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

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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
Final Internal Marks: (24x0.75) + (20x0.25) = 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

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

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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 2nd 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 2nd, III Year 1st, III Year 2nd and IV Year 1st 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 2nd semester with 100 objective questions for 100 marks on the subjects studied up to III Year 2nd 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 2nd 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 2nd 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 1st 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 1st 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 1st 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 1st 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 1st 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 1st semester and shall continue in the IV Year 2nd semester. The evaluation of project work shall be conducted at the end of the IV Year 2nd 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 ≥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 2nd to III Year 1st Semester only if he/she fulfils the academic requirement of securing **24 credits** in the subjects that have been studied up to II Year 1st Semester.

7.3 A student shall be promoted from III Year 2nd semester to IV Year 1st semester only if he/she fulfils the academic requirements of securing **42 credits** in the subjects that have been studied up to III Year 1st 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 1st semester or IV Year 1st 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
≥ 90	S (Superlative)	10
80-89	A (Excellent)	9
70-79	B (Very Good)	8
60-69	C (Good)	7
50-59	D (Average)	6
40-49	E (Below Average)	5
< 40	F (Fail)	0
Absent	Ab (Absent)	0

i. A student obtaining Grade 'F' or Grade 'Ab' in a subject shall be considered failed and will be required to reappear for that subject when it is offered the next supplementary examination.

ii. For mandatory courses, "Satisfactory" or "Unsatisfactory" shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA.

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

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

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

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

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

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

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

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

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

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

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

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

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

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:

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

b. Malpractices rules-nature and punishments are appended.

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

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

e. The Principal may change or amend the academic regulations of common B.o.S or syllabi at any time and the changes or amendments shall be made applicable to all the students on rolls with effect from the dates notified by the Principal.

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

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 2nd Semester to IV year 1st Semester only if the student fulfills the academic requirements of securing **25 credits** of the subjects that have been studied up to III Year 1st 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**
	If the Candidate:	
1 (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
1 (b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The Hall Ticket of the candidate is to be cancelled.
3	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred for four consecutive semesters from class work and all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for four consecutive semesters from class work and all examinations, if his involvement is established. Otherwise, the candidate is debarred for two consecutive semesters from class work and all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or 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.

Sri Krishnadevaraya University College of Engineering & Technology
Curriculum B. Tech Course Structure – R19
ELECTRICAL & ELECTRONICS ENGINEERING

Common for All Branches of Engineering				
S.No	**Course No**	**Course Name**	**Category**	**L-T-P-C**
1		Physical Activities – Sports, Yoga and Meditation, Plantation	MC	0-0-12-0
2		Career Counseling	MC	4-0-4-0
3		Orientation to all branches – career options, tools, etc.	MC	6-0-0-0
4		Orientation on admitted Branch – corresponding labs, tools and platforms	EC	4-0-6-0
5		Proficiency Modules & Productivity Tools	ES	4-2-4-0
6		Assessment on basic aptitude and mathematical skills	MC	4-0-6-0
7		Remedial Training in Foundation Courses	MC	4-2-4-0
8		Human Values & Professional Ethics	MC	6-0-0-0
9		Communication Skills – focus on Listening, Speaking, Reading, Writing skills	BS	4-2-4-0
10		Concepts of Programming	ES	4-0-4-0
Total				40-6-44-0

Sri Krishnadevaraya University College of Engineering & Technology					
Dept. of Electrical & Electronics Engineering					
I Year 1st Semester					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1.		Mathematics- I	BS	3-1-0	4
2.		Applied Physics	BS	2-1-0	3
3.		Problem Solving & Programming	ES	3-1-0	4
4.		Communicative English 1	HS	2-0-0	2
5.		Electrical & Electronics Engineering Workshop	LC	0-0-2	1
6.		Applied Physics 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.		Constitution of India	MC	3-0-0	0
				Total	**18**

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

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

Category	**CREDITS**
Basic Science course	8.5
Engineering Science Courses(Including LC)	13.5
TOTAL CREDITS	**22**

Sri Krishnadevaraya University College of Engineering & Technology					
Dept. of Electrical & Electronics Engineering					
II Year 1st Semester					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1.		Mathematics-III	BS	3-0-0	3
2.		Life Science for Engineers	HS	3-0-0	3
3.		Electrical Circuits -I	PC	3-0-0	3
4.		Electrical Machines - I	PC	3-0-0	3
5.		Electronic Devices and Circuits	PC	3-0-0	3
6.		Python Programming	ES	3-0-0	3
7.		Electrical Machines – I Lab	PC	0-0-3	1.5
8.		Electronic Devices and Circuits Lab	PC	0-0-2	1
9.		Python Programming Lab	ES	0-0-2	1
10.		Essence of Indian Traditional Knowledge	MC	3-0-0	0
				Total	**21.5**

Category	**CREDITS**
Basic Science course	3
Professional core Courses	11.5
Humanities and Social science	3
Engineering Science Course	4
TOTAL CREDITS	**21.5**

Sri Krishnadevaraya University College of Engineering & Technology					
Dept. of Electrical & Electronics Engineering					
II Year 2nd Semester					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1		Mathematics-IV	BS	3-0-0	3
2		Engineering Electromagnetics	PC	3-0-0	3
3		Generation of Electrical Power	PC	3-0-0	3
4		Switching Theory & Logic Design	PC	3-0-0	3
5		Analog Electronic Circuits	PC	3-0-0	3
6		Electrical Circuits -II	PC	3-0-0	3
7		Electrical Circuits Lab	PC	0-0-3	1.5
8		Analog Electronic Circuits Lab	PC	0-0-3	1.5
				Total	**21**

Category	**CREDITS**
Professional core Courses	18
Basic Science Course	3
TOTAL CREDITS	**21**

Sri Krishnadevaraya University College of Engineering & Technology					
Dept. of Electrical and Electronics Engineering					
III Year 1st Semester 1					
S.No	**Course Code**	**Course Name**	**Category**	**L-T-P**	**Credits**
1.		Power Electronics	PC	3-0-0	3
2.		Electrical Machines - II	PC	3-0-0	3
3.		Control systems	PC	3-0-0	3
4.		Managerial Economics and Financial Analysis	HS	3-0-0	3
5.		**Professional Elective courses-I** 1. Transmission of Electric Power 2. High voltage Engineering 3. Power system stability	PE-I	3-0-0	3
6.		Open Elective Course-I	OE-I	3-0-0	3
7.		A.C Machines Lab	PC	0-0-3	1.5
8.		Control systems and Simulation Lab	PC	0-0-3	1.5
9.		Socially Relevant Project(15hrs/Sem)	PR	- - -	0.5
				Total Credits	**21.5**

Category	**CREDITS**
Professional core courses	12
Professional Elective courses	03
Humanities and Social Science	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 Electrical and Electronics Engineering					
III Year 2nd Semester					
S.No	**Course Code**	**Course Name**	**Category**	**L-T-P**	**Credits**
1		Electrical & Electronic Measurements	PC	3-0-0	3
2		Electrical machines-III	PC	3-0-0	3
3		Computer aided power system Analysis	PC	3-0-0	3
4		Management science	HS	3-0-0	3
5		Professional Elective course-II 1. Power Semiconductor Drives 2. Programmable Logic Controllers 3. Linear and Non linear Optimization Techniques	PE-II	3-0-0	3
6		Open Elective Course –II	OE-II	3-0-0	3
7		Electrical & Electronics Measurements Lab	PC	0-0-3	1.5
8		Power Electronics and simulation Lab	PC	0-0-3	1.5
9		Socially Relevant Project(15hrs/Sem)	PR	- - -	0.5
10		Industrial Training/ Internship/ Research Projects in National Laboratories/Academic Institutions	- - -	- - -	- - -
				Total credits	**21.5**

Category	**CREDITS**
Professional Core Courses	12
Professional Elective Courses	03
Open Elective Course/Job oriented elective	03
Humanities and Social Science Course	03
Socially Relevant Project(15hrs/Sem)	0.5
TOTAL	21.5

Sri Krishnadevaraya University College of Engineering & Technology					
Dept. of Electrical and Electronics Engineering					
IV Year 1st Semester					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1.		Power system operation and control	PC	3-0-0	3
2.		Fundamentals of HVDC and FACTS	PC	3-0-0	3
3.		Utilization of Electric energy	PC	3-0-0	3
4.		Professional Elective courses-III 1. Switchgear and Protection 2. Electrical Energy conversion 3. Switched mode power converters	PE-III	3-0-0	3
5.		Professional Elective courses-IV 1. Distribution of Electric Power 2. Modern Control Theory 3. Electrical Machine Design	PE-IV	3-0-0	3
6.		Micro processor and Microcontrollers Lab	PC	0-0-3	1.5
7.		Power systems Simulation Lab	PC	0-0-3	1.5
8.		Project I	PR	- - -	2
		Socially Relevant Project(15hrs/Sem)	PR	- - -	0.5
9.		Industrial Training/ Internship/ Research Projects in National Laboratories/Academic Institutions	PR	- - -	1
				Total	**21.5**

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

Sri Krishnadevaraya University College of Engineering & Technology					
Dept. of Electrical and Electronics Engineering					
IV Year 2nd Semester					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1		Professional Elective courses-V 1. Renewable Energy Sources 2. Neural Networks and fuzzy Logic 3. Energy auditing and Demand side Management	PE-V	3-0-0	3
2		Professional Elective courses-VI 1. Power Quality issues 2. FPGA based Controller Design 3. Smart Grid Technologies	PE-VI	3-0-0	3
3		Project II			6
4		Comprehensive Online Exam			1
				Total	**13**

Category	**CREDITS**
Professional Elective courses	3
Open Elective Course/Job oriented elective	3
Project II	6
Comprehensive Online Exam	1
TOTAL CREDITS	**13**

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 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 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 Electrical & Electronics Engineering					
I Year 1st Semester					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1.		Mathematics- I	BS	3-1-0	4
2.		Applied Physics	BS	2-1-0	3
3.		Problem Solving & Programming	ES	3-1-0	4
4.		Communicative English 1	HS	2-0-0	2
5.		Electrical & Electronics Engineering Workshop	LC	0-0-2	1
6.		Applied Physics 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.		Constitution of India	MC	3-0-0	0
				Total	**18**

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

Sri Krishnadevaraya University College of Engineering & Technology

B.Tech – I Year 1st Sem	**(Electrical & Electronics 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 1st Sem	**(Electrical & Electronics Engineering)**	**L**	**T**	**P**	**C**
	Applied Physics	**2**	**1**	**0**	**3**
	(ECE, CSE & EEE Branches)				

Course Objectives:

- 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 electromagnetic theory and its propagation this leads topotential applications.
- To impart knowledge in basic concepts of lasers and optical fiber and its propagation along with its Engineering applications.
- To identify the importance of semiconductors in the functioning of electronic devices.
- To teach the concepts related to magnetic materials and superconductivity which lead to their fascinatingapplications.

Unit-I: Wave Optics

Interference-Principle of Superposition-Interference of light-Conditions for sustained Interference -Interference in thin films (reflected light)-Newton's Rings-Determination of Wavelength- Engineering applications of Interference.

Diffraction-Fraunhofer Diffraction-Single and Double slits - Diffraction Grating- Engineering applications of diffraction

Polarization-Polarization by reflection and double refraction-Nicol's Prism--Half wave and Quarter wave plate-Engineering applications of Polarization.

Learning Outcomes:

The students will be able to

- explain the need of coherent sources and the conditions for sustained interference
- identify engineering applications of interference including homodyne and heterodyne detection
- analyzethe 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-II: Dielectric & Electromagnetic waves

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

Gauss' theorem for divergence and Stokes' theorem for curl- Fundamental laws of Electric and Magnetic Fields-Derivation of Maxwell's Equations (Integral form and Differential form) - Electromagnetic wavepropagation (conducting and non-conducting media)-Propagation of Electromagnetic waves in dielectric medium.

Learning Outcomes:

The students will be able to

- explain the concept of dielectric constant and polarization in dielectric materials
- summarize various types of polarization of dielectrics
- interpret Lorentz field and Clausius- Mossotti relation in dielectrics
- apply the Gauss' theorem for divergence and Stokes' theorem for curl
- valuate the Maxwell's equations, Maxwell's displacement current and correction in Ampere's law
- asses the electromagnetic wave propagation and its power in non-conducting medium, conducting and dielectric medium

Unit – III: Lasers & Fiber Optics

Introduction-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.

Learning 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
- Apply the fiber optic concepts in various fields .

Unit – IV: Quantum Mechanics & Semiconductors
Dual nature of matter- Schrodinger's time independent wave equation- Schrodinger's time dependent wave equation-Significance of wave function-Particle in one dimensional infinite potential well.

Intrinsic semiconductors - density of charge carriers-Fermi energy – Electrical conductivity – extrinsic semiconductors - P-type & N-type - Density of charge carriers Dependence of Fermi energy on carrier concentration and temperature-Hall effect-Hall coefficient - Applications of Hall effect - Drift and Diffusion currents- Einstien's relation - Applications of Semiconductors.

Learning Outcomes:
The students will be able to

- classify the energy bands of semiconductors
- outline the properties of n-type and p-type semiconductors and charge carriers
- interpret the direct and indirect band gap semiconductors
- identify the type of semiconductor using Hall effect
- identify applications of semiconductors in electronic devices

Unit – V: Magnetic Materials & Superconductors
Introduction-Magnetic dipole moment-Magnetization-Magnetic susceptibility and permeability-Classification of Magnetic Materials-Hysteresis-soft and hard magnetic materials.

Superconductors-Properties-Critical magnetic field-Meissnereffect-Josephson Effect (AC & DC)-Types of Superconductors-SQUID- Applications of superconductors.

Learning Outcomes:
The students will be able to

- classify the magnetic materials based on susceptibility
- explain the applications of dielectric and magnetic materials
- Apply the concept of magnetism to magnetic devices
- explain how electrical resistivity of solids changes with temperature
- classify superconductors based on Meissner's effect
- explain Meissner's effect & Josephson effect in superconductors

Text Books:

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

Reference Books:

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

Course Outcomes:

The students will be able to

- identify the wave properties of light and the interaction of energy with the matter
- apply electromagnetic wave propagation in different guided media
- asses the electromagnetic wave propagation and its power in different media
- calculate conductivity of semiconductors
- interpret the difference between normal conductor and superconductor
- demonstrate the application of nanomaterials

Sri Krishnadevaraya University College of Engineering & Technology

B.Tech – I Year 1st Sem	**(Electrical & Electronics Engineering)**	**L**	**T**	**P**	**C**
	Problem Solving and Programming	**3**	**1**	**0**	**4**
	(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 1st Sem	**(Electrical & Electronics Engineering)**	**L**	**T**	**P**	**C**
	Communicative English I	**2**	**0**	**0**	**2**
	(Common to All Branches of Engineering)				

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

- Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational. Hewings, Martin. Cambridge Academic English (B2). CUP, 2012.
- English Alround, Communication Skills for Undergraduate Learners ,Prabavathi Y M Lalitha Sridevi,Orient Black Swan Publishers

Course Outcomes:

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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 1st Sem	**(Electrical & Electronics Engineering)**	**L**	**T**	**P**	**C**
		0	**0**	**2**	**1**

Electrical & Electronics Engineering Workshop

Course Objectives for Workshop:

1. To know about different tools, abbreviations and symbols in Electrical Engineering
2. To learn about types of measuring instruments to measure electrical quantities
3. To gain knowledge on different types of earthing and earth resistance
4. To study different types of wiring

Syllabus:

1. Study of Introduction to Electrical tools, symbols and abbreviations
2. Study of types of sizes of wires and making "T" joint and straight joint for wires
3. Measurements of Electrical quantities (like Voltage, Current, Power, Power factor in RLC circuits)
4. Study of measurements of Energy (using Single phase and Three phase Energy meter) by connecting different loads
5. Study of earthing and measurement of earth resistance
6. Study and performance of residential wiring (using Energy meter, Fuses, Switches, Indicator, Lamps, etc.)
7. Study of Fluorescent lamp wiring
8. Study of various electrical gadgets (CFL and LED)
9. Study of PV Cell
10. Study of Induction motor and Transformer
11. Assembly of choke or small transformer
12. Study of trouble shooting of electrical equipments (fan, iron box, mixer-grinder, etc.)
13. Introduction to basics of Electronic components: Solder practice, Multi meter, Power supply
14. Measurement of wire guages using guage meter
15. Identification of color code, resistors, ICs, Transistors, capacitors, diodes, SCRs, IGBTs etc.

References:

1. Lab manual of Electrical Engineering by TTTI, Chennai.

Course Outcomes for Workshop:

1. Able to demonstrate knowledge on different tools, abbreviations and symbols used in Electrical Engineering
2. Able to measure different electrical quantities using measuring instruments
3. Able to demonstrate how to trouble shoot the electrical equipments (like fan, grinder, motor, etc.)
4. Able to do wiring and earthing for residential houses

Sri Krishnadevaraya University College of Engineering & Technology

B.Tech – I Year 1st Sem	**(Electrical & Electronics Engineering)**	**L**	**T**	**P**	**C**
		0	**0**	**3**	**1.5**

Applied Physics Lab
(Common to ECE, CSE & EEE Branches)

Course Objectives:

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

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. Resolving power of a grating
   Experimental outcomes:
   operates optical instrument like spectrometer.
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^2
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. To determine the energy gap of a semiconductor
    Experimental outcomes:
    operates various instruments and connect them as per the circuit.
    estimate the energy gap of a semiconductor.
    Illustrates the engineering applications of energy gap .
    plots **1/T** with log R
11. 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
12. 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.
13. 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
14. Determination of pressure variation using Strain Guage sensor.
    Experimental outcomes:
    Operates various instruments.
    estimate the pressure variation using strain guage sensor.
    Illustrates the applications of strain gauge sensors.
15. To determine the self inductance of the coil (L) using Anderson's bridge.
    Experimental outcomes:
    operates various instruments and connect them as per the circuit.
    estimate the self inductance of the coil using Anderson's bridge.
    Identifies the significance of self inductance of the coil in electric devices.

Course Outcomes:

The students will be able to

- **operate** optical instruments like microscope and spectrometer
- **determine** thickness of a hair/paper with the concept of interference
- **estimate** the wavelength of different colours using diffraction grating and resolving power
- **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
- **determine** the resistivity of the given semiconductor using four probe method

- **identify** the type of semiconductor i.e., n-type or p-type using hall effect
- **calculate** the band gap of a given semiconductor

References Books:

1. S. Balasubramanian, M.N. Srinivasan “A Text book of Practical Physics”- S Chand Publishers, 2017.
2. http://vlab.amrita.edu/index.php -Virtual Labs, Amrita University

Sri Krishnadevaraya University College of Engineering & Technology

B.Tech – I Year 1st Sem	**(Electrical & Electronics Engineering)**	**L**	**T**	**P**	**C**
	Problem Solving And Programming Lab	**0**	**0**	**3**	**1.5**
	(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 ⟵ b ⟵ c ⟵ 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
   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 $1 - x^2/2! + x^4/4! - x^6/6! + \ldots.$
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 starts 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.

Sri Krishnadevaraya University College of Engineering & Technology

B.Tech – I Year 1st Sem	**(Electrical & Electronics Engineering)**	**L**	**T**	**P**	**C**
	Communicative English Lab - I	**0**	**0**	**2**	**1**

(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

Unit4

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 1st Sem	**(Electrical & Electronics Engineering)**	**L**	**T**	**P**	**C**
	Constitution of India	**3**	**0**	**0**	**0**

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 secrateriate

UNIT-IV

A.Local Administration - District's Administration Head - Role and Importance, Municipalities - Mayor and role of Elected Representative - CEO of Municipal Corporation PachayatiRaj: Functions PRI: Zila Panchayat, Elected

officials and their roles, CEO Zila Panchayat: Block level Organizational Hierarchy - (Different departments), Village level - Role of Elected and Appointed officials - Importance of grass root democracy

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
2. nptel.ac.in/courses/109104045/
3. nptel.ac.in/courses/101104065/
4. www.hss.iitb.ac.in/en/lecture-details
5. 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 Electrical & Electronics Engineering					
I Year 2nd Semester					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1		Mathematics-II	BS	3-1-0	4
2		Engineering Chemistry	BS	2-1-0	3
3		Data Structures	ES	3-0-0	3
4		Basic Civil & Mechanical Engineering	ES	3-0-0	3
5		Engineering Workshop	LC	0-0-2	1
6		Engineering Graphics	ES	1-0-4	3
7		Engineering Chemistry Lab	BS	0-0-3	1.5
8		Basic Civil & Mechanical Engineering Lab	ES	0-0-3	1.5
9		Data Structures Lab	ES	0-0-4	2
10		Environmental Sciences	MC	3-0-0	0
				Total	**22**

Category	**CREDITS**
Basic Science course	8.5
Engineering Science Courses(Including LC)	13.5
TOTAL CREDITS	**22**

Sri Krishnadevaraya University College of Engineering & Technology

		L	T	P	C
B.Tech – I Year 2nd Sem	**(Electrical & Electronics Engineering)**	**3**	**1**	**0**	**4**

Mathematics-II
(Differential Equations and Vector Calculus)
(Common to ECE,EEE,Civil & Mechanical Branches)

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.Tech – I Year 2nd Sem	**(Electrical & Electronics Engineering)**	**L**	**T**	**P**	**C**
	Engineering Chemistry	**2**	**1**	**0**	**3**
	(**Common CSE,ECE and EEE Branches**)				

Course Objectives

- To familiarize engineering chemistry and its applications
- To train the students on the principle and applications of electrochemistry, polymers chemistry
- To introduce instrumental methods and advanced engineering materials

Unit 1 : Structure and Bonding Models:

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

Learning Outcomes:

- Apply : Schrodinger wave equation Eigen values and Eigen function
- Illustrate: Crystal field theory and energy level diagrams
- Discuss: The magnetic behavior and colour of complexes
- Explain: The Splitting of octahedral and tetrahedral geometry

Unit 2 : Polymer Chemistry

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

Learning Out comes:

- Explain: Different types of polymers and their applications
- Compare: Elastomers Buna-S and Buna-N
- Explain: Conducting polymers polyacetylene, polyaniline and polythiophene
- Discuss: Synthesis mechanism of conducting polymers.

Unit 3: Electrochemistry and Applications

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. **Fuel cells:** Hydrogen-oxygen and methane-oxygen fuel cells advantages, disadvantages and its applications

Learning Outcomes:

- Apply: Nernst equation for calculating electrode and cell potentials
- Apply: Pilling Bed worth rule for corrosion and corrosion prevention
- Demonstrate: The corrosion prevention methods and factors affecting corrosion
- Compare: Different batteries and their applications

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:** Definition,criteries of refractories, Classification, properties, Factors affecting the refractory materials and applications. Failures of refractories.

Learning Outcomes:

- Identify: The factory 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: Instrumental methods and Applications

Electromagnetic spectrum and absorption of radiations. The absorption laws: Beer-Lambert's law. Ultraviolet and Visible Spectroscopy, Infrared Spectroscopy. Principle, instrumentation and applications of pH metry.

Learning Outcomes:

- Explain: The different types of spectral series in electromagnetic spectrum
- Outline: The different applications of analytical instruments
- Discuss: Difference between the UV-Visible and IR spectroscopy
- Understanding: To identify acid-base buffer pH meter

Text books:

1.A text book of engineering chemistry., Jain and Jain, Dhanpat Rai Publishing Company., 15th edition, New Delhi,**2008**.

2. Chemistry of engineering., Prof. K.N. Jayaveera, Dr. G.V. Subba Reddy and Dr. C. Ramachandraiah. McGraw hill higher education. Hyderabad, **2009.**

3. Peter Atkins, Julio de Paula and James Keeler, Atkin's Physical Chemistry, 10/e, Oxford University Press, 2010.

Reference books:

1.J.D Lee, Concise Inorganic Chemistry,5/e, OxfordUniversity Press,2008.

2.Skoog and West, Principles of instrumental Ananlysis, 6/e, Thomson,2007.

3.H.F.W. Taylor, Cement Chemistry, 2/e, Thomas Telford Publications, 1997.

4.Engineering chemistry K.B Chandra Sekhar et.al, SciTech Publications.

Course Out comes

- Demonstrate: The materials of construction for battery and electrochemical series
- Explain: The preparation, properties, and applications of thermosetting and thermoplastics
- Explain: The constituents of Portland cement and factory affecting the refractory material
- Explain: Difference between the UV-Visible and IR spectroscopy
- Discuss: The setting and hardening of cement and concrete phase

Useful Links

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

Sri Krishnadevaraya University College of Engineering & Technology

B.Tech – I Year 2nd Sem	**(Electrical & Electronics Engineering)**	**L**	**T**	**P**	**C**
	Data Structures	**3**	**0**	**0**	**3**
	(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: BTrees, 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 2nd Sem	**(Electrical & Electronics Engineering)**	**L**	**T**	**P**	**C**
	Basic Civil & Mechanical Engineering	**3**	**0**	**0**	**3**

Course Objectives:

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

UNIT – I:

Basic Definitions of Force – Stress – Strain – Elasticity. Shear force – Bending Moment – Torsion . Simple problems on Shear force Diagram and Bending moment Diagram for cantilever and simply supported beams.

Learning Outcomes

- understand principles of Stress and Strain.
- able to draw SFD & BMD for simply supported beams and cantilever beams.

UNIT – II:

Measurement of Strain - Electrical Capacitance and Resistance Strain gauges – multi channel strain indicators. Rosette analysis – Rectangular and Triangular strain rosettes – Wheatstone bridge.

Learning Outcomes

- understand basic principles of Strain Measurement.
- Apply the concepts of Strain Rosettes for strain measurement .

UNIT – III

Power Plant Engineering: Introduction – Energy Renewable and Non – Renewable Energy, Sources – Classification of Power Plants based on Sources of Energy – Thermal Power Plant or Steam Power Plant – Hydro Electric Power – Nuclear Fission, Chain Reaction, Layout of Nuclear Power Plant – Diesel Power Plant – Gas Turbine Power Plant – Open Cycle Gas Turbine, Closed Cycle Gas Turbine Power Plant, Comparison of Diesel Power Plant with Gas Turbine Power Plant – Pumps – Classification of Pumps, Centrifugal Pump, Applications of Centrifugal Pump, Priming, Reciprocating Pumps, Single Acting Reciprocating Pump, Working of a Double acting Reciprocating Pump, Comparison of Reciprocating Pump with Centrifugal Pump –Hydraulic Turbine – Classification of Hydraulic Turbines, Impulse Turbine, Reaction Turbine, Difference between Impulse and Reaction Turbine.

Learning Outcomes

- Outline sources of energy, compare and selection of types of power plants .
- Explain working principle and compare types of diesel power plant .
- Explain construction and operation of different pumps .
- Classify pumps based on principle of operation .
- Classify turbines based on principle of operation .

UNIT – IV

I.C Engine: Heat Engine – Types of Heat Engine – External Combustion Engine, IC Engine (Internal Combustion), Classification of I.C. Engine, Two Stroke Petrol Engine, Four Stroke Engine, Valve Timing Diagram, Port Timing Diagram, Comparison of Two Stroke and Four Stroke Engines, Comparison of Petrol Engine and Diesel Engine, Fuel System of a Petrol Engine, Ignition Systems.

Boilers: Classification of Boilers – Simple Vertical Boiler – Cochran Boiler – Babcock and Wilcox Boiler – Benson Boiler – Difference between Fire Tube and Water Tube Boilers – Boiler Mountings – Boiler Accessories – Difference between Boiler Mountings and Accessories.

Learning outcomes:

After completion of this unit, students will be able to

- Understand classification and working of IC engines .
- Compare 2 stroke and 4 stroke, petrol and diesel engines .
- Understand classification and construction of boilers .
- Compare boiler mountings and accessories .

UNIT – V

Refrigeration and Air Conditioning: Introduction – Terminology of Refrigeration and Air Conditioning – Properties of Refrigerants – List of Commonly used Refrigerants – Types of Refrigerating System – Vapour Compression Refrigeration System – Vapour Absorption Refrigerator – Domestic Refrigerator – Air Conditioning – Application of Air Conditioning – Psychrometry – Window Air Conditioning.

Learning outcomes:

After completion of this unit, students will be able to

1. Analyze the basics cycles of Refrigeration and Air Conditioning Systems .
2. Outline the operation of refrigerators .
3. Identify different refrigerants and applications .

Text Books:

1. Shanmugam G and Palanichamy M S, "Basic Civil and Mechanical Engineering", Tata McGraw Hill Publishing Co., New Delhi.
2. Ramamrutham S., "Basic Civil Engineering", Dhanpat Rai Publishing Co. (P) Ltd.
3. Basic Civil and Mechanical Engineering, by Prof.V.Vijayan, Prof.M.Prabhakaran and Er.R.Viashnavi, S.Chand Publication.
4. Elements of Mechanical Engineering Fourth Edition S Trymbaka Murthy, University Press.

Reference Books:

1. S.Trymbaka Murthy., "Computer Aided Engineering Drawing" , Universities Press
2. Seetharaman S., "Basic Civil Engineering", Anuradha Agencies.
3. Venugopal K. and Prahu Raja V., "Basic Mechanical Engineering", Anuradha Publishers, Kumbakonam.
4. Er. R. Vaishnavi,Basic Civil and Mechanical Engineering, 2/e, S.Chand Publications..

Course Outcomes:

At the end of the course, student is able to

- Draw SFD and BMD for cantilever and Simply supported beams.
- Understand the working principles of electrical resistors and capacitors.
- Apply concepts of Rosetta analysis for strain measurements
- Outline sources of energy, power plant economics, and environmental aspects . Describe working components of a steam power plant .
- Illustrate the working mechanism of Diesel and Gas turbine power plants .
- Explain different types of pumps and their application .
- Explain working of IC engines with combustion process .
- Possess the knowledge of system components of refrigeration and air conditioning

Sri Krishnadevaraya University College of Engineering & Technology

B.Tech – I Year 2nd Sem	**(Electrical & Electronics Engineering)**	**L**	**T**	**P**	**C**
	Engineering Workshop	**0**	**0**	**2**	**1**

C**ourse 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 b) Two way switch c) Godown lighting d) Tube light
e) Three phase motor 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.

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	L	T	P	C
B.Tech – I Year 2nd Sem (Electrical & Electronics Engineering)	**1**	**0**	**4**	**3**

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) Involutes –Normal and Tangent.

UNIT-II

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

UNIT-III

Projections of regular planes: 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. (L2)
- show projections of solids and sections graphically. (L2)
- draw the development of surfaces of solids. (L3)
- use computers as a drafting tool. (L2)
- draw isometric and orthographic drawings using CAD packages. (L3)

Note:

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

Additional Sources

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

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B.Tech – I Year 2nd Sem	**(Electrical & Electronics Engineering)**	**L**	**T**	**P**	**C**
		0	**0**	**3**	**1.5**

Engineering Chemistry Lab
(**Common CSE,ECE and EEE Branches**)

Course Objectives

- Verify the fundamental concepts with experiments

List of Experiments:

Chemical methods: Volumetric analysis

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

Iodometry Titrations:

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

(i) Part-I : Standardization of sodium thiosulphate ($Na_2S_2O_3$) solution with standard $K_2Cr_2O_7$

(ii) Part-II: Estimation of Copper

Complexometry Titrations:

3.Estimation of Calcium hardness of water using Standard EDTA solution

4.Estimation of Copper by using Standard EDTA solution

5.Dissolved Oxygen: To test the amount of dissolved oxygen present in the given water sample.

Physical methods: Instrumental Analysis

6. pH metric titration of (i) strong acid vs strong base, (ii) weak acid vs strong base

7. Determination of cell constant and conductance of solutions

8. Determination of colorimetric titration with $KMnO_4$ solution

9. 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 2nd Sem	**(Electrical & Electronics Engineering)**	**L**	**T**	**P**	**C**
	Basic Civil & Mechanical Engineering Lab	**0**	**0**	**3**	**1.5**

Basic Civil Engineering Laboratory Experiments

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

Basic Mechanical Engineering Laboratory Experiments

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

Course Outcomes:

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

- Explain different working cycles of engine.
- Illustrate the working of refrigeration systems
- Evaluate heat balance sheet of IC engine.

Sri Krishnadevaraya University College of Engineering & Technology

B.Tech – I Year 2nd Sem	**(Electrical & Electronics Engineering)**	**L**	**T**	**P**	**C**
	Data Structures Lab	**0**	**0**	**4**	**2**

(Common to All Branches of Engineering)

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.Tech – I Year 2nd Sem	**(Electrical & Electronics Engineering)**	**L**	**T**	**P**	**C**
	Environmental Science	**3**	**0**	**0**	**0**

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

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 UNIT-3

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 Electrical & Electronics Engineering					
II Year 1st Semester					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1.		Mathematics-III	BS	3-0-0	3
2.		Life Science for Engineers	HS	3-0-0	3
3.		Electrical Circuits -I	PC	3-0-0	3
4.		Electrical Machines - I	PC	3-0-0	3
5.		Electronic Devices and Circuits	PC	3-0-0	3
6.		Python Programming	ES	3-0-0	3
7.		Electrical Machines – I Lab	PC	0-0-3	1.5
8.		Electronic Devices and Circuits Lab	PC	0-0-2	1
9.		Python Programming Lab	ES	0-0-2	1
10.		Essence of Indian Traditional Knowledge	MC	3-0-0	0
				Total	**21.5**

Category	**CREDITS**
Basic Science course	3
Professional core Courses	11.5
Humanities and Social science	3
Engineering Science Course	4
TOTAL CREDITS	**21.5**

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B.Tech – II-I Sem	**(Electrical & Electronics Engineering)**	**L**	**T**	**P**	**C**
	Mathematics-III	**3**	**0**	**0**	**3**

(Complex Variables and Transforms**)**

(Common to ECE & EEE)

Course Objective:

This course aims at providing the student to acquire the knowledge on the calculus of functions of complex variables. The student develops the idea of using continuous/discrete transforms.

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, ez, cos z, z2) 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: Fourier transforms & Z Transforms:

Fourier integral theorem (without proof) – Fourier sine and cosine integrals-complex form of Fourier integral. Fourier transform – Fourier sine and cosine transforms – Properties – Inverse transforms – convolution theorem

Z-transform – Inverse z-transform – Properties – Damping rule – Shifting rule – Initial and final value theorems. Convolution theorem – Solution of difference equations by z-transforms.

Unit Outcomes:

Students will be able to

- Find Fourier Sine and cosine integrals.
- Understand Fourier transforms.
- Apply properties of Fourier transform.
- Understand Z transforms.
- Apply properties of Z transform.
- Apply Z transforms to solve difference 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, Fourier Transforms and Z transforms.
- Evaluate the Fourier series expansion of periodic functions.

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.

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		L	T	P	C
B.Tech – II-I Sem	**(Electrical & Electronics Engineering)**	**3**	**0**	**0**	**3**

Life Science for Engineers
(Common to all branches)

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

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B.Tech – II-I Sem	**(Electrical & Electronics Engineering)**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Electrical Circuits - I

Course Objectives:

To make the student learn about

- Basic characteristics of R, L, C parameters, their Voltage and Current Relations and Various combinations of these parameters.
- Kirchhoff's Laws to solve for DC networks
- Node node analysis with dependent and independent sources
- To understand basic graph theory
- Distinguish between classical method and Laplace transform approach in analysing transient phenomenon in DC excitations

UNIT-I : INTRODUCTION TO ELECTRICAL CIRCUITS

Circuit concept R-L-C parameters- voltage and current sources- Independent and dependent sources - Source transformation- voltage current relationship for passive elements.

Unit Outcomes:

- To know about RLC parameters DC networks
- To know about voltage source to current source and vice-versa transformation in their representation
- To understand voltage current relationship for passive elements

UNIT-II KIRCHOFF'S LAWS

Kirchoff's laws- network reduction techniques- series, parallel, star-to-delta or delta-to-star transformation, current division, voltage division.

Unit Outcomes:

- Kirchoffs laws for DC circuits analysis of series and parallel circuits
- To convert star-to-delta or delta-to-star transformation between balanced and unbalanced circuits
- To know current division, voltage division

UNIT-III METHODS OF ANALYSING CIRCUITS

Mesh analysis, super mesh analysis, Nodal analysis, Super node analysis with dependent and independent sources.

Unit Outcomes:

- To understand Mesh analysis, super mesh analysis
- To know Super node analysis with dependent and independent sources.

UNIT-IV MAGNETIC CIRCUITS

Magnetic circuits – Faradays laws of electromagnetic induction- Concept of self and mutual inductance- Dot connection- Co-efficient of coupling- composite magnetic circuits- analysis of series and parallel magnetic circuits.

Unit Outcomes:

- To understand basic Magnetic circuits
- To understand about Faradays laws of electromagnetic induction
- To understand Concept of self and mutual inductance- Dot connection Co-efficient of coupling- composite magnetic circuits- analysis of series and parallel magnetic circuits

UNIT-V NETWORK THEOREMS FOR DC EXCITATION

Superposition, Thevinin's , Nortones , Maximum power transfer, Tellegen's, millimance and compensation theorems for DC excitations, Duality and dual networks.

NETWORK TOPOLOGY-Definitions – Graph-Tree, Basic cutest and basic Tie set matrices for planar networks.

Unit Outcomes:

- To analyse Superposition, Thevinin's , Nortones , Maximum power transfer, Tellegen's, millimance and compensation theorems for DC excitations
- To Understand Duality and dual networks
- Understand the Graph-Tree, Basic cutest and basic Tie set matrices for planar networks.

Text Books:

v. Fundamentals of Electric Circuits Charles K. Alexander and Matthew. N. O. Sadiku, Mc Graw Hill, 5th Edition, 2013.

vi. Circuit Theory (Analysis & Synthesis) A. Chakrabarti, Dhanpat Rai & Sons, 7th Revised Edition, 2018.

Reference Books:

1. Engineering circuit analysis William Hayt and Jack E. Kemmerly, Mc Graw Hill Company, 7th Edition, 2006.
2. Network Analysis M.E Van Valkenberg, Prentice Hall (India), 3rd Edition, 1999.
3. Electrical Engineering Fundamentals V. Del Toro, Prentice Hall International, 2nd Edition, 2019.
4. Electric Circuits- Schaum's Series, Mc Graw Hill, 5th Edition, 2010.
5. Electrical Circuit Theory and Technology John Bird, Routledge, Taylor & Francis, 5th Edition, 2014.

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B.Tech – II-I Sem (Electrical & Electronics Engineering)

L	T	P	C
3	0	0	3

Electrical Machines – I

Course Objectives:

To make the students learn about:

- The course will impart the concepts and principle of electromechanical energy conversions in rotating DC machines
- The constructional features of DC machines and different types of winding employed in DC machines and the phenomena of armature reaction and commutation
- Characteristics of generators and parallel operation of generators
- Methods for speed control of DC motors and applications of DC motors
- Various types of losses that occur in DC machines , how to calculate efficiency and Testing of DC motors

UNIT-I

Principles of electromechanical energy conversion:

Energy in magnetic system, field energy and mechanical force, multiply-excited magnetic field systems, forces/torques in systems with permanent magnets, energy conversion via electric field, dynamical equations of electro mechanical systems

Unit Outcomes:

- Able to understand the electromechanical energy conversion system
- To understand about various magnetic materials, properties and Applications

UNIT-II

D.C GENERATORS: Principle of operation-Elementary Generator - Constructional details - types of armature windings - E.M.F. equation - Types of DC generators - Power division - problems Armature reaction- ATd/Pole,ATc/Pole -simple problems -Remedies for field distortion –- Compensating winding - commutation - methods of improving commutation.

D.C GENERATORS- CHARACTERISTICS: Characteristics of DC generators - building up of e.m.f of self excited dc shunt generator - causes for failure - critical field resistance and critical speed - characteristics of shunt, series and compound generators

Unit Outcomes:

- Able to understand the construction, operation and armature windings of a DC generator
- Able to analyze the characteristics of DC generators

UNIT-III

PARALLEL OPERATIONS OF DC GENERATOR: applications of DC generators - parallel operation of DC generators -reasons for paralleling - requirements - paralleling of shunt, compound generators - use of equalizer bar

Unit Outcomes:

- Able to analyzeparallel operation of DC Generators

UNIT - IV

DC MOTORS: Principle of operation - back or counter e.m.f - comparison between motor and generator action - torque developed - Mechanical power developed by a DC motor -types of DC motors - motors characteristics - comparison of DC motor characteristics

Unit Outcomes:

- Able to analyze speed control of DC motors, testing methods and parallel operation of DC machines
- Analyze the characteristics of DC motors

UNIT-V

SPEED CONTROL OF DC MOTORS: applications of DC motors - speed control of DC motors. Starting of dc motors - starters for shunt , series and compound motors, -calculation of starter steps for DC shunt motor.

LOSSES, EFFICIENCY AND TESTING OF DC MACHINES: Losses & efficiency - losses-copper, iron, mechanical - efficiency of DC machines - condition for maximum efficiency-Brake test-Swinburne's test-Hopkinson's test - Retardation test - Field's test.

Unit Outcomes:

- Able to understand and analyze the speed control of DC motors
- Analyze the efficiency and testing of DC motors

Course Outcomes:

At the end of this course, students will demonstrate the ability to

- Understand the concepts of magnetic circuits. Understand the operation of DC machines.
- Analyse the differences in operation of different DC machine configurations.
- Analyse single phase and three phase transformers circuits.

Text Books:

1. P. S. Bimbhra, "Electrical Machinery", Khanna Publishers, 2011.

2. I. J. Nagrath and D. P. Kothari, "Electric Machines", McGraw Hill Education,2010.

References:

1. A. E. Fitzgerald and C. Kingsley, "Electric Machinery", New York, McGraw Hill Education, 2013.
2. A. E. Clayton and N. N. Hancock, "Performance and design of DC machines", CBS Publishers, 2004.
3. M. G. Say, "Performance and design of AC machines", CBS Publishers, 2002.

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		L	T	P	C
B.Tech – II-I Sem	**(Electrical & Electronics Engineering)**	**3**	**0**	**0**	**3**

Electronic Devices and Circuits

Course Objectives:

- To acquire fundamental knowledge and expose to the field of semiconductor theory and devices and their applications.
- To introduce different types of semiconductor devices, viz., diodes and special diodes.
- To explain application of diodes as rectifiers, clippers, clampers and regulators.
- To describe operation and characteristics of Bipolar Junction Transistor& Field Effect Transistor.
- To analyze the various biasing circuits using BJTs & FETs.

Unit I:

Semiconductor Diode: Open circuited PN junction, PN junction as a rectifier, Current components in a PN diode, Diode Equation and its mathematical derivation, Volt-Ampere Characteristics, Energy band diagram of PN diode, Temperature dependence of Volt-Ampere Characteristics, Diode resistance (Static and Dynamic resistance), Transition capacitance, Diffusion capacitance, Step graded junction.

Unit Outcomes:

- Study the characteristics and operation of p-n junction diode.
- Explain the energy band diagram & effect of temperature on the characteristics of diode.
- Derive the expression for transition capacitance and diffusion capacitance.

Unit II:

Special Devices: Avalanche breakdown, V-I Characteristics of Zener diode, Zener breakdown, Principle of operation and characteristics of Tunnel diode with the help of Energy band diagram, Photo diode, LED, PIN diode and Varactor diode, Silicon Controlled Rectifier (SCR) and its V-I characteristics, DIAC, TRIAC, Schottky Barrier diode, solar cell, Uni-Junction Transistor (UJT) and its V-I Characteristics, Problem solving.

Unit Outcomes:

- Study the characteristics operation and applications of Zener diode.
- Explain V-I Characteristics of Tunnel diode, Photo diode, SCR, UJT and other special diodes.
- Apply concepts of semiconductor devices and solve problems..

Unit III:

Diode Applications: Diode as switch, Rectifier – Half wave and Full wave rectifier, Bridge rectifier, Ripple factor, PIV, Filters – Inductor and Capacitor Filter, L-section filter, pi-Filter, Zener as voltage regulator, Clipping and Clamping circuits, Detector, Voltage doubler, Problem solving related to diode applications.

Unit Outcomes:

- Understand the circuit operation involving p-n junction and Zener diodes.
- Analyze the performance of rectifiers with and without filters.
- Design half wave and full wave rectifier circuits, clippers, clampers and voltage regulator.
- Compare the various rectifier circuits in terms of their parameter metrics.

Unit IV:

Bipolar Junction Transistor (BJT):
Transistor – Structure, current components and their relationship, PNP and NPN transistors- Active mode of operation, symbols and conventions, Transistor equations, Transistor as an amplifier, input and output characteristics of Common Base, Common Emitter and Common collector configurations. DC analyses of Common Base, Common Emitter and Common collectorcircuits.
BJT Biasing: Load line and modes of operations, operating point, Bias stability, fixed bias, self bias, stabilization against variations in I_{co}, V_{BE}, β, Bias compensation, Thermal runaway, condition for Thermal stability, Problem solving.
Applications: As a switch, as an amplifier.

Unit Outcomes:

- Understand the current components and their relationships in BJT.
- Explain principle, operation and applications of Bipolar Junction Transistor.
- Describe input and output Characteristics of Bipolar Junction Transistor.
- Derive the expression for stability factor of various biasing circuits.
- Analyse the different configurations(CB,CC,CE).

Unit V:

Field-Effect Transistors (FET) : Metal Oxide Semiconductor Field-effect Transistor (MOSFET) - structures and V-I characteristics of n-channel Enhancement mode MOSFET, p- channel Enhancement mode MOSFET, n-channel depletion mode MOSFET, p-channel depletion mode MOSFET, symbols and conventions, Complementary MOSFETs (CMOSFETs) - structure, V-I characteristics, symbols and conventions, structure and V-I characteristics of n- channel and p-channel Junction Field Effect Transistors (JFET), Problemsolving.
Biasing Circuits Using MOSFETS and JFETS: Different configurations using MOSFETs and JFET, load line and modes of operation, different biasing circuits (self-bias, voltage divider bias) using MOSFETs and JFETs, DC Analysis of n-channel and p-channel MOSFETs (both Enhancement and Depletion modes),DC analysis of n-channel and p-channel JFETs, Problem solving.
Applications: MOSFETs, JFET as switch and small signal amplifier, CMOS as a switch.

Unit Outcomes:

- Understand the current components and their relationships in Field effect transistors (JFET, MOSFETs).
- Explain principle, operation and applications of Field effect transistors.
- Describe input and output Characteristics of Field effect transistors.
- Analyse the different configurations (CS,CG,CD) and biasingcircuits.

Course Outcomes:

After the completion of the course students will able to

CO1: Understand principle, operation, characteristics and applications of Bipolar Junction Transistor and Field Effect Transistor

CO2: Describe basic operation and characteristics of various semiconductor devices.

CO3: Analyze diode circuits for different applications such as rectifiers, clippers and clampers also analyze low frequency and high frequency models of BJT and FET.

CO4: Design various biasing circuits for BJT and FET.

CO5: Compare the performance of various semiconductor devices.

TEXT BOOKS:

1. Donald A Neamen, "Electronic Circuits – analysis and design", 3rd Edition, McGraw Hill (India),2019.
2. J. Milliman and C Halkias, "Integrated electronics", 2nd Edition, Tata McGraw Hill, 1991.

REFERENCES:

1. Behzad Razavi, "Microelectronics", 2nd edition, Wiley,2013.
2. R.L. Boylestadand Louis Nashelsky, "Electronic Devices and Circuits," 9th Edition, Pearson,2006.
3. Jimmie J Cathey, "Electronic Devices and Circuits," Schaum's outlines series,3rd
4. edition, McGraw-Hill (India), 2010.

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B.Tech – II-I Sem (Electrical & Electronics Engineering)

L	T	P	C
3	0	0	3

Python Programming
(Common to all Branches)

Course Objectives:

- To learn the fundamentals ofPython
- To elucidate problem-solving using a Python programminglanguage
- To introduce a function-oriented programming paradigm throughpython
- To get training in the development of solutions using modularconcepts
- To introduce the programming constructs ofpython

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, Keyboardinput.

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 theprogram.
- Apply the principle of recursion to solve theproblems.

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, Listarguments.

Unit Outcomes:

Student should be able to

- Use the data structurelist.
- Design programs for manipulatingstrings.

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, Writingmodules.
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 orientationconcepts.
- Use data structuredictionaries.
- Organize data in the form offiles.

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 orientationapproach.
- Illustrate the principle ofinheritance.

Course Outcomes:
Student should be able to

- Apply the features of Python language in various realapplications.
- Select appropriate data structure of Python for solving aproblem.
- Design object oriented programs using Python for solving real-worldproblems.
- Apply modularity toprograms.

TEXT BOOKS:

1. Allen B. Downey, “Think Python”, 2nd 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”, 2nd edition, Dreamtech Press,2019

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B.Tech – II-I Sem (Electrical & Electronics Engineering)	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

Electrical Machines-I Lab

Course Objectives:

To conduct various experiments on
DC motors and DC Generators

The speed control techniques of DC motors.

To conduct various experiments for testing on 1-phase transformers

1. Magnetization characteristics of DC shunt generator. Determination of critical field resistance and critical speed.
2. Load test on DC shunt generator. Determination of characteristics.
3. Brake test on DC shunt motor. Determination of performance curves.
4. Swinburne's test on DC shunt motor,Predetermination of efficiency.
5. Speed control of DC shunt motor (Armature control and Field control method).
6. Hopkinson's tests on DC shunt machines. Predetermination of efficiency.
7. OC and SC test on single phase transformer
8. Parallel operation of single phase transformers.
9. Sumpner's test on single phase transformers.
10. Load test on DC long shunt compound generator. Determination of characteristics.
11. Load test on DC short shunt compound generator. Determination of characteristics.
12. Separation of losses in DC shunt motor.

Note: Minimum ten experiments are required to be conducted as compulsory experiments:

Course Outcomes:

CO1Able to conduct and analyze load test on DC shunt generators
CO2 Able to understand and analyze magnetization characteristics of DC shunt generator CO3 Able to understand and analyze speed control techniques and efficiency of DC machines CO4 Able to understand to predetermine efficiency and regulation of single phase Transformers

Reference Book:

1. D. P. Kothari and B. S. Umre, Laboratory Manual for Electrical Machines, I.K International Publishing House Pvt. Ltd., 2017

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	L	T	P	C
B.Tech – II-I Sem (Electrical & Electronics Engineering)	**0**	**0**	**2**	**1**

Electronic Devices and Circuits Lab

Course Objectives:

- To verify the theoretical concepts practically from all the experiments.
- To analyze the characteristics of diodes, UJT, BJT, FET,SCR.
- To Model the electronic circuits using tools such as PSPICE/ Multisim.

LIST OF EXPERIMENTS:

1. Verification of Volt- Ampere characteristics of a PN junction diode and find static, dynamic and reverse resistances of the diode from the graphs obtained.
2. Design a full wave rectifier for the given specifications with and without filters, and verify the given specifications experimentally. Vary the load and find ripple factor. Draw suitable graphs.
3. Verify various clipping and clamper circuits using PN junction diode and draw the suitable graphs.
4. Design a Zener diode based voltage regulator against variations of supply and load. Verify the same from the experiment.
5. Study and draw the output and transfer characteristics of MOSFET (Enhance mode) in Common Source Configuration experimentally. Find Threshold voltage (V_T), g_m, & K from the graphs.
6. Study and draw the output and transfer characteristics of MOSFET (Depletion mode) or JFET in Common Source Configuration experimentally. Find I_{DSS}, g_m, & V_P from the graphs.
7. Verification of the input and output characteristics of BJT in Common Emitter configuration experimentally and find required h – parameters from the graphs.
8. Study and draw the input and output characteristics of BJT in Common Base configuration experimentally, and determine required h – parameters from the graphs.
9. Verify the Volt Ampere characteristics of SCR experimentally and determine holding current and break over voltage from the graph.
10. Study and draw the Volt Ampere characteristics of UJT and determine η, I_P, I_v,V_P,&Vv from the experiment.
11. Design and analysis of voltage- divider bias/self bias circuit using BJT.
12. Design and analysis of voltage- divider bias/self bias circuit using JFET.
13. Design and analysis of self bias circuit using MOSFET.
14. Design a suitable circuit for switch using CMOSFET/JFET/BJT.

Tools / Equipment Required: Software Tool like Multisim/ Pspice or Equivalent,
DC Power supplies, Multi meters, DC Ammeters, DC Voltmeters, AC Voltmeters, CROs, all the required active devices

Note: All the experiments shall be implemented using both Hardware and Software. Student has to perform minimum of any 12 experiments

Course Outcomes:

CO1: Understand the basic characteristics and applications of basic electronic devices. CO2: Observe the characteristics of electronic devices by plotting graphs
CO3: Analyze the Characteristics of UJT, BJT, FET, and SCR .
CO3: Design FET based amplifier circuits/BJT based amplifiers for the given specifications.
CO4: Simulate all circuits in PSPICE /Multisim.

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B.Tech – I Sem (Electrical & Electronics Engineering)	**L**	**T**	**P**	**C**
PYTHON PROGRAMMINGLABORATORY	**0**	**0**	**2**	**1**

Course Objectives:

- To train the students in solving computationalproblems
- To elucidate solving mathematical problems using Python programminglanguage
- To understand the fundamentals of Python programming concepts and itsapplications.
- To understand the object-oriented concepts using Python in problemsolving.

Laboratory Experiments

1. Install Python Interpreter and use it to perform different Mathematical Computations. Try to do all the operations present in a ScientificCalculator
2. Write a function that draws a grid like thefollowing:

```
+ - - - - + - - - +
|         |       |
|         |       |
|         |       |
|         |       |
+ - - - - + - - - +
|         |       |
|         |       |
|         |       |
|         |       |
+ - - - - + - - - - +
```

3. Write a function that draws a Pyramid with #symbols

```
          #
        # # #
      # # # # #
    # # # # # # #
  # # # # # # # # #
          .
```

Up to 15 hashes at the bottom

4. Using turtles concept draw a wheel of yourchoice
5. Write a program that draws ArchimedeanSpiral
6. The letters of the alphabet can be constructed from a moderate number of basic elements, like vertical and horizontal lines and a few curves. Design an alphabet that can be drawn with a minimal number of basic elements and then write functions that draw the letters. The alphabet can belong to any Natural language excluding English. You should consider at least Ten letters of thealphabet.
7. The time module provides a function, also named time that returns the current Greenwich Mean Time in "the epoch", which is an arbitrary time used as a reference point. On UNIX systems, the epoch is 1 January1970.

   >>> import time
   >>>time.time()
   1437746094.5735958

   Write a script that reads the current time and converts it to a time of day in hours, minutes, and seconds, plus the number of days since the epoch.
8. Given $n+r+1 <= 2^r$. n is the input and r is to be determined. Write a program which computes

minimum value of r that satisfies theabove.

9. Write a program that evaluates Ackermannfunction
10. The mathematician Srinivasa Ramanujan found an infinite series that can be used to generate a numerical approximation of 1/ π:
    Write a function called estimate_pi that uses this formula to compute and return an estimate ofπ.

$$\frac{1}{\pi} = \frac{2\sqrt{2}}{9801} \sum_{k=0}^{\infty} \frac{(4k)!(1103 + 26390k)}{(k!)^4 396^{4k}}$$

    It should use a while loop to compute terms of the summation until the last term is smaller than 1e-15 (which is Python notation for 10^{-15}). You can check the result by comparing it tomath.pi.
11. Choose any five built-in string functions of C language. Implement them on your own in Python. You should not use string related Python built-infunctions.
12. Given a text of characters, Write a program which counts number of vowels, consonants and special characters.
13. Given a word which is a string of characters. Given an integer say 'n', Rotate each character by 'n' positions and print it. Note that 'n' can be positive ornegative.
14. Given rows of text, write it in the form ofcolumns.
15. Given a page of text. Count the number of occurrences of each latter (Assume case insensitivity and don't consider special characters). Draw a histogram to represent the same
16. Write program which performs the following operations on list's. Don't use built-in functions
    a) Updating elements of alist
    b) Concatenation oflist's
    c) Check for member in thelist
    d) Insert into thelist
    e) Sum the elements of thelist
    f) Push and pop element oflist
    g) Sorting oflist
    h) Finding biggest and smallest elements in thelist
    i) Finding common elements in thelist

1. Write a program that reads a file, breaks each line into words, strips whitespace and punctuation from the words, and converts them tolowercase.
2. Go to Project Gutenberg (http://gutenberg.org) and download your favorite out-of-copyright book in plain text format. Read the book you downloaded, skip over the header information at the beginning of the file, and process the rest of the words as before. Then modify the program to count the total number of words in the book, and the number of times each word is used. Print the number of different words used in the book. Compare different books by different authors, written in differenteras.
3. Go to Project Gutenberg (http://gutenberg.org) and download your favorite out-of-copyright book in plain text format. Write a program that allows you to replace words, insert words and delete words from thefile.
4. Consider all the files on your PC. Write a program which checks for duplicate files in your PC and displays their location. Hint: If two files have the same checksum, they probably have the samecontents.
5. Consider turtle object. Write functions to draw triangle, rectangle, polygon, circle and sphere. Use object orientedapproach.
6. Write a program illustrating the object oriented features supported byPython.
7. Design a Python script using the Turtle graphics library to construct a turtle bar chart representing

the grades obtained by N students read from a file categorising them into distinction, first class, second class, third class andfailed.

8. Design a Python script to determine the difference in date for given two dates in YYYY:MM:DD format(0 <= YYYY <= 9999, 1 <= MM <= 12, 1 <= DD <= 31) following the leap yearrules.

9. Design a Python Script to determine the time difference between two given times in HH:MM:SS format.(0 <= HH <= 23, 0 <= MM <= 59, 0 <= SS <=59)

Unit Outcomes:

Student should be able to

- Design solutions to mathematicalproblems.
- Organize the data for solving theproblem.
- Develop Python programs for numerical and text basedproblems.
- Select appropriate programming construct for solving theproblem.
- Illustrate object orientedconcepts.

Reference Books:

1. Peter Wentworth, Jeffrey Elkner, Allen B. Downey and Chris Meyers, "How to Think Like a Computer Scientist: Learning with Python 3", 3rd edition, Available at http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf
2. Paul Barry, "Head First Python a Brain Friendly Guide" 2nd Edition, O'Reilly,2016
3. DainelY.Chen "Pandas for Everyone Python Data Analysis" Pearson Education,2019

Sri Krishnadevaraya University College of Engineering & Technology

B.Tech – II-I Sem (Electrical & Electronics Engineering)

L	T	P	C
3	0	0	0

Essence of Indian Traditional Knowledge

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

Sri Krishnadevaraya University College of Engineering & Technology					
Dept. of Electrical & Electronics Engineering					
II Year 2nd Semester					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1		Mathematics-IV	BS	3-0-0	3
2		Engineering Electromagnetics	PC	3-0-0	3
3		Generation of Electrical Power	PC	3-0-0	3
4		Switching Theory & Logic Design	PC	3-0-0	3
5		Analog Electronic Circuits	PC	3-0-0	3
6		Electrical Circuits -II	PC	3-0-0	3
7		Electrical Circuits Lab	PC	0-0-3	1.5
8		Analog Electronic Circuits Lab	PC	0-0-3	1.5
				Total	**21**

Category	**CREDITS**
Professional core Courses	18
Basic Science Course	3
TOTAL CREDITS	**21**

Sri Krishnadevaraya University College of Engineering & Technology

B.Tech – II-II Sem	**(Electrical & Electronics Engineering)**	**L**	**T**	**P**	**C**
	Mathematics-IV	**3**	**0**	**0**	**3**
	(Common to EEE, MECH)				

Course Objective:

This course aims at providing the student with the knowledge on

- Various numerical methods for solving equations, interpolating the polynomials, evaluation of integral equations and solution of differentialequations.
- The theory of Probability and randomvariables.

Unit-I: Solution of Algebraic & Transcendental Equations:

Introduction-Bisection method-Iterative method-Regula falsi method-Newton Raphson method System of Algebraic equations: Gauss Jordan method-Gauss Siedal method.

Unit Outcomes:

Students will be able to

- Calculate the roots of equation using Bisection method and Iterativemethod.
- Calculate the roots of equation using Regula falsi method and Newton Raphsonmethod.
- Solve the system of algebraic equations using Gauss Jordan method and Gauss Siedalmethod.

Unit-II: Interpolation

Finite differences-Newton's forward and backward interpolation formulae – Lagrange's formulae. Gauss forward and backward formula, Stirling's formula, Bessel's formula.

Unit Outcomes:

Students will be able to

- Understand the concept ofinterpolation.
- Derive interpolating polynomial using Newton's forward and backwardformulae.
- Derive interpolating polynomial using Lagrange'sformulae.
- Derive interpolating polynomial using Gauss forward and backwardformulae.

Unit-III: Numerical Integration & Solution of Initial value problems to Ordinary differential equations

Numerical Integration: Trapezoidal rule – Simpson's 1/3 Rule – Simpson's 3/8 Rule

Numerical solution of Ordinary Differential equations: Solution by Taylor's series-Picard's Method of successive Approximations-Modified Euler's Method-Runge-Kutta Methods.

Unit Outcomes:

Students will be able to

- Solve integral equations using Simson's 1/3 and Simson's 3/8rule.
- Solve integral equations using Trapezoidalrule.
- Solve initial value problems to ordinary differential equations using Taylor'smethod.
- Solve initial value problems to ordinary differential equations using Euler's method and Runge Kuttamethods.

Unit-IV: Probability theory:

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

Unit Outcomes:

Students will be able to

- Understand the concept ofProbability.
- Solve problems on probability using addition law and multiplicationlaw.
- Understand Random variables and probability mass and densityfunctions.
- Understand stastical constants of randomvariables.

Unit-V: Random variables & Distributions:

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

Unit Outcomes:

Students will be able to

- Understand Probability distributionfunction.
- Solve problems on Binomialdistribution.
- Solve problems on Poissondistribution.
- Solve problems on Normaldistribution.

Course Outcomes:

After the completion of course, students will be able to

- Apply numerical methods to solve algebraic and transcendentalequations
- Derive interpolating polynomials using interpolationformulae
- Solve differential and integral equationsnumerically
- Apply Probability theory to find the chances of happening ofevents.
- Understand various probability distributions and calculate their statisticalconstants.

Text Books:

1. B.S.Grewal, “Higher Engineering Mathematics”, Khannapublishers.
2. Ronald E. Walpole “Probability and Statistics for Engineers and Scientists”,,PNIE.
3. Erwin Kreyszig, “Advanced Engineering Mathematics”, WileyIndia

Reference Books:

1. B.V.Ramana, “Higher Engineering Mathematics”, Mc Graw Hillpublishers.
2. Alan Jeffrey, “Advanced Engineering Mathematics”,Elsevier.

Sri Krishnadevaraya University College of Engineering & Technology

		L	T	P	C
B.Tech – II-II Sem	**(Electrical & Electronics Engineering)**	**3**	**0**	**0**	**3**

Engineering Electromagnetics

Course Objectives:

- To understand the basic principles of electrostatics
- To understand the basic principles of magneto statics for time invariant and time varying fields
- To understand the principles of dielectrics, conductors and magnetic potentials

UNIT-I ELECTROSTATICS

Electrostatic Fields - Coulomb's Law - Electric Field Intensity (EFI) due to Line, Surface and Volume charges- Work Done in Moving a Point Charge in Electrostatic Field-Electric Potential due to point charges, line charges and Volume Charges - Potential Gradient - Gauss Law-Application of Gauss Law-Maxwell's First Law – Numerical Problems.

Laplace and Poisson Equations - Solution of Laplace Equation in one Variable. Electric Dipole - Dipole Moment - Potential and EFI due to Electric Dipole - Torque on an Electric Dipole in an Electric Field – Numerical Problems.

Unit Outcomes:

- Able to Determine electric field and potentials using Coulomb's law & Gauss law.
- Analyze Potential differences for different configurations.
- Able to Classify static electric magnetic fields in different engineering situations.
- Able to Determine the Concepts of Electric dipole, Electrostatic Energy and Energy density.

UNIT- II CONDUCTORS AND DIELECTRICS

Behaviour of Conductors in an Electric Field-Conductors and Insulators – Electric Field Inside a Dielectric Material – Polarization – Dielectric Conductors and Dielectric Boundary Conditions – Capacitance-Capacitance of Parallel Plate, Spherical & Co-axial capacitors – Energy Stored and Energy Density in a Static Electric Field – Current Density – Conduction and Convection Current Densities – Ohm's Law in Point Form – Equation of Continuity – Numerical Problems.

Unit Outcomes:

- Analyze the Concepts of Conduction and Convection currents.
- Understand the concept of capacitance for parallel plates, spherical & co-axial capacitors.
- Able to Calculate Energy stored and energy density in a static electric fields.

UNIT-III MAGNETO STATICS

Static Magnetic Fields – Biot-Savart Law – Oersted's experiment – Magnetic Field Intensity (MFI) due to a Straight, Circular &Solenoid Current Carrying Wire – Maxwell's Second Equation. Ampere's Circuital Law and its Applications Viz., MFI Due to an Infinite Sheet of Current and a Long Current Carrying Filament – Point Form of Ampere's Circuital Law – Maxwell's Third Equation – Numerical Problems.

Magnetic Force — Lorentz Force Equation – Force on Current Element in a Magnetic Field - Force on a Straight and Long Current Carrying Conductor in a Magnetic Field - Force Between two Straight and Parallel Current Carrying Conductors – Magnetic Dipole and Dipole moment

– A Differential Current Loop as a Magnetic Dipole – Torque on a Current Loop Placed in a Magnetic Field – Numerical Problems.

Unit Outcomes:

- Analyze the Concepts of Magnetic field intensity using Biot-Savart Law & Ampere Law.
- Able to understand Maxwell's equations.
- Develop MFI due to an infinite sheet of current and a long filament carrying conductor in Different loops.

UNIT – IV MAGNETIC POTENTIAL

Scalar Magnetic Potential and Vector Magnetic Potential and its Properties - Vector Magnetic Potential due to Simple Configuration – Vector Poisson's Equations.

Self and Mutual Inductances – Neumann's Formulae – Determination of Self Inductance of a Solenoid and Toroid and Mutual Inductance Between a Straight, Long Wire and a Square Loop Wire in the Same Plane – Energy Stored and Intensity in a Magnetic Field – Numerical Problems.

Unit Outcomes:

- Understand scalar magnetic potential and vector magnetic potential and its applications.
- Able to calculate the magnetic forces and torque produced by currents in Magnetic Field.
- Ability to calculate self and mutual Inductances.
- Analyze the Concepts of Magnetic boundary conditions & Energy stored in the Magnetic field.

UNIT-V TIMEVARYING FIELDS

Faraday's Law of Electromagnetic Induction – It's Integral and Point Forms – Maxwell's Fourth Equation. Statically and Dynamically Induced E.M.F's – Simple Problems – Modified Maxwell's Equations for Time Varying Fields – Displacement Current, poynting theorem.

Unit Outcomes:

- Acquires knowledge on time varying fields & Faraday's law for Electromagnetic induction
- Analyze the Concepts Maxwell's Equations in Different Forms.
- Understand the Concepts Calculation of Poynting vector & Theorem.
- Analyze the Concepts of Wave Theory

Course Outcomes:

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

- Understand the concept of electrostatics
- Understand the concepts of Conductors and Dielectrics
- Understand the fundamental laws related to Magneto Statics
- Understand the concepts of Magnetic Potential and Time varying Fields

TEXT BOOKS:

1. Sadiku, Kulkarni, "Principles of Electromagnetics", 6th Edition, Oxford University Press, 2015
2. William.H.Hayt, "Engineering Electromagnetics", Mc Graw Hill, 2010.

REFERENCE BOOKS:

1. J.D.Kraus, "Electromagnetics", 5th Edition, Mc Graw Hill Inc, 1999.
2. David K. Cheng, "Field & Electromagnetic Waves", 2nd Edition, 1989.
3. Joseph A. Edminister, "Electromagnetics", 2Edition, Schaum's Outline, Mc Graw Hill,
4. K.A. Gangadhar and P.M. Ramanathan, "Electomagnetic Field Theory", 8th Reprint, Khanna Publications, 2015.

Sri Krishnadevaraya University College of Engineering & Technology

B.Tech – II –II Sem (Electrical & Electronics Engineering)

Generation of Electrical Power

L	T	P	C
3	0	0	3

4. Course Objectives:

- To know about the principles of power generation. Investigate the line diagram and components in thermal power station.
- To accredit hydro and nuclear power stations.
- To enable the process involved in solar, wind,biogas, geothermal and ocean energy generation
- To analyze economic aspects in power generation and to investigate different tariff methods.

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: HYDRO & NUCLEAR POWER GENERATING SYSTEMS

Hydro Power: Selection of Site, Classification, Layout, Description of Main Components.

Nuclear Power: Nuclear Fission and Chain Reaction.- Nuclear Fuels.- Principle of Operation of NuclearReactor.-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: 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 AxisWind Mills-Performance Characteristics- Power- Speed & Torque- Speed Characteristics-Pitch & Yaw Controls – Power Electronics Application – Economic Aspects.

UNIT-IV: BIOGAS & GEOTHERMAL POWER GENERATING SYSTEMS

Biogas Power Generation: Principles of Bioconversion, Types of Biogas Digesters–Characteristics ofBio-Gas-Utilization- Economic and Environmental Aspects.

Geothermal and Ocean Power Generation: Principle of Geothermal Energy Methods of Harnessing-Principle of Ocean Energy-Tidal and Wave Energy- Mini Hydel Plants- 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 Rate, Block-Rate, Two-Part, Three –Part, and Power Factor Tariff Methods and Numerical Problems.

Course Outcomes:

CO1	Understand the principles of power generation. Analyze the construction, working andoperating principle, and essential components of Thermal power generating station with their relative merits and demerits.
CO2	Analyze the construction, working and operating principle, and essential components of Hydro and Nuclear power generating stations.
CO3	Analyze the different methods and characteristics of solar, wind, biogas, geothermal and ocean power generating systems along with their economic and environmental aspects.
CO4	Carry out a detailed analysis on the economic aspects of power generation involving various tariff methods and costs of generation.

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:

5. Renewable Energy Resources – John Twidell and Tony Weir, Second Edition, Taylor and Francis Group, 2006.

Electrical Power Generation, Transmission and Distribution by S.N.Singh., PHI, 2003.

Sri Krishnadevaraya University College of Engineering & Technology

	L	T	P	C
B.Tech – II-II Sem (Electrical & Electronics Engineering)	**3**	**0**	**0**	**3**

Switching Theory & Logic Design

Course Objectives:

- To teach significance of number systems, conversions, binary codes and functionality of logic gates.
- To discuss different simplification methods for minimizing Boolean functions.
- To impart knowledge on operation, characteristics and various configurations of TTL and CMOS logic families.
- To outline procedures for the analysis and design of combinational and sequential logic circuits.
- To introduce programmable logic devices.

Unit I

Number Systems and Codes: Decimal, Binary, Octal, and Hexa -decimal number systems and their conversions, ASCII code, Excess -3 codes, Gray code.
Binary codes Classification, Error detection and correction – Parity generators and checkers
Boolean Algebra& Logic Gates: Boolean operations, Boolean functions, Algebraic manipulations, Min-terms and Max terms, Sum-of-products and Product-of-sum representations, Two-input logic gates, NAND /NOR implementations.
Minimization of Boolean Functions: Karnaugh map, Don't-care conditions, Prime implicants, Minimization of functions using Quine-McClusky method.
Unit Outcomes:

- Summarize advantages of using different number systems.
- Explain usefulness of different coding schemes and functionality of logic gates.
- Apply basic laws and De Morgan's theorems to simplify Boolean expressions.
- Compare K- Map and Q-M methods of minimizing logic functions.

Unit II

Combinational Circuits: Introduction, Analysis of combinational circuits, Design Procedure– Binary Adder-Subtractor, Decimal Adder, Multiplier, Comparator, Code Converters, Encoders, Decoders, Multiplexers, Demultiplexers, Illustrative examples.
Sequential Circuits-1: Introduction, Latches –RS latch and JK latch, Flip-flops-RS, JK, T and D flip flops, Master-slave flip flops, Edge-triggered flip-flops, Flip-flop conversions.
Unit Outcomes:

- Apply Boolean algebra for describing combinational digital circuits.
- Analyze standard combinational circuits such as adders, subtractors, multipliers, comparators etc.
- Design various Combinational logic circuits.
- Implement logic functions with decoders and multiplexers.

Unit III
Sequential Circuits-2: Analysis and Design of Synchronous Sequential Circuits: Moore and Mealy machine models, State Equations, State Table, State diagram, State reduction & assignment, Synthesis using flip flops
Registers and Counters: Registers, shift registers, Ripple counters, Synchronous counters, Modulus-n Counter, Ring counter, Johnson counter, Up-Down counter.
Unit Outcomes:

- Describe behaviour of Flip-Flops andLatches.
- Compare Moore and Mealy machinemodels.
- Design synchronous sequential circuits using flip flops and construct digital systems using components such as registers and counters
- Utilize concepts of state and state transition for analysis and design of sequential circuits

Unit IV
Memory and Programmable Logic: RAM, Types of Memories, Memory decoding, ROM, Types of ROM,

Programmable Logic Devices (PLDs): Basic concepts, PROM as PLD, Programmable Array Logic (PAL) and Programmable Logic Array (PLA), Design of combinational and sequential circuits usingPLDs.

Unit Outcomes:

- Define RAM, ROM, PROM, EPROM and PLDs.
- Describe functional differences between different types of RAM & ROM.

Unit V

Digital Logic Families: Unipolar and Bipolar Logic Families, Transistor-Transistor Logic (TTL): Operation of TTL, Current sink logic, TTL with active pull up, TTL with open collector output, Shockley TTL, TTL characteristics, I^2L, ECL logic Families.

CMOS: CMOS Inverter, CMOS characteristics, CMOS configurations - Wired Logic, Open drain outputs, Interfacing: TTL to CMOS and CMOS to TTL, Tristate Logic, Characteristics of Digital ICs: Speed, power dissipation, figure of merit, fan-out, Current and voltage parameters, Noise immunity, operating temperature range, power supply requirements.

Unit Outcomes:

- Summarize significance of various TTL , I^2L, ECL and CMOS subfamilies.
- Examine Interface aspects of TTL & CMOS logic families.
- Explain characteristics of digital ICs such as speed, power dissipation, figure of merit, fan-out, noise immunity etc.
- Compare bipolar and MOS logic families.

Course Outcomes:

After completion of the course, student will be able to

CO1: Understand various number systems, error detecting, correcting binary codes, logic families, combinational and sequential circuits.

CO2: Apply Boolean laws, k-map and Q-M methods to minimize switching functions. Also describe the various performance metrics for logic families.

CO3: Design combinational and sequential logic circuits.

CO4: Compare different types of Programmable logic devices and logic families.

TEXTBOOKS:

1. M. Morris Mano and Michael D. Ciletti, “Digital Design", 4thEdition, Pearson Education,2013.
2. Z. Kohavi and N. K. Jha, “Switching and Finite Automata Theory”, 3rd Edition, Tata McGraw Hill,2010.
3. R. P. Jain, "Modern Digital Electronics", 4thedition, McGraw Hill Education (India Private Limited),2012.

REFERENCES:

1. Wakerly J.F., “Digital Design: Principles and Practices”, 4th Edition, Pearson India, 2008.
2. Charles H Roth (Jr), Larry L. Kinney, “Fundamentals of Logic Design”, 5th Edition, Cengage Learning India Edition,2010.
3. John.M Yarbrough, “Digital Logic Applications and Design”, Thomson Learning, 2006.

Sri Krishnadevaraya University College of Engineering & Technology

		L	T	P	C
B.Tech – II-II Sem	**(Electrical & Electronics Engineering)**	**3**	**0**	**0**	**3**

Analog Electronic Circuits

Course Objectives:

- List various types of feedback amplifiers, oscillators and large signal Amplifiers.
- Explain the operation of various electronic circuits and linear ICs.
- Apply various types of electronic circuits to solve engineering problems
- Analyse various electronic circuits and regulated power supplies for proper understanding
- Justify choice of transistor configuration in a cascade amplifier.
- Design electronic circuits for a given specification.

Unit 1

Multistage Amplifiers: Classification of amplifiers, different coupling schemes used inamplifiers, general analysis of cascade amplifiers, Choice of transistor configuration in a cascade amplifier, frequency response and analysis of two stage RC coupled and direct coupled amplifiers, principles of Darlington amplifier, Cascode amplifier.

Unit outcomes:

- Name different coupling schemes in amplifiers (L1)
- Explain the principles of Darlington amplifier (L2)
- Apply multistage amplifiers to solve engineering problems (L3)
- Analyse multistage amplifiers (L4)
- Justify choice of transistor configuration in a cascade amplifier (L5)

Unit 2

Feedback Amplifiers: Concepts of Feedback, Classification of Feedback Amplifiers, TransferGain with Feedback, General Characteristics of Negative-Feedback Amplifiers, Effect of Feedback on Amplifier characteristics, Analysis of a feedback Amplifiers - Voltage – Series, Current-Series, Current-shunt and Voltage – shunt.

Oscillators

Sinusoidal Oscillators, Conditions for oscillations, Phase - shift Oscillator, Wien Bridge Oscillator, L-C Oscillators (Hartley and Colpitts).

Unit Outcomes:

- Classify feedback amplifiers and oscillators (L1)
- Explain the concept of feedback and conditions for oscillations (L2)
- Apply the feedback amplifiers and oscillators to solve engineering problems (L3)
- Analyse feedback amplifiers and oscillator (L4)

Unit 3

Large Signal Amplifiers(Power Amplifiers): Introduction, Classification, Class A large signalamplifiers, Second - Harmonic Distortion, Higher - Order Harmonic Generations, Transformer Coupled Class A Audio Power Amplifier, Efficiency of Class A, Class B, Class AB Amplifiers, Distortion in Power Amplifiers, Class C Power Amplifier.

Unit Outcomes:

- Classify the large signal amplifiers (L1)
- Explain the operation of different types of large signal amplifiers (L2)
- Apply large signal amplifiers in a given engineering situation (L3)
- Analyse harmonic distortion in large signal amplifiers (L4)

Unit 4: Linear Integrated Circuits:

Operational Amplifier: Introduction, Block diagram, Characteristics and Equivalent circuits ofan ideal op-amp, Various types of Operational Amplifiers and their applications, Power supply configurations for OP-AMP applications, Inverting and non-inverting amplifier configurations. The Practical op-amp: Introduction, Input offset voltage, Offset current, Thermal drift, Effect of variation in power supply voltage, common-mode rejection ratio, Slew rate and its Effect, PSRR and Gain – bandwidth product, frequency limitations and compensations, transient response.

Unit Outcomes:

- Understand different Offsets present in Op amp & nullification circuits. (L1)
- Examine performance of Op-Amp in open loop and closed configurations. (L2)
- Analyse emitter-coupled differential amplifier. (L3)
- Compare ideal and practical Op-Amps. (L5)

Unit 5: Applications of Linear Integrated Circuits:

Adder, Integrator, Differentiator, Difference amplifier and Instrumentation amplifier, Converters: Current to voltage and voltage to current converters, Active Filters: First order filters, second order low pass, high pass, band pass and band reject filters, Oscillators: RC phase shift oscillator, Wien bridge oscillator, Square wave generator.

Special Purpose Integrated Circuits: Functional block diagram, working, design andapplications of Timer 555 (Monostable &Astable), Functional block diagram, working and applications of VCO 566, PLL 565, Fixed and variable Voltage regulators.

Unit Outcomes:

- Understand various applications of Linear ICs (L1)
- Explain operation of Op. Amp. in various applications, Timer, Fixed voltage regulators(L2)
- Apply linear ICs in a given engineering situation (L3)

Course outcomes:

On successful completion of the course, the student shall be able to

CO1. List various types of feedback amplifiers, oscillators and large signal amplifiers (L1)

CO2. Explain the operation of various electronic circuits and linear ICs (L2)

CO3. Apply various types of electronic circuits to solve engineering problems (L3)

CO4. Analyse various electronic circuits and regulated power supplies for proper understanding (L4)

CO5. Justify choice of transistor configuration in a cascade amplifier (L5)

CO6. Design electronic circuits for a given specification (L6)

Text Books:

1. Millman, Halkias and Jit, "Electronic Devices and Circuits", 4th Edition, Mc Graw Hill Education (India) Private Ltd., 2015.
2. Salivahanan and N. Suresh Kumar, "Electronic Devices and Circuits", 4th Edition, Mc Graw Hill Education (India) Private Ltd., 2017.
3. Ramakanth A. Gayakwad, "Op-Amps & Linear ICs", 4th Edition, Pearson, 2017.

Reference Books:

1. Millman and Taub, Pulse, Digital and Switching Waveforms, 3rd Edition, Tata McGraw-Hill Education, 2011.
2. J. Milliman, C. C. Halkias and Chetan Parikh, "Integrated Electronics", 2nd Edition, Mc Graw Hill, 2010.
3. David A. Bell, "Electronic Devices and Circuits", 5th edition, Oxford Press, 2008.
4. D. Roy Choudhury, "Linear Integrated Circuits", 2ndEdition,New Age International (p) Ltd, 2003.

Sri Krishnadevaraya University College of Engineering & Technology

B.Tech II Year II Sem	**ELECTRICAL CIRCUITS – II**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Objectives:

To make the student learn about

- Various parameters of single phase sinusoidal waves and its representation..
- Single phase circuits locus diagrams and three phase circuits parameters
- Network theorems for a.c excitations
- To analyze the responses of circuits for D.C and A.C excitations
- To Understand the two port network parameters and its relations .

UNIT - I Single Phase A.C Circuits-I :

R.M.S and Average values and form factor for different periodic wave forms, Steady state analysis of R, L and C (in series, parallel and series parallel combinations) with sinusoidal excitation - Concept of Reactance, Impedance, Susceptance and Admittance - Phase and Phase difference - concept of power factor, Real and Reactive powers - J-notation, Complex and Polar forms of representation.

Unit Outcomes:

- To know about RMS, average and form factors of various periodic waveforms
- To know about steady state analysis of RLC with sinusoidal excitations.
- To understand phase and phase difference, power and power factor.

UNIT – II Single Phase A.C Circuits-II

Complex power - Locus diagrams - series R-L, R-C, R-L-C and parallel combination with variation of various parameters - Resonance - series, parallel circuits, concept of band width and Q factor.

Three Phase Circuits **:** Three phase circuits: Phase sequence - Star and delta connection - Relation between line and phase voltages and currents in balanced systems - Analysis of balanced and Unbalanced 3 phase circuits - Measurement of active and reactive power.

Unit Outcomes:

- To draw locus diagrams of R-L, R-C, R-L-C circuits
- To know about Resonance - series, parallel circuits of R-L, R-C, R-L-C circuits.
- To understand three phase circuit connections its relation with voltages and measurement of power.

UNIT - III Network theorems for A.C Excitations

For AC excitation: Duality & Dual networks. Tellegen's, Superposition, Reciprocity, Thevenin's, Norton's, Maximum Power Transfer, Millman's and Compensation theorems for a.c. excitations.

Unit Outcomes:

- To analyse Superposition, Thevinin's , Nortones , Maximum power transfer, Tellegen's, millimance and compensation theorems for AC excitations

UNIT – IV Transient Analysis :

Transient response of R-L, R-C, R-L-C circuits (Series and Parallel combinations) for d.c. and sinusoidal excitations - Initial conditions – Classical method and laplace transforms methods of solutions.

Unit Outcomes:

- To study the Transient response of R-L, R-C, R-L-C circuits
- To understand the laplace transforms methods of solutions.

UNIT – V Network parameters

Two port network parameters - Z, Y, ABCD and hybrid parameters and their relations -concept of transformed network - 2-port network parameters using transformed variables.

Unit Outcomes:

- To understand the Two port network parameters and their relations.
- To understand the concept of transformed network - 2-port network parameters using transformed variables.

TEXT BOOKS :

1. Engineering circuit analysis - by William Hayt and Jack E. Kemmerly, Mc Graw Hill Company, 6th edition.

2.Network Theory : N.C. Jagan & C.Lakshminarayana, B.S Publications . REFERENCES :

1. Network Analysis by Vanvalkenburg, PHI.

2. Linear circuit analysis (time domain phasor ,and Laplace transform approaches). Second edition by RAYMOND A.DeCARLO and PEN-MIN-LIN, Oxford University Press. Second edition 2004.

3. "Circuits" by Carlson, Thomson Publishers.

4. Network Analysis: - C.K. Mithal, Khanna Publishers.

5. Electric Circuits by A. Chakrabarthy, Dhanipat Rai & Sons.

6. Electric Circuit theory by K. Rajeswaran, Pearson Education,2004.

Sri Krishnadevaraya University College of Engineering & Technology

B.Tech – II-ISem(Electrical & Electronics Engineering)

L	T	P	C
0	0	2	1

Electrical Circuits Lab

Hands-on experiments related to the course contents of **Electrical Circuit Analysis**

1. Verification of Thevenin's and Norton's Theorems
2. Verification of Superposition Theorem for average and rms values
3. Maximum Power Transfer Theorem for DC and AC circuits
4. Verification of Compensation Theorem for DC circuits
5. Verification of Reciprocity, Millmann's Theorems for DC circuits
6. Determination of Self, Mutual Inductances and Coefficient of Coupling
7. Measurement of Active Power for Star Connected Balanced Loads
8. Measurement of Reactive Power for Star Connected Balanced Loads
9. Measurement of 3-Phase Power by Two Wattmeter Method for Unbalanced Loads
10. Measurement of Active Power for Delta Connected Balanced Loads
11. Measurement of Reactive Power for Delta Connected Balanced Loads

Course Outcomes:

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

CO1: Remember, understand and apply various theorems and verify practically.

CO2: Understand and analyze active, reactive power measurements in three phase balanced & un balanced circuits.

Sri Krishnadevaraya University College of Engineering & Technology

B.Tech – II-II Sem (Electrical & Electronics Engineering)	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

Analog Electronic Circuits Lab

Course Objectives:

To learn basic techniques for the design of analog circuits, digital circuits and fundamental concepts used in the design of systems.
To design and analyze multistage amplifiers, feedback amplifiers and OP AMP based circuits.
To implement simple logical operations using combinational logic circuits To design combinational logic circuits, sequential logic circuits.

PART A

List of Experiments:

1. Design and simulate two stage RC coupled amplifier for given specifications. Determine Gain and Bandwidth from its frequency response curve.
2. Design and simulate Darlington amplifier. Determine Gain and Bandwidth from its frequency response curve.
3. Design and simulate voltage series feedback amplifier for the given specifications. Determine the effect of feedback on the frequency response of a voltage series feedback amplifier.
4. Design RC Phase shift oscillator/Wien bridge oscillator and square wave generator for the given specifications. Determine the frequency of oscillation.
5. Analyze a Class B complementary symmetry power amplifier and observe the waveforms with and without cross-over distortion. Determine maximum output power and efficiency.
6. Design inverting and non inverting amplifiers for the given specifications using OP-AMP and verify the same experimentally.
7. Design practical differentiator and integrator circuits using OP-AMP for the given specifications and verify the same practically.
8. Design a second order low pass and high pass active filters using OP-AMP using the given specifications. Verify them practically.
9. Design an astable multi-vibrator circuit for the given specifications using 555 timer. Observe ON & OFF states of transistor in an astable multi-vibrator. Plot output waveforms.

Note: Design & simulate any 6 experiments with Multisim / PSPICE or equivalent software and verify the results in hardware lab with discrete components.

PART B

List of Experiments:

1. To study basic gates (AND, OR, NOT) and verify their truth tables.
2. Realization of Boolean Expressions using Gates
3. Design a 3 – bit Adder / Subtractor
4. Design and realization a 4 – bit gray to Binary and Binary to Gray Converter
5. Design and construct basic flip-flops R-S,J-K,J-K Master slave flip-flops using gates and verify their truth tables
6. Design and implementation of Mod-N synchronous counter using J-K flip-flops.

7. Design and implementation of i) Ring counter and ii) Johnson counter using 43 bit shift register
8. Design and realization of 8x1 MUX using 2x1 MUX

Note: Student has to perform minimum of 4 experiments using digital ICs

Course Outcomes:

At the end of this course, students will demonstrate the ability to

- Analyze various amplifier circuits.
- Design multistage amplifiers.
- Design OPAMP based analog circuits.
- Understand working of logic gates.
- Design and implement Combinational and Sequential logic circuits.

Sri Krishnadevaraya University College of Engineering & Technology					
Dept. of Electrical and Electronics Engineering					
III Year 1st Semester 1					
S.No	**Course Code**	**Course Name**	**Category**	**L-T-P**	**Credits**
1.		Power Electronics	PC	3-0-0	3
2.		Electrical Machines - II	PC	3-0-0	3
3.		Control systems	PC	3-0-0	3
4.		Managerial Economics and Financial Analysis	HS	3-0-0	3
5.		**Professional Elective courses-I** 1. Transmission of Electric Power 2. High voltage Engineering 3. Power system stability	PE-I	3-0-0	3
6.		Open Elective Course-I	OE-I	3-0-0	3
7.		A.C Machines Lab	PC	0-0-3	1.5
8.		Control systems and Simulation Lab	PC	0-0-3	1.5
9.		Socially Relevant Project(15hrs/Sem)	PR	- - -	0.5
				Total Credits	**21.5**

Category	**CREDITS**
Professional core courses	12
Professional Elective courses	03
Humanities and Social Science	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

B.Tech III – I Sem	**(Electrical And Electronics Engineering)**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Power Electronics

Course Objectives:

The student will be able to:

- Understand the differences between signal level and power level devices.
- Analyze controlled rectifier circuits.
- Analyze the operation of DC-DC choppers.
- Analyze the operation of voltage source inverters.

Course Outcomes:

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

- Understand the operation, characteristics and usage of basic Power Semiconductor Devices.
- Understand different types of Rectifier circuits with different operating conditions.
- Understand the construction and operation of AC Voltage Controllers and Cyclo Converters.
- Apply all the above concepts to solve various numerical problem solving

UNIT – I POWER SEMI CONDUCTOR DEVICES

Thyristors – Silicon Controlled Rectifiers (SCR's) – BJT – Power MOSFET – Power IGBT and their characteristics and other thyristors – Basic theory of operation of SCR – Static characteristics – Turn on methods- Dynamic characteristics of SCR - Turn on and Turn off times -Salient points.Two transistor analogy – SCR – R and RC Triggering - UJT firing circuit —– Series and parallel connections of SCR's – Snubber circuit details – Specifications of SCR's, BJT, IGBT - Numerical problems.

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UNIT – II PHASE CONTROLLED RECTIFIERS

Phase control technique – Single phase Line commutated converters – Mid point and Bridge connections – Half controlled converters with Resistive, RL loads and RLE load– Derivation of average load voltage and current -Active and Reactive power inputs to the converters without and with Freewheeling Diode – Numerical problems.

Fully controlled converter- Midpoint and Bridge connections with Resistive, RL loads - Derivation of average load voltage and current – Line commutated inverters -Active and Reactive power inputs to the converters without and with Freewheeling Diode, Effect of source inductance – Derivation of load voltage and current – Numerical problems..

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UNIT – III THREE PHASE LINE COMMUTATED CONVERTERS

Three phase converters – Three pulse and six pulse converters – Mid point and bridge connections average load voltage With R and RL loads – Effect of Source inductance–Dual converters (both single phase and three phase) - Waveforms –Numerical Problems

.

UNIT – IV 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. Morgan chopper- Jones chopper (Principle of operation only) wave forms, Problems.

INVERTERS-Inverters – Single phase inverter – Basic series inverter – Basic parallel Capacitor inverter bridge inverter – Waveforms – 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, Numerical Problems.

TEXT BOOKS:

1. M. H. Rashid, "Power Electronics: Circuits, Devices and Applications", 2nd edition, Prentice Hall of India, 1998
2. P.S.Bimbhra,"Power Electronics", 4th Edition, Khanna Publishers, 2010.
3. M. D. Singh & K. B. Kanchandhani, "Power Electronics", Tata Mc Graw Hill Publishing Company, 1998.

REFERENCE BOOKS:

1. Ned Moha, "Power Electronics", Wiley, 2011.
2. Robert W. Erickson and Dragan Maksimovic, "Fundamentals of Power Electronics" 2nd Edition, Kluwer Academic Publishers, 2004.
3. Vedam Subramanyam, "Power Electronics", New Age International (P) Limited, 1996.
4. V.R.Murthy, "Power Electronics", 1st Edition, Oxford University Press, 2005.

Sri Krishnadevaraya University College of Engineering & Technology

B.Tech III – I Sem (Electrical And Electronics Engineering)

L	T	P	C
3	0	0	3

Electrical Machines – II

Course objectives:

This course amis at providing the student to acquire the knowledge on:

- Transformers
- Testing of transformers
- Poly phase transformers
- Poly phase induction motors
- Characteristics and testing of induction motors

UNIT-I: TRANSFORMERS

General aspects - basic definitions - working principle - rating – types of transformers-construction - types windings, - transformer cooling - ideal transformer e.m.f. equation - transformation ratio - operation on no-load, load - resistance and magnetic leakage - equivalent resistance and reactance - voltage drop in a transformer - regulation.

UNIT-II : TESTING OF TRANSFORMERS

Transformer tests - O.C and S.C tests - Sumpner's or Back to Back test Transformer losses, efficiency - All-day efficiency - Auto transformers - polarity of transformers - parallel operation of transformers.

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UNIT –III: POLY PHASE TRANSFORMERS

Poly phase transformers – Poly phase connections - Y/Y, Y/Δ, Δ/Y, Δ/Δ and open Δ,- three winding transformers- off load and on load tap changing; Scott connection.

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UNIT – IV: POLY PHASE INDUCTION MOTORS

Poly phase induction motors-construction details of cage and wound rotor machines-production of a rotating magnetic field - principle of operation –Slip, rotor speed, rotor emf and rotor frequency - rotor reactance, rotor current and pf at standstill and during operation.

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UNIT-V: CHARACTERISTICS AND TESTING OF INDUCTION MOTORS

Rotor power input, rotor copper loss and mechanical power developed and their inter relation-torque equation-expressions for starting torque, running torque and maximum torque - torque slip characteristic - crawling and cogging -double cage and deep bar rotors. Load test - Circle diagram-no load and blocked rotor tests-simple problems SPEED CONTROL OF INDUCTION MOTOR-: Speed control-change of frequency - change of poles and methods of consequent poles- cascade connection-injection of an emf into rotor circuit - induction generator-principle of operation..

TEXT BOOKS:

1. Theory and Performance of Electrical machines- J.B.Gupta
2. Electrical Machinery by P.S.Bimbhra, Khanna Publishers

REFERENCE BOOKS:

1. Electric machinery - A.E. Fitzgerald, C.Kingsley and S.Umans, Mc Graw Hill Companies, 5th edition
2. Generalized theory of Electrical Machines by P.S.Bimbra
3. Electric Machines -by I.J.Nagrath & D.P.Kothari,Tata Mc Graw Hill, 7th Edition 2005.
4. Electrical Machines, 2nd edition - by Ashfaq Hussain

Sri Krishnadevaraya University College of Engineering & Technology

B.Tech III – I Sem (Electrical And Electronics Engineering)

L	T	P	C
3	0	0	3

Control Systems

Course Objectives:

To make the students learn about:

- Merits and demerits of open loop and closed loop systems; the effect of feedback
- The use of block diagram algebra and Mason's gain formula to find the overall transfer function
- Transient and steady state response, time domain specifications and the concept of Root loci
- Frequency domain specifications, Bode diagrams and Nyquist plots
- State space modelling of Control system

Course Outcomes:

After completing the course, the student should be able to:

- Understand the concepts of control systems classification feedback effect, mathematical modeling, time response and frequency response characteristics, state space analysis
- Apply the concepts of Block diagram reduction, Signal flow graph method and state space formulation for obtaining mathematical and Root locus, Bode, Nyquist, Polar plots for stability calculations, controllability and observability and demonstrate the use of these techniques.
- Analyse time response analysis, error constants, and stability characteristics of a given mathematical model using different methods.
- Design and develop different compensators, controllers and their performance evaluation for various conditions. Implement them in solving various engineering applications.

UNIT – I CONTROL SYSTEMS CONCEPTS

Open loop and closed loop control systems and their differences- Examples of control systems- Classification of control systems, Feedback characteristics, Effects of positive and negative feedback, Mathematical models – Differential equations of translational and rotational mechanical systems and electrical systems, Analogous Systems, Block diagram reduction methods – Signal flow graphs - Reduction using Mason's gain formula. Principle of operation of DC and AC Servo motor, Transfer function of DC servo motor - AC servo motor, Synchros.

UNIT-II TIME RESPONSE ANALYSIS

Step Response - Impulse Response - 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, P, PI, PID Controllers.

UNIT– III STABILITY ANALYSIS IN TIME DOMAIN

The concept of stability – Routh's stability criterion – Stability and conditional stability – limitations of Routh's stability. 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-Stability Analysis from Bode Plots. Polar Plots-Nyquist Plots- Phase margin and Gain margin-Stability Analysis. Compensation techniques – Lag, Lead, Lag-Lead Compensator design in frequency Domain.

UNIT– V STATE SPACE ANALYSIS OF CONTINUOUS SYSTEMS

Concepts of state, state variables and state model, state models - differential equations & Transfer function models - Block diagrams. Diagonalization, Transfer function from state model, Solving the Time invariant state Equations- State Transition Matrix and it's Properties. System response through State Space models. The concepts of controllability and observability, Duality between controllability and observability.

TEXT BOOKS:

1. Katsuhiko Ogata, "Modern Control Engineering", 5th edition, Prentice all of India Pvt. Ltd., 2010.
2. I. J. Nagrath and M. Gopal, "Control Systems Engineering" 5th edition, New Age International (P) Limited Publishers, 2007.
3. A.Nagoor Kani "Control Systems " 2nd edition ,RBA Publications.

REFERENCE BOOKS:

1. M. Gopal, "Control Systems Principles & Design" 4th Edition, Mc Graw Hill Education, 2012.
2. B. C. Kuo and Farid Golnaraghi, "Automatic Control Systems" 8th edition, John wiley and sons, 2003.
3. Joseph J Distefano III, "Feedback and Control Systems", Allen R Stubberud & Ivan J Williams, 2nd Edition, Schaum's outlines, Mc Graw Hill Education, 2013.
4. Graham C. Goodwin, "Control System Design" Stefan F. Graebe and Mario E. Salgado, Pearson, 2000.
5. Gene F. Franklin, "Feedback Control of Dynamic Systems", J.D. Powell and Abbas Emami-Naeini, 6th Edition, Pearson, 2010.

Sri Krishnadevaraya University College of Engineering & Technology

B.Tech III – I Sem (Electrical And Electronics Engineering)

L	T	P	C
3	0	0	3

Managerial Economics & Financial Analysis

Course Objectives:

The objective of this course is

- To inculcate the basic knowledge of micro economics and financial accounting
- To make the students learn how demand is estimated for different products
- To know the input- output relationship for optimizing production and cost
- To give an overview on investment appraisal methods to promote the students to learn how to plan long-term investment decisions.
- To provide fundamental skills on Accounting and to explain the process of preparing Financial statements

Course Outcomes:

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

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

UNIT I - INTRODUCTION TO MANAGERIAL ECONOMICS

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

UNIT II – ELASTICITY AND FORECASTING DEMAND:

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

UNIT III: THEORY OF PRODUCTION AND COST ANALYSIS

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

UNIT –IV FORMS OF BUSINESS ORGANIZATIONS AND NEW ECONOMIC ENVIRONMENT.

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

UNIT –V CAPITAL BUDGETING AND FINACIAL ACCOUNTING

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

Data Books Required:

Present Value Factors table

TEXT BOOKS:

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

REFERENCES:

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

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B.Tech III – I Sem	**(Electrical And Electronics Engineering)**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Transmission of Electric Power

(Professional Elective Course-I)

Course Objectives :

The objectives of this course are

- Understanding the transmission line resistance, conductance, capacitance and their problems.
- Analyze classifications of transmission lines.
- Analyze types of transients, Bewley's Lattices diagrams.
- Analyze overhead line insulators, sag and tension calculations.
- Analyze Underground cables.

UNIT-I TRANSMISSION LINE PARAMETERS

Types of conductors - calculation of resistance for solid conductors - Calculation of inductance for single phase and three phase, concept of GMR & GMD, symmetrical and asymmetrical conductor configuration with and without transposition, Numerical Problems. Calculation of capacitance for 2 wire and 3 wire systems, effect of ground on capacitance, capacitance calculations for symmetrical and asymmetrical single and three phase, Numerical Problems.

UNIT-II PERFORMANCE TRANSMISSION LINES

Classification of Transmission Lines - Short, medium and long line and their model - representations - Nominal-T, Nominal-Pie and A, B, C, D Constants. Numerical Problems. Mathematical Solutions to estimate regulation and efficiency of all types of lines - Numerical Problems. Long Transmission Line-Rigorous Solution, evaluation of A,B,C,D Constants– Equivalent T and Equivalent – π – surge Impedance and surge Impedance loading - wavelengths and Velocity of propagation – Ferranti effect , Charging current.

UNIT – III POWER SYSTEM TRANSIENTS

Types of System Transients - Travelling or Propagation of Surges - Attenuation, Distortion, Reflection and Refraction Coefficients - Termination of lines with different types of conditions - Open Circuited Line, Short Circuited Line, T-Junction, Lumped Reactive Junctions (Numerical Problems). Bewley's Lattice Diagrams (for all the cases mentioned with numerical examples).

UNIT-IV: INSULATORS, SAG, TENSION AND CORONA

Corona - Description of the phenomenon, factors affecting corona, critical voltages and power loss, Radio Interference. OVERHEAD LINE INSULATORS SAG AND TENSION CALCULATIONS-Types of Insulators, String efficiency and Methods for improvement, Numerical Problems - voltage distribution, calculation of string efficiency, Capacitance grading and Static Shielding. Sag and Tension Calculations with equal and unequal heights of towers, Effect of Wind and Ice on weight of Conductor, Numerical Problems - Stringing chart and sag template and its applications.

UNIT-V: UNDERGROUND CABLES

Types of Cables, Construction, Types of Insulating materials, Calculations of Insulation resistance and stress in insulation, Numerical Problems. Capacitance of Single and 3-Core belted cables, Numerical Problems. Grading of Cables - Capacitance grading, Numerical Problems, Description of Inter-sheath grading. .

TEXT BOOKS:

1. A Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, U.S.Bhatnagar, A.Chakrabarthy, Dhanpat Rai & Co Pvt. Ltd.
2. Electrical power systems - by C.L.Wadhwa, New Age International (P) Limited, Publishers,1998.
3. Power System Engineering by R. K. Rajput, Laxmi Publications, 1st Edition.

REFERENCE BOOKS:

1. Power system Analysis-by John J Grainger, William D Stevenson, TMC Companies, 4th edition
2. Power System Analysis and Design by B.R.Gupta, S. Chand & Co, 6th Revised Edition, 2010.
3. Modern Power System Analysis by I.J.Nagarath and D.P.Kothari, Tata McGraw Hill, 2nd Edition.
4. Electric Power Transmission System Engineering: Analysis and Design, by Turan Gonen, 2nd Edition, CRC Press.

Sri Krishnadevaraya University College of Engineering & Technology

B.Tech III – I Sem (Electrical And Electronics Engineering)	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

High Voltage Engineering

(Professional Elective course-I)

Course Objectives:

To get the student exposed to:

- Formation and breakdown in gaseous liquid dielectrics and solid dieletrics
- High voltage DC transmission systems
- Flexible AC transmission systems
- Various configurations of the above, Principle of operation, Characteristics of various devices

Course Outcomes:

Knowing this student exposed to:

- Formation and breakdown in gaseous liquid dielectrics and solid dieletrics
- High voltage DC transmission systems
- Flexible AC transmission systems
- Various configurations of the above, Principle of operation, Characteristics of various devices.

UNIT-I INTRODUCTION AND BREAK DOWN IN GASEOUS LIQUID DIELECTRICS AND SOLID DIELECTRICS

Introduction to HV technology, need for generating high voltages in laboratory. Industrial applications of high voltage, Electrostatic precipitation, separation. Gases as insulating media, collision process, Ionization process, Townsend's criteria of breakdown in gases, Paschen's law, Liquid as Insulator, pure and commercial liquids, breakdown in pure and commercial liquids. Intrinsic breakdown, electromechanical breakdown, thermal breakdown, breakdown of solid dielectrics in practice, Breakdown in composite dielectrics, solid dielectrics used in practice.

UNIT – II GENERATION OF HV AC AND DC VOLTAGE

HV AC-HV transformer: Need for cascade connection and working of transformers units connected in cascade. Series resonant circuit- principle of operation and advantages - Tesla coil - HV DC- voltage doubler circuit, Cockroft- Walton type high voltage DC set - Calculation of high voltage regulation, ripple and optimum number of stages for minimum voltage drop.

UNIT - III GENERATION OF IMPULSE VOLTAGE AND CURRENT:

Introduction to standard lightning and switching impulse voltages - Analysis of single stage impulse generator-expression for Output impulse voltage - Multistage impulse generator working of Marx impulse generator, Rating of impulse generator - Components of multistage impulse generator - Triggering of impulse generator by three electrode gap arrangement - Trigatron gap and oscillograph time sweep circuits, Generation of switching impulse voltage - Generation of high impulse current.

UNIT –IV MEASUREMENT OF HIGH VOLTAGES:

Electrostatic voltmeter-principle, construction and limitation - Chubb and Fortescue method for HV AC measurement - Generating voltmeter- Principle, construction - Series resistance micro ammeter for HV DC measurements - Standard sphere gap measurements of HVAC, HVDC and impulse voltages - Factors affecting the measurements - Potential dividers-resistance dividers capacitance dividers mixed RC potential dividers. Measurement of high impulse currents-Rogowsky coil.

UNIT – V NON-DESTRUCTIVE INSULATION TESTING TECHNIQUES

Dielectric loss and loss angle measurements using Schering Bridge - Transformer ratio Arms Bridge. Need for

discharge detection and PD measurements aspects - Factors affecting the discharge detection, Discharge detection methods-straight and balanced methods.

HIGH VOLTAGE TESTS ON ELECTRICAL APPARATUS-Definitions and terminology, tests on isolators, circuit breakers, cables, insulators and transformers.

TEXT BOOKS:

1. High Voltage Engineering by M.S.Naidu and V. Kamaraju – TMH Publications, 4th Edition
2. High Voltage Engineering by C.L.Wadhwa, New Age Internationals (P) Limited, 1997.
3. High Voltage Engineering Problems & Solutions, R. D. Begamudre, New Age International Publishers, First Edt., 2010.

REFERENCE BOOKS:

1. High Voltage Engineering: Fundamentals by E.Kuffel, W.S.Zaengl, J.Kuffel by Elsevier, 2nd Edition.
2. High Voltage Insulation Engineering by Ravindra Arora, Wolfgang Mosch, New Age International (P) Limited, 1995.
3. High Voltage Technology by L. L. Alston, OXFORD University Press, Second Edition,

Sri Krishnadevaraya University College of Engineering & Technology

B.Tech III – I Sem	**(Electrical And Electronics Engineering)**	**L**	**T**	**P**	**C**
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Power System Stability

(Professional Elective Course-I)

COURSE OBJECTIVES:

- To get knowledge about mathematical model and system responses for small disturbances
- To get knowledge about system analysis at dynamic and transient state
- To get knowledge about power system stabilizers
- To get knowledge about excitation require to the system
- To get knowledge about stability analysis of the system

COURSE OUTCOMES:

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

- How system reacts mathematical model and system responses for small disturbances
- In the system analysis at dynamic and transient state positions
- Make power system stabilizers connect to system
- How much excitation require to the system
- The stability analysis of the system

UNIT- I: THE ELEMENTARY MATHEMATICAL MODEL AND SYSTEM RESPONSE TO SMALL DISTURBANCES

A Classical model of one machine connected to an infinite bus – Classical model of multimachine system – Problems – Effect of the excitation system on Transient stability. The unregulated synchronous Machine – Effect of small changes of speed – Modes of oscillation of an unregulated multimachine system – Regulated synchronous machine – Voltage regulator with one time lag – Governor with one time lag – Problems.

UNIT- II: DYNAMIC STABILITY & TRANSIENT ANALYSIS

Concept of Dynamic stability – State space model of one machine system connected to infinite bus – Effect of excitation on Dynamic stability – Examination of dynamic stability by Routh's criterion – TRANSIENT ANALYSIS-Transient Analysis of Three-Phase Power Systems Symmetrical Components in Three Phase Systems - Sequence Components for Unbalanced Network Impedances - The Sequence Networks - The Analysis of Unsymmetrical Three-Phase Faults - The Single Line-to-Ground Fault - The Three-Phase-to-Ground Fault.

UNIT- III: POWER SYSTEM STABILIZERS

Introduction to supplementary stabilizing signals - Block diagram of the linear system - Approximate model of the complete exciter – Generator system – Lead compensation – Stability aspect using Eigen value approach.

UNIT- IV: EXCITATION SYSTEMS

Excitation system response – Non-continuously regulated systems – Continuously regulated systems – Excitation system compensation – State space description of the excitation system - Simplified linear model – Effect of excitation on generator power limits. Type –2 system: Rotating rectifier system, Type-3 system: Static with terminal potential and current supplies - Type –4 system: Non – continuous acting - Block diagram representation – State space modeling equations of these types.

Unit outcomes:

UNIT - V: STABILITY ANALYSIS

Review of Lyapunov's stability theorems of non-liner systems using energy concept – Method based on first concept – Method based on first integrals – Quadratic forms – Variable gradient method – Zubov's method – Popov's method, Lyapunov function for single machine connected to infinite bus. What is voltage stability – Factors affecting voltage instability and collapse – Comparison of Angle and voltage stability – Analysis of

voltage instability and collapse – Integrated analysis of voltage and Angle stability – Control of voltage instability.

TEXT BOOKS:

1. P.M.Anderson, A.A.Fouad, “Power System Control and Stability”, IOWA State University Press, Galgotia Publications, Vol-I, 1st Edition.
2. Transients in Power System, Lou Van Der Sluis, John Wiley & Sons.

REFERENCE BOOKS:

1. M.A.Pai, Power System Stability-Analysis by the direct method of Lyapunov, North Holland Publishing Company, New York, 1981. EPS R-13 2 JNTUA COLLEGE OF ENGINEERING (Autonomous) PU

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AC Machines Lab

The following experiments are required to be conducted as compulsory experiments:

1. O.C. & S.C. Tests on Single phase Transformer
2. Sumpner's test on a pair of single phase transformers
3. Scott connection of transformers
4. No-load & Blocked rotor tests on three phase Induction motor
5. Regulation of a three –phase alternator by synchronous impedance & m.m.f. methods
6. V and Inverted V curves of a 3 phase synchronous motor.
7. Equivalent Circuit of a single phase induction motor
8. Determination of Xd and Xq of a salient pole synchronous machine

In addition to the above eight experiments, atleast any two of the following experiments are required to be conducted from the following list:

1. Parallel operation of Single phase Transformers
2. Separation of core losses of a single phase transformer
3. Brake test on three phase Induction Motor
4. Regulation of three-phase alternator by Z.P.F. and A.S.A methods

TEXT BOOKS:

1. Electrical Machines Lab manual with MATLAB Programs by Dr. D. K. Chaturvedi, University Science Press.

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Control Systems and Simulation Lab

Any Eight of the following experiments are to be conducted:

1. Time response of Second order system
2. Characteristics of Synchros
3. Programmable logic controller – Study and verification of truth tables of logic gates, simple Boolean expressions and application of speed control of motor.
4. Effect of feedback on DC servo motor
5. Transfer function of DC Machine
6. Effect of P, PD, PI, PID Controller on a second order systems
7. Lag and lead compensation – Magnitude and phase plot
8. Temperature controller using PID
9. Characteristics of magnetic amplifiers
10. Characteristics of AC servo motor

Any two simulation experiments are to be conducted:

1. PSPICE simulation of Op-Amp based Integrator and Differentiator circuits.
2. Linear system analysis (Time domain analysis, Error analysis) using MATLAB.
3. Stability analysis (Bode, Root Locus, Nyquist) of Linear Time Invariant system using MATLAB
4. State space model for classical transfer function using MATLAB – Verification.

REFERENCE BOOKS:

1. Simulation of Electrical and electronics Circuits using PSPICE – by M.H.Rashid, M/s PHI Publications.
2. PSPICE A/D user's manual – Microsim, USA.
3. PSPICE reference guide – Microsim, USA.
4. MATLAB and its Tool Books user's manual and – Mathworks, USA.

Sri Krishnadevaraya University College of Engineering & Technology					
Dept. of Electrical and Electronics Engineering					
III Year 2nd Semester					
S.No	**Course Code**	**Course Name**	**Category**	**L-T-P**	**Credits**
1		Electrical & Electronic Measurements	PC	3-0-0	3
2		Electrical machines-III	PC	3-0-0	3
3		Computer aided power system Analysis	PC	3-0-0	3
4		Management science	HS	3-0-0	3
5		Professional Elective course-II 1. Power Semiconductor Drives 2. Programmable Logic Controllers 3. Linear and Non linear Optimization Techniques	PE-II	3-0-0	3
6		Open Elective Course –II	OE-II	3-0-0	3
7		Electrical & Electronics Measurements Lab	PC	0-0-3	1.5
8		Power Electronics and simulation Lab	PC	0-0-3	1.5
9		Socially Relevant Project(15hrs/Sem)	PR	- - -	0.5
10		Industrial Training/ Internship/ Research Projects in National Laboratories/Academic Institutions	- - -	- - -	- - -
				Total credits	**21.5**

Category	**CREDITS**
Professional Core Courses	12
Professional Elective Courses	03
Open Elective Course/Job oriented elective	03
Humanities and Social Science Course	03
Socially Relevant Project(15hrs/Sem)	0.5
TOTAL	21.5

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B.Tech III – II Sem (Electrical And Electronics Engineering)

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Electrical and Electronic Measurements

Course Objectives:

- To study the principle of operation and working of different types of instruments. Measurement of voltage and current.
- To study the working principle of operation of different types of instruments for measurement of power and energy
- To understand the principle of operation and working of dc and ac potentiometers.
- To understand the principle of operation and working of various types of bridges for measurement of parameters –resistance, inductance, capacitance and frequency.
- To study the principle of operation and working of various types of magnetic measuring instruments.
- To study the applications of CRO for measurement of frequency, phase difference and hysteresis loop using Lissajous patterns

Course Outcomes:

- Able to choose right type of instrument for measurement of voltage and current for ac and dc.
- Able to choose right type of instrument for measurement of power and energy – able to calibrate energy meter by suitable method
- Able to calibrate ammeter and potentiometer.
- Able to select suitable bridge for measurement of electrical parameters
- Able to use the ballistic galvanometer and flux meter for magnetic measuring instruments
- Able to measure frequency and phase difference between signals using CRO. Able to use digital instruments in electrical measurements.

UNIT-I MEASURING INSTRUMENTS

Classification – deflecting, control and damping torques – Ammeters and Voltmeters – PMMC, Dynamometer, moving iron type instruments – expression for the deflecting torque and control torque – Errors and compensations, extension of range using shunts and series resistance. CT and PT – Ratio and phase angle errors – design considerations. Types of P.F. Meters – dynamometer and moving iron type – 1-ph and 3-ph meters.

UNIT –II MEASUREMENT OF POWER / ENERGY

Single phase dynamometer wattmeter, LPF and UPF, Double element and three element dynamometer wattmeter, expression for deflecting and control torques. Single phase induction type energy meter – driving and braking torques – errors and compensations. Three phase energy meter.

UNIT –III POTENTIOMETERS

Principle and operation of D.C. Crompton's potentiometer – standardization – Measurement of unknown resistance, current, voltage. A.C. Potentiometers: polar and coordinate types standardization – applications.

UNIT – IV D.C & A.C BRIDGES

Method of measuring low, medium and high resistance – sensitivity of Wheatstone's bridge – Kelvin's double bridge for measuring low resistance, measurement of high resistance – loss of charge method. Measurement of inductance - Maxwell's bridge, Anderson's bridge. Measurement of capacitance and loss angle - Desauty bridge. Wien's bridge – Schering Bridge.

UNIT – V MAGNETIC MEASUREMENTS

Ballistic galvanometer – equation of motion – flux meter – constructional details, comparison with ballistic galvanometer. Determination of B-H Loop methods of reversals - six point method – A.C. testing – Iron loss of bar samples. OSCILLOSCOPE AND DIGITAL METERS-Cathode Ray Oscilloscope- Cathode Ray tube-Time base generator-Horizontal and Vertical amplifiers – application of CRO – Measurement of phase ,

frequency, current & voltage- Lissajous pattern. Digital Voltmeter- Successive approximation,ramp and integrating type-Digital frequency meter-Digital multimeter-Digital Tachometer**.**

TEXT BOOK:

1. Electrical Measurements and measuring Instruments – by E.W. Golding and F.C. Widdis, 5th Edition, Reem Publications.
2. Electrical & Electronic Measurement & Instruments by A.K.Sawhney Dhanpat Rai & Co. Publications.
3. Electrical & Electronic Measurement & Instrumentation by R. K. Rajput, 2nd Edition, S. Chand & Co.
4. Electronic Instrumentation by H. S. Kalsi, Tata Grawhill Mc, 3rd Edition.

REFERENCE BOOKS:

1. Electrical Measurements – by Buckingham and Price, Prentice – Hall
2. Electrical Measurements: Fundamentals, Concepts, Applications – by Reissland, M.U, New Age International (P) Limited, Publishers

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B.Tech III – II Sem (Electrical And Electronics Engineering)	**L**	**T**	**P**	**C**
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Electrical Machines – III

Course Objectives:

- To introduce the concepts of ideal synchronous machines and poly-phase induction machines.
- Applications which will be utilized in the electrical machines with its performance and theory of operation.
- Study of special machines

Course Outcomes:

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

- Understand the armature reaction and leakage reactance of DC generator
- Understand the regulation of synchronous impedance method MMF,ZPF and ASA method
- Understand the parallel operation of alternator and load sharing
- Understand the excitation and power circles diagrams and methods of starting

UNIT – I CONSTRUCTION AND CHARACTERISTICS OF SYNCHRONOUS GENERATOR

Constructional Features of round rotor and salient pole machines – Armature windings – Integral slot and fractional slot windings; Distributed and concentrated windings – distribution, pitch and winding factors – E.M.F Equation.– armature reaction - leakage reactance – synchronous reactance and impedance – experimental determination - phasor diagram – load characteristics.

UNIT – II REGULATION OF SYNCHRONOUS GENERATOR

Regulation by synchronous impedance method, M.M.F. method, Z.P.F. method and A.S.A. methods – salient pole alternators – two reaction analysis – experimental determination of X_d and X_q (Slip test) Phasor diagrams – Regulation of salient pole alternators.

UNIT – III PARALLEL OPERATION OF SYNCHRONOUS GENERATORS

Synchronizing alternators with infinite bus bars – synchronizing power torque – parallel operation and load sharing - Effect of change of excitation and mechanical power input. Analysis of short circuit current wave form – determination of sub-transient, transient and steady state reactance's.

UNIT – IV SYNCHRONOUS MOTORS

Theory of operation – phasor diagram – Variation of current and power factor with excitation – V and Inverted V Curves - Power developed – Synchronous Condenser. Excitation and power circles – hunting and its suppression – Methods of starting – synchronous induction motor.

UNIT – V SINGLE PHASE MOTORS

Single phase induction motor – Constructional features - Double revolving field theory – Elementary idea of cross-field theory – split-phase motors – shaded pole motor.

SPECIAL MOTORS - Principle & performance of A.C. Series motor-Universal motor – Principle of permanent magnet and reluctance motors.

TEXT BOOKS

1. Electric Machines – by I.J.Nagrath & D.P.Kothari, Tata Mc Graw-Hill Publishers, 4th Edition, 2010.
2. Electrical Machines – by P.S. Bimbra, Khanna Publishers.

REFERENCE BOOKS:

1. The Performance and Design of A.C.Machines – by M.G.Say, ELBS and Ptiman & Sons.
2. Electric Machinery – by A.E. Fitzgerald, C.Kingsley and S.Umans, Mc Graw-Hill Companies, 5th edition, 1990.
3. Theory of Alternating Current Machinery by Langsdorf, Tata Mc Graw-Hill, 2nd edition.
4. Electromachanics-III (Synchronous and single phase machines), S.Kamakashiah, Overseas publishers Pvt Ltd.
   Electric Machines - by M. S. Sarma and M. K. Pathak, CENGAGE Learning

WEB LINK:

1) nptel.ac.in–coursera.org-engg.vediolectures.com.
2) https://www.youtube.com/watch?v=XZehRIgB-ys.

https://www.youtube.com/watch?v=ThIbiFCRaa4

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B.Tech III –II Sem (Electrical And Electronics Engineering)	**L**	**T**	**P**	**C**
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Computer Aided Power System Analysis

Course objectives:

- To able to design the power system network matrices
- Design the power flow studies in power systems
- Calculate the short circuit analysis for system per-unit system
- To design the power system steady state stability analysis

Course Outcomes:

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

- Able to design the power system network matrices
- Design the power flow studies in power systems
- Calculate the short circuit analysis for system per-unit system
- Determination the power system steady state stability analysis

UNIT -I POWER SYSTEM NETWORK MATRICES

Representation of Power system elements, Essential characteristics of a good Algorithm, Steps involved in solving a problem using Digital computer - Graph Theory: Definitions, Bus Incidence Matrix, Y_{bus} formation by Direct and Singular Transformation Methods, Numerical Problems.

UNIT –II POWER FLOW STUDIES-I

Necessity of Power Flow Studies – Data for Power Flow Studies – Derivation of Static load flow equations – Load flow solutions using Gauss Seidel Method: Acceleration Factor, Load flow solution with and without P-V buses, Algorithm and Flowchart. Numerical Load flow Solution for Simple Power Systems (Max. 3-Buses): Determination of Bus Voltages, Injected Active and Reactive Powers (Sample One Iteration only) .

UNIT – III POWER FLOW STUDIES-II

Newton Raphson Method in Rectangular and Polar Co-Ordinates Form: Load Flow Solution with or without PV Busses- Derivation of Jacobian Elements, Algorithm and Flowchart. Decoupled and Fast Decoupled Methods.- Comparison of Different Methods .

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UNIT – IV SHORT CIRCUIT ANALYSIS

SHORT CIRCUIT ANALYSIS-I- Per-Unit System of Representation. Per-Unit equivalent reactance network of a three phase Power System, Numerical Problems. Symmetrical fault Analysis: Short Circuit Current and MVA Calculations, Fault levels, Application of Series Reactors, Numerical Problems.

SHORT CIRCUIT ANALYSIS-II- Symmetrical Component Theory: Symmetrical Component Transformation, Positive, Negative and Zero sequence components: Voltages, Currents and Impedances. Sequence Networks: Positive, Negative and Zero sequence Networks, Numerical Problems. Unsymmetrical Fault Analysis: LG, LL, LLG faults with and without fault impedance, Numerical Problems

UNIT –V POWER SYSTEM STEADY STATE STABILITY ANALYSIS

Elementary concepts of Steady State, Dynamic and Transient Stabilities. Description of: Steady State Stability Power Limit, Transfer Reactance, Synchronizing Power Coefficient, Power Angle Curve and Determination of Steady State Stability and Methods to improve steady state stability. Derivation of Swing Equation. Determination of Transient Stability by Equal Area Criterion, Application of Equal Area Criterion, Critical Clearing Angle Calculation. Methods to improve Stability.

TEXT BOOKS:

1. Computer Methods in Power Systems, Stagg El – Abiad & Stags, Mc Graw-hill Edition.
2. Modern Power system Analysis – by I.J.Nagrath & D.P.Kothari: Tata McGraw-Hill Publishing Company, 2nd edition.
3. Power System Analysis by Nagsarkar and Sukhija, OXFORD University Press.

REFERENCE BOOKS:

1. Power System Analysis by Grainger and Stevenson, Tata McGraw Hill.
2. Computer Techniques in Power System Analysis by M A Pai, Second Edition, TMH.
3. Power System Analysis and Design by B.R.Gupta, S. Chand & Co, 6th Revised Edition, 2010.
4. Computer Modeling of Electrical Power Systems by J. Arrillaga and N. R. Watson, John Wiley Student Edition, 2/e.
5. Computer Techniques and Models in Power Systems by K. Uma Rao, I. K. International.
6. Electric Power Systems by S. A. Nasar, Schaum's Outline Series, Revised 1st Edition, TMH.
7. Power System Analysis by Glovar and Sarma, Thomson Publishers

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Management Science

Course Objectives:

- To provide fundamental knowledge on Management, Administration, Organization & its concepts.
- To make the students understand the role of management in Production
- To impart the concept of HRM in order to have an idea on Recruitment, Selection, Training & Development, job evaluation and Merit rating concepts
- To create awareness on identify Strategic Management areas & the PERT/CPM for better Project Management
- To make the students aware of the contemporary issues in management

Course Outcomes:

- At the end of the course, students will be able to
- Understand the concepts & principles of management and designs of organization in a practical world
- Apply the knowledge of Work-study principles & Quality Control techniques in industry
- Analyze the concepts of HRM in Recruitment, Selection and Training & Development.
- Evaluate PERT/CPM Techniques for projects of an enterprise and estimate time & Cost of project & to analyze the business through SWOT.
- Create Modern technology in management science.

UNIT I-INTRODUCTION TO MANAGEMENT:

Concepts of Management and organization- nature, importance and Functions of Management, Taylor's Scientific Management Theory, Fayol's Principles of Management, Mayo's Hawthorne Experiments, Maslow's Theory of Human Needs, Douglas McGregor's Theory X and Theory Y, Herzberg's Two-Factor Theory of Motivation, Systems Approach to Management and contingency approach, Leadership Styles.

UNIT II-DESIGNING ORGANIZATIONAL STRUCTURES:

Basic concepts related to Organisation - Departmentation and Decentralisation, Types of mechanistic and organic structures of organisation (Line organization, Line and staff organization, functional organization, Committee organization, matrix organization, Virtual Organisation, Cellular Organisation, team structure, boundaryless organization) and their merits, demerits and suitability.

UNIT III-OPERATIONS AND PROJECT MANAGEMENT:

Principles and Types of Plant Layout-Methods of production (Job, batch and Mass Production), Work Study - Basic procedure involved in Method Study and Work Measurement- Statistical Quality Control: chart, R chart, *c* chart, *p* chart, (simple Problems), Acceptance Sampling, Deming's contribution to quality.Project management: Network Analysis, Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), Project Cost Analysis, Project Crashing.

UNIT IV-MATERIALS MANAGEMENT:

Objectives, Need for Inventory control, EOQ, ABC Analysis, Purchase Procedure, Stores Management and Stores Records.

UNIT V-HUMAN RESOURCES MANAGEMENT (HRM):

Concept of HRM functions of HR Manager: Human resource planning, Recruitment, Selection process, Training and Development, Performance Appraisal, Placement, Wage and Salary Administration, Promotion, Transfer policies, Grievance Handling and employee Welfare Administration.

CONTEMPORARY MANAGEMENT PRACTICES: Basic concepts of MIS, Just-In-Time (JIT) System, Six sigma and Capability Maturity Model (CMM) Levels, Enterprise Resource Planning (ERP), Business Process outsourcing (BPO), Business Process Re-engineering

TEXT BOOKS:

1. Aryasri: Management Science, TMH, 2004.
2. Stoner, Freeman, Gilbert, Management, 6th Ed, Pearson Education, New Delhi, 2004.

REFERENCES:

1. Kotler Philip & Keller Kevin Lane: Marketing Mangement 12/e, PHI, 2005.
2. Koontz & Weihrich: Essentials of Management, 6/e, TMH, 2005.
3. Thomas N.Duening & John M.Ivancevich Management—Principles and Guidelines, Biztantra, 2003.

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Power Semiconductor Drives
(PROFESSIONAL ELECTIVE-II)

Course objectives:

This course aims at providing the student to acquire the knowledge on:

Control of dc motors by single phase and three phase converters**.**

- Four quadrant operation of dc drives.
- Control of dc motors by choppers.
- Control of induction motor by stator voltage and stator frequency.
- Control of induction motor from rotor side.

UNIT – I: CONTROL OF DC MOTORS BY SINGLE PHASE AND THREE PHASE CONVERTERS.

Introduction to Thyristor controlled Drives, Single Phase semi and Fully controlled converters connected to d.c separately excited and d.c series motors – continuous current operation – output voltage and current waveforms – Speed – Torque Characteristics- Problems on Converter fed d.c motors. Three phase semi and fully controlled converters conn ected to d.c separately excited and d.c series motors – output voltage and current waveforms – Speed – Torque characteristics – Problems.

UNIT – II FOUR QUADRANT OPERATION OF DC DRIVES

Introduction to Four quadrant operation – Motoring operations, Electric Braking – Plugging, Dynamic and Regenerative Braking operations. Four quadrant operation of D.C motors by dual converters.

UNIT-III : CONTROL OF DC MOTORS BY CHOPPERS

Single quadrant, Two –quadrant and four quadrant chopper fed dc separately excited and series excited motors – Continues current operation – Output voltage and current wave forms – Speed torque expressions – speed torque characteristics – Problems on Chopper fed d.c Motors – Closed Loop operation (Block Diagram Only)

UNIT-IV: CONTROL OF INDUCTION MOTOR BY STATOR VOLTAGE AND STATOR FREQUENCY

Variable voltage characteristics-Control of Induction Motor by Ac Voltage Controllers – Waveforms – speed torque characteristics. Variable frequency characteristics-Variable frequency control of induction motor by Voltage source and current source inverter and cyclo converters- PWM control – Comparison of VSI and CSI operations – Speed torque characteristics – numerical problems on induction motor drives – Closed loop operation of induction motor drives (Block Diagram Only)

UNIT –V: CONTROL OF INDUCTION MOTOR FROM ROTOR SIDE

Static rotor resistance control – Slip power recovery – Static Scherbius drive – Static Kramer Drive – their performance and speed torque characteristics – advantages - applications – problems control of synchronous motors by VSI and CSI cycloconverters. Load commutated CSI fed Synchronous Motor – Operation – Waveforms – speed torque characteristics – Applications – Advantages and Numerical Problems – Closed Loop control operation of synchronous motor drives (Block Diagram Only).

TEXT BOOKS:

1. Fundamentals of Electric Drives – by G K Dubey Narosa Publications
2. Power Electronic Circuits, Devices and applications by M.H.Rashid, PHI.

REFERENCE BOOKS:

1. Power Electronics – MD Singh and K B Khanchandani, Tata McGraw-Hill Publishing company,1998
2. Modern Power Electronics and AC Drives by B.K.Bose, PHI.
3. Thyristor Control of Electric drives – Vedam Subramanyam, Tata McGraw Hill Publilcations.
4. Analysis of Thyristor Power – conditioned motors, S K Pillai, Universities press, 1st Edition..

WEB LINK:

1) nptel.ac.in–coursera.org-engg.vediolectures.com.
2) https://www.youtube.com/watch?v=NP8Im7fKcpQ

https://www.youtube.com/watch?v=7ry2PEA64

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B.Tech III – II Sem	**(Electrical And Electronics Engineering)**	**L**	**T**	**P**	**C**
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Programmable Logic Design

(Professional Elective-II)

Course Objectives:

The student will be able to:

- Understand the basic functions and types of PLCs
- Get exposure of Easy Veep software, its applications
- Classification of PLCs and applications
- Programming using PLCs
- Troubleshooting aspects using PLCs

Course Outcomes:

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

- Understand different types of PLCs
- Understand the usage of Easy Veep software
- Understand the hardware details of Allen Bradley PLC
- Programming of PLCs
- Know about few applications of PLCs in different fields of Science and Technology

UNIT-I Introduction:

Basic functions of PLCs, Mechanical relays versus PLC, Different types of PLC's – Allen- Bradley – Micrologix: ML1000, ML1100, SLC500, Compact Logix, Mitsubishi FX series, HMI's, Processor and I/O cards

UNIT-II

Introduction to Easy Veep software, Link between mechanical, electrical and programming documentation, Logic diagrams, Flip-Flop Logic, M8000, M8001 internal bits interpretation, Binary code, data table, manipulation and search engine in Mitsubishi environment Communication between PC and PLC, Communication between PC and HMI, PLC and HMI Serial Local network, Introduction to SLC500

UNIT-III

PLC software and applications, Boolean algebra – understanding binary code, ADD and SUB functions, UP and Down Counters, Introduction to k1Y0, MOV function, CPR and ZCP functions, SHWT and SHRD instructions, Introduction to Absolutely Drum Instruction.

Allen Bradley PLC: Introduction to Rockwell Software, Hardware focus,Hardware considerations (Field wiring, Master Control Relay, VFD), Basic programming and applications, Cascade control – subroutine, Different programs.

UNIT-IV

Programming instructions: Instructions and binary interpretation, Bit Instruction, Timers and counters, Comparison instructions, Programming Instructions - Math instructions, Move and Logical Instructions, Discussions of programming, communications for PLC-Robotic arm, Exercise of setup and monitoring

UNIT-V

Analog and Digital parameters by using SLC5/03-VFD-Panel Mate series 1700, Practical Troubleshooting, troubleshooting technique, Control system stability and tuning basics. Applications: Process to rewind, test, and integrate with extrusion process for wiring and fibre optic industries, Food industry – yeast, flour distribution and control. Process Medical equipment Industry – Gas analyzer, Leak tester (using CO2), plastic wrapping machines etc.

Text Books:

Hugh Jack, “Automating manufacturing systems” with PLCs 2010.
PLC Hand Book (Automationdirect Siemens)

References:

R. Bliesener, “Programmable Logic Controllers”, F Ebel, Festo. Didactic publishers, 2002.
W. Bolton, “Programmable Logic Controllers”, 4th Edition, Newnes, 2006.
by Jay F. Hooper, “Introduction to PLCs”, 2nd Edition, Carolina Academic Press, 2006.

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B.Tech III –II Sem (Electrical And Electronics Engineering)

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Linear & Nonlinear Optimization Techniques

(Professional Elective-II)

Course Objectives:

- Introduction to optimization techniques using both linear and non-linear programming.
- The focus of the course is on convex optimization though some techniques will be covered for non-convex function optimization too.
- After an adequate introduction to linear algebra and probability theory,
- will learn to frame engineering minima maxima problems in the framework of optimization problems.

Course Outcome:

On successful completion of the course, the student will:

- Be able to model engineering minima/maxima problems as optimization problems.
- Be able to use Matlab to implement optimization algorithms.
- Cast engineering minima/maxima problems into optimization framework.
- Learn efficient computational procedures to solve optimization problems.

UNIT – I Introduction and Classical Optimization Techniques:

Statement of an Optimization problem – design vector – design constraints – constraint surface – objective function – objective function surfaces – classification of Optimization problems. Classical Optimization Techniques: Single variable Optimization – multi variable Optimization without constraints – necessary and sufficient conditions for minimum/maximum – multivariable Optimization with equality constraints. Solution by method of Lagrange multipliers – multivariable Optimization with inequality constraints – Kuhn – Tucker conditions.

UNIT – II Linear Programming

Standard form of a linear programming problem – geometry of linear programming problems – definitions and theorems – solution of a system of linear simultaneous equations – pivotal reduction of a general system of equations – motivation to the simplex method – simplex algorithm.

UNIT – III Transportation Problem

Formulation, methods of solution: Finding initial basic feasible solution by north – west (NW) corner rule, least cost and Vogel's approximation methods – testing for optimality of balanced transportation problems.

UNIT – IV Unconstrained & Constrained Nonlinear Programming:

One – dimensional minimization methods: Classification, Fibonacci method and Quadratic interpolation method. Unconstrained Optimization Techniques: Univariate method, Powell's method and steepest descent method. Constrained optimization Technique: Characteristics of a constrained problem, Classification, Basic approach of Penalty Function method - Basic approaches of Interior and Exterior penalty function methods.

UNIT – V Constrained Nonlinear & Dynamic Programming:

Introduction to convex Programming Problem. Dynamic programming multistage decision processes – types – concept of sub optimization and the principle of optimality – computational procedure in dynamic programming – examples illustrating the calculus method of solution - examples illustrating the tabular method of solution.

TEXT BOOKS:

1. "Engineering optimization: Theory and practice"-by S. S.Rao, New Age International (P) Limited, 3rd edition, 1998.
2. "Introductory Operations Research" by H.S. Kasene & K.D. Kumar, Springer(India), Pvt .LTd.

REFERENCE BOOKS:

1 "Optimization Methods in Operations Research and systems Analysis" – by K.V. Mital and C. Mohan, New Age International (P) Limited, Publishers, 3rd edition, 1996.
2. Operations Research – by Dr. S.D.Sharma.
3. "Operations Research: An Introduction" – by H.A. Taha, PHI Pvt. Ltd., 6th edition
4.LinearProgramming–byG.Hadley

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		0	**0**	**3**	**1.5**

Electrical & Electronics Measurements Lab

The following experiments are required to be conducted as compulsory experiments:

1. Calibration and Testing of single phase energy Meter
2. Calibration of dynamometer power factor meter
3. Crompton D.C. Potentiometer – Calibration of PMMC ammeter and PMMC voltmeter
4. Kelvin's double Bridge – Measurement of resistance – Determination of Tolerance.
5. Measurement of % ratio error and phase angle of given C.T. by comparison.
6. Schering bridge & Anderson bridge.
7. Measurement of 3 phase reactive power with single-phase wattmeter.
8. Measurement of parameters of a choke coil using 3 voltmeter and 3 ammeter methods.

In addition to the above eight experiments, atleast any two of the experiments from the following list are required to be conducted:

9. Optical bench – Determination of polar curve measurement of MHCP of filament lamps
10. Calibration LPF wattmeter – by Phantom testing
11. Measurements of 3 phase power with Two watt meter method (Balanced & Un balanced).
12. Dielectric oil testing using H.T. testing Kit
13. LVDT and capacitance pickup – characteristics and Calibration
14. Resistance strain gauge – strain measurements and Calibration
15. Transformer turns ratio measurement using a.c. bridge.
16. A.C. Potentiometer – Calibration of AC Voltmeter, Parameters of Choke.

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		0	**0**	**3**	**1.5**

Power Electronics and Simulation Lab

Any Eight of the Experiments in Power Electronics Lab

1. Study of Characteristics of SCR, MOSFET & IGBT
2. Gate firing circuits for SCR's
3. Single Phase AC Voltage Controller with R and RL Loads
4. Single Phase fully controlled bridge converter with R and RL loads
5. Forced Commutation circuits (Class A, Class B, Class C, and Class D & Class E)
6. DC Jones chopper with R and RL Loads
7. Single Phase Parallel, inverter with R and RL loads
8. Single Phase Cycloconverter with R and RL loads
9. Single Phase Half controlled converter with R load
10. Three Phase half controlled bridge converter with R-load
11. Single Phase series inverter with R and RL loads
12. Single Phase Bridge converter with R and RL loads
13. Single Phase dual converter with RL loads

Any two simulation experiments with PSPICE/PSIM
PSPICE simulation of single-phase full converter using RLE loads and single-phase AC voltage controller using RLE loads.
PSPICE simulation of resonant pulse commutation circuit and Buck chopper.
PSPICE simulation of single phase Inverter with PWM control.

REFERENCE BOOKS:
1. Simulation of Electric and Electronic circuits using PSPICE – by M.H.Rashid, PHI.
2. PSPICE A/D user's manual – Microsim, USA.
3. PSPICE reference guide – Microsim, USA.
4. MATLAB and its Tool Books user's manual and – Mathworks, USA.

Sri Krishnadevaraya University College of Engineering & Technology					
Dept. of Electrical and Electronics Engineering					
IV Year 1st Semester					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1.		Power system operation and control	PC	3-0-0	3
2.		Fundamentals of HVDC and FACTS	PC	3-0-0	3
3.		Utilization of Electric energy	PC	3-0-0	3
4.		Professional Elective courses-III 1. Switchgear and Protection 2. Electrical Energy conversion 3. Switched mode power converters	PE-III	3-0-0	3
5.		Professional Elective courses-IV 1. Distribution of Electric Power 2. Modern Control Theory 3. Electrical Machine Design	PE-IV	3-0-0	3
6.		Micro processor and Microcontrollers Lab	PC	0-0-3	1.5
7.		Power systems Simulation Lab	PC	0-0-3	1.5
8.		Project I	PR	- - -	2
		Socially Relevant Project(15hrs/Sem)	PR	- - -	0.5
9.		Industrial Training/ Internship/ Research Projects in National Laboratories/Academic Institutions	PR	- - -	1
				Total	**21.5**

Category	**CREDITS**
Professional core courses	12
Professional Elective courses	03
Humanities and Social Science	03
Open Elective Course/Job oriented elective	03
Socially Relevant Project(15hrs/Sem)	0.5
TOTAL	21.5

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Power System Operation and Control

Course Objectives:

- To know about economic load dispatch problems with and without losses in Power Systems
- To distinguish between hydro-electric and thermal plants and coordination between them
- To understand about optimal power flow problems and solving using specified method
- To understand about Automatic Generation Control problems and solutions in Power Systems
- To understand necessity of reactive power control, compensation under no-load and load operation of transmission systems
- To understand about deregulation aspects in Power Systems

Course Outcomes:

- To be able to understand to deal with problems in Power System as Power System Engineer
- To be able to Understand to deal with AGC problems in Power System
- To be able to understand to deal the problems in hydro electric and hydro thermal problems
- To understand the complexity of reactive power control problems and to deal with them

UNIT – I ECONOMIC OPERATION OF POWER SYSTEMS

Optimal operation of Generators in Thermal Power Stations, Incremental fuel and Production costs, input-output characteristics, Optimum generation allocation with line losses neglected. Optimum generation allocation including the effect of transmission line losses – Loss Coefficients, General transmission line loss formula.

UNIT – II HYDROTHERMAL SCHEDULING

Optimal scheduling of Hydrothermal System: Hydroelectric power plant models, scheduling problems-Short term hydrothermal scheduling problem.

UNIT –III MODELING OF TURBINE, GOVERNOR

Modelling of Turbine: First order Turbine model, Block Diagram representation of Steam Turbines and Approximate Linear Models. Modelling of Governor: Mathematical Modelling of Speed Governing System .

UNIT – IV LOAD FREQUENCY CONTROL - I

Necessity of keeping frequency constant-Definitions of Control area – Single area control – Block diagram representation of an isolated power system – Steady state analysis – Dynamic response – Uncontrolled case. Load frequency control of 2-area system – uncontrolled case and controlled case, tie-line bias control

LOAD FREQUENCY CONTROL – II – Proportional plus Integral control of single area and its block diagram representation, steady state response – Load Frequency Control and Economic dispatch control.

UNIT – V REACTIVE POWER CONTROL

Overview of Reactive Power control – Reactive Power compensation in transmission systems – advantages and disadvantages of different types of compensating equipment for transmission systems; load compensation – Specifications of load compensator, Uncompensated and compensated transmission lines: shunt and Series Compensation

.

TEXT BOOKS:

1. Power System Analysis Operation and Control – A. Chakravarthi and S. Halder, 3rd Edition, PHI.
2. Modern Power System Analysis – by I.J.Nagrath & D.P.Kothari Tata M Graw – Hill Publishing Company

Ltd, 2nd edition.
3. Electric Energy Systems by O I Elgerd, Mc Graw-hill Edition.
4. Electric Power Generation, Transmission and Distribution by S. N. Singh, 2nd Edition, PHI.
5. An Introduction to: Reactive Power Control and Voltage Stability in Power Transmission Systems by Abhijit Chakrabarti, D. P. Kothari, A. K. Mukhopadhyay and Abhinandan De, Eastern Economy Edition, 2010.

REFERENCE BOOKS:

1. Power System Analysis and Design by J.Duncan Glover and M.S.Sarma., THOMPSON, 3rd Edition.
2. Electric Power Systems by S. A. Nasar, Schaum's Outline Series, Revised 1st Edition, TMH

WEB LINK:

1) nptel.ac.in–coursera.org-engg.vediolectures.com.
2) https://www.youtube.com/watch?v=zkN13OmgGOs
3) www.youtube.com/playlist?list=PL4BFB13CCDB954BCF

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Fundamentals of HVDC and FACTS

Course Objectives:

To get the student exposed to:

- High voltage DC transmission systems
- Flexible AC transmission systems
- Various configurations of the above, Principle of operation, Characteristics of various FACTS devices

Course Outcomes:

The student will be able to understand:

- The necessity of HVDC systems as emerging transmission networks
- Power Electronic devices to understand the necessity of reactive power compensation devices
- To obtain equivalent circuits of various HVDC system configurations.

UNIT-I:

INTRODUCTION

Electrical Transmission Networks, Conventional Control Mechanisms-Automatic Generation Control, Excitation Control, Transformer Tap-Changer Control, Phase-Shifting Transformers; Advances in Power-Electronic Switching Devices, Principles and Applications of Semiconductor Switches; Limitations of Conventional Transmission Systems, Emerging Transmission Networks, HVDC and FACTS.

UNIT – II:

HIGH VOLTAGE DC TRANSMISSION – I

Types of HVDC links - Monopolar, Homopolar, Bipolar and Back-to-Back, Advantages and disadvantages of HVDC Transmission, Analysis of Greatz circuit, Analysis of bridge circuit without overlap, Analysis of bridge with overlap less than 60^0, Rectifier and inverter characteristics, complete characteristics of rectifier and inverter, Equivalent circuit of HVDC Link.

UNIT – III:

HIGH VOLTAGE DC TRANSMISSION – II

Desired features and means of control, control of the direct current transmission link, Constant current control, Constant ignition angle control, Constant extinction angle control, Converter firing-angle control-IPC and EPC, frequency control and Tap changer control, Starting, Stopping and Reversal of power flow in HVDC links.

UNIT-IV:

FLEXIBLE AC TRANSMISSION SYSTEMS-I

Types of FACTS Controllers, brief description about various types of FACTS controllers, Operation of 6-pulse converter, Transformer Connections for 12-pulse, 24-pulse and 48-pulse operation, principle of operation of various types of Controllable shunt Var Generation, Principle of switching converter type shunt compensator, principles of operation of various types of Controllable Series Var Generation, Principle of Switching Converter type series compensator.

UNIT-V:

FLEXIBLE AC TRANSMISSION SYSTEMS-II

Unified Power Flow Controller (UPFC) – Principle of operation, Transmission Control Capabilities, Independent Real and Reactive Power Flow Control; Interline Power Flow Controller (IPFC) – Principle of operation and Characteristics, UPFC and IPFC control structures (only block diagram description), objectives and approaches of voltage and phase angle regulators

Text Books:

1. Narain G. Hingorani and Laszlo Gyugyi, "Understanding FACTS: Concepts and Technology of Flexible AC Transmission Systems", IEEE Press, Wiley-Interscience, New Jersey, 2000.
2. E.W. Kimbark, "Direct current transmission, Vol. I", Wiley Inter science, New York, 1971.

Reference Books:

1. K R Padiyar, "FACTS Controllers in Power Transmission and Distribution", New Age International Publishers, New Delhi, 2007.
2. Anrique Acha, Claudio R. Fuerte-Esquivel, Hugo Ambriz-Pérez and César Angeles- Camacho, "FACTS: Modelling and Simulation in Power Networks", John Wiley & Sons, West Sussex, 2004.
3. R Mohan Mathur and Rajiv K Varma, Thyristor-"Based FACTS Controllers for Electrical Transmission Systems", IEEE Press, Wiley-Interscience, New Jersey, 2002.

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Utilization of Electrical Energy

Course Objectives:

At the end this course, Student will be able to,

- Describe various electric heating and welding methods,
- Design illumination systems for residential, commercial and industrial environments.
- Design an illumination system.
- Calculate the required tonnage capacity for a given air-conditioning system.
- Evaluate domestic wiring connection and debug any faults occurred.

Course Outcomes:,

- Get knowledge about various electric heating and welding methods,
- They to Design illumination systems for residential, commercial and industrial environments.
- Know about an illumination system.
- How to Calculate the required tonnage capacity for a given air-conditioning system.

UNIT – I ILLUMINATION

Definition – Laws of illumination – Polar curves – Calculation of MHCP and MSCP. Lamps: Incandescent lamp, Sodium Vapour lamp, Fluorescent lamp. Requirement of good lighting scheme – Types, Design and Calculation of illumination. Street lighting and Factory lighting – Numerical Problems.

UNIT – II ELECTRICAL HEATING AND WELDING

Advantages. Methods of Electric heating – Resistance, arc, Induction and dielectric heating.
Types – Resistance, Electric arc, gas welding. Ultrasonic, Welding electrodes of various metals, Defects in welding.

UNIT – III ELECTROLYTIC PROCESS

Electrolysis - Faradays laws, Application of Electrolysis, Power supply for Electrolysis.

UNIT – IV ELECTRIC DRIVES

Advantages, Types of D. C and A. C Motors and their Characteristics – Electric Breaking. Speed Control of D. C and A. C Motors – Temperature Rise and Load Equalization – Selection of Motors for particular Drive.

UNIT – V ELECTRIC TRACTION -I

Introduction – Systems of Electric Traction. Comparison between A. C and D. C Traction - Mechanics of train movement. Speed-time curves of different services – trapezoidal and quadrilateral, speed-time curves – Numerical Problems.ELECTRIC TRACTION- II- Calculations of tractive effort, Power, specific energy consumption - effect of varying acceleration and braking retardation, Adhesive weight and coefficient of adhesion – Problems.

TEXT BOOK:

1. Utilization of Electric Energy – by E. Openshaw Taylor and V. V. L. Rao, Universities Press.
2. Utilization of Electrical Power – by R. K. Rajput, Laxmi Publications.

REFERENCE BOOKS:

1. Utilization of Electrical Power including Electric drives and Electric traction – by N.V.Suryanarayana, New Age International (P) Limited, Publishers, 1996.
2. Art & Science of Utilization of electrical Energy – by Partab, Dhanpat Rai & Co

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Switch Gear Protection

(Professional Elective-III)

Course objectives:

- To provide the basic principles of arc interruption, circuit breaking principles, operation of various types of circuit breakers.
- To study the classification, operation, construction and application of different types of electromagnetic protective relays.
- To explain various types of faults in generators and transformers and different types of protective schemes.
- To impart knowledge of various protective schemes used for feeders and bus bars.
- To explain the principles and operations of different types of static relays.
- To study different types of over voltages in a power system and principles of different protective schemes for insulation co– ordination.

Course Outcomes:

- To be able to understand the principles of arc interruption for application to high voltage circuit breakers of air, oil, vacuum, SF6 gas type.
- Ability to understand the working principle and constructional features of different types of electromagnetic protective relays.
- Students acquire in depth knowledge of faults that is observed to occur in high power generator and transformers and protective schemes used for all protections.
- Improves the ability to understand various types of protective schemes used for feeders and bus bar protection.
- Generates understanding of different types of static relays with a view to application in the system.
- To be able to understand the different types of over voltages appearing in the system, including existing protective schemes required for insulation co–ordination.

UNIT – I CIRCUIT BREAKERS

Circuit Breakers: Elementary principles of arc interruption, Recovery, Restriking Voltage and Recovery voltages.- Restriking Phenomenon, Average and Max. RRRV, Numerical Problems - Current Chopping and Resistance Switching - CB ratings and Specifications: Types and Numerical Problems. – Auto reclosures.Description and Operation of following types of circuit breakers: Minimum Oil Circuit breakers, Air Blast Circuit Breakers, Vacuum and SF6 circuit breakers.

UNIT – II ELECTROMAGNETIC RELAYS

Basic Requirements of Relays – Primary and Backup protection - Construction details of – Attracted armature, balanced beam, inductor type and differential relays – Universal Torque equation – Characteristics of over current, Direction and distance relays.

UNIT – III STATIC AND MICROPROCESSOR BASED RELAYS

Static Relays – Advantages and Disadvantages – Definite time, Inverse and IDMT static relays – Comparators – Amplitude and Phase comparators. Microprocessor based relays – Advantages and Disadvantages – Block diagram for over current (Definite, Inverse and IDMT) and Distance Relays and their Flow Charts.

UNIT – IV GENERATOR AND TRANSFORMER PROTECTION

Protection of generators against Stator faults, Rotor faults, and Abnormal Conditions. Restricted Earth fault and Inter-turn fault Protection. Numerical Problems on % Winding Unprotected.Protection of transformers: Percentage Differential Protection, Numerical Problem on Design of CT s Ratio, Buchholtz relay Protection.

UNIT –V PROTECTION OF FEEDERS AND TRANSMISSION LINES

Protection of Feeder (Radial & Ring main) using over current Relays. Introduction to distance relays-Universal torque equation-Protection of Transmission line – 3 Zone protection using Distance Relays. Carrier current protection. Protection of Bus bars.

PROTECTION AGAINST OVER VOLTAGES - Generation of Over Voltages in Power Systems.-Protection against Lightning Over Voltages - Valve type and Zinc-Oxide Lighting Arresters - Insulation Coordination – BIL.

TEXT BOOKS:

1. Switchgear and Protection – by Sunil S Rao, Khanna Publlishers
2. Power System Protection and Switchgear by Badari Ram , D.N Viswakarma, TMH Publications.
3. Fundamentals of Power System Protection by Y. G. Paithankar and S. R. Bhide, 2nd Edition, PHI.

REFERENCE BOOKS:

1. Transmission network Protection by Y.G. Paithankar ,Taylor and Francis,2009.
2. Power system protection and switch gear by Bhuvanesh Oza, TMH, 2010.
3. Electrical Power Systems – by C.L.Wadhwa, New Age international (P) Limited, Publishers, 3nd editon
4. Electrical power System Protection by C. Christopoulos and A. Wright, 2nd Edition, Springer International Edition

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Electrical Energy Conversion

(Professional Elective-III)

Course objectives:

- To know about energy auditing
- To get knowledge about electrical load management
- To get knowledge about electrical motors
- To know how lighting postures in system
- To get knowledge about energy management in information system

Course Outcomes:

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

- How To calculate the energy billing
- Find out knowledge about electrical load management
- To get knowledge about electrical motors
- How lighting postures in system
- To get knowledge about energy management in information system

Unit I Energy Auditing

Introduction, Economics Analysis of investments, Present value criterion, Average rate of return criterion, Return on investment, Payback period criterion.

Unit II Electrical Load Management

Introduction, Transformer, Reduction of transformer losses, Power factor improvement, Methods of improving power factor, Location of capacitor installation, Demand Management, Energy efficiency issues.

Unit III Electric motors

Introduction, Selection and application, Factors affecting performance, operational improvements, Retrofit improvements, Field testing, Energy Efficiency motors, Existing motor details, Power factor correction, variable speed drives ,Energy saving controllers.

Unit IV Lighting

Introduction, Illumination, Glare, Colour and colour rendering, Incandescent, Fluorescent, high intensity discharge, Low pressure sodium, Energy efficiency, Replacing lamps and fixtures, Improving lighting control, maintenance.

Unit V Energy management Information System

Introduction, Field transducers, PLC, Communication network energy bench marking.
Energy Instruments-Energy Instruments - Wattmeter, Data loggers, Thermocouples, Pyrometers, Lux meters, Tongue testers, Application of PLC's.

Text Books:

1. Handbook on Energy Audits & Management – A.X.Tyagi – Teri, New Delhi
2. W.R. Murphy & G. Mckay Butter worth, Energy management, Heinemann publications.
3. John, C. Andreas, Energy efficient electric motors, Marcel Dekker Inc. Ltd, 2nd edition, 1995

WEB LINK:

1) nptel.ac.in–coursera.org-engg.vediolectures.com.
2) https://www.youtube.com/watch?v=Rhr2kWAYYR4

https://www.youtube.com/watch?v=P3YpuknNcnw

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Switched Mode Power Converters

(Professional Elective-III)

Course Objectives:

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

- Understand basic concepts of DC-DC converters
- Understand the concepts of resonant converters and their classification, various types of multilevel inverters, power conditioners, UPS and filters.
- Apply various modulation and harmonic elimination techniques over the converters.
- Analyze the state space modeling of various types of converters.
- Design inductor and transformer for various power electronic applications.

Course Outcomes:

- To be able to solve the problems and to design of various DC-DC converters
- To be able to understand advanced converters of SMPCs
- To understand the performance of resonant converters
- To understand various types and performance characteristics of 1-ϕ and 3-ϕ inverters with single/multi levels
- To understand about power conditioners, UPS and filters

UNIT I

DC-DC CONVERTERS: Principles of step-down and step-up converters – Analysis and state space modeling of Buck, Boost, Buck- Boost and Cuk converters – Numerical Examples

UNIT II:

SWITCHING MODE POWER CONVERTERS

Analysis and state space modeling of fly back, Forward, Luo, Half bridge and full bridge converters- control circuits and PWM techniques – Numerical Examples

UNIT III:

RESONANT CONVERTERS

Introduction- classification- basic concepts- Resonant switch- Load Resonant converters- ZVS, Clamped voltage topologies- DC link inverters with Zero Voltage Switching- Series and parallel Resonant inverters- Voltage control – Numerical Examples

UNIT IV:

DC-AC CONVERTERS

Single phase and three phase inverters, control using various (sine PWM, SVPWM and advanced modulation) techniques, various harmonic elimination techniques- Multilevel inverters- Concepts - Types: Diode clamped- Flying capacitor- Cascaded types- Applications.

UNIT V:

POWER CONDITIONERS, UPS & FILTERS

Introduction- Power line disturbances- Power conditioners –UPS: offline UPS, Online UPS, Applications – Filters: Voltage filters, Series-parallel resonant filters, filter without series capacitors, filter for PWM VSI, current filter, DC filters – Design of inductor and transformer for PE applications – Selection of capacitors.

Text Book:

1. L. Umanand, "Power Electronics: Essentials and Applications", Wiley, 2009
2. M.H. Rashid, " Power Electronics handbook", Elsevier Publication, 2001.
3. V Ramanarayanan, "Course material on Switched Mode Power Conversion" Dept. of Electrical Engg. IISc. Bangalore.

References:

1. Philip T. Krein, "Elements of Power Electronics", Oxford University Press, 2012
2. Ned Mohan, Tore.M.Undeland, William.P.Robbins, "Power Electronics converters, Applications and design", 3rd Edition, John Wiley and Sons, 2006
3. M.H. Rashid, "Power Electronics circuits, devices and applications", 3rd Edition Prentice Hall of India New Delhi, 2007.

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Distribution of Electrical Power

(Professional Elective-IV)

Course objectives:

This course aims at providing the student to acquire the knowledge on:

- Distribution system, classification of load characteristics.
- Different types of feeders, design & consideration of distribution feeders.
- primary &secondary distribution systems, voltage drop calculations.
- Substations &types of bus-bar connected to the substations.
- System Analysis &power factor improvement.

UNIT – I: GENERAL CONCEPTS

Introduction to distribution systems, Load modelling and characteristics. Coincidence factor, contribution factor loss factor - Relationship between the load factor and loss factor. Classification of loads (Residential, commercial, Agricultural and Industrial) and their characteristics.

UNIT – II: GENERAL ASPECTS OF D.C. AND A.C DISTRIBUTION SYSTEMS

Classification of Distribution Systems - Comparison of DC vs AC and Under-Ground vs Over - Head Distribution Systems- Requirements and Design features of Distribution Systems- Voltage Drop Calculations (Numerical Problems) in D.C Distributors for the following cases: Radial D.C Distributor fed one end and at the both the ends (equal/unequal Voltages) and Ring Main Distributor. Design Considerations of Distribution Feeders: Radial and loop types of primary feeders, voltage levels, feeder loading; basic design practice of the secondary distribution system. Voltage Drop Calculations (Numerical Problems) in A.C. Distributors for the following cases: Power Factors referred to receiving end voltage and with respect to respective load voltages.

UNIT – III: **SUBSTATIONS**

Location of Substations: Rating of distribution substation, service area within primary feeders. Benefits derived through optimal location of substations. Classification of substations: Air insulated substations - Indoor & Outdoor substations: Substations layout showing the location of all the substation equipment. Bus bar arrangements in the Sub-Stations: Simple arrangements like single bus bar, sectionalized single bus bar, main and transfer bus bar Double breaker – One and half breaker system with relevant diagrams

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UNIT – IV: POWER FACTOR AND VOLTAGE CONTROL

Causes of low p.f -Methods of Improving p.f -Phase advancing and generation of reactive KVAR using static Capacitors-Most economical p.f. for constant KW load and constant KVA type loads, Numerical Problems. Dependency of Voltage on Reactive Power flow.- Methods of Voltage Control: Shunt Capacitors, Series Capacitors, Synchronous Capacitors, Tap changing and Booster Transformers.

UNIT–V: SYSTEM ANALYSIS AND POWER FACTOR IMPROVEMENT

Voltage drop and power-loss calculations: Derivation for voltage drop and power loss in lines, manual methods of solution for radial networks, three phase balanced primary lines. Capacitive compensation for power-factor control - effect of shunt capacitors (Fixed and switched), Power factor correction-Economic justification - Procedure to determine the best capacitor location.

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TEXT BOOK:

1. "Electric Power Distribution system, Engineering" – by Turan Gonen, Mc Graw-hill Book Company.
2. Electric Power Distribution – by A.S. Pabla, Tata Mc Graw-hill Publishing Company, 4th edition, 1997.

REFERENCE BOOK:

1. Electric Power Distribution Automation by Dr. M. K. Khedkar and Dr. G. M. Dhole, University Science Press.
2. Electrical Power Distribution Systems by V. Kamaraju, Right Publishers.
3. Electrical Power Systems for Industrial Plants by Kamalesh Das, JAICO Publishing House

WEB LINK:

1) nptel.ac.in–coursera.org-engg.vediolectures.com.
2) *https://www.youtube.com/watch?v=EG9ra2hw2LM*
3) *https://www.youtube.com/watch?v=nMyYtMNfrpg*

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Modern Control Theory

(Professional Elective-IV)

Course objectives:

This course aims at providing the student to acquire the knowledge on:

- State variable description.
- Pole placement observer.
- Describing function and phase-plane analysis.
- Stability analysis stability analysis.
- Optimal and adaptive control.

UNIT – I: STATE VARIABLE DISCRIPTION

State space representation of systems – State diagrams for continuous time state models – Solution of state equations – State transmission matrix. Controllability and observability for continuous time systems, Principle of Duality, Controllability and observability of state models in Jordan canonical form and other canonical forms.

UNIT – II: POLE PLACEMENT OBSERVER

Fundamental theorem of feedback control - - Pole assignment by state feedback using Ackermann's formula – Eigen structure assignment problem-Design of full order observer using Ackermann's formula. - Full order Observer based controller design. Reduced order observer design.

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UNIT – III : DESCRIBING FUNCTION AND PHASE-PLANE ANALYSIS

Introduction to nonlinear systems, Types of nonlinearities, Concepts of describing functions, Derivation of describing functions for Dead zone, Saturation, backlash, relay with dead zone and Hysteresis - Jump Resonance. Introduction to phase-plane analysis, Method of Isoclines for Constructing Trajectories, Singular points, Phase-plane analysis of nonlinear control systems.

UNIT-IV: STABILITY ANALYSIS

Stability in the sense of Lyapunov. Lyapunov's stability and Lypanov's instability theorems. Direct method of Lypanov for the Linear and Nonlinear continuous time autonomous systems.problems.

UNIT –V : OPTIMAL AND ADAPTIVE CONTROL

Formulation of optimal control problem. Minimum time, Minimum energy, minimum fuel problems. State regulator problem. Infinite time Regulator, Output regulator problem. Tracking problem, Parameter Optimization. Basic block diagram of adaptive system, Classification of adaptive control systems- MRAC systems- different configuration-classification- Mathematical description.

TEXT BOOKS:

1. Modern Control System Theory – by M. Gopal, New Age International Publishers, 2nd edition, 1996
2. Modern Control Engineering – by K. Ogata, Prentice Hall of India, 3rd edition, 1998
3. Control Systems Engineering by I.J. Nagarath and M.Gopal, New Age International (P) Ltd.

REFERENCE BOOKS:

1. Digital Control and State Variable Methods – by M. Gopal, Tata Mc Graw-Hill Companies, 1997.
2. Systems and Control by Stainslaw H. Zak , Oxford Press, 2003
3. T. Kailath, T., Linear Systems, Perntice Hall, Englewood Cliffs, NJ, 1980.
4. N. K. Sinha , Control Systems, New Age International, 3rd edition, 2005**.**
5. K.J.Astrom and Bjorn Wittenmark, Adaptive control, Pearson Edu., 2nd Edn
6. Sankar Sastry, Adaptive control.

WEBLINKS:

1) https://www.ece.ufl.edu/content/modern-control-theory
2)www.math.auth.gr/en/node/143
3)nptel.ac.in/courses/108101037
4)*www.zapmeta.co.in/Modern+Control+Theory*

Sri Krishnadevaraya University College of Engineering & Technology

B.Tech IV –I Sem	**(Electrical And Electronics Engineering)**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Electrical Machine Design

(Professional Elective-IV)

Course Objectives:

The student will be able to:

- Know about various principles of design factors, ratings based on heating and coolingof electrical machines
- Know about designing of DC machines along with windings
- Understand about overall designing of 1-ϕ transformer
- Be able to know about designing of Induction machine along with winding configurations
- Able to know about designing of Synchronous machines

Course Outcomes:

The student will be able to:

- Understand various design factors, types of windings, choice of machine, selectionand ratings
- Able to design DC machine based on specified rating
- Able to design 1-ϕ transformer based on specified rating
- Able to design 3-ϕ Induction machine based on specifiedrating
- Able to design 3-ϕ Synchronous machine based on specifiedrating

UNIT-I:

DESIGN FACTORS, HEATING AND COOLING

Introduction, Design factors, Limitations in Design. Theory of solid body heating, Heating time constant and estimation, Selection of machine power rating, types of duties and ratings (Description only), Selection of motor capacity for continuous, short-time and Intermittent periodic duty ratings, Concept of the methods used for determination of machine rating for variable loads.

UNIT-II:

DESIGN OF DC MACHINES

Output equation and main dimensions, choice of flux density, choice of ampere-conductors, Selection of number of poles, Length of air gap, Design of field winding, Simplex Lap and Wave windings-Numerical examples.

UNIT-III:

DESIGN OF SINGLE PHASE TRANSFORMERS

Output of transformer, Design of core, Selection of type of winding, Design of insulation, Overall design, No-load current estimation, Design of tank with tubes-Numerical examples.

UNIT-IV:

DESIGN OF INDUCTION MACHINES

Three phase Induction machine output equation and main dimensions, Selection of stator and rotor slots, Length of air gap, and Reduction of harmonic torques, Hemitropic, whole coil and Mush windings-Numerical examples.

UNIT-V:

DESIGN OF SYNCHRONOUS MACHINES

Output equation, Main dimensions for cylindrical and salient pole machines, Choice of specific magnetic and electric loadings, Effect of SCR on machine performance, Length of air gap, Selection of stator slots, and mitigation of harmonics-Numerical examples.

Text books:

1. A.K. Sawhney and Chakrabarti, "A course on Electrical Machine Design", 6th edition, Dhanpat Rai & Co Pvt. Ltd., 2014.
2. K. G. Upadhyay, "Design of Electrical Machines", 1st Edition, New Age International Pvt. Ltd., 2018.

Reference books:

1. M G Say, "The performance and Design of Alternating Current Machines", 3rd edition, CBS Publishers & Distributors, New Delhi, 2002.
2. A. E. Clayton and N N Hancock, "Performance and Design of Direct Current Machines", 3rd edition, CBS Publication, 2004.
3. V. N. Mittle and Aravind Mittal, "Design of Electrical Machines", Standard

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		0	**0**	**3**	**1.5**

Microprocessors and Microcontrollers Lab

I . Microprocessor 8086:

Introduction to MASM/TASM.
Arithmetic operation – Multi byte addition and subtraction, Multiplication and Division – Signed and unsigned Arithmetic operation, ASCII – arithmetic operation.
Logic operations – Shift and rotate – Converting packed BCD to unpacked BCD, BCD to ASCII conversion.
By using string operation and Instruction prefix: Move Block, Reverse string, Sorting, Inserting, Deleting, Length of the string, String comparison.
Modular Program: Procedure, Near and Far implementation, Recursion.
Dos/BIOS programming: Reading keyboard (Buffered with and without echo) – Display characters, Strings.

II. Interfacing

8259 – Interrrupt Controller.
8279 – Keyboard Disply.
8255 – PPI.
8251 – USART.

III. Mcrocontroller 8051:

1. Reading and Writing on a parallel port.
2. Timer in different modes.
3. Serial communication implementation.
4. Understanding three memory areas of 00 – FF (Programs using above areas).
5. Using external interrupts
6. Programs using special instructions like swap, bit/byte, set/reset etc.
7. Programs based on short, page, absolute addressing.

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		0	**0**	**3**	**1.5**

Power Systems Simulation Lab

1. Determination of sequence Impedance of cylindrical rotor Synchronous Machine.
2. Separation of Load Losses of 3-Phase Induction Motor.
3. Power Angle Characteristics of Salient pole Machine.
4. Equivalent Circuit of Three Winding Transformer.
5. Determination of Subtransient Reactance of Salient pole Synchronous Machine.
6. Three Phase to Two Phase Conversion.
7. Fault Analysis-I(LG & LL).
8. Fault Analysis-II(LLG & LLLG).
9. Ybus formation by using MATLAB.
10. Zbus formation by using MATLAB.
11. Load flow solution using GAUSS-SEIDEL method.
12. Fast decoupled load flow analysis by using MATLAB.
13. Transient stability analysis for single machine connected to an infinite bus by using 'point by point method'.
14. Step response of two area system by constructing the simulink block diagram and estimating of Tie line power frequency deviation.
15. Step response of two area system by constructing the simulink block diagram and estimating of Tie line Power deviation.

Sri Krishnadevaraya University College of Engineering & Technology					
Dept. of Electrical and Electronics Engineering					
IV Year 2nd Semester					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1		Professional Elective courses-V 1. Renewable Energy Sources 2. Neural Networks and fuzzy Logic 3. Energy auditing and Demand side Management	PE-V	3-0-0	3
2		Professional Elective courses-VI 1. Power Quality issues 2. FPGA based Controller Design 3. Smart Grid Technologies	PE-VI	3-0-0	3
3		Project II			6
4		Comprehensive Online Exam			1
				Total	**13**

Category	**CREDITS**
Professional Elective courses	3
Open Elective Course/Job oriented elective	3
Project II	6
Comprehensive Online Exam	1
TOTAL CREDITS	**13**

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B.Tech IV –II Sem	**(Electrical And Electronics Engineering)**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Renewable Energy Sources

(Professional Elective-V)

Course Objectives:

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

- Identify various sources of Energy and the need of Renewable Energy Systems.
- Understand the concepts of Solar Radiation, Wind energy and its applications.
- Distinguish between solar thermal and solar PV systems
- Interpret the concept of geo thermal energy and its applications.
- Understand the use of biomass energy and the concept of Ocean energy and fuel cells.

Course Outcomes:

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

- To distinguish between various alternate sources of energy for different suitable application requirements
- To differentiate between solar thermal and PV system energy generation strategies
- To understand about wind energy system
- To get exposed to the basics of Geo Thermal Energy Systems
- To know about various diversified energy scenarios of ocean, biomass and fuel cells

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 titled 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

WEB LINK:

1) nptel.ac.in–coursera.org-engg.vediolectures.com.
2) https://www.youtube.com/watch?v=KEeH4EniM3E
3) https://www.youtube.com/watch?v=B8WuEyL-YNY

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B.Tech IV –II Sem	**(Electrical And Electronics Engineering)**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Neural Networks and Fuzzy Logic

(Professional Elective-V)

Course Objectives:

The objectives of the course are to make the students learn about:

- Importance of AI techniques in engineering applications
- Artificial Neural network and Biological Neural Network concepts
- ANN approach in various Electrical Engineering problems
- Fuzzy Logic and Its use in various Electrical Engineering Applications

Course Outcomes: The students should acquire awareness about: Approaches and architectures of Artificial Intelligence

- Application of ANN to Electrical Load Forecasting problem, Control system problem
- Artificial Neural Networks terminologies and techniques
- Application of ANN to System Identification and Pattern recognition
- The development of Fuzzy Logic concept
- Use of Fuzzy Logic for motor control and AVR operation
- Use of Fuzzy Logic controller in an 18 bus bar system

UNIT – I INTRODUCTION TO ARTIFICIAL INTILLEGENCE

Introduction and motivation – Approaches to AI – Architectures of AI – Symbolic Reasoning System – Rule based Systems – Knowledge Representation – Expert Systems.

UNIT – II ARTIFICIAL NEURAL NETWORKS

Basics of ANN - Comparison between Artificial and Biological Neural Networks – Basic Building Blocks of ANN – Artificial Neural Network Terminologies – McCulloch Pitts Neuron Model – Learning Rules – ADALINE and MADALINE Models – Perceptron Networks – Back Propagation Neural Networks – Associative Memories.

UNIT – III ANN APPLICATIONS TO ELECTRICAL SYSTEMS

ANN approach to: Electrical Load Forecasting Problem – System Identification – Control Systems – Pattern Recognition.

UNIT – IV FUZZY LOGIC

Classical Sets – Fuzzy Sets – Fuzzy Properties and Operations – Fuzzy Logic System – Fuzzification – Defuzzification – Membership Functions – Fuzzy Rule base – Fuzzy Logic Controller Design.

UNIT – V FUZZY LOGIC APPLICATIONS TO ELECTRICAL SYSTEMS

Fuzzy Logic Implementation for Induction Motor Control – Switched Reluctance Motor Control –Fuzzy Excitation Control Systems in Automatic Voltage Regulator - Fuzzy Logic Controller in an 18 Bus Bar System.

Text Books:

1. S. N. Sivanandam, S. Sumathi and S. N. Deepa, "Introduction to Neural Networks using MATLAB", McGraw Hill Edition, 2006.

2. Timothy J. Ross, "Fuzzy Logic with Engineering Applications", Third Edition, WILEY India Edition, 2012.

References:

1. S. N. Sivanandam, S. Sumathi and S. N. Deepa, "Introduction to Fuzzy Logic using MATLAB", Springer International Edition, 2013.

2. Yung C. Shin and Chengying Xu, "Intelligent System – Modeling, Optimization

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B.Tech IV –II Sem	**(Electrical And Electronics Engineering)**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Energy Auditing and Demand Side Management

(Professional Elective-V)

Course objectives:

- To know about energy auditing
- To get knowledge about electrical load management
- To get knowledge about electrical motors
- To know how lighting postures in system
- To get knowledge about energy management in information system

Course Outcomes:

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

- How To calculate the energy billing
- Find out knowledge about electrical load management
- To get knowledge about electrical motors
- How lighting postures in system
- To get knowledge about energy management in information system

Unit I Energy Auditing

Introduction, Economics Analysis of investments, Present value criterion, Average rate of return criterion, Return on investment, Payback period criterion.

Unit II Electrical Load Management

Introduction, Transformer, Reduction of transformer losses, Power factor improvement, Methods of improving power factor, Location of capacitor installation, Demand Management, Energy efficiency issues.

Unit III Electric motors

Introduction, Selection and application, Factors affecting performance, operational improvements, Retrofit improvements, Field testing, Energy Efficiency motors, Existing motor details, Power factor correction, variable speed drives ,Energy saving controllers.

Unit IV Lighting

Introduction, Illumination, Glare, Colour and colour rendering, Incandescent, Fluorescent, high intensity discharge, Low pressure sodium, Energy efficiency, Replacing lamps and fixtures, Improving lighting control, maintenance.

Unit V Energy management Information System

Introduction, Field transducers, PLC, Communication network energy bench marking.

Energy Instruments-Energy Instruments - Wattmeter, Data loggers, Thermocouples, Pyrometers, Lux meters, Tongue testers, Application of PLC’s.

Text Books:

2. Handbook on Energy Audits & Management – A.X.Tyagi – Teri, New Delhi

2. W.R. Murphy & G. Mckay Butter worth, Energy management, Heinemann publications.
3. John, C. Andreas, Energy efficient electric motors, Marcel Dekker Inc. Ltd, 2nd edition, 1995

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		3	**0**	**0**	**3**

Power Quality Issues
(Professional Elective-VI)

UNIT-I INTRODUCTION

What is power quality? Power quality – voltage quality, why are we concerned about power quality, The power quality Evaluation procedure, Terms and Definitions, Transients, Long-duration voltage variations, short-voltage variations, voltage imbalance, wave form distortion, voltage fluctuation, power frequency variations, power quality terms CBEMA and ITI curves.

UNIT-II VOLTAGE SAGS AND TRANSIENT OVER VOLTAGES

Sources of sagas and interruptions, Estimating voltage sag performance, fundamental principles of protection, solutions at the end-use level, Motor-starting sags, utility system fault-clearing issues. Sources of over voltages, principles of over voltage protection, devices for over voltage protection, utility capacitor-switching transients, utility system lightning protection.

UNIT-III FUNDAMENTALS OF HARMONICS

Harmonic Distortion, Voltage versus current distortion, Harmonics versus Transients, power system qualities under non sinusoidal conditions, Harmonic indices, Harmonic sources from commercial loads, Harmonic sources from Industrial loads, Effects of Harmonics, Harmonic distortion evaluations, Principles of Controlling Harmonics, Devices for Controlling Harmonic Distortion

UNIT-IV LONG-DURATION VOLTAGE VARIATIONS

Principles of regulating the voltage, Devices for voltage regulation, utility voltage regulator Application, Capacitors for voltage regulation flicker.

UNIT-V POWER QUALITY BENCH MARKING AND MONITORING

Benchmarking process, RMS Voltage variation Indices, Harmonics indices Power Quality Contracts, Monitoring considerations, power quality measurement equipment, Power quality Monitoring standards

TEXT BOOKS:

1. Electrical Power Systems Quality, Roger C. Dugan, Mark F.McGranaghan, Surya Santoso, H.Wayne Beaty, 2nd Edition, TMH Education Pvt. Ptd.
2. Power quality by C. Sankaran, CRC Press

REFERENCE BOOKS:

1. Electrical systems quality Assessment by J. Arrillaga, N.R. Watson, S. Chen, John Wiley & Sons
2. Understanding Power quality problems by Math H. J. Bollen IEEE Press

WEB LINKS :

1) *https://en.wikipedia.org/wiki/Electric_power_quality*
2) www.ecmweb.com/power-quality/power-quality-measurement-and-analysis-basics
3)https://link.springer.com/content/pdf/10.1007%2F978-1-4471-2467-2_127.pdf

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B.Tech IV –II Sem (Electrical And Electronics Engineering)

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FPGA Based Control and Design

(Professional Elective-VI)

Course Objectives:

- To know about FPGA architecture features and fabrics
- To understand about FPGA based systems and basics of VLSI technology
- To learn about logic implementation and design aspects of FPGA
- To understand about performance analysis of sequential machines
- To learn about architectures and multi-FPGA large scale systems

Course Outcomes:

- To be able to understand about features of FPGA and its fabrics
- To understand and develop FPGA based systems and various logic gates of VLSI technology
- To understand about various combinational logic gates for implementation in FPGAs
- To understand and develop sequential logic machines and analyze the performance
- To be able to distinguish and develop single and multi FPGA systems

UNIT-I: FPGA ARCHITECTURE AND FABRICS

Programmable Logic Devices-Types-PLA, PAL, FPGA-architectures, SRAM-based FPGAs, Permanently Programmed FPGAs, Chip I/O. Circuit Design of FPGA Fabrics. Architecture of FPGA Fabrics.

UNIT-II: FPGA-BASED SYSTEMS AND VLSI TECHNOLOGY

Introduction, Basic Concepts, Digital Design and FPGAs. FPGA-based system design. Manufacturing Processes, Deriving Transistor Characteristics, CMOS Logic Gates, Wires, Registers and RAM, Packages and Pads.

UNIT-III: COMBINATIONAL LOGIC

The Logic Design Process. Hardware Description Languages, combinational network delay. Power and energy optimization, arithmetic logic, logic implementation for FPGAs. Physical Design for FPGAs. The Logic Design Process.

UNIT-IV: SEQUENTIAL MACHINES

The sequential machine design process. Sequential design styles. Rules for Clocking. Performance Analysis. Power Optimization.

UNIT-V: LARGE SCALE SYSTEMS

Architectures and Large Scale Systems, Behavioral Design, Design Methodologies. Design Example. Buses, Platform FPGAs, Multi-FPGA Systems, Novel Architectures.

TEXT BOOKS

1. Wayne Wolf, " FPGA Based System Design", Prentice Hall, 2004.
2. Wayne Wolf, "Modern VLSI Design", Pearson Education 2002.

REFERENCE BOOKS

1. Michael D Ciletti, " Advanced Digital Design with verilog HDL", Pearson Education 2005
2. Samir Palnitkar, "Verilog HDL", Pearson Education 2005.
3. J Bhaskar, " A Verilog HDL Primer", 2nd edition, B S Publications, 2007.
4. Kevin Skahill "VHDL for Programmable Logic", Pearson Education, 2004

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		3	**0**	**0**	**3**

Smart Grid Technologies

(Professional Elective-VI)

Course Objectives:

The objectives of the course are to make the students learn about:

- Overview of the technologies required for the smart grid
- Switching techniques and different means for data communication
- Standards for information exchange and smart metering
- Methods used for information security on smart grid
- Smart metering, and protocols for smart metering
- Management systems for Transmission and distribution

Course Outcomes:

The student should have learnt about:

- How to meet the standards for information exchange and for smart metering
- How to preserve data and Communication security by adopting encryption and decryption procedures.
- Monitoring, operating, and managing the transmission and distribution tasks under smart grid environment

UNIT – I

THE SMART GRID

Introduction, Ageing Assets and Lack of Circuit Capacity, Thermal Constraints, Operational Constraints, Security of Supply, National Initiatives,

Early Smart Grid Initiatives, Active Distribution Networks, Virtual Power Plant, Other Initiatives and Demonstrations, Overview of The Technologies Required for The Smart Grid.

UNIT – II

COMMUNICATION TECHNOLOGIES

Data Communications: Introduction, Dedicated and Shared Communication Channels, Switching Techniques, Circuit Switching, Message Switching, Packet Switching, Communication Channels, Wired Communication, Optical Fibre, Radio

Communication, Cellular Mobile Communication, Layered Architecture and Protocols, The ISO/OSI Model, TCP/IP

Communication Technologies: IEEE 802 Series, Mobile Communications, Multi

Protocol Label Switching, Power line Communication, Standards for Information Exchange, Standards For Smart Metering, Modbus, DNP3, IEC61850

UNIT – III

INFORMATION SECURITY FOR THE SMART GRID

Introduction, Encryption and Decryption, Symmetric Key Encryption, Public Key Encryption, Authentication, Authentication Based on Shared Secret Key, Authentication Based on Key Distribution

Center, Digital Signatures, Secret Key Signature, Public Key Signature, Message Digest, Cyber Security Standards, IEEE 1686: IEEE Standard for Substation Intelligent Electronic Devices(IEDs) Cyber Security Capabilities, IEC 62351: Power Systems Management And Association Information Exchange – Data and Communication Security.

UNIT – IV

SMART METERING AND DEMAND SIDE INTEGRATION

Introduction, smart metering – evolution of electricity metering, key components of smart metering, smart meters: an overview of the hardware used – signal acquisition, signal conditioning, analogue to digital conversion, computation, input/output, communication.

Communication infrastructure and protocols for smart metering- Home area network, Neighbourhood Area Network, Data Concentrator, meter data management system, Protocols for communication. Demand Side Integration- Services Provided by DSI, Implementation of DSI, Hardware Support, Flexibility Delivered by Prosumers from the Demand Side, System Support from DSI.

UNIT – V

TRANSMISSION AND DISTRIBUTION MANAGEMENT SYSTEMS

Data Sources, Energy Management System, Wide Area Applications, Visualization Techniques, Data Sources and Associated External Systems, SCADA, Customer Information System, Modelling and Analysis Tools, Distribution System Modelling, Topology Analysis, Load Forecasting, Power Flow Analysis, Fault Calculations, State

Estimation, Applications, System Monitoring, Operation, Management, Outage Management System, Energy Storage Technologies, Batteries, Flow Battery, Fuel Cell and Hydrogen Electrolyser, Flywheels, Superconducting Magnetic Energy Storage Systems, Supercapacitors.

TEXT BOOKS:

1. Smart Grid, Janaka Ekanayake, Liyanage, Wu, Akihiko Yokoyama, Jenkins, Wiley Publications, 2012, Reprint 2015.
2. Smart Grid: Fundamentals of Design and Analysis, James Momoh, Wiley, IEEE Press., 2012, Reprint 2016.

REFERENCES:

1. Smart Grid – Enabling Energy efficiency and demand response, Clark W. Gellings, P.E., CRC Press, Taylor & Francis group, First Indian Reprint. 2015.
2. Smart Grid – Applications, Communications, and Security Edited by Lars Torsten Berger, Krzysztof Iniewski, WILEY, 2012, Reprint 2015.
3. Practical Electrical Network Automation and Communication Systems, Cobus Strauss, ELSVIER, 2003.

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

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B.Tech	(Electronics & Communication Engineering)	L	T	P	C
		3	0	0	3

Fundamentals of Digital Electronics

(Open Elective for non ECE Students)

UNIT-I- Binary Systems

Binary Systems Introduction of Digital Computers and Digital Systems Binary umbers 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 andCharacteristic 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

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B.Tech	(Electronics & Communication Engineering)	L	T	P	C
		3	0	0	3

Fundamentals of Communication Systems
(Open Elective for non ECE Students)

UNIT I INTRODUCTION TO COMMNICATION 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; FMdemodulators, 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

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B.Tech	**(Electronics & Communication Engineering)**	**L**	**T**	**P**	**C**
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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”, 2nd 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”, 4thEdition, TMH, 2019.

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Microprocessors and Microcontrollers
(Open Elective for non ECE Students)

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

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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 with8085 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 SubrataGhoshal,

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Electronic Measurements & Instrumentation
(Open Elective for non ECE Students)

UNIT I: ELECRICAL 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: electrodynamometer, 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, Willium D. Cooper-PHI-2002
2. Electronic Instrumentation and Measurements- David A. Bell-PHI-2nd edition-2003.

REFERENCES:

1. A course in Electrical and Electronic Mesurements and Instrumentation- A.K. Sawhney- DhanpatiRai&CO-7th edition-2005
2. Electronic Instrumentation- H Kalsi- TMH-3rd edition
3. Electronic Measurements and Instrumentation- Oliver and Cage- TMH

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Embedded Systems
(Open Elective for non ECE Students)

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

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Basics of VLSI

(Open Elective for non ECE Students)

UNIT – I

Introduction: Introduction to MOS Technology – MOS, PMOS, NMOS, CMOS and BiCMOStechnologies, fabrication fundamentals: Oxidation, Lithography, Diffusion, Ionimplantation, Metallization and Encapsulation.

Basic Electrical Properties: Basic Electrical Properties of MOS,CMOS and BiCMOS Circuits, IDS-VDSrelationships, MOS transistor threshold Voltage, gm, gds, figure of merit ωo, Passtransistor, NMOS inverter, Various pull - ups, Determination of pull-up to pulldown ratio (Zpu / Zpd) , 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 ofMOS 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 ResistanceRS and its concept to MOS, Area Capacitance Units, Calculations, The delay unitT, Inverter Delays, Driving large Capacitive Loads, Wiring Capacitances, Fan-inand fan-out, Choice of layers

UNIT – IV

Subsystem Design: Subsystem Design, Shifters, Adders, ALUs, Multipliers: Array multiplier, SerialParallel multiplier, Parity generator, Comparators, Zero/One Detectors, Up/DownCounter, 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”, EshraghianDouglesand 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”, 3rd edition, DavidHarris, Ayan Banerjee, Pearson, 2009.

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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” , 4th edition , Pearson Education/PHI, 2007.
3. A.V. Oppenheim and R.W. Schaffer, “Discrete Time Signal Processing”, 2nd edition., PHI.

REFERENCES:

1. A.V. Oppenheim, A.S. Will sky and S.H. Nawab, “Signals and Systems”, PHI, 2nd 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.

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Introduction to Image Processing
(Open Elective for non ECE Students)

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", 3rd Edition, Pearson Education, 2011.

REFERENCE BOOKS:

1. S Jayaraman, S Esakkirajan and T Veerakumar, "Digital Image Processing", TMH, 2011.

S. Sridhar, "Digital Image Processing", 2nd Edition, Oxford Pu

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B.Tech **(Electrical and Electronics Engineering)**

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Introduction to Hybrid Electric Vehicles

(Open Elective offered for non EEE Students)

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”, 2nd 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.

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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:

2. G.K. Mithal, “Electrical Engineering Materials”, Khanna publishers, 2nd edition, 1991.
3. 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”, 1st 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.

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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 AxisWind 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.

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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, 2nd edition.

REFERENCE BOOKS:

1. Modern Control Engineering – by Katsuhiko Ogata – Prentice Hall of India Pvt. Ltd., 3rd edition, 1998.
2. Control Systems by N.K.Sinha, New Age International (P) Limited Publishers, 3rd Edition, 1998.
3. Control Systems Engg. by NISE 3rd Edition – John wiley
4. "Modelling & Control Of Dynamic Systems" by Narciso F. Macia George J. Thaler, Thomson Publishers

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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 titled 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

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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”, 2nd edition, Prentice Hall of India, 1998

2.P.S.Bimbhra,”Power Electronics”, 4th 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” 2nd Edition, Kluwer Academic Publishers, 2004.

6. Vedam Subramanyam, “Power Electronics”, New Age International (P) Limited, 1996.

7. V.R.Murthy, “Power Electronics”, 1st 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

Sri Krishnadevaraya University College of Engineering & Technology

		L	T	P	C
B.Tech	**(Computer Science and Engineering)**	**3**	**0**	**0**	**3**

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 connectivites – 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 dependies-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 & CarlosCoronel 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

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B.Tech	**(Computer Science and Engineering)**	**L**	**T**	**P**	**C**
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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, Commoncommands: 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, Operationsunique to regular files, Operations unique to directories, Operations common to both.

Security & File Permissions: users and groups, security levels, changing permissions, user masks, changingownership and group.

UNIT III

Introduction to Shells: Unix Session, Standard Streams, Redirection, Pipes, Tee Command, CommandExecution, Command-Line Editing, Quotes, Command Substitution, Job Control, Aliases, Variables, PredefinedVariables, 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, StringFunctions, String Functions, Mathematical Functions, User – Defined Functions, Using System commands inawk, Applications, awk and grep.

UNIT V

Interactive Korn Shell: Korn Shell Features, Two Special Files, Variables, Output, Input, Exit Status of aCommand, eval command, Environmental Variables, Options, Startup Scripts, Command History, CommandExecution 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

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Object Oriented Programming through Java

(Open Elective for non CSE Students)

UNIT I Java Basics - Introduction, comments, data types, variables, constants, scope andlife time of variables, operators, type conversion and casting, control flowconditionalstatements, break and continue, simple java program, arrays. OOP concepts, parameter passing,static fields and methods, access control, this, overloading methods and constructors, recursion, garbagecollection, 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, abstractclasses and methods, the Object class and its methods.
Interfaces – Interfaces vs. Abstract classes, implementing interfaces, accessingimplementations 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, Filemanagement using File class, Using java.io. **Networkingin Java**– Introduction, Client/Server Interaction with Stream Socket Connections, Connectionless Client/Server Interaction withDatagrams, 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, threadstates, creating threads, interrupting threads, thread priorities, synchronizing threads, interthreadcommunication, thread groups, daemon threads.**Event Handling** - Events, Event sources, Event classes, Event Listeners, Relationship between Eventsources 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, JTextField, JTextArea, JList, JComboBox, JMenu, capabilities –colorcontrol, Font control, Drawing lines, rectangles and ovals, Drawing arcs, Layout management - Layout managertypes – border, grid, flow, box.

TEXT BOOKS

1. Java; the complete reference, 7th editon, Herbert schildt, TMH.
2. Understanding OOP with Java, updated edition, T. Budd, pearsoneduction.

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, seventhEdition, Pearson Education.
6. Core Java 2, Vol 2, Advanced Features, Cay.S.Horstmann and Gary Cornell,
Seventh Edition, PearsonEducation.

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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, Publicaiton Wiley

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B.Tech	**(Computer Science and Engineering)**	**3**	**0**	**0**	**3**

Computer Networks

(Open Elective for non CSE Students)

UNIT I: Introduction: Network Hardware, Network Software, References Models. The Physical Layer: GuidedTransmission 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, SlidingWindow 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, the802.11 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), CongestionControl Algorithms,Internetworking.

UNIT IV: The Transport Layer: The Transport Service, Elements of Transport Protocols, The Internet TransportProtocols: UDP, TCP.

UNTI 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, Fouth Edition, Pearson Education.

REFERENCES:

1. Computer Communications and Networking Technologies, Michael A. Gallo, William M. Hancock, CengageLearning.
2. Computer Networks: Principles, Technologies and Protocols for Network Design, Natalia Olifer, VictorOlifer, 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, CengageLearning.
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

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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, Softwaremyths. **A Generic view of process:** Software engineering- A layered technology, a process framework, TheCapability Maturity Model Integration (CMMI), Process patterns, process assessment, personal and teamprocess models.

UNIT II

Process models: The waterfall model, Incremental process models, Evolutionary process models, The Unifiedprocess. **Software Requirements:** Functional and non-functional requirements, User requirements, Systemrequirements, Interface specification, the software requirements document.

UNIT III

Requirements engineering process: Feasibility studies, Requirements elicitation and analysis, Requirementsvalidation, 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, teststrategies 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 InternationalEdition.
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

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B.Tech	(Computer Science and Engineering)	L	T	P	C
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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 Joh n W.Ruttinghouse, James F. Ransome.CRC Press, Taylor & Franc is group, 2010.

2) Cloud Computing a practical approach by Anthony T.velte, Toby J.velte Robert Elsenpeter. Tata Me Graw Hill edition, 2010

REFERENCES:

1) Cloud Application Architectures by George Reese. Oreilly publishers

2) Cloud computing and SOA convergence in your enterprise, by David S. Linthicum, Addison- Wesley

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		L	T	P	C
B.Tech	**(Computer Science and Engineering)**	**3**	**0**	**0**	**3**

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. Sriddhara Bhatt; "Production & Operations Management", 2nd Edition Himalaya Publication.

Adam Ebert: Production And Operation Management (Phi)

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B.Tech	**(Computer Science and Engineering)**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

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: Concensus on Blockchain network, mining, Block validation, state storage in Ethereum.

Text book:

1. Arshadeepbahga, Vijay madisetti, “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

Sri Krishnadevaraya University College of Engineering & Technology

B.Tech	(Civil Engineering)	L	T	P	C
		3	0	0	3

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

Unit-IV:

ASSEMENT OF IMPACT ON VEGETATION AND WILDLIFE:

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

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

Unit-V:

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.

Sri Krishnadevaraya University College of Engineering & Technology

B.Tech	(Civil Engineering)	L	T	P	C
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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.

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B.Tech	(Civil Engineering)	L	T	P	C
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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 Palnetary Hazards/ Disasters- Man induced Hazards /Disasters- Physical hazards/ Disasters-Soil Erosion

Unit-V:

Soil Erosion: Mechanics & forms of Soil Erosion, Factors & causes of Soil Erosion, Conservation measures of Soil Erosion. Chemical hazards/ disasters, Release of toxic chemicals, nuclear explosion, Sedimentation processes. Sedimentation processes, Global Sedimentation problems- Regional Sedimentation problems-Sedimentation & Environmental problems- Corrective measures of Erosion & Sedimentation. Biological hazards/ disasters, Population Explosion.

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, Universiters Press, India, 2003.
4. R.B. Singh, Space Technology for Disaster Mitigation in India (INCED), University of Tokyo, 1994.
5. Dr.Satender,Disaster Management t in Hills, Concept Publishing Co., New Delhi, 2003.

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B.Tech	**(Civil Engineering)**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

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.,NewYork, 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.

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B.Tech	(Civil Engineering)	L	T	P	C
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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	(Civil Engineering)	L	T	P	C
		3	0	0	3

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

Sri Krishnadevaraya University College of Engineering & Technology

B.Tech	(Mechanical Engineering)	L	T	P	C
		3	0	0	3

Manufacturing Processes

(Open Elective offered for non Mech. Students)

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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, 1st Edition, Springer, 2010.

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B.Tech	(Mechanical Engineering)	L	T	P	C
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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

Sri Krishnadevaraya University College of Engineering & Technology

B.Tech	**(Mechanical Engineering)**	**L**	**T**	**P**	**C**
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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.

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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.

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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

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B.Tech	(Mechanical Engineering)	L	T	P	C
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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 - Epicylic 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.

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B.Tech	**(Mechanical Engineering)**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

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

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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 Accostic 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