for base measurement-corrections to the observed length of a base line-the base net-auxiliary operations in base line work..

**UNIT - II**

**Hydrographic surveying** – Introduction-tides-equilibrium theory-spring tides and neap tides-priming and lagging-primary and derivative tide waves – lunar tidal interval- tide prediction-tide gauges-mean sea level-shoreline surveys-sounding equipment and methods-locating the soundings –reduction and plotting the soundings-three point problem-tidal current surveys-capacity of a reservoir –river surveying –area velocity method-weir method-chemical method.

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

**UNIT -IV Typical Curve Setting:**

Compound and reverse curves, elements of compound curve-relationship between the parts of a compound curve-setting out compound curve, elements of a reverse curve, relationships between various parts of a reverse curve.

Transition curves-general requirements-length of transition curve- the ideal transition curve, clothoid-characteristics of a transition curve-computations and setting out – spiraling compound curves – spiraling of reverse curves – Bernoulli's lemniscates curve.

**Vertical curves:** Introduction to vertical curves – Types of vertical curves.

**UNIT -V**

**Remote Sensing:** Introduction –Electromagnetic Spectrum, interaction of electromagnetic radiation with the atmosphere and earth surface, remote sensing data acquisition: platforms and sensors; visual image interpretation; digital image processing.



**GPS:** Segments, GPS measurements, errors and biases, co-ordinate transformation, accuracy considerations.

**TEXT BOOKS:**

1. Surveying and levelling by R. Subramanian, Oxford university press, New Delhi.
2. Chandra A M, “Higher Surveying”, New age International Pvt. Ltd., Publishers, New Delhi, 2002.
3. Hoffman. B, H. Lichtenegga and J. Collins, Global Positioning System - Theory and Practice, Springer -Verlag Publishers, 2001.
4. C.Venkatramaiah, “Text book of surveying”, 2<sup>nd</sup> edition, Universities press, 2018

**REFERENCES:**

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

**Urban Hydrology**  
**(Professional Elective-II)**

**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.

**Course Outcomes**

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

- Develop intensity duration frequency curves for urban drainage systems.
- Develop design storms to size the various components of drainage systems.
- Apply best management practices to manage urban flooding.
- Develop master drainage plan for an urbanized area.

**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

**TEXT BOOKS:**

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.

**REFERENCES BOOKS:**

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.

**Sri Krishnadevaraya University College of Engineering & Technology**

**B.Tech – III-II Sem**

**Civil Engineering**

Course Code	ENGINEERING GEOLOGY LAB	L	T	P	C
		0	0	3	1.5
<b>3<sup>rd</sup> Year 2<sup>nd</sup> Semester</b>					
<b>Course Objectives:</b>					
<ul style="list-style-type: none"><li>• Study of physical properties and identification of minerals referred under theory.</li><li>• Megascopic description and identification of rocks referred under theory.</li><li>• Interpretation and drawing of sections for geological maps showing tilted beds, faults, uniformities etc.</li><li>• Simple Structural Geology problems.</li></ul>					
<b>Course Outcomes (CO):</b>					
<b>List of Experiments:</b>					
1. Description and identification of SIX minerals					
2. Description and identification of Six (including igneous, sedimentary and metamorphic rocks)					
3. Interpretation of a Geological map along with a geological section.					
4. Simple strike and Dip problems.					

**Sri Krishnadevaraya University College of Engineering & Technology**

**B.Tech – III-II Sem**

**Civil Engineering**

Course Code	TRANSPORTATION ENGINEERING LAB	L	T	P	C
		0	0	3	1.5
<b>3<sup>rd</sup> Year 2<sup>nd</sup> Semester</b>					
<b>Course Objectives:</b>					
To Study of physical properties of materials used in transportation engineering.					
<b>Course Outcomes (CO):</b>					
<b>List of Experiments:</b>					
<b>I. ROAD AGGREGATES:</b>					
1. Aggregate Crushing value					
2. Aggregate Impact Test.					
3. Specific Gravity and Water Absorption.					
4. Attrition Test					
5. Abrasion Test.					
6. Shape tests					
<b>II. BITUMINOUS MATERIALS :</b>					
1. Penetration Test.					
2. Ductility Test.					
3. Softening Point Test.					
4. Flash and fire point tests.					

Sri Krishnadevaraya University College of Engineering & Technology					
Dept. of Civil Engineering					
IV Year 1 <sup>st</sup> Semester					
S.No	Course No	Course Name	Category	L-T-P	Credits
1.		Foundation Engineering	PC	3-0-0	3
2.		Construction Planning and Management	PC	3-0-0	3
3.		Estimation, Costing and Valuation	PC	3-0-0	3
4.		Pre-stressed Concrete	PC	3-0-0	3
5.		Professional Elective-III 1. Traffic Engineering 2. Bridge Engineering 3. Noise and Air Pollution	PE-III	3-0-0	3
6.		Professional Elective-IV 1. Environmental Impact Assessment 2. Water Shed Management 3. Ground Improvement Techniques	PE-IV	3-0-0	3
7.		Project I	PR	- - -	2
8.		Socially Relevant Project(15hrs/Sem)	PR	- - -	0.5
9.		Survey Camp/Industrial Training/ Internship/ Research Projects in National Laboratories/Academic Institutions	PR	- - -	1
<b>Total</b>					<b>21.5</b>

Category	CREDITS
Professional Core Courses	12
Professional Elective Courses	6
Project I	2
Socially Relevant Project(15hrs/Sem)	0.5
Industrial/Research Internship	1
<b>TOTAL CREDITS</b>	<b>21.5</b>

**Course Objective:**

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:**

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

- Ability to apply the principle of shear strength and settlement analysis for foundation system.
- Ability to design shallow and deep foundations
- Ability to design problems associated with black cotton soils.
- 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.

**TEXT BOOKS:**

1. Analysis and Design of Foundations and Retaining Structures- Shamsheer 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.
- 5.

**REFERENCES:**

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



## Construction Planning and Project Management

### 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:

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

- 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

**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.

### TEXT BOOK:

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.

**Estimation, Costing and Valuation**

**Course Objective:**

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:**

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

- Apply different types of estimates for different building elements
- Carry out analysis of rates and bill preparation different building elements
- Understand the concepts of specification writing
- 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.

**TEXT BOOKS:**

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

**REFERENCES:**

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”.

## Pre-Stressed Concrete

### Course Objective:

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:

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

- Methods of prestressing and able to design various pre-stressed concrete structural elements.
- 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.

### TEXT BOOKS:

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.

### REFERENCES:

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.

**Sri Krishnadevaraya University College of Engineering & Technology**

**B.Tech – IV-I Sem**

**(Civil Engineering)**

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**Traffic Engineering**  
**(Professional Elective –III)**

**Course Objective:**

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

**Course Outcomes:**

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

- Understand about the Traffic Forecast.
- Understand about the Demand relationships, methods for future projection
- Understand the Current road projects in India highway alignment and project preparation
- Understand the Traffic Characteristics and use of materials in pavements
- 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.

**TEXT BOOKS:**

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.

**REFERENCES:**

1. Transportation Engineering an introduction by Khisty Lal, Pearson Publications
2. Highway Engineering – S.P.Bindra , Dhanpathi Rai & Sons.
3. Introduction to Transportation Engineering by James.H.Banks, Tata Mc.Grawhill Edition, New Delhi.
4. Traffic and Highway Engineering Nicholas.J.Garber & Lester A.Hoel, Cengage Learning.
5. High way engineering by Paul .H.Wright & Karen K.Dixon,wiley india limited.
6. A Text book of Transportation Engineering by S.P.Chandola, S.Chand Publications, New *Delhi*.

**Bridge Engineering**  
(Professional Elective – III)

**Course Objective:**

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:**

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).

**TEXT BOOKS:**

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..

**REFERENCES:**

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.

**Noise and Air Pollution**  
(Professional Elective – III)

**Course Objective:**

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

**Course Outcomes:**

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.

**TEXT BOOKS:**

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

**REFERENCES:**

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.

**Environmental Impact Assessment**  
(Professional Elective – IV)

**Course Objective:**

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:**

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 activities. Procurement of relevant soil quality, Impact prediction, Assessment of Impact and significance. Identification and Incorporation of mitigation measures. E I A in surface water, Air and Biological environment: Methodology for the assessment of Impacts on surface water environment, Air pollution sources, generalized approach for assessment of Air pollution Impact.

**Unit-IV:**

**ASSESSMENT OF IMPACT ON VEGETATION AND WILDLIFE:**

Introduction - Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation, Causes and effects of deforestation.

**ENVIRONMENTAL AUDIT :** Introduction - Environmental Audit & Environmental legislation objectives of Environmental Audit, Types of environmental Audit, Audit protocol, stages of Environmental Audit, onsite activities, evaluation of Audit data and preparation of Audit report.

**Unit-V:**

**ENVIRONMENTAL ACTS (PROTECTION AND PREVENTION)**

Post Audit activities, The Environmental protection Act, The water Prevention Act, The Air (Prevention & Control of pollution Act.), Wild life Act. Case studies and preparation of Environmental Impact assessment statement for various Industries.



**TEXT BOOKS:**

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

**REFERENCES:**

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.

**Water Shed Management**  
(Professional Elective – IV)

**Course Objective:**

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

**Course Outcomes:**

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.

**TEXT BOOKS:**

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

**REFERENCES:**

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

**Ground Improvement Techniques**  
(Professional Elective – IV)

**Course Objective:**

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

**Course Outcomes:**

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.

**TEXT BOOKS:**

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

**REFERENCES:**

1. Moseley M.P. (1993) Ground Improvement, Blackie Academic and Professional, Boca Taton, Florida, USA.
2. Xanthakos P.P, Abramson, L.W and Brucwe, D.A (1994) Ground Control and Improvement, John Wiley and Sons, New York, USA.
3. Robert M. Koerner, Designing with Geosynthetics, Prentice Hall New Jercey, USA.

<b>Sri Krishnadevaraya University College of Engineering &amp; Technology</b>					
<b>Dept. of Electrical and Electronics Engineering</b>					
<b>IV Year 2<sup>nd</sup> Semester</b>					
<b>S.No</b>	<b>Course No</b>	<b>Course Name</b>	<b>Category</b>	<b>L-T-P</b>	<b>Credits</b>
1		Professional Elective- 1. Finite Element Methods in Civil Engineering 2. Railway and Airport Engineering 3. Earthquake Engineering	PE-V	3-0-0	3
2		Professional Elective- 1. Experimental stress Analysis 2. Advanced Structural Design 3. Rehabilitation and Retrofitting of Structures	OE-III	3-0-0	3
3		Project Phase-II			7
<b>Total</b>					<b>13</b>

<b>Category</b>	<b>CREDITS</b>
Professional Elective courses	3
Open Elective Course/Job oriented elective	3
Project II	7
<b>TOTAL CREDITS</b>	<b>13</b>

**Finite Element Methods in Civil Engineering**  
**(Professional Elective –V)**

**Course Objective:**

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

**Course Outcomes:**

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

- To demonstrate the differential equilibrium equations and their relationship.
- To apply numerical methods to FEM.
- To demonstrate the displacement models and load vectors.
- To compute the stiffness matrix for isoperimetric elements.
- 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.

**TEXT BOOKS:**

1. Finite Elements Methods in Engineering by Tirupati.R. Chandrepatta 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.

**REFERENCES:**

1. Finite Element analysis – Theory & Programming by C.S.Krishna Murthy- Tata Mc.Graw Hill Publishers.
2. Text book of Finite Element analysis by P.Seshu – Prentice Hall of India.

**Course Objective:**

To familiarize the student with the latest developments in railways and airport Engineering.

**UNIT – I :**

Railway Engineering:

Introduction, permanent way components, cross section of permanent way, functions and requirements of rails, sleepers and ballast, types of gauges, creep of rails, theories related to creep, coning of wheels adzing of sleepers, rail fastenings.

**Unit – II :**

Geometric design of railway track Gradients, grade compensation, cant and negative super elevation – cant deficiency, degree of curves, safe speed on railway track, points and crossings, layout and functioning of left hand turn out and right hand turn outs, station yards, signaling and interlocking.

**Unit –III:**

Airport Engineering

Airport site selection – factors affecting site selection and surveys- runway orientation – wind rose diagram – basic runway length – correction for runway length – terminal area – layout and functions – concepts of terminal building – simple building , linear concept, pier concept and satellite concept – typical layouts . Geometric design of taxiways, functions of taxiways.

**Unit – IV:**

Geometric design of runways

Aircraft characteristics – influence of characteristics on airport planning and design – geometric design elements of runway – standards and specifications

**Unit – V:**

Ports and Harbours

Requirements of ports and harbours – types of ports – classification of harbours – docks and types of docks, dry docks, wharves and jetties – breakwaters: layouts of different types of harbours and docks – dredging operations – navigation aids.

**Text books:**

1. A Text Book of Railway Engineering-S.C.Saxena and S.Arora, Dhanpatrai and Sons, New Delhi.
2. Satish Chandra and Agarwal, M.M. (2007) “Railway Engineering” Oxford Higher Education, University Press New Delhi.
3. Airport Planning and Design- S.K. Khanna and M.G Arora, Nemchand Bros.
4. A Text book of Transportation Engineering – S.P.Chandola – S.Chand & Co. Ltd. – (2001).
5. Railway Track Engineering by J.S.Mundrey

**References:**

1. Highway, railway, Airport and Harbour Engineering – K.P. Subramanian, Scitech publishers.
2. Harbour, Dock and Tunnel Engineering – R. Srinivasan, Charotar Publishing House Pvt. Limited, 2009
3. Dock and Harbour Engineering – Hasmukh P Oza, Gutam H Oza, Chartor Publishers pvt ltd.

**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.

**TEXT BOOKS:**

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

**REFERENCES:**

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

**Experimental Stress Analysis**  
(Professional Elective –VI)

**Course Objective:**

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

**Course Outcomes:**

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

- The student will be able to understand different methods of experimental stress analysis
- The student will be able to understand the use of strain gauges for measurement of strain.
- The student will be exposed to different Non destructive methods of concrete.
- 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, Isochromic Fringe patterns – Isoclinic Fringe patterns passage of light through plane Polariscope and Circular polariscope, Materials for photo – Elasticity Properties of Photo elastic Materials.

**TEXT BOOKS & REFERENCES:**

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



**Advanced Structural Design**  
(Professional Elective –VI)

**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.

**TEXT BOOKS:**

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 B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi

**REFERENCES:**

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

**Sri Krishnadevaraya University College of Engineering & Technology**

**B.Tech – IV-II Sem**

**Civil Engineering**

**Rehabilitation and Retrofitting of Structures  
(Professional Elective –VI)**

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

**Course Objective:**

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

**Course Outcomes:**

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

- The student will be able to understand different methods of experimental stress analysis
- The student will be able to understand the use of strain gauges for measurement of strain.
- The student will be exposed to different Non destructive methods of concrete.
- 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

**TEXT BOOKS:**

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

**REFERENCES:**

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).

**SYLLABUS FOR  
OPEN ELECTIVES OFFERED BY  
DEPARTMENT OF E.C.E**

**Sri Krishnadevaraya University College of Engineering & Technology**

<b>B.Tech</b>	<b>(Electronics &amp; Communication Engineering)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Fundamentals of Digital Electronics</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
	<b>(Open Elective for non ECE Students)</b>				

**UNIT-I- Binary Systems**

Binary Systems Introduction of Digital Computers and Digital Systems Binary numbers Base Conversion Complements R's Complement (R-1)'s Complement Binary Codes Decimal Codes Error Detection codes Reflected Code

**UNIT-II -Binary Logic And Boolean Algebra**

Binary logic Logic Gates Postulates of Boolean algebra Two value Boolean algebra Basic theorems of Boolean algebra De-Morgan's Theorems Boolean functions Boolean forms

**UNIT-III -Boolean Function Implementation**

Need for simplification K – Map method 2 – Variable K – map 3 – Variable K – map 4 – variable K – map K – Map using Don't care condition Universal Gates NAND Gate NOR Gate NAND Implementation NOR Implementation

**UNIT-IV-Basic Combinational Logic**

Design procedure of combinational logic Adder ,Half Adder ,Full Adder ,Subtractor ,Half Subtractor ,Full Subtractor Code Conversion BCD – Excess-3 conversion .

**UNIT-VCombinational Logic Using MSI And LSI**

Binary Parallel Adder ,Magnitude Comparator ,2 Input Comparator ,Decoder ,Encoder ,Multiplexer ,Demultiplexers

**UNIT-VI-SEQUENTIAL CIRCUITS:** Classification of sequential circuits, Basic Flip-Flops, Excitation and Characteristic Tables.

**TEXTBOOKS:**

1. Switching & Finite Automata theory- ZviKohavi, TMH,2nd Edition.
2. Digital Design-Morris Mano, PHI, 3rd Edition,2006.
3. Switching Theory and Logic design-A. Anand Kumar,2008.

**REFERENCES:**

1. An Engineering Approach to Digital Design-Fletcher, PHI.
  2. Fundamentals of Logic Design-Charles H.Roth.5th Edition, 2004, Thomson publications.
- Digital Logic Applications and Design-John M.Yarbrough, 2006, Thomson Publications

B.Tech

(Electronics & Communication Engineering)

L T P C

**Fundamentals of Communication Systems**

3 0 0 3

**(Open Elective for non ECE Students)**

**UNIT I INTRODUCTION TO COMMUNICATION SYSTEMS:** Communication process, Elements of Communication Systems; Modulation: Need for Modulation, Forms of Modulation: AM, FM, PM, Advantages, Disadvantages and Applications.

**UNIT II AMPLITUDE MODULATION AND DEMODULATION:** Introduction, Mathematical Representation of AM, Modulation Factors, Percentage of Modulation, Power Relationships, Virtues and imitations of AM. DSB AM: Analog Message Conventions, AM Signals and Spectra, DSB signals and spectra. SSB AM: SSB Signals and Spectra, SSB generation, VSB Generation, Demodulation of AM, Square law detector.

**UNIT III FREQUENCY, PHASE MODULATION AND DEMODULATION:** FM:

Introduction, Mathematical Representation of FM, Modulation Index, Deviation Sensitivity, Deviation Ratio, Bandwidth of FM (Carson's rule), Narrow band FM, Wide band FM, Voltage and Power for FM, Pre-emphasis and Deemphasis, Illustrative Problems. PM: Introduction, Narrow Band PM, Phase Modulation and Indirect FM; FM demodulators, Slope detector, Balanced slope discriminators, Phase difference discriminators, Ratio detector, PLL Detectors, Distortion and Transmission estimates.

**UNIT IV TRANSMITTERS AND RECEIVERS:** AM Transmitters: Balanced Modulator, Square Law Modulator, and Product Modulator.

**Receivers:** Super Heterodyne Receiver, Double Conversion Receiver and Independent Sideband Receiver. FM Transmitters: Direct FM and VCO's, Mixer, Divider, Multiplier. Receivers: Local Oscillator, Slope Detector, Phase Locked Loop, Introduction to IC 565 applications, FM demodulator.

**UNIT V PULSE MODULATION TECHNIQUES:** Definition, Types: PAM, PWM, PPM,

Sampling, Nyquist rate, Flat top sampling, Generation and Detection of PAM, PWM, PPM.

**TEXT BOOKS:**

1. A. Bruce Carlson, & Paul B. Crilly, "Communication Systems – An Introduction to Signals & Noise in Electrical Communication", McGraw-Hill International Edition, 5th Edition, 2010.
2. "Electronic Communications systems" Modulation and Transmission-Robert Schoenbeck, UBS Publications, New Delhi.

**REFERENCES:**

1. Simon Haykin, "Communication Systems", Wiley-India edition, 3rd edition, 2010
2. Sham Shanmugam, "Digital and Analog Communication Systems", Wiley-India edition, 2006.
3. B.P. Lathi, & Zhi Ding, "Modern Digital & Analog Communication Systems", Oxford University Press, International 4th edition, 2010.
4. Linear Integrated Circuits – D. Roy Chowdhury, New Age International (p) Ltd, 2nd Edition

<b>B.Tech</b>	<b>(Electronics &amp; Communication Engineering)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

## Signals and Systems (Open Elective for non ECE Students)

### UNIT - I    **Signals and Systems**

Signals & Systems: Basic definitions and classification of Signals and Systems (Continuous time and discrete time), operations on signals, Concepts of Convolution and Correlation of signals, Analogy between vectors and signals-Orthogonality, mean square error..

### UNIT - II    **Fourier Series and Fourier Transform**

Fourier series: Trigonometric & Exponential, Properties of Fourier series, concept of discrete spectrum, Illustrative Problems.

Continuous Time Fourier Transform: Definition, Computation and properties of Fourier transform for different types of signals and systems, Inverse Fourier transform. Statement and proof of sampling theorem of low pass signals, Illustrative Problems.

### UNIT - III    **Laplace Transform**

Laplace Transform: Definition, ROC, Properties, Inverse Laplace transforms, the S-plane and BIBO stability, Transfer functions, System Response to standard signals, Solution of differential equations with initial conditions.

### UNIT - IV    **Signal Transmission through LTI systems**

Signal Transmission through Linear Systems: Linear system, impulse response, Response of a linear system for different input signals, linear time-invariant (LTI) system, linear time variant (LTV) system, Transfer function of a LTI system. Filter characteristics of linear systems. Distortion less transmission through a system, Signal bandwidth, System bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Paley-Wiener criterion for physical realization, Relationship between bandwidth and rise time, Energy and Power spectral densities, Illustrative Problems.

### UNIT - V    **DTFT & Z-Transform**

**Discrete Time Fourier Transform:** Definition, Computation and properties of Discrete Time Fourier transform for different types of signals and systems.

**Z-Transform:** Definition, ROC, Properties, Poles and Zeros in Z-plane, The inverse Z-Transform, System analysis, Transfer function, BIBO stability, System Response to standard signals, Solution of difference equations with initial conditions. Illustrative Problems.

#### **Textbooks:**

1. A.V. Oppenheim, A.S. Willsky and S.H. Nawab, "Signals and Systems", 2nd Edition, PHI, 2009.
2. Simon Haykin and Van Veen, "Signals & Systems", 2nd Edition, Wiley, 2005.
3. BP Lathi, "Principles of Linear Systems and Signals", 2<sup>nd</sup> Edition, Oxford University Press, 015.
4. Matthew Sadiku and Warsame H. Ali, "Signals and Systems A primer with MATLAB", CRC Press, 2016.
5. Hwei Hsu, "Schaum's Outline of Signals and Systems", 4<sup>th</sup> Edition, TMH, 2019.

B.Tech	(Electronics & Communication Engineering)	L	T	P	C
	<b>Microprocessors and Microcontrollers</b> <b>(Open Elective for non ECE Students)</b>	3	0	0	3

#### UNIT-I

**8086 MICROPROCESSOR:** Evaluation of microprocessors. Overview of 8085. Register organization of 8086, architecture, signal description of 8086, physical memory organization, general bus operations, I/O addressing capability, special processor activities, 8086-Minimum mode and maximum mode of operation, Timing diagram.

#### UNIT-II

**8086 INSTRUCTION SET AND ASSEMBLER DIRECTIVES:** Addressing modes of 8086, Instruction set of 8086, Assembler Directives and operators. 8086 Assembly language programs involving logical, branch and call instructions, sorting, evaluation of arithmetic expressions, string manipulation.

#### UNIT-III

**PROGRAMMABLE PERIPHERAL DEVICES AND THEIR INTERFACING:** Memory interfacing to 8086 (static RAM and EPROM). 8255 PPI-various modes of operation and interfacing to 8086. D/A and A/D converter interfacing, Stepper motor interfacing. Interrupt structure of 8086, Vector interrupt table. Interrupt service routines. 8259 PIC architecture and interfacing cascading of interrupt controller and its importance

#### UNIT-IV

**8051 MICROCONTROLLER:** Architecture of 8051 microcontroller. Pin Diagram of 8051, and external memories, counters and timers, serial communication, interrupts.

#### UNIT-V

**8051 ASSEMBLY LANGUAGE PROGRAMMING:** Instruction set of 8051, Addressing modes of 8051, Assembly Language Programming examples using 8051. Interfacing to LCD, Keyboard, ADC & DAC.

#### TEXT BOOKS:

1. Microprocessor Architecture, Programming and Applications with 8085 By Ramesh S Gaonkar.
2. Advanced microprocessor and peripherals-A.K. Ray and K.M. Bhurchandi, 2nd edition, TMH, 2000.
3. 8051 microcontroller and embedded systems by mazidi and mazidi ,pearson education 2000.

#### REFERENCES:

1. Microprocessors Interfacing-Douglas V.Hall, Revised 2nd edition, 2007.
2. The 8088 and 8086 Microprocessors- Walter A. Triebel, Avtar Singh, PHI, 4th Edition, 2003.
3. 8051 Microcontroller-Internals, Instructions, Programming and Interfacing by Subrata Ghoshal,

B.Tech	(Electronics & Communication Engineering)	L	T	P	C
<b>Electronic Measurements &amp; Instrumentation</b> (Open Elective for non ECE Students)		3	0	0	3

**UNIT I: ELECTRICAL MEASUREMENTS:** Electrical standards: ampere, voltage, resistance, capacitance & inductance standards-Suspension Galvanometer-Torque & deflection of the galvanometer- PMMC mechanism - DC Ammeters-DC voltmeters-Voltmeter sensitivity-Series and Shunt type ohm meters-Multimeters-Alternating current indicating instruments: electrodynamic meter, rectifier type-Thermo instruments-Electrodynamometers in power measurements-Watt hour meter-Power factor meter.

**UNIT II: BRIDGE MEASUREMENTS:** Resistance Measurement: Wheat stone bridge, Kelvin bridge- AC bridges: Condition for bridge balance- Inductance measurement: Maxwell Bridge, Hay Bridge- Capacitance measurement: Schering Bridge- Frequency measurement: Wein Bridge- Problems of shielding and grounding.

**UNIT III: ELECTRONIC MEASUREMENTS:** FET input electronic volt-ohm-ammeters- AC voltmeters: rectifier type, true RMS type- Digital voltmeters: Ramp, Dual slope integration & SAR types

**UNIT IV: OSCILLOSCOPES:** Oscilloscope block diagram- Vertical deflection system-Delay line- Horizontal deflection system-Vertical I/p and sweep generator signal synchronization-Oscilloscope probes: 1:1 probes, attenuator probes, active probes, current probes- Oscilloscope controls-Measurement of voltage, frequency, phase .

**UNIT V: SIGNAL GENERATORS AND ANALYZERS:** Low-frequency signal generators- Function generators- Pulse generators- RF signal generators.

**UNIT VI: FREQUENCY & TIME MEASUREMENT:** Time & frequency standards – Frequency measurement - time base - Period measurement - Measurement errors.

**TEXT BOOKS:**

1. Modern Electronic Instrumentation and Measurement Techniques- Albert D. Helfrick, William D. Cooper- PHI-2002
2. Electronic Instrumentation and Measurements- David A. Bell-PHI-2nd edition-2003.

**REFERENCES:**

1. A course in Electrical and Electronic Measurements and Instrumentation- A.K. Sawhney- Dhanpat Rai & CO- 7th edition-2005
2. Electronic Instrumentation- H Kalsi- TMH-3rd edition
3. Electronic Measurements and Instrumentation- Oliver and Cage- TMH



<b>B.Tech</b>	<b>(Electronics &amp; Communication Engineering)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Embedded Systems</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
	<b>(Open Elective for non ECE Students)</b>				

**Unit - I**

Embedded Computing: Introduction, Complex Systems and Microprocessor, The Embedded System Design Process, Formalisms for System Design, Design Examples.

**Unit - II**

The 8051 Architecture : Introduction, 8051 Micro controller Hardware, Input / Output Ports and Circuits, External Memory, Counter and Timers, Serial data Input /Output, Interrupts.

**Unit - III**

Basic Assembly Language Programming Concepts: The Assembly Language Programming Process, Programming Tools and Techniques, Programming the 8051. Data Transfer and Logical Instructions. Arithmetic Operations, Decimal Arithmetic. Jump and Call Instructions, Further Details on Interrupts. Applications: Interfacing with Keyboards, Displays, D/A and A/D Conversions

**Unit IV**

Introduction to Real – Time Operating Systems: Tasks and Task States, Tasks and Data, Semaphores, and Shared Data; Message Queues, Mailboxes and Pipes, Timer Functions, Events, Memory Management, Interrupt Routines in an RTOS Environment.

**Unit , V**

Basic Design Using a Real,Time Operating System: Principles, Semaphores and Queues, HardReal,Time Scheduling Considerations, Saving Memory and Power,

**TEXT BOOKS :**

1. Computers and Components, Wayne Wolf, Elseveir.
2. The 8051 Microcontroller , Kenneth J.Ayala, Thomson.

**REFERENCES :**

1. Embedding system building blocks, Labrosse, via CMP publishers.
2. Embedded Systems, Raj Kamal, TMH.
3. Micro Controllers, Ajay V Deshmukhi, TMH.
4. Embedded System Design, Frank Vahid, Tony Givargis, John Wiley.
5. Microcontrollers, Raj kamal, Pearson Education.
6. An Embedded Software Primer, David E. Simon, Pearson Education

B.Tech	(Electronics & Communication Engineering)	L	T	P	C
	Basics of VLSI	3	0	0	3
	(Open Elective for non ECE Students)				

#### UNIT – I

**Introduction:** Introduction to MOS Technology – MOS, PMOS, NMOS, CMOS and BiCMOS technologies, fabrication fundamentals: Oxidation, Lithography, Diffusion, Ion implantation, Metallization and Encapsulation.

**Basic Electrical Properties:** Basic Electrical Properties of MOS, CMOS and BiCMOS Circuits,  $I_{DS}$ - $V_{DS}$  relationships, MOS transistor threshold Voltage,  $g_m$ ,  $g_{ds}$ , figure of merit  $\omega_0$ , Pass transistor, NMOS inverter, Various pull - ups, Determination of pull-up to pulldown ratio (  $Z_{pu} / Z_{pd}$  ), CMOS Inverter analysis and design, BiCMOS inverters, Latch-up in CMOS circuits.

#### UNIT – II

**VLSI Circuit Design Processes:** VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layouts, Lambda based design rules, Contact cuts, CMOS Lambda based design rules, Layout Diagrams for logic gates, Transistor structures, wires and vias, Scaling of MOS circuits- Scaling models, scaling factors, scaling factors for device parameters, Limitations of Scaling.

#### UNIT – III

**Gate Level Design and Layout:** Architectural issues, Switch logic networks: Gate logic, Alternate gate circuit: Pseudo-NMOS Dynamic CMOS logic. Basic circuit concepts, Sheet Resistance  $R_S$  and its concept to MOS, Area Capacitance Units, Calculations, The delay unit  $T$ , Inverter Delays, Driving large Capacitive Loads, Wiring Capacitances, Fan-in and fan-out, Choice of layers

#### UNIT – IV

**Subsystem Design:** Subsystem Design, Shifters, Adders, ALUs, Multipliers: Array multiplier, Serial Parallel multiplier, Parity generator, Comparators, Zero/One Detectors, Up/Down Counter, Memory elements: SRAM, DRAM, ROM, Serial Access Memories.

#### UNIT – V

**Semiconductor Integrated Circuit Design:** PLDs, FPGAs, CPLDs, Standard Cells, Programmable Array Logic, Programmable Logic Array Design Approach.

#### TEXT BOOKS:

1. Kamran Eshraghian, “Essentials of VLSI circuits and systems”, Eshraghian Douglas and A. Pucknell, PHI, 2005 Edition
2. Wayne Wolf, “Modern VLSI Design”, 3rd Edition, Pearson Education, 1997.

#### REFERENCE BOOKS:

1. John .P. Uyemura, “CMOS logic circuit Design”, Springer, 2007.
2. Neil H. E Weste, “CMOS VLSI Design – A Circuits and Systems Perspective”, 3<sup>rd</sup> edition, David Harris, Ayan Banerjee, Pearson, 2009.

B.Tech	(Electronics & Communication Engineering)	L	T	P	C
		3	0	0	3

**Principles of Digital Signal Processing  
(Open Elective for non ECE Students)**

**UNIT- I:**

**INTRODUCTION TO SIGNALS**

Classification of Signals: Analog, Discrete, Digital, Deterministic & Random, Periodic & Aperiodic, Even & Odd, Energy & Power signals. Basic operations on signals: Time shifting, Time scaling, Time reversal, Amplitude scaling and Signal addition. Elementary Signals: Unit step, Unit ramp, Unit parabolic, Impulse, Sinusoidal function, Exponential function, Gate function, Triangular function, Sinc function and Signum function.

**UNIT – II:**

**DISCRETE TIME SIGNALS AND SYSTEMS**

**Discrete Time Signals:** Elementary discrete time signals, Classification of discrete time signals: power and energy signals, even and odd signals. Simple manipulations of discrete time signals: Shifting and scaling of discrete-time signals.

**Discrete Time Systems:** Input-Output description of systems, Block diagram representation of discrete time systems, Linear Constant Coefficient Difference Equations, Classification of discrete time systems: linear and nonlinear, time-invariant and variant systems, causal and non causal, stable and unstable systems.

**UNIT- III:**

**LAPLACE TRANSFORMS AND Z- TRANSFORMS**

**Laplace Transforms:** Laplace transforms, Partial fraction expansion, Inverse Laplace transform, Concept of Region of Convergence (ROC), Constraints on ROC for various classes of signals, Properties of Laplace transforms.

**Z-Transforms:** Concept of Z-transform of a discrete sequence, Region of convergence in Z- Transform, constraints on ROC for various classes of signals, inverse Z-transform, properties of Z-Transforms.

**UNIT – IV:**

**FAST FOURIER TRANSFORMS**

Discrete Time Fourier Transform (DTFT), Discrete Fourier Transform (DFT), Radix-2 Fast Fourier Transforms (FFT), Decimation in Time and Decimation in Frequency FFT Algorithms: radix-2 DIT-FFT, DIF-FFT, and Inverse FFT: IDFT-FFT.

**UNIT – V:**

**IIR AND FIR DIGITAL FILTERS**

**IIR DIGITAL FILTERS:** Analog filters approximations: Butterworth and Chebyshev, Design of IIR digital filters from analog filters. Realization of IIR filters: Direct form-I, Direct form-II, cascade form and parallel form.

**FIR DIGITAL FILTERS:** Characteristics of FIR digital filters, frequency response. Design of FIR digital filters using window techniques: Rectangular window, Triangular or Bartlett window, Hamming window, Hanning window, Blackman window. Realization of FIR filters: Linear phase and Lattice structures.

**TEXT BOOKS:**

1. B. P. Lathi, "Signals, Systems and Communications", BS Publications, 2008.
2. John G. Proakis, Dimitris G. Manolakis, "Digital signal processing, principles, Algorithms and applications", 4<sup>th</sup> edition , Pearson Education/PHI, 2007.
3. A.V. Oppenheim and R.W. Schaffer, "Discrete Time Signal Processing", 2<sup>nd</sup> edition., PHI.

**REFERENCES:**

1. A.V. Oppenheim, A.S. Will sky and S.H. Nawab, "Signals and Systems", PHI, 2<sup>nd</sup> Edition, 2013.
2. A. Anand Kumar, "Signals and Systems", PHI Publications, Third Edition, 2013
3. P. Ramesh Babu. "Digital Signal Processing".
4. Andreas Antoniou, "Digital signal processing", Tata McGraw Hill, 2006.
5. R S Kaler, M Kulkarni,, Umesh Gupta, "A Text book on Digital Signal processing" –I K International Publishing House Pvt. Ltd.

<b>B.Tech</b>	<b>(Electronics &amp; Communication Engineering)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>Introduction to Image Processing</b>					
<b>(Open Elective for non ECE Students)</b>					

**UNIT-I:**

**INTRODUCTION TO DIGITAL IMAGE PROCESSING**

**Introduction:** Digital image representation, Fundamental steps in image processing, Elements of digital image processing, Elements of visual perception, Simple image model, Sampling and Quantization, Basic relationships between pixels, Image transformations.

**Applications:** Medical imaging, Robot vision, Character recognition, Remote sensing.

**UNIT-II:**

**IMAGE ENHANCEMENT**

Need for image enhancement, Point processing, Histogram processing, Spatial filtering- Smoothing and Sharpening.

**UNIT-III:**

**COLOR IMAGE PROCESSING**

Colour fundamentals, Colour models, Color transformations, Pseudo colour image processing, Full colour image processing.

**UNIT-IV:**

**IMAGE COMPRESSION**

Redundancies, Fidelity criteria, Image compression model, Lossless compression: Huffman coding, Arithmetic coding. Lossy compression: Lossy Predictive Coding, JPEG Compression Standard.

**UNIT-V:**

**IMAGE SEGMENTATION**

Detection of discontinuities: point, line and edge detection, Edge linking and Boundary detections: Local Processing, Global processing via Hough transform, Thresholding, Region oriented segmentation: Region growing, Region splitting and merging.

**TEXT BOOKS:**

1. Rafael C. Gonzalez and Richard E. Woods, "Digital Image Processing", 3<sup>rd</sup> Edition, Pearson Education, 2011.

**REFERENCE BOOKS:**

1. S Jayaraman, S Esakkirajan and T Veerakumar, "Digital Image Processing", TMH, 2011.  
S. Sridhar, "Digital Image Processing", 2<sup>nd</sup> Edition, Oxford Pu

**SYLLABUS FOR  
OPEN ELECTIVES OFFERED BY  
DEPARTMENT OF E.E.E**

**Sri Krishnadevaraya University College of Engineering & Technology**

<b>B.Tech</b>	<b>(Electrical and Electronics Engineering)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Introduction to Hybrid Electric Vehicles</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
	<b>(Open Elective offered for non EEE Students)</b>				

**UNIT I: Electric Vehicle Propulsion and Energy Sources**

Introduction to electric vehicles, vehicle mechanics - kinetics and dynamics, roadway fundamentals propulsion system design - force velocity characteristics, calculation of tractive power and energy required, electric vehicle power source - battery capacity, state of charge and discharge, specific energy, specific power, Ragone plot. battery modeling - run time battery model, first principle model, battery management system- soc measurement, battery cell balancing. Traction batteries - nickel metal hydride battery, Li-Ion, Lipolymer battery.

**UNIT II: Electric Vehicle Power Plant And Drives**

Introduction electric vehicle power plants. Induction machines, permanent magnet machines, switch reluctance machines. Power electronic converters-DC/DC converters - buck boost converter, isolated DC/DC converter. Two quadrant chopper and switching modes. AC drives- PWM, current control method. Switch reluctance machine drives - voltage control, current control.

**UNIT III: Hybrid And Electric Drive Trains**

Introduction hybrid electric vehicles, history and social importance, impact of modern drive trains in energy supplies. Hybrid traction and electric traction. Hybrid and electric drive train topologies. Power flow control and energy efficiency analysis, configuration and control of DC motor drives and induction motor drives, permanent magnet motor drives, switch reluctance motor drives, drive system efficiency.

**UNIT IV: Electric and Hybrid Vehicles - Case Studies**

Parallel hybrid, series hybrid -charge sustaining, charge depleting. Hybrid vehicle case study – Toyota Prius, Honda Insight, Chevrolet Volt. 42 V system for traction applications. Lightly hybridized vehicles and low voltage systems. Electric vehicle case study - GM EV1, Nissan Leaf, Mitsubishi Miev. Hybrid electric heavy duty vehicles, fuel cell heavy duty vehicles.

**UNIT V: Electric And Hybrid Vehicle Design :**

Introduction to hybrid vehicle design. Matching the electric machine and the internal combustion engine. Sizing of propulsion motor, power electronics, drive system. Selection of energy storage technology, communications, supporting subsystem. Energy management strategies in hybrid and electric vehicles - energy management strategies- classification, comparison, implementation.

**Text Books :**

1. Iqbal Hussein, “Electric and Hybrid Vehicles: Design Fundamentals”, 2<sup>nd</sup> edition, CRC Press, 2003.
2. [Amir Khajepour](#), [M. Saber Fallah](#), [Avesta Goodarzi](#), “Electric and Hybrid Vehicles: Technologies, Modeling and Control - A Mechatronic Approach”, illustrated edition, John Wiley & Sons, 2014.
3. Mehrdad Ehsani, YimiGao, Sebastian E. Gay, Ali Emadi, “Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design”, CRC Press, 2004.

**References:**

1. James Larminie, John Lowry, “Electric Vehicle Technology”, Explained, Wiley, 2003.

B.Tech

(Electrical and Electronics Engineering)

L T P C

3 0 0 3

**Electrical Engineering Materials**  
(Open Elective offered for non EEE Students)

**UNIT-I Conducting Materials**

Introduction – classification of materials – Metals and Non metals, physical, thermal, mechanical and electrical properties of materials – classification of electrical materials – concept of atom – electron configuration of atom, conductors, general properties of conductors, factors effecting resistivity of electrical materials – electrical/mechanical/thermal properties of copper, aluminium, iron, steel, lead, tin and their alloys – applications.

**UNIT-II Dielectric and High Resistivity Materials**

Introduction – solid, liquid and gaseous dielectrics, leakage current, permittivity, dielectric constant, dielectric loss – loss angle – loss constant, Breakdown voltage and dielectric strength of-solid, liquid and gaseous dielectrics, effect of break down– electrical and thermal effects, Polarization – electric, ionic and dipolar polarization. Effect of temperature and Frequency on dielectric constant of polar dielectrics. High Resistivity materials – electrical / thermal / mechanical properties of Manganin, Constantan, Nichrome, Tungsten, Carbon and Graphite and their applications in electrical equipment.

**UNIT-III Solid Insulating Materials**

Introduction – characteristics of a good electrical insulating materials – classification of insulating materials – electrical, thermal, chemical and mechanical properties of solid insulating materials - Asbestos, Bakelite, rubber, plastics, thermo plastics. Resins, polystyrene, PVC, porcelain, glass, cotton and paper.

**UNIT-IV Liquid & Gas Insulating Materials**

Liquid insulating materials – Mineral oils, synthetic liquids, fluorinated liquids – Electrical, thermal and chemical properties – transformer oil – properties – effect of moisture on insulation properties Gaseous insulators – classification based on dielectric strength – dielectric loss, chemical stability properties and their applications.

**UNIT-V Domestic Wiring**

Wiring materials and accessories – Types of wiring – Types of Switches - Specification of Wiring – Stair case wiring - Fluorescent lamp wiring- Godown wiring – Basics of Earthing – single phase wiring layout for a residential building.

**Text Books:**

1. G.K. Mithal, “Electrical Engineering Materials”, Khanna publishers, 2<sup>nd</sup> edition, 1991.
2. R.K. Rajput, A course in “Electrical Engineering Materials”, Laxmi publications, 2009.

**Reference Books:**

1. C.S. Indulkar and S. Thiruvengadam, “An Introduction to Electrical Engineering Materials” S Chand & Company, 2008.
2. Technical Teachers Training Institute, “Electrical engineering Materials”, 1<sup>st</sup> Edition, Madras, McGraw Hill Education, 2004.
3. by S.P. Seth, “A course in Electrical Engineering Materials Physics Properties & Applications”, Dhanapat Rai & Sons Publications, 2018.



B.Tech

(Electrical and Electronics Engineering)

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**Generation of Electric Power**  
(Open Elective offered for non EEE Students)

**UNIT-I: THERMAL POWER GENERATING SYSTEMS**

Block Diagram of Thermal Power Station (TPS) showing paths of Coal, Steam, Water, Air, Ash and Flue Gasses - Brief Description of TPS Components: Economizers, Boilers, Super Heaters, Turbines, Condensers, Chimney and Cooling Towers.

**UNIT-II: NUCLEAR POWER GENERATING SYSTEMS**

**Nuclear Power:** Nuclear Fission and Chain Reaction.- Nuclear Fuels.- Principle of Operation of Nuclear Reactor.-Reactor Components: Moderators, Control Rods, Reflectors and Coolants.- Radiation Hazards: Shielding and Safety Precautions.- Types of Nuclear Reactors and Brief Description of PWR, BWR and FBR.

**UNIT –III: HYDRO POWER GENERATING STATIONS**

**Hydro Power:** Selection of Site, Classification, Layout, Description of Main Components.

**UNIT-IV: SOLAR & WIND POWER GENERATING SYSTEMS**

**Solar Power Generation:** Role and Potential of Solar Energy Options, Principles of Solar Radiation, Flat Plate and Concentrating Solar Energy Collectors, Different Methods of Energy Storage – PV Cell-V-I Characteristics.

**Wind Power Generation:** Role and potential of Wind Energy Option, Horizontal and Vertical Axis Wind Mills- Performance Characteristics- Power- Speed & Torque- Speed Characteristics-Pitch & Yaw Controls – Power Electronics Application – Economic Aspects.

**UNIT-V: ECONOMIC ASPECTS OF POWER GENERATION**

Load Curve, Load Duration and Integrated Load Duration Curves-Load Demand, Diversity, Capacity, Utilization and Plant Use Factors- Numerical Problems. Costs Of Generation and their Division Into Fixed, Semi-Fixed and Running Costs. Tariff Methods: Desirable Characteristics of a Tariff Method.-Flat

**TEXT BOOKS:**

1. A Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, U.S.Bhatnagar and A.Chakraborti, Dhanpat Rai & Co. Pvt. Ltd., 1999.
2. Electric Power Generation Distribution and Utilization by C.L Wadhwa, New Age International (P) Ltd., 2005.
3. Non Conventional Energy Sources by G.D. Rai, Khanna Publishers, 2000.

**REFERENCE BOOKS:**

1. Renewable Energy Resources – John Twidell and Tony Weir, Second Edition, Taylor and Francis Group, 2006.
2. Electrical Power Generation, Transmission and Distribution by S.N.Singh., PHI, 2003.

## Control Systems

(Open Elective offered for non EEE Students)

### UNIT – I INTRODUCTION AND TRANSFER FUNCTION REPRESENTATION

Concepts of Control Systems- Open Loop and closed loop control systems and their differences- Different examples of control systems- Classification of control systems, Feed-Back Characteristics, Effects of feedback. Mathematical models – Differential equations, Impulse Response and transfer functions - Translational and Rotational mechanical systems . Transfer Function of DC Servo motor - AC Servo motor- Synchro transmitter and Receiver, Block diagram representation of systems considering electrical systems as examples -Block diagram algebra – Representation by Signal flow graph - Reduction using Mason's gain formula.

### UNIT-II-TIME RESPONSE ANALYSIS

Standard test signals - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants – Effects of proportional derivative, proportional integral systems.

### UNIT – III -STABILITY ANALYSIS IN S-DOMAIN

The concept of stability – Routh's stability criterion – qualitative stability and conditional stability – limitations of Routh's stability. Root Locus Technique: The root locus concept - construction of root loci-effects of adding poles and zeros to  $G(s)H(s)$  on the root loci.

### UNIT – IV FREQUENCY RESPONSE ANALYSIS

Introduction, Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram-Phase margin and Gain margin-Stability Analysis from Bode Plots.

### UNIT – V STABILITY ANALYSIS IN FREQUENCY DOMAIN AND DESIGN TECHNIQUES

Polar Plots-Nyquist Plots-Stability Analysis. Compensation techniques – Lag, Lead, Lead-Lag Controllers design in frequency Domain, PID Controllers. State Space Analysis of Continuous Systems-Concepts of state, state variables and state model, derivation of state models from block diagrams, Diagonalization- Solving the Time invariant state Equations- State Transition Matrix

#### TEXT BOOKS:

1. Automatic Control Systems 8th edition– by B. C. Kuo 2003– John wiley and son's.,
2. Control Systems Engineering – by I. J. Nagrath and M. Gopal, New Age International (P) Limited, Publishers, 2<sup>nd</sup> edition.

#### REFERENCE BOOKS:

1. Modern Control Engineering – by Katsuhiko Ogata – Prentice Hall of India Pvt. Ltd., 3<sup>rd</sup> edition, 1998.
2. Control Systems by N.K.Sinha, New Age International (P) Limited Publishers, 3<sup>rd</sup> Edition, 1998.
3. Control Systems Engg. by NISE 3<sup>rd</sup> Edition – John wiley
4. "Modelling & Control Of Dynamic Systems" by Narciso F. Macia George J. Thaler, Thomson Publishers

B.Tech

(Electrical and Electronics Engineering)

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**Renewable Energy Sources**  
(Open Elective offered for non EEE Students)

**UNIT – I PRINCIPLES OF SOLAR RADIATION:**

Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on tilted surface, instruments for measuring solar radiation and sun shine, solar radiation data.

**UNIT-II SOLAR ENERGY COLLECTION STORAGE AND APPLICATIONS**

Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors. Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications- solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion.

**UNIT-III WIND ENERGY:**

Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria

**UNIT-IV BIO-MASS:**

Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C.Engine operation and economic aspects.

**UNIT-V GEOTHERMAL ENERGY:**

Resources, types of wells, methods of harnessing the energy, potential in India.

**OCEAN ENERGY AND DIRECT ENERGY CONVERSION** - OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics. Need for DEC, Carnot cycle, limitations, principles of DEC.

**TEXT BOOKS:**

1. Non-Conventional Energy Sources by G.D. Rai, Khanna Publishers
2. Renewable Energy Resources – Twidell & Wier, CRC Press( Taylor & Francis)

**REFERENCE BOOKS:**

1. Renewable energy resources by Tiwari and Ghosal, Narosa.
2. Renewable Energy Technologies by Ramesh & Kumar, Narosa.
3. Non-Conventional Energy Systems by K Mittal, Wheeler
4. Renewable energy sources and emerging technologies by D.P.Kothari,K.C.Singhal, PHI

B.Tech

(Electrical and Electronics Engineering)

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## **Fundamentals of Power Electronics**

(Open Elective offered for non EEE Students)

### **UNIT-I: POWER SWITCHING DEVICES**

Diode, Thyristor, MOSFET, IGBT: I-V Characteristics; Firing circuit for thyristor; Voltage and current commutation of a thyristor; Gate drive circuits for MOSFET, IGBT and GTO.

### **UNIT-II: THYRISTOR RECTIFIERS**

Single-phase half-wave and full-wave rectifiers, Single-phase full-bridge thyristor rectifier with R-load and highly inductive load; Three-phase full-bridge thyristor rectifier with R-load and highly inductive load; Input current wave shape and power factor-Numerical problems.

### **UNIT – III CHOPPERS**

Choppers – Time ratio control and Current limit control strategies – Step down choppers Derivation of load voltage and currents with R, RL and RLE loads- Step up Chopper– Load voltage expression & numerical problems.

### **UNIT-IV:INVERTERS**

Single phase Voltage Source inverters – operating principle -basic series inverter, single phase parallel inverter – basic principle of operation only, Numerical problems.

### **UNIT-V: AC VOLTAGE CONTROLLERS & CYCLO CONVERTERS:**

AC voltage controllers – Principle of phase control – Principle of integral cycle control - Single phase two SCRs in anti parallel – With R and RL loads – modes of operation of Triac – Triac with R and RL loads – RMS load voltage, current and power factor - wave forms – Numerical problems. Cyclo converters - Midpoint and Bridge connections - Single phase to single phase step-up and step-down cyclo converters with Resistive and inductive load, Principle of operation, Waveforms, output voltage equation.

### **TEXT BOOKS:**

- 1.M. H. Rashid, “Power Electronics: Circuits, Devices and Applications”, 2<sup>nd</sup> edition, Prentice Hall of India, 1998
- 2.P.S.Bimbhra,”Power Electronics”, 4<sup>th</sup> Edition, Khanna Publishers, 2010.
- 3.M. D. Singh & K. B. Kanchandhani, “Power Electronics”, Tata Mc Graw Hill Publishing Company, 1998.

### **REFERENCE BOOKS:**

- 4.Ned Moha, “Power Electronics”, Wiley, 2011.
- 5.. Robert W. Erickson and Dragan Maksimovic, “Fundamentals of Power Electronics” 2<sup>nd</sup> Edition, Kluwer Academic Publishers, 2004.
6. Vedam Subramanyam, “Power Electronics”, New Age International (P) Limited, 1996.
7. V.R.Murthy, “Power Electronics”, 1<sup>st</sup> Edition, Oxford University Press, 2005.
8. P.C.Sen, “Power Electronics”, Tata Mc Graw-Hill Education, 1987.

**SYLLABUS FOR  
OPEN ELECTIVES OFFERED BY  
DEPARTMENT OF C.S.E**

**Database Management Systems**  
(Open Elective for non CSE Students)

**UNIT-I** Database System Applications, database System VS file System – View of Data – Data Abstraction – Instances and Schemas – data Models – the ER Model – Relational Model – Database Languages – DDL – DML. Database System Architecture – Database Users and Administrator – Transaction Management – Storage Manager – the Query Processor.

Data base design and ER diagrams - Entities, Attributes and Entity sets– Relationships and Relationship sets – Additional features of ER Model – Conceptual Design with the ER Model.

**UNIT-II** Introduction to the Relational Model – Integrity Constraint Over relations – Enforcing Integrity constraints – Logical database Design – Introduction to Views – Destroying /altering Tables and Views .Relational Algebra – Selection and projection set operations – renaming – Joins – Division – Relational calculus : Tuple relational Calculus – Domain relational calculus.

The Form of a Basic SQL Query – Examples of Basic SQL Queries – Introduction to Nested Queries – Correlated Nested Queries, Set – Comparison Operators – Aggregate Operators – NULL values – Logical connectives – AND, OR and NOT – Outer Joins –

Disallowing NULL values – Triggers and Active Data bases.

**UNIT-III** Schema refinement – Problems Caused by redundancy – Decompositions – Problems related to decomposition– Functional dependencies-reasoning about FDS – FIRST, SECOND, THIRD Normal forms – BCNF – Lossless join Decomposition – Dependency preserving Decomposition – Schema refinement in Data base Design – MultiValued Dependencies – FORTH Normal Form.

**UNIT-IV** Overview Of Transaction Management: The ACID Properties, Transactions and Schedules, Concurrent Execution of transactions-Lock Based Concurrency Control, Performance of Locking, Transaction Support in SQL, Introduction to crash recovery, Concurrency Control: 2PL, serializability and recoverability, Introduction Lock Management, Lock Conversions, Dealing with Deadlocks, Concurrency control without locking.

**UNIT-V** Data on External Storage – File Organizations and Indexing – Cluster Indexes, Primary and Secondary Indexes– Index data Structures – Hash Based Indexing – Tree base Indexing – Comparison of File Organizations – The Memory Hierarchy, RAID, Disk Space Management, Buffer Manager.

**TEXT BOOKS:**

1. Data base Management Systems, Raghurama Krishnan, Johannes Gehrke, TATA McGrawHill 3rd Edition
2. Data base System Concepts, Silberschatz, Korth, McGraw hill, V edition.

**REFERENCES:**

1. Data base Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. Fundamentals of Database Systems, Elmasri Navrate Pearson Education.
3. Introduction to Database Systems, C.J.Date Pearson Education
4. Introduction to Database Management, M.L. Gillenson and others, Wiley Student Edition.
5. Database Development and Management, Lee Chao, Auerbach publications, Taylor & Francis Group.
6. Database Management Systems, G.K. Gupta, TMH

B.Tech

(Computer Science and Engineering)

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## Unix Programming

(Open Elective for non CSE Students)

### UNIT I

Introduction: Why Unix?, Computer System, The Unix Environment, Unix structure, Accessing Unix, Common commands: date, cal, who, passwd, echo, man, lpr. Other useful commands: tty, clear, sty, script, uname, bc, tar, gzip, cpio, finger, arp, ftp, telnet, rlogin. Vi editor: Editor concepts, The vi editor, Modes, Commands.

### UNIT II

File Systems: File Names, File Types, Regular Files, Directories, File System Implementation, Operations unique to regular files, Operations unique to directories, Operations common to both. Security & File Permissions: users and groups, security levels, changing permissions, user masks, changing ownership and group.

### UNIT III

**Introduction to Shells:** Unix Session, Standard Streams, Redirection, Pipes, Tee Command, Command Execution, Command-Line Editing, Quotes, Command Substitution, Job Control, Aliases, Variables, Predefined Variables, Options, Shell/Environment Customization.

**Filters:** Filters and Pipes, Concatenating files, Display Beginning and End of files, Cut and Paste, Sorting, Translating Characters, Files with Duplicate Lines, Count characters, Words or Lines, Comparing Files.

### UNIT IV

**Grep:** Operation, grep Family, Searching for File Content.

**awk:** Execution, Fields and Records, Scripts, Operations, Patterns, Actions, Associative Arrays, String Functions, String Functions, Mathematical Functions, User – Defined Functions, Using System commands in awk, Applications, awk and grep.

### UNIT V

**Interactive Korn Shell:** Korn Shell Features, Two Special Files, Variables, Output, Input, Exit Status of a Command, eval command, Environmental Variables, Options, Startup Scripts, Command History, Command Execution Process.

**Korn Shell Programming:** Basic Script concepts, Expressions, Decisions: Making Selections, Repetition, special Parameters and Variables, changing Positional Parameters, Argument Validation, Debugging Scripts, Script Examples.

### TEXT BOOKS:

1. Unix and shell Programming Behrouz A. Forouzan, Richard F. Gilberg. Thomson
2. Your Unix the ultimate guide, Sumitabha Das, TMH. 2nd Edition

**Object Oriented Programming through Java**  
(Open Elective for non CSE Students)

**UNIT I Java Basics** - Introduction, comments, data types, variables, constants, scope and life time of variables, operators, type conversion and casting, control flow conditional statements, break and continue, simple java program, arrays. OOP concepts, parameter passing, static fields and methods, access control, this, overloading methods and constructors, recursion, garbage collection, Strings, string functions.

**UNIT II Inheritance**—Inheritance concept, Member access rules, types of Inheritance, super uses, final classes and methods, casting, polymorphism- dynamic binding, method overriding, abstract classes and methods, the Object class and its methods.

Interfaces – Interfaces vs. Abstract classes, implementing interfaces, accessing implementations through interface references, extending interface.

Packages- Creating and Accessing a Package, Understanding CLASSPATH, importing packages.

**UNIT III Files**— streams, text Input/output, binary input/output, random access file operations, File management using File class, Using java.io. **Networking in Java**— Introduction, Client/Server Interaction with Stream Socket Connections, Connectionless Client/Server Interaction with Datagrams, Using java.net. Exception handling – benefits of exception handling, exception hierarchy, checked exceptions and unchecked exceptions, usage of try, catch, throw, throws and finally, rethrowing exceptions, built in exceptions, creating own exceptions.

**UNIT IV Multithreading** - Differences between multiple processes and multiple threads, thread states, creating threads, interrupting threads, thread priorities, synchronizing threads, interthread communication, thread groups, daemon threads. **Event Handling** - Events, Event sources, Event classes, Event Listeners, Relationship between Event sources and Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes.

**UNIT V GUI Programming with Java**- The AWT class hierarchy, Introduction to Swing, Swing vs. AWT, MVC architecture, Hierarchy for Swing components, Containers – Top-level containers – JFrame, JApplet, JWindow, JDialog, JPanel, A simple swing application, swing components- JButton, JToggleButton, JCheckBox, JRadioButton, JLabel, JPasswordField, JTextArea, JList, JComboBox, JMenu, capabilities – color control, Font control, Drawing lines, rectangles and ovals, Drawing arcs, Layout management - Layout managers – border, grid, flow, box.

**TEXT BOOKS**

1. Java; the complete reference, 7th edition, Herbert Schildt, TMH.
2. Understanding OOP with Java, updated edition, T. Budd, Pearson Education.

**REFERENCES**

1. An Introduction to programming and OO design using Java, J. Nino and F.A. Hosch, John Wiley & sons.
2. An Introduction to OOP, second edition, T. Budd, Pearson Education.
3. Introduction to Java programming 6th edition, Y. Daniel Liang, Pearson Education.
4. An introduction to Java programming and object oriented application development, R.A. Johnson-Thomson.
5. Core Java 2, Vol 1, Fundamentals, Cay.S. Horstmann and Gary Cornell, seventh Edition, Pearson Education.
6. Core Java 2, Vol 2, Advanced Features, Cay.S. Horstmann and Gary Cornell, Seventh Edition, Pearson Education.



**B.Tech**

**(Computer Science and Engineering)**

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## **Cyber Security**

**(Open Elective for non CSE Students)**

### **UNIT-I**

Classical Encryption Techniques: Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Block Ciphers And Data Encryption Standard; Traditional Block Cipher Structure, The Des Algorithm And Example.

### **UNIT-II**

Public Key Cryptography And RSA: Principles Of Public Key Cryptosystem, The RSA Algorithm, Diffe – Hellman Key Exchange. Elliptic Curve Cryptography, Secure Hash Algorithm (SHA) SHA-512 Logic, SHA – 512 Round Function, Message Authentication Requirements, Functions HMAC

### **UNIT –III**

Overview Of Vulnerability Scanning: Open Port / Service Identification, Banner / Version Check, Traffic Probe, Vulnerability Probe, Vulnerability Examples, OpenVAS, Metasploit.

### **UNIT –IV**

Firewalls And Packet Filters : Firewall Basics, Packet Filter Vs Firewall, How A Firewall Protects A Network, Packet Characteristic To Filter, Stateless Vs Stateful Firewalls, Network Address Translation (NAT) And Port Forwarding

### **UNIT –V**

Networks Vulnerability Scanning: Netcat, Socat Understanding Port And Services Tools – Datapipe, Fpipe , Scanning For Web Vulnerabilities Tools: Nikto, W3af, HTTP Utilities – Curl, OpenSSL And Stunnel, Application Inspection Tools – Zed Attack Proxy, Sqlmap

### **TEXT BOOKS:**

1. Cryptography & Network Security; William Stallings Lie, Pearson Education
2. Anti-Hacker Tool Kit (Indian Edition) By Mike Shema, Publication Mc Graw Hill.
3. Cyber Security Understanding Cyber Crimes, Computer Forensics And Legal Perspectives By Nina Godbole And Sunit Belpure, Publication Wiley

B.Tech

(Computer Science and Engineering)

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**Computer Networks**  
(Open Elective for non CSE Students)

**UNIT I: Introduction:** Network Hardware, Network Software, References Models. The Physical Layer: Guided Transmission Media, Communication Satellites, The public Switched Telephone Network- the Local Loop: Modern ADSL, and wireless, Trunks and Multiplexing, Switching

**UNIT II: The Data Link Layer:** Data link Layer Design Issues, Elementary Data Link Protocols, Sliding Window Protocols.

**The Medium Access Control sub layer:** Multiple Access protocols, Ethernet- Ethernet Cabling, Manchester Encoding, The Ethernet MAC Sub layer Protocol. Ethernet Performance, Switched Ethernet, Fast Ethernet. Wireless LANs- The 802.11 Protocol Stack, the 802.11 Physical Layer, the 802.11 MAC Sub Layer Protocol, the 802.11 Frame Structure.

**UNIT III: The Network Layer:** Network Layer Design Issues, Routing Algorithms (Shortest path, Flooding, Distance Vector, Link state and Hierarchical routing, Broad cast routing, Multicast routing), Congestion Control Algorithms, Internetworking.

**UNIT IV: The Transport Layer:** The Transport Service, Elements of Transport Protocols, The Internet Transport Protocols: UDP, TCP.

**UNIT V: The Application Layer:** DNS-The Domain Name System, Electronic Mail, The World Wide Web. Network Security: Cryptography, Symmetric-Key Algorithms, Public-Key Algorithms, Digital Signatures.

**TEXT BOOKS:**

1. Computer Networks, Andrew S. Tanenbaum, Fourth Edition, Pearson Education.

**REFERENCES:**

1. Computer Communications and Networking Technologies, Michael A. Gallo, William M. Hancock, Cengage Learning.
2. Computer Networks: Principles, Technologies and Protocols for Network Design, Natalia Olifer, Victor Olifer, Wiley India.
3. Data Communications and Networking, Behrouz A. Forouzan, Fourth Edition, Tata McGraw Hill.
4. Understanding Communications and Networks, Third Edition, W.A. Shay, Cengage Learning.
5. Computer and Communication Networks, Nader F. Mir, Pearson Education
6. Computer Networking: A Top-Down Approach Featuring the Internet, James F. Kurose, K.W. Ross, Third Edition, Pearson Education.
7. Data and Computer Communications, G.S. Hura and M. Singhal, CRC Press, Taylor and Francis Group

**Sri Krishnadevaraya University College of Engineering & Technology**

**B.Tech**

**(Computer Science and Engineering)**

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**Software Engineering**

**(Open Elective for non CSE Students)**

**UNIT I**

**Introduction to Software Engineering:** The evolving role of software, Changing Nature of Software, Software myths. **A Generic view of process:** Software engineering- A layered technology, a process framework, The Capability Maturity Model Integration (CMMI), Process patterns, process assessment, personal and team process models.

**UNIT II**

**Process models:** The waterfall model, Incremental process models, Evolutionary process models, The Unified process. **Software Requirements:** Functional and non-functional requirements, User requirements, System requirements, Interface specification, the software requirements document.

**UNIT III**

**Requirements engineering process:** Feasibility studies, Requirements elicitation and analysis, Requirements validation, Requirements management. **System models:** Context Models, Behavioural models, Data models, Object models.

**UNIT IV**

**Design Engineering:** Design process and Design quality, Design concepts, the design model.

**Creating an architectural design:** Software architecture, Data design, Architectural styles and patterns.

**Performing User interface design:** Golden rules, User interface analysis and design, interface analysis, interface design steps, Design evaluation.

**UNIT V**

**Testing Strategies:** A strategic approach to software testing, test strategies for conventional software, Black-Box and White-Box testing, Validation testing, System testing, the art of Debugging.

**Metrics for Process and Products:** Software Quality, Software Measurement, Metrics for software quality.

**Quality Management:** Quality concepts, Software quality assurance, Software Reviews, Formal technical reviews, Statistical Software quality Assurance, The ISO 9000 quality standards.

**TEXT BOOKS:**

1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition. McGrawHill International Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson education.

**REFERENCES:**

1. Software Engineering- K.K. Agarwal & Yogesh Singh, New Age International Publishers
2. Software Engineering, an Engineering approach- James F. Peters, Witold Pedrycz, John Wiely.
3. Systems Analysis and Design- Shely Cashman Rosenblatt, Thomson Publications.
4. Software Engineering principles and practice- Waman S Jawadekar, The McGraw-Hill Companies

## Sri Krishnadevaraya University College of Engineering & Technology

B.Tech

(Computer Science and Engineering)

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### Cloud Computing (Open Elective for non CSE Students)

#### UNIT-I

**Introduction:** What Is the Cloud? The Emergence of Cloud Computing, The Global Nature of the Cloud, Cloud-Based Service Offerings, Grid Computing or Cloud Computing?, Is the Cloud Model Reliable?, Benefits of Using a Cloud Model, What About Legal Issues When Using Cloud Models?, What Are the Key Characteristics of Cloud Computing?, Challenges for the Cloud.

**The Evolution of Cloud Computing:** Hardware Evolution, Internet Software Evolution, Server Virtualization.

#### UNIT-II

**Web Services Delivered from the Cloud:** Communication-as-a-Service (CaaS), Infrastructure-as-a-Service (IaaS), Monitoring-as-a-Service (MaaS), Platform-as-a-Service (PaaS), Software-as-a-Service (SaaS),

**Building Cloud Networks:** The Evolution from the MSP Model to Cloud.

Computing and Software-as-a-Service, The Cloud Data Center, Collaboration, Service-Oriented Architectures as a Step Toward Cloud Computing, Basic Approach to a Data Center-Based SOA.

#### UNIT III

**Federation, Presence, Identity, and Privacy in the Cloud:** Federation in the cloud, Presence in the Cloud, Privacy and Its Relation to Cloud-Based Information Systems, Security in the Cloud: Cloud security challenges - Software- as-a-service security

#### UNIT IV

**Common Standards in Cloud Computing:** The open cloud consortium- The distributed management task force - standards for application developers - standards for messaging - standards for security

#### UNIT V

**Cloud Computing case studies:** Google App Engine, Google Web Toolkit, Microsoft Azure Services Platform, Windows Live, Exchange Online, SharePoint Services, Microsoft Dynamics CRM, Amazon EC2, Amazon Simple DB, Amazon S3, Amazon Cloud Front, Amazon SQS

#### TEXTBOOKS:

- 1) Cloud Computing implementation, management and security by John W. Ruttinghouse, James F. Ransome. CRC Press, Taylor & Francis group, 2010.
- 2) Cloud Computing a practical approach by Anthony T. velte, Toby J. velte Robert Elsenpeter. Tata Mc Graw Hill edition, 2010

#### REFERENCES:

- 1) Cloud Application Architectures by George Reese. O'Reilly publishers
- 2) Cloud computing and SOA convergence in your enterprise, by David S. Linthicum, Addison- Wesley

B.Tech

(Computer Science and Engineering)

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**Introduction Operations Management**  
(Open Elective for non CSE Students)

- UNIT-I :**  
**Introduction:** Role and Scope of production Management – Concepts of productivity production System – production decision levels.
- UNIT-II :**  
**Plant Location:** Plant Layout – Facilities Management Maintenance Management – Equipment Replacement.
- UNIT-III : Design of Work System:** Job design –Measurement of Work (Work Study) – Methods study – Time Study) – Value analysis, Value engineering.
- UNIT-IV : Production:** Planning and control – Job Shop, Flow shop scheduling, line balancing - Line of Balance – PERT – CPM.
- UNIT-V : Quality control:** Inspection – charts – Acceptance Sampling – Variables and Attributes – Six Sigma.  
**Materials Management:** Concepts – principles – Classification - Inventory Management methods – Stores Management.

**Reference Books:**

1. Roberta S. Russel And Bermard W. Taylor, Operations Management (Pearson Education).
  2. R. Panner Selman: Production And Operation Management (PHI).
  3. S.N. Chary: Production And Operation Management, (Tata Mc Graw Hill).
  4. K. Aswathappa, K. Sridhdhara Bhatt; “Production & Operations Management”, 2<sup>nd</sup> Edition Himalaya Publication.
- Adam Ebert: Production And Operation Management (Phi)

B.Tech

(Computer Science and Engineering)

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**Block Chain Technology**  
(Open Elective for non CSE Students)

**UNIT-I**

Blockchain concepts: Blockchain, Blockchain application example: Escrow, Blockchain stack, from web 2.0 to the next generation decentralized web, domain specific Blockchain application, Blockchain benefits and challenges. Blockchain application templates: Blockchain application components, design methodology for Blockchain applications, Blockchain applications templates.

**Unit II:**

Setting up Ethereum development tools: Ethereum clients, Ethereum languages, TestRPC, Mist Ethereumwalle, meta mask, web3 JavaScript API, truffle. Ethereum Accounts: Ethereum Accounts, keypairs, working with EOA Accounts, working with contract accounts.

**Unit III:**

Smart contracts: Smart contract, structure of a contract, setting up and interacting with a contract using Geth client, setting up and interacting with a contract using Mist Wallet

**Unit IV:**

Smart contracts (continued): Smart contract examples, Smart contract patterns. Decentralized Applications: implementing Dapps, case studies,

**Unit V:**

Mining: Consensus on Blockchain network, mining, Block validation, state storage in Ethereum.

**Text book:**

1. Arshadeepbahga, Vijay madiseti, "Blockchain Applications A hands-on approach", VPT 2017.
2. Chandramouli Subramanian, Asha A George, Abhilash K A and MeenaKarthikeyan, "Blockchain Technology", Universty Press, 2021

**Reference Books**

1. Imran Bashir, "Mastering Blockchain" Packt Publishing Ltd, March 2017.
2. Melanie swan, "Blokchain blueprint for a new economy", O'REILLY

**SYLLABUS FOR  
OPEN ELECTIVES OFFERED BY  
DEPARTMENT OF CIVIL ENGINEERING**

**Environmental Impact Assessment**  
(Open Elective offered for non Civil Students)

**Unit-I:**

**INTRODUCTION:**

Basic concept of EIA, Initial environmental Examination, Elements of EIA, factors affecting EIA. Impact evaluation and analysis, preparation of Environmental Base map. Classification of environmental parameters.

**Unit-II:**

**EIA METHODOLOGIES:**

E I A Methodologies: introduction, Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method, overlay methods and cost/benefit Analysis.

**Unit-III:**

**IMPACT OF DEVELOPMENTAL ACTIVITIES AND LAND USE:**

Introduction and Methodology for the assessment of soil and ground water. Delineation of study area, Identification of activities. Procurement of relevant soil quality, Impact prediction, Assessment of Impact and significance. Identification and Incorporation of mitigation measures. E I A in surface water, Air and Biological environment: Methodology for the assessment of Impacts on surface water environment, Air pollution sources, generalized approach for assessment of Air pollution Impact.

**Unit-IV:**

**ASSESSMENT OF IMPACT ON VEGETATION AND WILDLIFE:**

Introduction - Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation, Causes and effects of deforestation.

**ENVIRONMENTAL AUDIT :** Introduction - Environmental Audit & Environmental legislation objectives of Environmental Audit, Types of environmental Audit, Audit protocol, stages of Environmental Audit, onsite activities, evaluation of Audit data and preparation of Audit report.

**Unit-V:**

**CASE STUDIES:**

. Case studies and preparation of Environmental Impact assessment statement for various Industries, namely thermal power plants, steel plants, highway and pharmaceutical industries.

**TEXT BOOKS:**

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

**REFERENCES:**

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.



**Noise And Air Pollution**  
(Open Elective offered for non Civil Students)

**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.

**TEXT BOOKS:**

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

**REFERENCES:**

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.

**Disaster Mitigation And Management**  
(Open Elective offered for non Civil Students)

**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 Planetary 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.

**TEXT BOOKS:**

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

**REFERENCES:**

1. Kates, B.I & White, G.F The Environment as Hazards, Oxford, New York, 1978.
2. R.B. Singh (Ed) Disaster Management, Rawat Publication, New Delhi, 2000.
3. H.K. Gupta (Ed) Disaster Management, Universities Press, India, 2003.
4. R.B. Singh, Space Technology for Disaster Mitigation in India (INCED), University of Tokyo, 1994.
5. Dr. Satender, Disaster Management in Hills, Concept Publishing Co., New Delhi, 2003.

**Ground Improvement Techniques**  
(Open Elective offered for non Civil Students)

**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

**TEXT BOOKS:**

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

**REFERENCES:**

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.

**Sri Krishnadevaraya University College of Engineering & Technology**

**B.Tech**

**( Civil Engineering)**

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**Environmental Pollution Control**  
**(Open Elective offered for non Civil Students)**

**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.

**TEXT BOOKS:**

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,

**REFERENCES:**

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

**Sri Krishnadevaraya University College of Engineering & Technology**

**B.Tech**

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**Remote Sensing and GIS**  
**(Open Elective offered for non Civil Students)**

**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.

**TEXT BOOKS:**

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.

**REFERENCES:**

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.
- L. R. A. Narayana, Remote Sensing and its applica

**SYLLABUS FOR  
OPEN ELECTIVES OFFERED BY  
DEPARTMENT OF MECH. ENGINEERING**

B.Tech

(Mechanical Engineering)

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## Manufacturing Processes

(Open Elective offered for non Mech. Students)

### UNIT I

**Introduction:** Importance and selection of manufacturing processes.

**Casting Processes:** Introduction to casting process, process steps; pattern: types, materials and allowance; Cores: Types of cores, core prints, principles and design of gating system; Solidification of casting: Concept, solidification of pure metal and alloy; Special casting processes: Shell casting, investment casting, die casting, centrifugal casting, casting defects and remedies. .

### UNIT II

**Metal Forming:** Introduction, nature of plastic deformation, hot and cold working of metals, mechanics of metal forming; Rolling: Principle, types of rolling mill and products, roll passes, forces in rolling and power requirements; Extrusion: Basic extrusion process and its characteristics, hot extrusion and cold extrusion, wire drawing, tube drawing.

**Forging:** Principles of forging, tools and dies. Types: Smith forging, drop forging, forging hammers, rotary forging and forging defects. Sheet metal forming: Mechanics of sheet metal working, blanking, piercing, bending, stamping.

### UNIT III

**Metal Joining Processes:** Classification of welding processes, types of welds and welded joints and V-I characteristics, arc welding, weld bead geometry, submerged arc welding, gas tungsten arc welding, gas metal arc welding. applications, advantages and disadvantages of the above processes, other fabrication processes. Heat affected zones in welding; soldering and brazing: Types and their applications, Welding defects: causes and remedies.

### UNIT IV : Plastic Processing, Ceramics and Powder Metallurgy:

**Plastics:** Types, properties and their applications, processing of plastics, extrusion of plastics, transfer molding and compression molding, injection molding, thermoforming, rotational molding and blow molding

**Ceramics:** Classification of ceramic materials, properties and their application, ceramic powder preparation; Processing of ceramic parts: Pressing, casting, sintering; Secondary processing of ceramics: Coatings, finishing.

**Powder Metallurgy:** Principle, manufacture of powders, steps involved.

### UNIT V

**Unconventional Machining Processes:** Electrical discharge machining (EDM), principle and processes parameters, electro-chemical machining (ECM) Laser beam machining (LBM), plasma arc machining (PAM) and electron beam machining

Principles and process parameters of Abrasive jet machining (AJM), water jet machining, ultrasonic machining

### Text Books:

1. Rao P.N., Manufacturing Technology – Volume I, 5/e, McGraw-Hill Education, 2018.
2. Kalpakjain S and Schmid S.R., Manufacturing Engineering and Technology, 7/e, Pearson, 2018.

### Reference Books:

1. Millek P. Groover, Fundamentals of Modern Manufacturing: Materials, Processes and Systems, 4/e, John Wiley and Sons Inc, 2010.
2. Sharma P.C., A Text book of Production Technology, 8/e, S Chand Publishing, 2014.
3. Ian Gibson, David W. Rosen, Brent Stucker, Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing, 1<sup>st</sup> Edition, Springer, 2010.

## **Entrepreneurship**

**(Open Elective offered for non Mech. Students)**

### **UNIT I**

Introduction to Entrepreneurship, Definition of Entrepreneur, Entrepreneurial Traits, Entrepreneur vs. Manager, Entrepreneur vs Intrapreneur. The Entrepreneurial decision process. Role of Entrepreneurship in Economic Development, Ethics and Social responsibility of Entrepreneurs. Opportunities for Entrepreneurs in India and abroad. Woman as Entrepreneur.

### **UNIT II**

Creating and Starting the Venture, Sources of new Ideas, Methods of generating ideas, creating problem solving, product planning and development process, channels of distribution, marketing functions.

### **UNIT III**

Financing and managing the new venture, Sources of capital, venture capital, Record keeping, recruitment, motivating and leading teams, and financial controls. Marketing and sales controls. E-commerce and Entrepreneurship, Internet advertising.

### **UNIT IV**

small scale enterprises. Characteristics of small scale industry, role and importance of small business, problems of small business enterprises, sickness in small scale enterprises, Institutional support to entrepreneurship

### **UNIT V**

Choosing location and layout, Issues related to Selection of layout.

Labour legislation, Salient Provision under Indian Factories Act, Industrial Disputes Act, Employees State Insurance Act, Workmen's Compensation Act and payment of Bonus Act.

This course replaces the course offered in earlier years as 'Entrepreneurship & Management'

#### **TEXTBOOKS:**

1. Entrepreneurship, Robert Hisrich, & Michael Peters, 5/e TMH.
2. Entrepreneurship, Dollinger, Pearson, 4/e, 2004.

#### **REFERENCES:**

1. Dynamics of Entrepreneurial Development and Management, Vasant Desai, Himalaya Publ. House, 2004.
2. Entrepreneurship management Bolanath dutta



## IC Engines

(Open Elective offered for non Mech. Students)

### UNIT – I

**I.C.Engines:** Energy conversion– basic engine components - Working principle of two stroke and four stroke engines - comparison of two stroke and four stroke, SI and CI engines – Classification of I.C. Engines, Valve and port timing diagrams, application of I.C Engines.

.

### UNIT-II

**Power Cycles:** Carnot cycle, Air standard cycles -Description and representation of Otto cycle, Diesel cycle & Dual cycles on P–V and T-S diagram -Thermal Efficiency – Comparison of Otto, Diesel and Dual cycles. Simple problems on Otto, Diesel and Dual cycles

### UNIT – III

**Testing and Performance:** Engine Performance Parameters - Determination of, Brake power, friction power and indicated power – Performance test – Heat balance sheet- problems.

.

### UNIT – IV

**Engine Systems:** Working principle of Magneto & Battery Ignition System - Simple Carburetor – fuel Injection System - Air & Thermostat cooling system -Lubrication system.

**Super Charging:** Introduction, types of superchargers, methods of supercharging, advantages and limitations of supercharging.

### UNIT – V

**Combustion in S.I. Engines:** Homogeneous Mixture - Stages of combustion –Abnormal Combustion - Phenomenon of Knocking, Combustion Chambers- types, Rating of S.I Engine fuels.

### TEXT BOOKS:

1. I.C. Engines / V. GANESAN- TMH
2. Thermal Engineering / R.K Rajput / Lakshmi Publications.

### REFERENCES:

1. I.C Engines – Mathur & Sharma – Dhanpath Rai & Sons.
2. Engineering fundamentals of I.C Engines – Pulkrabek / Pearson /PHI

**Automobile Engineering**  
(Open Elective offered for non Mech. Students)

**UNIT - I**

**Introduction to vehicle structure and engine components:** Vehicle construction - Chassis and body - Specifications - Engine - Types - Construction - Location of engine - Cylinder arrangement - Construction details - Cylinder block - Cylinder head - Cylinder liners - Piston – piston rings - Piston pin - Connecting rod - Crankshaft - Valves. Lubrication system - Types - Oil pumps - Filters - Cooling system - Types - Water pumps - Radiators - Thermostats - Anti-freezing compounds.

**UNIT - II**

**Ignition, fuel supply and emission control system:** Ignition system - Coil and Magneto - Spark plug - Distributor – Electronic ignition system - Fuel system - Carburetor - Fuel pumps - Fuel injection systems - Mono point and Multi point – Unit injector – Nozzle types - Electronic Fuel Injection system (EFI) – GDI, MPFI, DTSI-Automobile Emissions - Source of formation – Effects on human health and environment - Control techniques - Exhaust Gas Recirculation (EGR) - Catalytic converter - Emission tests and standards (Indian and Europe)

**UNIT - III**

**Transmission system:** Clutches - Function - Types - Single plate, Multiple plate and Diaphragm Clutch – Fluid coupling - Gearbox - Manual - Sliding - Constant - Synchromesh - Overdrive – Automatic transmission - Torque converter - Epicyclic and Hydromatic transmission – Continuously variable transmission - Universal joint - Propeller shaft - Hotchkiss drive – Final drive - Rear axle assembly - Types -Differential - Need - Construction – Non-slip differential – Differential locks - Four wheel drive.

**UNIT - IV**

**Steering, suspension and braking system:** Principle of steering - Steering Geometry and wheel alignment - Steering linkages – Steering gearboxes - Power steering - front axle - Suspension system - Independent and Solid axle – coil, leaf spring and air suspensions - torsion bar - shock absorbers – Wheels and Tires - Construction - Type and specification - Tire wear and causes - Brakes - Needs – Classification –Drum and Disc Mechanical - Hydraulic and pneumatic - Vacuum assist – Retarders – Anti-lock Braking System(ABS)

**UNIT - V**

**Automobile electrical systems, instrumentation and advances in automobile engineering:** Battery-General electrical circuits-Dash board instrumentation - Passenger comfort – Safety and security - HVAC - Seat belts - Air bags - Automotive Electronics - Electronic Control Unit (ECU) - Variable Valve Timing (VVT) - Active Suspension System (ASS) - Electronic Brake Distribution (EBD) – Electronic Stability Program(ESP) Traction Control System (TCS) - Global Positioning System (GPS) - X-by-wire - Electric - Hybrid vehicle.

**TEXTBOOKS:**

1. William.H.Crouse, Automotive Mechanics, 10/e Edition, McGraw-Hill, (2006).
2. David A. Corolla, Automotive Engineering: Powertrain, Chassis System and Vehicle Body, Butterworth-Heinemann Publishing Ltd, (2009).
3. Richard Stone, Jeffrey K. Ball, Automotive Engineering Fundamentals" SAE International (2004).

**REFERENCES:**

1. Bosch, Automotive Hand Book, (2007), 6/e SAE Publications year.
2. K. Newton and W. Steeds, The motor vehicle, 13/e Butterworth-Heinemann Publishing Ltd. (year).
3. Kirpal Singh, Automobile Engineering, Vol.1&2, Standard Publications year.

**Non Conventional Sources of Energy**  
(Open Elective offered for non Mech. Students)

**UNIT – I:**

**Principles of Solar Radiation :** Introduction - solar constant - Role and potential of new and renewable source, Environmental impact of solar power, physics of the sun, instruments for measuring solar radiation .

**UNIT – II:**

**Solar Energy Collectors :** Introduction – type - Flat plate and concentrating (Parabolic) collectors - Merits & Demerits of Flat plate and Concentrating (Parabolic) Collectors.

**UNIT – III:**

**Solar Energy Storage and Applications:** Introduction - Different methods - Solar Applications- solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion- photovoltaic Cells

**UNIT – IV:**

**Wind Energy:** Introduction – Basic Principle of wind energy conversion - Basic components – classification – Horizontal & Vertical Axis wind mill – Merit & demerits. Wind energy collectors advantages, disadvantages.

**UNIT – V:**

**Geothermal Energy:** Introduction – nature of geothermal fields – geothermal sources – hybrid systems –merits and demerits- applications.

**Ocean Energy:** Introduction – OTEC (open, closed & hybrid cycle) – Energy from Tides – components – Operating methods – Ocean waves – wave energy conversion devices.

**Biomass:** Principles of Bio-Conversion - Anaerobic/Aerobic Digestion – Design of a community Biogas plant for a village-classification of biomass gasifiers- up draught, down draught & cross draught gasifiers.

**Text Books:**

1. Renewable energy resources/ Tiwari and Ghosal/ Narosa.
2. Renewable Energy Sources /Twidell & Weir.
3. Non-Conventional Energy Sources /G.D. Rai.

**REFERENCE BOOKS:**

1. Solar Energy /Sukhatme.
2. Solar Power Engineering / B.S Magal Frank Kreith & J.F Kreith

## Non Destructive Evaluation

(Open Elective offered for non Mech. Students)

### UNIT I

**Introduction:** An Overview, Factors influencing the Reliability of NDE, Defects in materials, Defects in composites. NDT methods used for evaluation of materials and composites.

Visual Inspection: Basic principle and applications.

### UNIT II

**Liquid Penetrant Testing:** Principle, scope. Equipment & techniques, Tests stations, Advantages, types of penetrant and developers. Illustrative examples – Heavy castings of large size, frame of jet engine, porosity testing of nickel alloys, leak testing. Zyglo test.

### UNIT III

**Radiographic Inspection:** Principles of X – ray radiography, equipment, Absorption, Scattering, X-ray film processing, General radiographic procedures, Reading and Interpretation of Radiographs, Industrial radiographic practice, Limitations and Applications, Welding defects detection. Gamma ray radiography.

### UNIT IV

**Ultrasonic Testing:** Principle of wave propagation, Ultrasonic equipment, Variables affecting an ultrasound test, Basic methods: Pulse Echo and Through Transmission, Types of scanning.

**Applications of UT:** Testing of products, Welding Inspection, Tube Inspection, Thickness Measurement, Elastic Constant Determination, Ultrasonic testing of composites.

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### UNIT V

**Magnetic Particle Inspection:** Methods of generating magnetic field, Demagnetization of materials, Magnetic particle test: Principle, Test Equipment and Procedure, Interpretation and evaluation.

**Introduction to Accoustic Emission Testing and Thermography.**

**Eddy Current Testing:** Principle of eddy current, Factors affecting eddy currents, Test system and test arrangement, Standardization and calibration, Application and effectiveness. Comparison and Selection of NDT Methods, Codes and Standards.

### TEXT BOOKS:

1. Non-Destructive Testing by Baldev Raj et. al., Narosa Publishing House.
2. J Prasad, GCK Nair, Non destructive test and evaluation of Materials, Tata mcgraw-Hill Education Publishers, 2008.
3. Josef Krautkrämer, Herbert Krautkrämer, Ultrasonic testing of materials, 3/e, Springer-Verlag, 1983.
4. X. P. V. Maldague, Non destructive evaluation of materials by infrared thermography, 1/e, Springer-Verlag, 1993.

### REFERENCES:

1. Non-Destructive Testing by P. Halmshaw
2. Metals Handbook Vol.II, Nondestructive inspection and quality control
3. Non-Destructive Testing by Warren J.Mcgomnagle, Mc Grawhill
4. Gary L. Workman, Patrick O. Moore, Doron Kishoni, Non-destructive, Hand Book, Ultrasonic Testing, 3/e, Amer Society for Nondestructive, 2007.
5. ASTM Standards, Vol 3.01, Metals and alloys