ACADEMIC REGULATIONS
COURSE STRUCTURE
AND
DETAILED SYLLABUS
(Choice Based Credit System)

R19

ELECTRICAL AND ELECTRONICS ENGINEERING

For

B.TECH. FOUR YEAR DEGREE COURSE

(Applicable for batches admitted from 2019-2020)

SWARNANDHRA
COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

SEETHARAMAPURAM, NARSAPUR-534 280, W.G.DT., A.P.

ACADEMIC REGULATIONS

1. INTRODUCTION

Swarnandhra College of Engineering & Technology (**Subsequently referred to asSCET**) will be followed the norms of Jawaharlal Nehru Technological University Kakinada and Govt. of Andhra Pradesh.

All Academic Programme rules and regulations are approved by the Academic Council, which is the highest Academic body of the Institute. It is applicable for all Bachelor of Technology (B. Tech) degree programme from academic year 2019-20 admission onwards.

2. ADMISSIONS

2.1 Regular Admission

(Join in first year B. Tech Programme)

Admissionsin the Institution are classified into **CATEGORY – A,** through convener, EAMCET and **CATEGORY- B** filled by the college management.

2.2 Lateral Entry Admission

(Join in the Second year/third semester of B. Tech Programme)

Eligibility: B.Sc. Graduate & Diploma holders.

Based on the rank secured by the candidate at Engineering Common Entrance Test (ECET) conducted by the convener ,ECET, and Central counseling by Higher Education, Government of Andhra Pradesh.

2.3 Advance standing Admission

(Transfer from other Colleges/ Re-admission due to dis-continuation)

These may arise in the following cases:

a) When a student seeks transfer from other colleges to SCET and desirous to pursue the study at SCET in an eligible branch of study.
b) When students of SCET get transferred from one regulation to another regulation or from previous syllabus to revised syllabus.

In all such cases for admission, when needed, permissions from the statutory bodies are to be obtained and the Programme of study at SCET will be governed by the transitory regulations.

3. UNDER GRADUATE PROGRAMMES OFFERED

Presently, the College is offering Under Graduate Programmes in the following disciplines:

- Computer Science and Engineering (CSE)
- Electronics and communication Engineering (ECE)
- Electrical and Electronics Engineering (EEE)
- Information Technology (IT)
- Mechanical Engineering (ME)
- Civil Engineering (CE)

3.1 Structure of the Programme:

i) **Preamble:**

It is emphasized in UGC Guidelines on Choice Based Credit System (CBCS), that the important measures taken to enhanceacademic standards and quality in higher education include innovation and improvements in curriculum, teaching-learning process, examination and evaluation systems, besides governance and other matters. It is adopted grading system in place of conventional system of marks and percentages.

Our CBCS provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching. The students can register any courses of their choice, learn at their own pace, undergo additional courses and acquire more than the required credits, and adopt an interdisciplinary approach through open electives.

Key words CBCS, such as Course, credit, credit point, CGPA, SGPA, Grade Point, Letter Grades, Foundation Courses (FC), Programme Core Course (PCC) and Elective Courses (EC) as given in the UGC guidelines are used the same definitions.

Each Programme of a Discipline or branch will consist of:

i). Foundation courses in Basic Sciences, Engineering Sciences and Humanities.
ii). Programme core courses to impart broad based knowledge needed in the concerned branch.
iii). Elective courses from the discipline or interdisciplinary areas / industry related opted by the student based on their interest in specialization.
iv). Open Elective courses from the interdisciplinary areas opted by the students based on their interest in specialization.

Each Programme designed to have 35-40 theory courses and 20-25 laboratorycourses. The categories of courses are indicated in the following table.

TABLE-1 CATEGORY OF COURSES

Course Category
Foundation Courses – Basic Sciences & Humanities
Foundation Courses – Engineering Sciences
Programme Core Courses in the branch of study
Elective Courses
Open Elective

Note: All components prescribed in the curriculum will be conducted and evaluated.

ii)**Contact hours:** Depending on the complexity and volume of the course the number of contact hours per week will be determined.

iii)**Credits:**

TABLE-2 CREDITS BASED ON CONTACT HOURS

Course type	No. of Contact Hours	No. of Credits
Theory	1	1
Laboratory	2	1

TABLE-3 CREDITS FOR DIFFERENT COURSES

Course type	Lecture method			Credits
	L	T	P	C
Theory /Elective	3	1	0	4
	2	1	0	3
	3	0	0	3
	2	0	2	3
	2	0	0	2
Laboratory	0	0	2	1
	0	0	3	1.5
	0	0	4	2

3.2 Curriculum for each Programme:

- The Four year curriculum of any B. Tech Programme of study in any branch of Engineering is formulated based on the guidelines mentioned in 3.1 and will be recommended by the concerned Board of Studies and is approved by the Academic Council.
- In case of students admitted under lateral entry, the respective regular curriculum contents from 3rd semester onwards are to be pursued by them.
- In case of students admitted under advanced standing, the equivalence will be prepared by the concerned Board of Studies and the Academic Council has to approve the same..

4. <u>DURATION OF THE PROGRAMME</u>:

The duration of theB. Tech. Programme is four academic years consisting of eight semesters. Students, who fail to fulfill all the academic requirements for the award of the degree within the prescribed duration as per article 4.1, will forfeit their admission in B. Tech course**.**

4.1 Maximum duration of study.

Maximum duration permitted for any student to successfully complete the four year B. Tech. Programme of study will be:

Regular Admission: Eight academic years in sequence from the year of admission for a student admitted into first year of any Programme.
Lateral Entry Admission: Six academic years in sequence from the year of admission for a student admitted into second year of any Programme.
Advanced standing Admission: The maximum time for completion of Programme of study, will be twice the period in terms of academic years in sequence, stipulated in the Programme curriculum defined at the time of admission.

4.2 Cancellation of Admission :

In case, any student fails to meet the above applicable/eligible conditions for the award of degree,his/her admission stands cancelled.

TABLE- 4 MAXIMUM DURATION OF STUDY

Admitted year of study	Maximum duration
First year	8 academic years in sequence
Second year (Lateral entry)	6 academic years in sequence
Advanced standing	Twice the period in terms of academic years in sequence

5. MEDIUM OF INSTRUCTION :

The medium of instruction and examinations are in English.

6. MINIMUM INSTRUCTION DAYS: Each semester will consist of 22 weeks duration with minimum of 110 working days which includes instruction days, internal tests andEnd examinations.

7. TRANSITORY REGULATIONS:

For those who admitted under advance standing, these transitory regulations will provide the modus of operandi. At the time of such admission, based on the Programme pursued (case by case)

- Equivalent courses completed by the student are established by the BOS of concerned discipline.
- Marks/Credits are transferred for all such equivalent courses and treated as successfully completed in the Programme of study prescribed by SCET.
- A Programme chart of residual courses not completed will be derived and a Programme of study with duration specified will be prescribed for pursuit at SCET.
- Marks obtained in the previous system, as the case maybe, shall be converted to equivalent grades and CGPA.

All other modalities and regulations governing shall be the same as those applicable to the stream of students with whom; such a candidate is merged with current regulations.

8. DISTRIBUTION AND WEIGHTAGE OF MARKS:

Each semester consists of 4/5/6 theory courses and 2/3/4 Laboratories. However, in the 8thsemesterthere will be only 2 theory courses in addition to the project work.

(a). **Theory Courses:**

- Each course consists of five units.
- All courses will be evaluated with a maximum of 100 marks.
- Marks distribution will be 30 marks for internal evaluation and 70 marks for the end semester examination.
- The internal evaluation of 30 marks consists of two cycles. Each cycle consists of descriptive test (internal test) for 20 marks and two class tests for 10 marks.
- Mid Examination: Each mid examination will be conducted for 20 marks with the duration of 75 Minutes.Internal test paper consists of three questions (8M+8M+4M) from two and half units and all are to be answered.
- Class tests for 10 markscalculation: There will be two class tests conducted in each cycle unit wise. **Best of two** will be considered.
- **Weighted average of two Cycles** performance will be considered, weightage of 80% for the best Cycle performance and 20% for second.
- The **end semester** examination will be conducted for 70 marks which covers full syllabus. In end examination pattern, **Part – A** consists of five short questions from all units (Brainstorming/Thought provoking/Case study) for 10 marks. **Part – B** has **5 questions** with internal choice from each unit and valued for 60 marks.

(b). **Practical Courses:**

- All courses will be evaluated with a maximum of 100 marks.
- Marks distribution will be 30 marks for internal evaluation and 70 marks for the end semester examination.
- End practical examination will be conducted by the internal and external examiner appointed by COE.
- Internal evaluation will be a continuous assessment during the semester for 30 marks with 15 marks for day-to-day work, including record valuation and 15 marks for internal test.

(c). **Design or Engineering Drawing Marks Distribution:**

For the courses of design or drawing such as Engineering Graphics, etc., the distributionwill be 30 marks for internal evaluation with 10 marks for day-to-day work, and 20 marks from two internal tests (80% of first best + 20% of second best). End examinationwill be conducted for 70 marks.

(d) **Internship:**It can be carried out with a minimum of two weeks and maximum of four weeks, any time after completion of 4^{th} semester till end of 7^{th} semester.It will be evaluated internally by an internal evaluation committee comprising of Head of the Department and two faculty of the department. A minimum of 50% of maximum marks shall be obtained to earn the corresponding credits

(e) **Mini Project:**The $6^{th}/7^{th}$ Semester Mini Project work will be evaluated for 100 marks.

The project work is evaluated for internal assessment for 30 and external examination for 70.

i) Internal Assessment: Internal Assessment will be monitored by Project Review Committee consisting of 1) Head of the Department 2) Supervisor and 3) Senior faculty member on the basis of two seminars and the internal marks will be awarded by Project Supervisorwith recommendation of PRC.

ii) External Examination: External Examination will be conductedthrough presentation / viva - voice by the student by Project external examination committee consisting of 1) Head of the Department 2) Supervisor and 3) External examiner appointed by COE.

(g) Project Work: The 8th Semester main Project Work will be evaluated for 200 marks. The project work is evaluated for internal assessment of 60 and external examination for 140.

i) Internal Assessment: Internal Assessment will be monitored by Project Review Committee consisting of 1) Head of the Department 2) Supervisor and 3) Senior faculty member on the basis of two seminars and the internal marks will be awarded by Project Supervisor with recommendation of PRC.

ii) External Examination: External Examination will be conducted through presentation / viva - voice by the student by Project external examination committee consisting of 1) Head of the Department 2) Supervisor and 3) External examiner appointed by COE.

TABLE- 5 MARKS ALLOCATION

Course type	Marks Allocation			
	Internal		End Semester	Total
	Internal test	Class Test/ Day to day work		
Theory course	20	10	70	100
Laboratory course	15	15	70	100
Design or Drawing course	20	10	70	100

(h) Mandatory Courses: These courses are compulsory with zero credits. They shall be no external examination. However attendance in the mandatory course of minimum attendance (75%) in that particular course.

(i) Open Electives: Students are to choose Open Elective – I during 5th Semester, Open Elective–II during 6th Semester and Open Elective – III and IV during 7th Semester from the list of Open Electives given in the Course Structure. However, students cannot opt for an Open Elective Subject offered by their own (parent) Department, if it is already listed under any category of the courses offered by the parent Department in any Semester.

9. ATTENDANCE REGULATIONS

(i) A student will be eligible to appear for end semester examinations, if he/she acquired a minimum of 75% of attendance in aggregate of all the courses.

(ii) Condonation of shortage of attendance in aggregate up to 10% on medical grounds (Above 65% and below 75%) in any semester may be granted by the College Academic Committee.

(iii) Shortage of Attendance below 65% in aggregate shall not be condoned.

(iv) Students with less than 65% of attendance in any semester are not eligible to take up their end examination of that particular semester and their registration for examination shall be allowed.

(v) Attendance may also be condoned for those who participate in Intercollegiate/university sports, co- and extracurricular activities provided their attendance is in the minimum prescribed range for the purpose (>65%) and recommended by the concerned authority. He/ She shall pay the prescribed condonation fee.

(vi) Prescribed Condonation fee shall be payable by the student to appear for the end examination.

(vii) A Student will not be promoted to the next semester unless he/she satisfies the attendance requirement of the present semester as applicable. They may seek re-admission for that semester as and when offered consecutively by the Department.

(viii) A student will be condoned only four times for regular student and three times for lateral entry students during entire course of study.

TABLE-7 ATTENDANCE REQUIREMENT

Attendance Percentage	Condonation fee	Appear End Exams
Above 75 %	Nil	Eligible
65 % -75%	Yes (on medical grounds)	Eligible
Below 65 %	Nil	Not Eligible (Seek re-admission to that semester when offered)

10. MINIMUM ACADEMIC REQUIREMENTS:

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in **S.No.9.**

(i) A student will be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory or practical or design or drawing subject or project if he/she secures not less than a minimum of 35% of marks exclusively in the end semester examinations in each of the courses, for which the candidate had appeared. However, the candidate should have secured a minimum of 40% marks in both external and internal components put together to declare eligible for pass in the subject.

(ii) A student will be promoted from first semester to second semester, second semester to third and third to fourth semester, if he/she satisfies the minimum attendance requirement.

(iii) A student will be promoted from 4^{th} Semester to 5^{th} Semester, if he/she fulfills the academic requirements of 40% of the credits up to 4^{th} Semester from all the examinations (Regular and supplementary) whether or not the candidate takes the examinations.

(iv) A student will be promoted from 6^{th} to 7^{th} Semester, only if he/she fulfills the academic requirements of 40% of the credits up to 6^{th} Semester from, all the examinations (regular and supply) whether or not the candidate takes the examinations.

(v) There will be supplementary examinations along with the regular semester examinations enabling the students to give a fair chance to appear in the subject if any failed.

TABLE-8 PROMOTION IN TO NEXT HIGHER CLASS

Promotion From	Promotion to	Promotion Criteria
1^{ST} Semester	2^{nd} Semester	Minimum Attendance requirement
2^{nd} Semester	3^{rd} Semester	
3^{rd} Semester	4^{th} Semester	
4^{th} Semester	5^{th} Semester	Minimum Attendance requirement & 40% of credits up to 4^{th} semester for all exams
5^{th} Semester	6^{th} Semester	Minimum Attendance requirement
6^{th} Semester	7^{th} Semester	Minimum Attendance requirement & 40% of credits up to 6^{th} semester for all exams
7^{th} Semester	8^{th} Semester	Minimum Attendance requirement

11. GAP YEAR CONCEPT

Students who wish to pursue entrepreneurship full time can take break of one year study, after the 4th Semester with the due recommendations of the GAP committee and approved by the principal. This 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

12. ELIGIBILITY FOR AWARD OF DEGREE:

A student shall be eligible for award of the B.Tech. Degree if he/she fulfills all the following conditions:

(i) Pursue the programme of study for a stipulated period of four years and not more than eight years.

(ii) Register for 160 credits and secure the same.

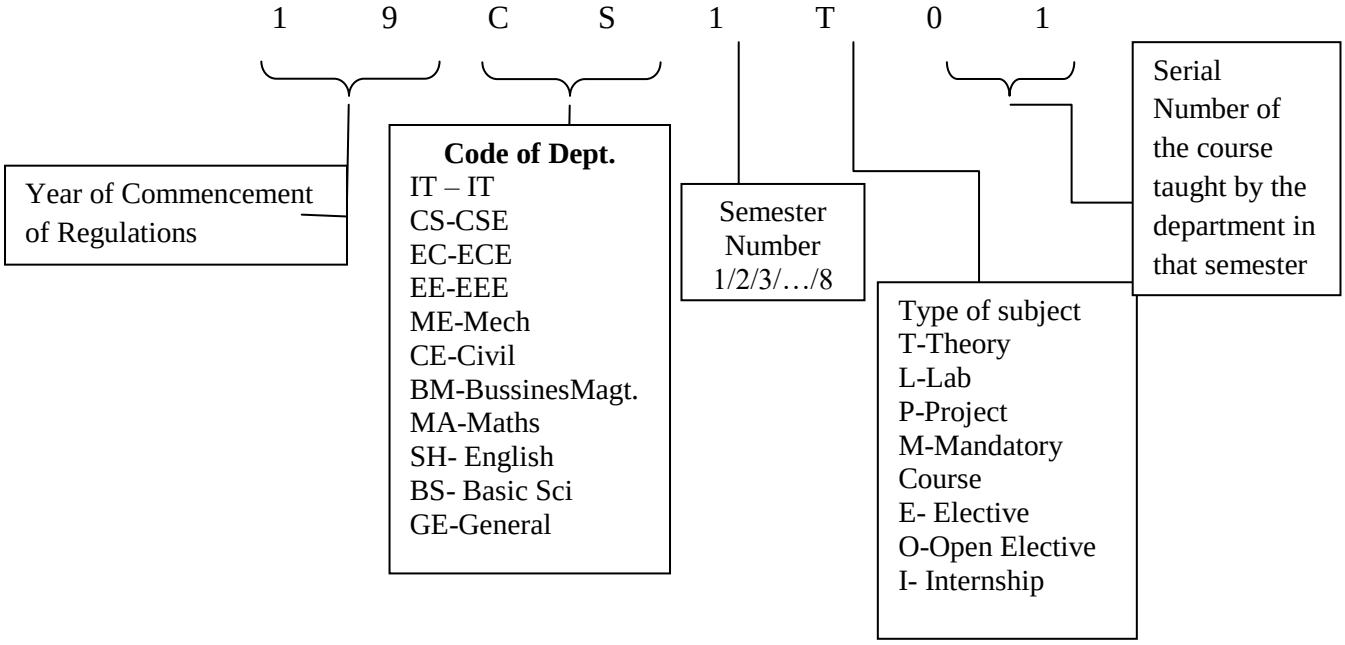
(iii) Registered and successfully completed all the components prescribed in the programme of study in whichhe/she is admitted.

(iv) All mandatory courses must be completed with satisfactory.

(v) Obtained CGPA greater than or equal to 4.75 (minimum requirements for pass).

13. COURSE CODE & COURSE NUMBERING SCHEME:

The subject codes will be given by the department teaching the subject. Each subject code contains 8 characters. The 8 characters for each subject will be filled as per the following guidelines.



14. GRADING SYSTEM:

14.1 Award of Grade:

(i) Grade Point Average (GPA):

a) The Grade Point Average (GPA) will be calculated according to the formula

$$GPA = \frac{\sum C_i G_i}{\sum C_i}$$

Where C_i = number of credits for the subject i

G_i = grade points obtained by the student in the subject.

b) To arrive at Cumulative Grade Point Average (CGPA), the formula is used consideringthe student's performance in all the courses taken in all the semesters completed up to the particular point of time.

$$CGPA = \frac{\sum C_i G_i}{\sum C_i}$$

Where C_i = number of credits for the subject i

G_i = grade points obtained by the student in the subject.

c) Equivalent percentage = (CGPA-0.75) x 10

(ii) After a student satisfy the requirements prescribed for the award of UG/PG Programme he/she shall be placed in one of the following four grades. The award of the degree is based on CGPA on a grade point scale of 10 and given in Table 9.

Table -9

CGPA	Award of Division
≥7.75*	First Class with Distinction
≥6.75	First Division
≥5.75	Second Division
≥4.75	Pass Division
<4.75	Unsatisfactory

* In addition to the required CGPA of 7.75, the student must have necessarily passed all the courses of every semester in the minimum stipulated period for the programme.

14.2 Award of Grade in Each Semester:

(i) Based on the student performance during a given semester, a final letter grade will be awarded at the end of the semester for each subject. The letter grades and the corresponding grade points are as given in the Table 10.

Table -10

Percentage of Marks Scored	Letter Grade	Level	Grade points
>=90	O	Outstanding	10
80 - 89	S	Excellent	9
70-79	A	Very Good	8
60-69	B	Good	7
50-59	C	Fair	6
40-49	D	Satisfactory	5
<40	F	Fail	0
		Absent	0

(ii) A student earns a minimum of 5 grade points (D grade) in a subject is declared to have successfully completed the subject, and is deemed to have earned the credits assigned to that subject. However, it should be noted that a pass in any subject/term paper/seminar/project/mini project shall be governed by the rules mentioned in **S.No. 8**.

(iii) Grade Sheet: A grade sheet (memorandum) will be issued to each student indicating his/her performance in all courses taken in that semester and also indicating the grades.

(iv) Transcripts: After successful completion of the programme of study, a Transcript containing performance of all academic years will be issued as a final record. Duplicate transcripts will also be issued up to any point of study to the student on request and by paying stipulated fee in force.

(v) Candidates shall be permitted to apply for revaluation within the stipulated period with payment of prescribed fee.

(vi) The Academic Council has to approve and recommend to the JNTUK, Kakinada for the award of a degree to any student.

14. SUPPLEMENTARY EXAMINATIONS:

In addition to the Regular Final Examinations held at the end of each semester, a Supplementary Examination will be conducted. A student can appear for any number courses of supplementary examinations till he/she clears the courses. However the maximum stipulated period of programmecannot be relaxed under any circumstance.

15. ADVANCED SUPPLEMENTARY EXAMINATIONS:

Candidate who fails the courses in 7th and 8th Semester can appear for Advanced Supplementary Examinations.

16. ACADEMIC REGULATIONS FOR B.TECH (LATERAL ENTRY SCHEME):

i. The students have to acquire 120 credits from 3rd Semester to 8th Semester of B. Tech Programmefor the award of the degree.
ii. All mandatory courses must be completed with satisfactory for award of degree.
iii. Obtained CGPA greater than or equal to 4.75 (minimum requirements for pass).
iv. The same attendance regulations are to be adopted as per the rules mentioned in item No.10.
v. **Rules for Promotion from 6th Semester to 7th Semester**: A student shall be promoted from 6th Semester to 7th Semester only if he/she fulfills the academic requirements of 40% credits up to 6th Semester.
vi. Students, who fail to fulfill the requirement for the award of the degree in six consecutive academic years from the year of admission, shall forfeit their seat.

17. CONDUCT AND DISCIPLINE:

Students admitted in SCET are to be followed the conduct and discipline of the college and which will be updated from time to time.

18. MALPRACTICES:

If any malpractices held in internal assessment tests or Semester-End Examinations, Principal constitute a Malpractice Enquiry Committee to enquire the case. The principal shall take necessary action based on the recommendations of the committee as per stipulated norms.

19. WITHHOLDING OF RESULTS

If the student has not paid the dues, if any, to the institution or if any case of indiscipline is pending against him, the result of the student will be withheld. His degree will be withheld in such cases.

20. ACADEMIC FLEXIBILITY:

Students can study two elective courses of 8thSemester in advance, one in 6th and the other in 7th semester, those who cleared all the courses with CGPA 8.50 up to 5th semester. If a student fails in any course of the 6th/ 7thsemester, the flexibility will be cancelled. 8th Semester elective courses can study in advance from the MOOC/NPTEL/SWAYAM/etc.,courses.

21. GENERAL:

a) Wherever the words “he”, “him”, “his”, occur in the regulations, they include “she”, “her”, “hers”.
b) The academic regulation should be read as a whole for the purpose of any interpretation.
c) In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Principal is final and which is to be ratified by the Chairman of the Governing Body.
d) The college may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the college.

SEMESTER-I

S. No.	Course Code	Course Title	L	T	P	C	IM	EM	TM
1	19MA1T01	Calculus and Linear Algebra	3	1	0	4.0	30	70	100
2	19BS1T01	Engineering Physics	3	0	0	3.0	30	70	100
3	19CS1T01	Problem Solving and Programming Using C	3	0	0	3.0	30	70	100
4	19ME1T01	Engineering Graphics	2	0	2	3.0	30	70	100
5	19BS1L01	Engineering Physics Lab	0	0	3	1.5	30	70	100
6	19CS1L01	C Programming Lab	0	0	3	1.5	30	70	100
7	19CS1L02	IT Workshop	0	0	3	1.5	30	70	100
8	19HS1L01	English Proficiency Lab	0	0	3	1.5	30	70	100
		Total	**11**	**1**	**14**	**19.0**	**240**	**560**	**800**

SEMESTER-II

S. No.	Course Code	Course Title	L	T	P	C	IM	EM	TM
1	19MA2T02	Differential Equations and Vector Calculus	3	0	0	3.0	30	70	100
2	19BS2T02	Engineering Chemistry	3	0	0	3.0	30	70	100
3	19BS2T01	English	3	0	0	3.0	30	70	100
4	19ME2T02	Basics of Mechanical Engineering	3	0	0	3.0	30	70	100
5	19EE2T02	Electrical Networks	3	0	0	3.0	30	70	100
6	19BS2L02	Engineering Chemistry Lab	0	0	3	1.5	30	70	100
7	19ME2L01	Engineering Workshop	0	0	3	1.5	30	70	100
8	19ME2L02	Mechanical Engineering Lab	0	0	3	1.5	30	70	100
9	19HS2L02	English Communication Skill Lab	0	0	3	1.5	30	70	100
		Total	**15**	**0**	**12**	**21.0**	**270**	**630**	**900**

L-LECTURE HOURS, **T**- TUTORIAL HOURS, **P**-PRACTICAL HOURS, **C**-CREDITS.

IM-INTERNAL MARKS, **EM**- EXTERNAL MARKS, **TM**- TOTAL MARKS

SEMESTER-III

S. No.	Course Code	Course Title	L	T	P	C	IM	EM	TM
1	19MA3T06	Numerical Methods and Transforms	3	0	0	3.0	30	70	100
2	19EE3T01	Electrical Circuits and Synthesis	3	0	0	3.0	30	70	100
3	19EE3T02	Electromagnetic Fields	3	0	0	3.0	30	70	100
4	19EE3T03	Electrical Machines-I	3	0	0	3.0	30	70	100
5	19EC3T04	Analog Electronics	3	0	0	3.0	30	70	100
6	19EE3L01	Electrical Circuits and Simulation Lab	0	0	3	1.5	30	70	100
7	19EC3L04	Analog Electronics Lab	0	0	3	1.5	30	70	100
8	19CS3L03	C++ Programming Lab	0	0	4	2.0	30	70	100
9	19CE0M01	Environmental Science	2	--	0	--	--	--	-
		Total	**17**	**0**	**10**	**20.0**	**240**	**560**	**800**

SEMESTER-IV

S. No.	Course Code	Course Title	L	T	P	C	IM	EM	TM
1	19EE4T01	Electrical Machines-II	3	0	0	3.0	30	70	100
2	19EE4T02	Control Systems	3	0	0	3.0	30	70	100
3	19EE4T03	Electrical and Electronics Instrumentation	3	0	0	3.0	30	70	100
4	19EC4T04	Digital Electronics	3	0	0	3.0	30	70	100
5	19CS4T05	Data Structures	3	0	0	3.0	30	70	100
6	19EE4L01	Electrical Machines Lab-I	0	0	3	1.5	30	70	100
7	19EE4L02	Electrical Measurements Lab	0	0	3	1.5	30	70	100
8	19EC4L03	Digital Electronics Lab	0	0	3	1.5	30	70	100
9	19CS4L05	Data Structures Lab	0	0	3	1.5	30	70	100
10	19BM0M02	Indian Constitution	2	0	0	--	--	--	--
		Total	**17**	**0**	**12**	**21.0**	**270**	**630**	**900**

L-LECTURE HOURS, **T**- TUTORIAL HOURS, **P**-PRACTICAL HOURS, **C**-CREDITS.
IM-INTERNAL MARKS, **EM**- EXTERNAL MARKS, **TM**- TOTAL MARKS

SEMESTER-V

S. No.	Course Code	Course Title	L	T	P	C	IM	EM	TM
1	19EE5T01	Power Generation and Transmission Systems	3	0	0	3.0	30	70	100
2	19EC5T04	Linear IC Applications	3	0	0	3.0	30	70	100
3	19BM5T02	Principles of Economics and Management	3	0	0	3.0	30	70	100
4		**Elective-I**	3	0	0	3.0	30	70	100
5		**Open Elective-I**	3	0	0	3.0	30	70	100
6	19EE5L01	Electrical Machines – II Lab	0	0	3	1.5	30	70	100
7	19EE5L02	Control Systems and Simulation Lab	0	0	3	1.5	30	70	100
8	19CS5L04	Java Programming Lab	0	0	4	2.0	30	70	100
9	19BM0M04	Introduction to Cyber Law	2	0	0	--	--	--	--
		Total	**17**	**0**	**10**	**20.0**	**240**	**560**	**800**

SEMESTER-VI

S. No.	Course Code	Course Title	L	T	P	C	IM	EM	TM
1	19EE6T01	Power System Analysis	3	0	0	3.0	30	70	100
2	19EE6T02	Power Electronics	3	0	0	3.0	30	70	100
3		**Elective-II**	3	0	0	3.0	30	70	100
4		**Elective-III**	3	0	0	3.0	30	70	100
5		**Open Elective-II**	3	0	0	3.0	30	70	100
6	19EE6L01	Power Electronics and Simulation Lab	0	0	3	1.5	30	70	100
7	19EE6L02	Industrial Automation Lab Using PLC	0	0	3	1.5	30	70	100
8	19CS6L03	Python and Application Lab	0	0	4	2.0	30	70	100
9	19HS6L03	Advanced English Communication Lab	0	0	2	1.0	50	--	50
10	19BM0M03	Professional Ethics and IPR	2	--	--	--	--	--	--
		Total	**17**	**0**	**12**	**21.0**	**290**	**560**	**850**

L-LECTURE HOURS, **T**- TUTORIAL HOURS, **P**-PRACTICAL HOURS, **C**-CREDITS.

IM-INTERNAL MARKS, **EM**- EXTERNAL MARKS, **TM**- TOTAL MARKS

SEMESTER-VII

S. No.	Course Code	Course Title	L	T	P	C	IM	EM	TM
1	19EE7T01	Power System Operation and Control	3	1	0	4.0	30	70	100
2	19EC7T03	Micro Processors and Micro Controllers	3	0	0	3.0	30	70	100
3		**Elective-IV**	3	0	0	3.0	30	70	100
4		**Open Elective-III**	3	0	0	3.0	30	70	100
5		**Open Elective-IV**	3	0	0	3.0	30	70	100
6	19EE7L01	Power System Simulation Lab	0	0	3	1.5	30	70	100
7	19EC7L03	Micro Processors and Micro Controllers Lab	0	0	3	1.5	30	70	100
8	19EE7P01	Mini Project	0	0	6	3.0	30	70	100
9	19EE7I01	Internship	--	--	--	1.0	50	--	50
		Total	15	1	12	**23.0**	**290**	**560**	**850**

SEMESTER-VIII

S. No.	Course Code	Course Title	L	T	P	C	IM	EM	TM
1		**Elective-V**	3	0	0	3.0	30	70	100
2		**Elective-VI**	3	0	0	3.0	30	70	100
3	19EE8P01	Project Work	0	0	18	9.0	60	140	200
		Total	6	0	18	**15.0**	**120**	**280**	**400**

CONSOLIDATION

SEM.	No. Theories	No. Practical's	Mini/ Final Project	MC/ MOOCS	Intern-ship	Credits	IM	EM	TM
I	4	4	-	-	-	19.0	**240**	**560**	**800**
II	5	4	-	-	-	21.0	**270**	**630**	**900**
III	5	4	-	1	-	20.0	**240**	**560**	**800**
IV	5	4	-	1	-	21.0	**270**	**630**	**900**
V	5	3	-	1	-	20.0	**240**	**560**	**800**
VI	5	4	-	1	-	21.0	**290**	**560**	**850**
VII	5	2	1	-	1	23.0	**290**	**560**	**850**
VIII	2	-	1	-	-	15.0	**120**	**280**	**400**
Total	**36**	**25**	**2**	**4**	**1**	**160**	**1960**	**4340**	**6300**

L-LECTURE HOURS, **T**- TUTORIAL HOURS, **P**-PRACTICAL HOURS, **C**-CREDITS.
IM-INTERNAL MARKS, **EM**- EXTERNAL MARKS, **TM**- TOTAL MARKS

ELECTIVES

Track 1: Electrical Power System

Track 2: Power Electronics & Drives

Track 3: Electronics and Communication Engineering

Track 3: Computer Science and Engineering

Elective-1 (Semester V)		
Track 1	19EE5E01	Industrial Electrical Systems
Track 2	19EE5E02	Special Electrical Machines
Track 3	19EC5E21	Signals and Systems
Track 4	19CS5E19	Operating System
Elective-2 (Semester VI)		
Track 1	19EE6E03	Power System Protection
Track 2	19EE6E04	Electrical Machine Design
Track 3	19EC6E22	Analog and Digital Communication
Track 4	19CS6E21	Data base Management System
Elective-3 (Semester VI)		
Track 1	19EE6E05	High Voltage Engineering
Track 2	19EE6E06	Line Commutated and Active Rectifiers
Track 3	19EC6E23	Digital Signal Processing
Track 4	19CS6E20	Computer Networks
Elective-4 (Semester VII)		
Track 1	19EE7E07	Electrical Distribution System
Track 2	19EE7E08	Control of Electric Drives
Track 3	19EC7E24	VLSI Design
Track 4	19CS7E26	Principles of Software Engineering
Elective-5 (Semester VIII)		
Track 1	19EE8E09	Renewable Energy Systems
Track 2	19EE8E10	Advanced Control System For Electric Drives
Track 3	19EC8E25	Embedded Systems
Track 4	19CS8E28	Artificial Intelligence
Elective-6 (Semester VIII)		
Track 1	19EE8E11	Flexible Alternating Current Transmission Systems
Track 2	19EE8E12	Hybrid Electric Vehicles
Track 3	19EC8E26	Digital Image Processing
Track 4	19CS8E30	Soft Computing

LIST OF OPEN ELECTIVES

S. No.	Course Code	Course Title	Offering Dept.
1	19EEXO01	Electrical Safety Management	**EEE**
2	19EEXO02	Non-conventional Energy sources	
3	19EEXO03	Electrical Vehicle	
4	19EEXO04	Electrical Energy Conservation and Auditing	
5	19CEXO01	Disaster Management	**CE**
6	19CEXO02	Water Pollution and Control	
7	19CEXO03	Solid Waste Management	
8	19CEXO04	Building Planning and Drawing	
9	19MEXO01	3D Printing	**ME**
10	19MEXO02	Form Machinery	
11	19MEXO03	Bio-Mechanical Engineering	
12	19MEXO04	Waste to Energy Conversion	
13	19CSXO01	Internet of Things and Applications	**CSE**
14	19CSXO02	Foundation to Data Analytics	
15	19CSXO03	Data Engineering	
16	19CSXO04	Machine Learning	
17	19ECXO01	Nanotechnology and Applications	**ECE**
18	19ECXO02	Global Positioning and Navigation Satellite Systems	
19	19ECXO03	Remote Sensing	
20	19ECXO04	Mobile Communication and Applications	
21	19ITXO01	Software Engineering Principles	**IT**
22	19ITXO02	Cloud Computing Principles	
23	19ITXO03	E-Commerce	
24	19ITXO04	Web Technology Principles	
25	19BMXO01	Innovations and Entrepreneurship	**MBA**
26	19BMXO02	Industrial Sociology and Psychology	
27	19BMXO03	Digital Marketing	
28	19BMXO04	Business Environment	
29	19BSXO01	Operation Research	BS
30	19BSXO02	Optimization Models	
31	19BSXO03	Quantum Computing	
32	19BSXO04	Optoelectronics	

B. TECH -I SEMESTER	L	T	P	C
	3	1	-	4

19MA1T01 :: CALCULUS AND LINEAR ALGEBRA

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1	:	Develop the use of matrix algebra techniques that is needed by engineers for practical applications (K3)
CO2	:	familiarize with functions of several variables which is useful in optimization (K3)
CO3	:	Learn important tools of calculus in higher dimensions. Students will become familiar with double integral(K3)
CO4	:	familiarize with triple integral and also learn the utilization of special functions

SYLLABUS

UNIT-I	:	**MATRIX OPERATIONS AND SOLVING SYSTEMS OF LINEAR EQUATIONS**
Rank of a matrix by echelon form, Normal form - solving system of homogeneous and non-homogeneous linear equations- Gauss Elimination, Jacobi and Gauss Seidel methods - Eigen values and Eigen vectors and their properties (without proof).		
UNIT-II	:	**CAYLEY-HAMILTON THEOREM AND QUADRATIC FORMS**
Cayley-Hamilton theorem (without proof), Finding inverse and power of a matrix by Cayley-Hamilton theorem - Reduction to diagonal form - Quadratic forms and nature of the quadratic forms, reduction of quadratic form to canonical form by orthogonal transformation.		
UNIT-III	:	**MULTIVARIABLE CALCULUS**
Expansions of functions: Taylor's and Maclaurin's series - Partial derivatives, total derivatives, chain rule, change of variables, Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers.		
UNIT-IV	:	**MULTIPLE INTEGRALS**
Double Integrals: change of order of integration, double integrals in polar coordinates, areas enclosed by plane curves. **Triple Integral**: Evaluation of triple integrals, change of variables		
UNIT-V	:	**SPECIAL FUNCTIONS**
Beta and Gamma functions and their properties, relation between beta and gamma functions.		

TEXT BOOKS:

1	B. S. Grewal, Higher Engineering Mathematics, 42/e, Khanna Publishers, 2012

REFERENCE BOOKS:

1	Erwin Kreyszig, Advanced Engineering Mathematics, 9/e, John Wiley & Sons, 2013
2	B.V. RAMANA, Higher Engineering Mathematics, Tata McGraw Hill, 2007.

B. TECH 1 SEMESTER	L	T	P	C
	3	-	-	3
19BS1T01: ENGINEERING PHYSICS				

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1	:	Describe Basic crystal systems and determination of crystal structures
CO2	:	Explain Magnetic and Dielectric Materials properties
CO3	:	Describe Concept of Magnetic Induction and Super Conducting properties
CO4	:	Explain Pure & Doped Semiconductor materials for better utility
CO5	:	Describe Optical fibers and Optical properties of materials and their applications

SYLLABUS

UNIT-I	:	**CRYSTAL STRUCTURE AND X-RAY DIFFRACTION**

CRYSTAL STRUCTURE:

Introduction – Space lattice – Basis – Unit Cell – Lattice parameters – Bravais lattices – Crystal systems – Structures and packing fractions of SC, BCC and FCC.

X-RAY DIFFRACTION:

Directions in crystals- planes in crystals- Miller indices and procedure to find Miller indices- Various planes in crystals- Separation between successive (h k l) planes-Bragg's law-Bragg's Spectrometer.

UNIT-II	:	**MAGNETIC AND DIELECTRIC PROPERTIES**

MAGNETIC PROPERTIES: Introduction-Magnetic permeability – Magnetization – Relation between three magnetic vectors - Origin of magnetic moment – Classification of Magnetic materials- Dia, Para, Ferro, Anti-Ferro and Ferri-magnetism – Hysteresis- soft and Hard Magnetic materials.

DIELECTRIC PROPERTIES: Introduction-Dielectric constant- Relation between three electric vectors-Electronic and ionic polarizations (Quantitative) - orientation polarizations (Qualitative) - Internal fields in solids- Clausius - Mossotti equation.

UNIT-III	:	**ELECTROMAGNETIC WAVES AND SUPERCONDUCTIVITY**

ELECTROMAGNETIC WAVES: Introduction-Electric flux –magnetic flux- Gauss law in electrostatics- Gauss law in magnetostatics- Ampere's law - Biot-Savart's law-Magnetic Induction due to current carrying circular loop-Faraday's law - Maxwell's equations.

SUPERCONDUCTIVITY: General and Thermal properties –Meissner effect – Type-I and Type-II superconductors – Flux quantization – BCS Theory of Superconductivity - Josephson effects – Applications of Superconductors.

UNIT-IV	:	**PHYSICS OF SEMICONDUCTORS**

Classification of solids based on band theory - Intrinsic semiconductors- density of charge carriers- Equation for conductivity – Extrinsic semiconductors- P-type and N-type- density of charge carriers- Drift and diffusion – Einstein's equation – Hall Effect- Hall coefficient – Applications of Hall effect– direct & indirect band gap semiconductors

UNIT-V	:	**LASERS AND OPTICAL FIBERS**

LASERS: Introduction– Characteristics of lasers – Spontaneous and Stimulated emission of radiation – Einstein's coefficients – Population inversion - Three level and four level laser pumping schemes - Ruby laser – Helium-Neon laser- Applications of Laser.

FIBER OPTICS: Introduction to Optical fibers- Critical angle of propagation- Total internal reflection- Acceptance angle and acceptance cone- Numerical aperture- Classification of optical fibers based on refractive index profile-Classification of optical fibers based on modes- Applications of optical fibers.

TEXT BOOKS:

1	A text book of "Engineering Physics" by M. N. Avadhanulu, P.G. Kshirasagar& TVS Arun Murthy, S Chand publications, 11th Addition 2019.

REFERENCE BOOKS:

1	Engineering Physics by Shatendra Sharma and Jyotsna Sharma, Pearson Education, 2018.
2	Engineering Physics by Palanisamy (Scitech Publishers)
3	Engineering Physics by D. Thirupathi Naidu and M. Veeranjaneyulu

B. TECH I SEMESTER	L	T	P	C
	3	-	-	3
19CS1T01: PROBLEM SOLVING AND PROGRAMMING USING C				

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1	:	Illustrate the Fundamental concepts of Computers and basics of computer programming
CO2	:	Use Control Structures and Arrays in solving complex problems
CO3	:	Develop modular program aspects and Strings fundamentals.
CO4	:	Demonstrate the ideas of pointers usage.
CO5	:	Solve real world problems using the concept of Structures, Unions and File operations

SYLLABUS

UNIT-I	:	**Introduction to Computer Problem Solving**
Programs and Algorithms, Computer Problem Solving Requirements, Phases of Problem Solving, Problem Solving Strategies, Top-Down Approach, Algorithm Designing, Program Verification, Improving Efficiency, Algorithm Analysis and Notations.		
UNIT-II	:	**Introduction to C Programming**
Introduction, Structure of a C Program, Comments, Keywords, Identifiers, Data Types, Variables, Constants, Input/output Statements, Operators, Type Conversion. **Control Flow, Relational Expressions:** Conditional Branching Statements: if, if-else, if-else–if, switch. Basic Loop Structures: while, do-while loops, for loop, nested loops, The Break and Continue Statements, goto statement.		
UNIT-III	:	**Arrays &Pointers**
Arrays: Introduction, Operations on Arrays, Arrays as Function Arguments, Two dimensional Arrays, Multi-dimensional arrays. **Pointers:** Concept of a Pointer, Declaring and Initializing Pointer Variables, Pointer Expressions and Address Arithmetic, Null Pointers, Generic Pointers, Pointers as Function Arguments, Pointers and Arrays, Pointer to Pointer, Dynamic Memory Allocation, Dangling Pointer, Command Line Arguments.		
UNIT-IV	:	**Functions & Strings**
Functions: Introduction, Function Declaration, Function Definition, Function Call, Categories of Functions, Passing Parameters to Functions, Scope of Variables, Variable Storage Classes,Recursion. **Strings:** String Fundamentals, String Processing with and without Library Functions, Pointers and Strings.		
UNIT-V	:	**Structures, Unions, Bit Fields**
Introduction, Nested Structures, Arrays of Structures, Structures and Functions, Self-Referential Structures, Unions, Enumerated Data Type –enum variables, Using Typedef keyword, Bit Fields. **Files:** Introduction to Files, Using Files in C, Reading from Text Files, Writing to Text Files, Random File Access.		

TEXT BOOKS:

1	How to solve it by Computer, R. G. Dromey, and Pearson Education
2	Computer Programming, ReemaThareja, Oxford University Press.

REFERENCE BOOKS:

1	. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.
2	Programming In C A-Practial Approach, Ajay Mittal, Pearson
3	C Programming – A Problem Solving Approach, Forouzan, Gilberg, Cengage.
4	The C Programming Language, Dennis Richie And Brian Kernighan, Pearson Education.
5	Programming In C, Ashok Kamthane, Second Edition, Pearson Publication
6	Let us C ,YaswanthKanetkar, 16th Edition, BPB Publication.

B. TECH I SEMESTER	L	T	P	C
	3	-	-	3
19ME1T02: ENGINEERING GRAPHICS				

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1	:	Construct polygons, conics, cycloids, involutes.
CO2	:	Draw the orthographic projections of points, lines in different positions.
CO3	:	Draw the orthographic projections of plane surfaces in different positions.
CO4	:	Draw the orthographic projections of solids like prisms, cylinder, pyramids and cone.
CO5	:	Convert Isometric views to orthographic views and vice-versa and also visualize 2D & 3D objects using Auto CAD.

SYLLABUS

UNIT-I	:	**POLYGONS**

Constructing regular polygons by general methods, inscribing and describing polygons on circles. Curves: Parabola, Ellipse and Hyperbola by Eccentricity method, Cycloid, Epi-cycloid and Hypo-cycloid and Involutes

UNIT-II	:	**ORTHOGRAPHIC PROJECTIONS**

Reference plane, importance of reference lines, projections of points in various quadrants, projections of lines, line parallel to both the planes, line parallel to one plane and inclined to other plane. Projections of straight lines inclined to both the planes, determination of true lengths, and angle of inclination.

UNIT-III	:	**PROJECTIONS OF PLANES**

Regular planes perpendicular and parallel to one reference plane and inclined to the other reference plane; inclined to both the reference planes.

UNIT-IV	:	**PROJECTIONS OF SOLIDS**

Prisms, Pyramids, Cone and Cylinder, Simple positions of solids and Axis of the Solid parallel to one plane and inclined to other plane.

UNIT-V	:	**ISOMETRIC VIEWS**

Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

CAD:

FUNDAMENTALS OF AUTOCAD - FOR POLYGONS, CREATING 2D AND 3D DRAWINGS USING AUTOCAD:

Computer Aided Design, Drawing practice using Auto CAD simple figures like polygons, creating 2D&3D drawings of objects using Auto CAD

Note: In the End Examination there will be no question from CAD

TEXT BOOKS:

	Engineering Drawing by N.D. Butt, Chariot Publications 2016
	Engineering Drawing + AutoCAD – K Venugopal, V. Prabhu Raja, New Age 2010

REFERENCE BOOKS:

1	Engineering Drawing by K.L.Narayana& P. Kannaiah, Scitech Publishers 2016
2	Engineering Graphics for Degree by K.C. John, PHI Publishers 2009
3	Engineering Graphics by PI Varghese, McGrawHill Publishers 2013

B. TECH I SEMESTER	L	T	P	C
	-	-	3	1.5
19BS1L01: ENGINEERING PHYSICS LAB				

STUDENT HAS TO DO ANY TEN OF THE FOLLOWING

1. Determination of wavelength of Laser using diffraction grating.
2. Determination of Numerical Aperture and Acceptance angle of an Optical Fiber.
3. Determination of the charge carrier density by using Hall Effect.
4. Determination of the Band Gap of a Semiconductor using a p-n junction diode.
5. Study of Characteristic curves (l/V) of a Zener diode to determine its Breakdown voltage.
6. Determination of Temperature coefficient of resistance of a Thermistor by using its Characteristic curve.
7. Study the variation of intensity of magnetic field along the axis of a circular current carrying coil by using Stewart and Gee's experiment.
8. Study of Characteristic curves (l/V) of a P-Ndiode.
9. Determine Frequency of given electrically driven tuning fork in Transverse and Longitudinal modes by using Melde's apparatus
10. Determine frequency of A.C. supply by using Sonometer.
11. Determination of the Time Constant for a C-R Circuit
12. Determination of the Planck's constant by using Photo-Cell.
13. Determination of dielectric constant of a given material

B. TECH I SEMESTER	L	T	P	C
	-	-	3	1.5
19CS1L01: C PROGRAMMING LAB				

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1	:	Implement basic programs in C and design flowcharts in Raptor.
CO2	:	Use Conditional and Iterative statements to solve real time scenarios in C.
CO3	:	Implement the concept of Arrays and Modularity and Strings.
CO4	:	Apply the Dynamic Memory Allocation functions using pointers
CO5	:	Develop programs using structures, and Files.

List of Experiments

1. Introduction to Algorithms and Flowcharts

1.1) Implement Algorithm Development for Exchange the values of Two numbers.

1.2) Given a set of n student's examination marks (in the range 0-100) make a count of the number of students that passed the examination. A Pass is awarded for all of 50 and above.

1.3) Given a set of n numbers design an algorithm that adds these numbers and returns the resultant sum. Assume N is greater than or equal to zero.

2. Introduction to C Programming

2.1) Exposure to Turbo C, Code Blocks IDE, Dev C++, Falcon C++.

2.2) Writing simple programs using printf(), scanf() .

3. Raptor

3.1) Introduction to Raptor.

3.2) Draw a flow chart to find the Sum of 2 numbers.

3.3) Draw a flow chart to find Simple interest.

4. Basic Math

4.1) Write a C Program to convert Celsius to Fahrenheit and vice versa.

4.2) Write a C Program to find largest of three numbers using ternary operator.

4.3) Write a C Program to Calculate area of a Triangle using Heron's formula.

5. Control Flow- I

5.1) Write a C Program to Find Whether the Given Year is a Leap Year or not.

5.2)Write a C program to find the roots of a Quadratic Equation.

5.3) Write a C Program to make a simple Calculator to Add, Subtract, Multiply or Divide Using Switch…case.

6. Control Flow- II

6.1) Write a C Program to Find Whether the Given Number is Prime number or not.

6.2) Write a C Program to Find Whether the Given Number is Armstrong Number or not.

6.3) Write a C program to print Floyd Triangle.

7. Control Flow- III

7.1) Write a C program to find the sum of individual digits of a positive integer.

7.2) Write a C program to check whether given number is palindrome or not.

7.3) Write a C program to read two numbers, x and n, and then compute the sum of the geometric progression $1+x+x^2+x^3+\ldots\ldots\ldots\ldots+x^n$.

Practice Programs:

Write a C program to print all natural numbers from 1 to n. - using while loop

Write a C program to print all natural numbers in reverse (from n to 1). - using while loop

Write a C program to print all alphabets from a to z. - using while loop
Write a C program to print all even numbers between 1 to 100. - using while loop
Write a C program to print sum of all even numbers between 1 to n.
Write a C program to print sum of all odd numbers between 1 to n.
Write a C program to print table of any number.
Write a C program to find first and last digit of any number.
Write a C program to count number of digits in any number.
Write a C program to calculate sum of digits of any number.
Write a C program to calculate product of digits of any number.
Write a C program to swap first and last digits of any number.
Write a C program to enter any number and print its reverse.
Write a C program to enter any number and check whether the number is palindrome or not.
Write a C program to find frequency of each digit in a given integer.
Write a C program to enter any number and print it in words.
Write a C program to print all ASCII character with their values.
Write a C program to enter any number and print all factors of the number.
Write a C program to enter any number and calculate its factorial.
Write a C program to find HCF (GCD) of two numbers.
Write a C program to find LCM of two numbers.
Write a C program to check whether a number is Prime number or not.
Write a C program to check whether a number is Armstrong number or not.
Write a C program to check whether a number is Perfect number or not.
Write a C program to check whether a number is Strong number or not.
Write a C program to print Fibonacci series up to n terms.

8. Arrays

8.1) Write a C program to search an element in the given array (Linear Search).
8.2) Write a C program to perform matrix addition.
8.3) Write a C program to perform matrix multiplication.

Practice Programs:

Write a C program to read and print elements of array.
Write a C program to find sum of all array elements. - using recursion.
Write a C program to find maximum and minimum element in an array. - using recursion.
Write a C program to find second largest element in an array.
Write a C program to copy all elements from an array to another array.
Write a C program to insert an element in an array.
Write a C program to delete an element from an array at specified position.
Write a C program to print all unique elements in the array.
Write a C program to print all negative elements in an array.
Write a C program to count total number of even and odd elements in an array.
Write a C program to count total number of negative elements in an array.
Write a C program to count total number of duplicate elements in an array.
Write a C program to delete all duplicate elements from an array.
Write a C program to count frequency of each element in an array.
Write a C program to merge two array to third array.
Write a C program to find reverse of an array.
Write a C program to convert lowercase string to uppercase.
Write a C program to convert uppercase string to lowercase.
Write a C program to toggle case of each character of a string.

Write a C program to find total number of alphabets, digits or special character in a string.

9. Pointers

9.1) Write a C Program to Perform Addition, Subtraction, Multiplication and Division of two numbers using Command line arguments.

9.2)Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using malloc () function.

9.3) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using calloc () function.

10. Functions, Array & Pointers

10.1) Write a C Program to demonstrate parameter passing in Functions.

10.2) Write a C Program to find Fibonacci, Factorial of a number with Recursion and without recursion.

10.3) Write a C Program to find the sum of given numbers with arrays and pointers.

Practice Programs:

Program to change the value of constant integer using pointers.

Program to print a string using pointer.

Program to count vowels and consonants in a string using pointer.

Program to read array elements and print with addresses.

11. Strings

11.1) Implementation of string manipulation operations with library function:

copy
concatenate
length
compare

11.2) Implementation of string manipulation operations without library function:

copy
concatenate
length
compare

11.3) Verify whether the given string is a palindrome or not.

12. Structures

12.1) Write a C Program to Store Information of a book Using Structure.

12.2) Write a C Program to Add Two Complex Numbers by Passing Structure to a Function.

13. Files

13.1) Write a C program to open a file and to print the contents of the file on screen.

13.2) Write a C program to copy content of one file to another file.

13.3) Write a C program to merge two files and store content in another file.

14. Application

Creating structures to capture the student's details save them in file in proper record format, search and prints the student details requested by the user.

Note: Draw the flowcharts using Raptor from Experiment 3 to Experiment 6.

REFERENCE BOOKS:

1	Let Us C YashwanthKanetkar, 16th edition, BPB Publications.
2	2. Programming in C A-Practial Approach Ajay Mittal. Pearson Education
3	The C programming Language, Dennis Richie and Brian Kernighan, Pearson Education.
4	Problem solving using C , K Venugopal,3rdEdition,TMG Publication.

B. TECH 1 SEMESTER	L	T	P	C
	-	-	3	1.5

19CS1LO2:IT WORKSHOP

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1	:	Identify the components of a personal computer and Install Operating System.
CO2	:	Send email messages (with or without attachments)
CO3	:	Prepare their own Presentation / Documentation using Office Tools
CO4	:	Create Interactive Visual Programs Using Scratch.
CO5	:	Develop Static web site Applications

SYLLABUS

1. KNOWING OF COMPUTER
Identification of peripherals of a PC, Laptop, and Smart Phones:
Prepare a report containing the block diagram along with the configuration of each Component and its functionality, Input/ Output devices, I/O ports and interfaces, Main memory, cache memory and secondary storage technologies, digital storage Basics, networking components and speeds.
2. OPERATING SYSTEMS
Functions of OS, Types, **OS simple setting** : Changing system date and time, display properties, to add or remove a window component and changing mouse properties
File and Directory Management : Creating and renaming of files and directories, **MS-DOS Commands**
3. INTERNET SERVICES
Web Browser usage and **Advanced settings** like LAN, Proxy, Content, Privacy, Security, Cookies, Extensions/ Plug-in**, Antivirus installation,** Configuring a firewall, blocking pop-ups ,**Email** creation and usage.
4 . Practice on **Microsoft-Word**
5 . Practice on **Microsoft-PowerPoint**
6 . Practice on **Microsoft-Excel**
7 . Creating pdf documents.
8. CLOUD BASED COLLABORATION TOOLS
Store, sync, and share files with ease in the cloud using Google Drive Manage event Registrations, create quizzes, and analyze responses using Google Forms
9&10STATIC WEB PAGE DESIGNING
Basic HTML Tags, Table Tags, List Tags, Image Tags, Forms

B. TECH I SEMESTER	L	T	P	C
	-	-	3	1.5
19HS1L01: ENGLISH PROFICIENCY LAB				

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1	:	**a) Reading Skills.** • Addressing explicit and implicit meaning of a text. • Understanding the context. • Learning new words and phrases. Using words and phrases in different contexts
CO2	:	**b) Writing Skills:** • Using the basic structure of a sentence. • Applying relevant writing formats to create paragraphs, essays, letters, E-Mails, reports and presentations. • Retaining a logical flow while writing. Planning and executing an assignment creatively
CO3	:	**c) Interactive skills:** • Analyzing a topic of discussion and relating to it. • Participating in discussions and influencing them. • Communicating ideas effectively. Presenting ideas coherently within a stipulated time
CO4	:	**d) Life Skills and Core Skills:** • Examining self-attributes and identifying areas that require improvement self-diagnosis, self-motivation. • Adopting to a given situation and developing a functional approach to find solutions-adaptability, problem-solving. • Understanding the importance of helping others-community service, enthusiasm.

SYLLABUS

UNIT-I	:	Vowels, Consonants, Pronunciation, Phonetic transcripts
UNIT-II	:	Word stress and syllables
UNIT-III	:	Rhythm and Intonation
UNIT-IV	:	Contrastive Stress –Homographs
UNIT-V	:	Word Stress : Weak and Strong forms , Stress in compound words

TEXT BOOKS:

1	"Infotech" by Maruthi Publications (2019)

REFERENCE BOOKS:

1	Better English Pronunciation by O' Connor
2	Phonetics and Phonology – Peter Roach
3	A Grammar of Spoken English – Harold Palmer
4	English Phonetics – Bansal and Harrison

B. TECH II SEMESTER	L	T	P	C
	3	-	-	3
19MA2T02:DIFFERENTIAL EQUATIONS & VECTOR CALCULUS				

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1	:	solve the differential equations related to various engineering fields (K3)
CO2	:	identify solution methods for partial differential equations that model physical processes (K3)
CO3	:	interpret the physical meaning of scalar and vector point functoins different operators such as del,gradient, curl and divergence (K3)
CO4	:	estimate the work done against a field, circulation and flux using vector calculus and familiarize vector integral theorems. (K3)

SYLLABUS

UNIT-I	:	Ordinary Differential equations of first order and first degree
Linear differential equations – Bernoulli's equations – Exact equations and equations reducible to exact form. Applications: Newton's Law of cooling – Law of natural growth and decay – Orthogonal trajectories		
UNIT-II	:	Linear differential equations of higher order
Solutions of Non-homogeneous equations of higher order with constant coefficients – with non-homogeneous term of the type e^{ax}, sin ax, cos ax, polynomials in x^n, e^{ax} V(x) and x^nV(x) – Method of Variation of parameters. Applications: LCR circuit		
UNIT-III	:	Partial Differential Equations of First Order
Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Solutions of first order linear (Lagrange) equation and nonlinear (standard types) equations		
UNIT-IV	:	Vector differentiation
Scalar and vector point functions, vector operator del, del applied to scalar point functions-Gradient, del applied to vector point functions-Divergence and Curl, physical interpretation of Gradient Div F and Curl F, Del applied twice to point functions Del applied to products of point functions		
UNIT-V	:	Vector integration
Integration of VectorsLine 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).		

TEXT BOOKS:

	B. S. Grewal, Higher Engineering Mathematics, 42/e, Khanna publishers, 2012.

REFERENCE BOOKS:

1	Erwin Kreyszig, Advanced Engineering Mathematics, 9/e, John Wiley & Sons, 2013.
2	N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, 2008

B. TECH II SEMESTER	L	T	P	C
	3	-	-	3
19BS2T02: ENGINEERING CHEMISTRY				

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1	:	Explain the impurities present in raw water, problems associated and how to avoid them (K2)
CO2	:	Explain the advantages of Polymers in daily life (K2)
CO3	:	Explain the theory of construction of battery and fuel cells and theories of corrosion and prevention methods. (K2
CO4	:	Differentiate conventional and non-conventional energy sources and their advantages and disadvantages. (K2
CO5	:	Identify the usage of advanced materials in day to day life (K2)

SYLLABUS

UNIT-I : **WATER TECHNOLOGY**

Hardness of water-types of hardness-disadvantages of hard water-determination of hardness by EDTA complexometric method. Portable water and its specifications-steps involved in purification of water-chlorination, break point of chlorination. Boiler troubles: Scale and sludge-priming and foaming-boiler corrosion-caustic embrittlement.
Industrial Water Treatment: Softening methods: zeolite process-ion exchange process.
Brackish water treatment (desalination methods): Reverse osmosis - electro dialysis.

UNIT-II : **POLYMERS AND COMPOSITE MATERIALS**

Polymers-Introduction-Types of polymers-degree of polymerization-functionality-preparation properties and applications of individual polymers-Bakelite-PVC-Poly styrene.
Plastics: Types (thermosetting and thermoplastic)-compounding of plastics-moulding Process (Any Four) - recycling of e-waste.
Rubbers and elastomers: Introduction-natural rubber-vulcanization of rubber-synthetic rubbers-Buna-N, Buna-S.
Composite materials: Fiber reinforced plastics-biodegradable polymers-biomedical polymers-conducting polymers

UNIT-III : **ELECTRO CHEMICAL CELLS AND CORROSION**

Electrochemical Cells
Introduction-single electrode potential-electrochemical cell-electrochemical series and applications. Reference electrodes-standard hydrogen electrode and calomel electrode-construction of glass electrode.
Batteries: Construction, working and cell reaction of primary (dry cell) and Secondary (Pb acid, Ni-Cd, Zinc-Air and Li-ion) battery. Fuel cells (H_2-O_2, Methanol-Air cells).
Corrosion
Defination-theories of corrosion (Chemical and Electrochemical corrosion)-types of corrosion (Galvanic, Differential aeration (waterline and pitting corrosion), stress Corrosion). Factors influencing rate of corrosion-nature of metal-nature of corrosive atmosphere.
Corrosion Prevention methods: Cathodic protection-Sacrificial anodic method-Impressed voltage method. Metallic coatings: Galvanization-Tinning-Electro plating-Electro less plating

UNIT-IV : **CONVENTIONAL AND NONCONVENTIONAL ENERGY RESOURCES**

Introduction to fuels-classification and characteristics of fuels-solid, Liquid and gaseous fuels-advantages and disadvantages-calorific value-higher and lower calorific values-construction and working of bomb calorimeter-analysis of coal-proximate and ultimate analysis-numerical problems related to bomb calorimeter, Dulong's formula and coal analysis-petroleum refining-cracking-petrol and diesel knocking-octane number and cetane number-gaseous fuels-Natural gas-CNG-LPG
Non-conventional energy sources
Solar energy: Advantages-disadvantages of solar cells-construction and working of photo voltaic cell-Introduction to hydro power-geo thermal power-tidal and wave power

UNIT-V : **CHEMISTRY OF MATERIALS**

Nano materials: Introduction-sol-gel method-characterization by BET, SEM and TEM methods-carbon nanotubes and fullerenes: Types, preparation and applications
Semiconductors:Preparation (Distillation, Zone refining, Czochralski crystal pulling epitaxy, diffusion, ion implantation)-semiconductor devices (P-N junction diode as rectifier, junction transistor)
Cement: Constituents of cement-setting and Hardening of cement, Decay of Cement.
Refractories: Definition of refractory-classification and properties of refractoriness-applications of refractories.

TEXT BOOKS:

1	A Text Book of Engineering Chemistry - N. Y. S. Murthy, V. Anuradha& K. Ramana Rao, Maruthi Publications. (2018)
2	A Text Book of Engineering Chemistry - K. SeshaMaheswaramma, MridulaChugh, Pearson Publications (2018).

REFERENCE BOOKS:

1	Engineering Chemistry – Jain & Jain, Dhanpat Rai Publishing Company (2017
2	Text Book of Engineering Chemistry - Shashi Chawla, Dhanpat Rai & Co. (P) Limited (2017)
3	Chemistry –PrasantaRath, SubhenduChakroborthy, Cengage publications (2018)

B. TECH II SEMESTER	L	T	P	C
	3	-	-	3
19HS2T01: ENGLISH				

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1	:	**A) Reading Skills** • Addressing explicit and implicit meaning of a text. • Understanding the context. • Learning new words and phrases. • Using words and phrases in different contexts.
CO2	:	**B) Writing Skills** • Using the basic structure of a sentence. • Applying relevant writing formats to create paragraphs, essays, letters, e-mails, reports and presentations. • Retaining a logical flow while writing. Planning and executing an assignment creatively
CO3	:	**C) Interactive skills** • Analyzing a topic of discussion and relating to it. • Participating in discussions and influencing them. • Communicating ideas effectively. Presenting ideas coherently within a stipulated time
CO4	:	**D) Grammar in context** • Enable the skills of grammar using in a situation • Identifying the needs of apt grammar in life related situation • Promoting discourse with grammar effectively

SYLLABUS

UNIT-I	:	**Vocabulary Building**
1.1 Video Lesson 1.2.1 Word formation 1.2.2. Root words 1.2.3. Prefixes and Suffixes 1.2.4. Synonyms and Antonyms 1.3 Parts of Speech 1.4 Note- making, Note-taking		
UNIT-II	:	**Basic Writing Skills**
2.1 Video Lesson 2.2.1 Basic sentence structure 2.2.2. Clauses and Phrases 2.2.3 Punctuations 2.2.4 Creating coherence 2.2.5 Organizing principles of paragraph documents 2.2.6 Techniques for writing precisely 2.3 Tenses 2.4 Letter Writing		
UNIT-III	:	**Identifying Common Errors in Writing**
3.1 Video Lesson		

3.2.1 Sub + verb agreement 3.2.2 Noun pronoun agreement 3.2.3 Articles 3.2.4 Preposition 3.2.5 Redundancies 3.2.6 Clichés 3.3.1 Active - Passive Voice 3.3.2 Reported Speech 3.4 Resume Writing		
UNIT-IV	:	**Nature and Style of sensible Writing**
4.1 Video Lesson 4.2.1 Describing 4.2.2 Classifying 4.2.3 Writing Introduction and conclusion 4.3.1 Conditional Sentences 4.3.2 Degrees of Comparison 4.4 Email writing		
UNIT-V	:	**Writing Practice**
5.1 Video Lesson 5.2.1 Comprehension 5.2.2 Precise writing 5.2.3 Essay Writing 5.3 Simple Compound and Complex Sentences 5.4 Report Writing		

TEXT BOOKS:

1	Building Effective Communication Skills By Maruti Publications (2019)

B. TECH II SEMESTER	L	T	P	C
	3	-	-	3
19ME2T02:: BASICS OF MECHANICAL ENGINEERING				

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1	:	Analyze the principles of statics of particles to solve engineering problems.[K4]
CO2	:	Calculate the centroids of different composite plane figures.[K3]
CO3	:	Understand the concepts of properties of fluids, fluid flow and flow measuring devices.[K1]
CO4	:	Identify and differentiate different types of turbines and pumps.[K1,K2]
CO5	:	Describe the basics of various thermodynamic concepts.[K1]

SYLLABUS

UNIT-I	:	I **ENGINEERING MECHANICS: STATICS**

CONCURRENT FORCES IN A PLANE: Principles of statics, Composition and resolution of forces, Equilibrium of concurrent forces in a plane, Method of projections, Equilibrium of three forces in a plane, method of moments.

UNIT-II	:	**CENTER OF GRAVITY**

PARALLEL FORCES IN A PLANE:Two parallel forces, General case of parallel forces in a plane, Center of parallel forces. Center of gravity, centroids of composite plane figures and curves, Distributed force in a plane

UNIT-III	:	**FLUID MECHANICS**

Dimensions and units- physical properties of fluids- specific gravity, viscosity and surface tension- atmospheric, gauge and vacuum pressure –measurement of pressure- Piezometer, U- Tube and Differential manometers, Classification of flows-steady & unsteady, uniform, non-uniform, laminar, turbulent, rotational, and irrational flows-Equation of continuity for one dimensional flow, Euler‘s and Bernoulli‘s equations for flow, venture meter, orifice meter.

UNIT-IV	:	**HYDRAULIC MACHINES**

Turbines: Classification of turbines, working principle of Pelton Wheel, Francis and for Kaplan turbines, Governing of Pelton wheel turbine and centrifugal turbines, Cavitation, Surge tank, Water hammer.
Pumps: Types of pumps, working principle of Reciprocating pumps (single acting and double acting) and Centrifugal Pumps.

UNIT-V	:	**BASIC CONCEPTS OF THERMODYNAMICS**

System, Control Volume, Surrounding, Boundaries, Universe, Types of Systems, Macroscopic and Microscopic viewpoints, Concept of Continuum, Thermodynamic Equilibrium, State, Property, Process, Cycle, Reversibility, Quasi – static Process, Irreversible Process, Causes of Irreversibility, Energy in State and in Transition, Types, Work and Heat, Point and Path function. Zeroth Law of Thermodynamics, Concept of Temperature, Principles of Thermometry, Reference Points, Constant Volume gas Thermometer, Scales of Temperature, Ideal Gas Scale.

TEXT BOOKS:

1	Engineering Mechanics - S. Timoshenko & D.H. Young, McGraw Hill.2017
2	A text book of Fluid Mechanics and Hydraulic Machines by R.K.Bansal, Laxmi Publications 2004
3	A text Book of Engineering Thermodynamics- Fourth Edition, R.K. Rajput - Lakshmi Publications. 2015.

REFERENCE BOOKS:

1	Engineering Mechanics - S. S. Bhavikatti, New Age Publishers.2010.
2	Hydraulics and fluid mechanics by P.N. MODI and S.M.SETH, Standard book house. 2015.
3	Fluid Mechanics and Machinery by D. Rama Durgaiah, New Age International.2007.
4	. Engineering Thermodynamics - P.K. Nag, 4th Edition, Tata McGraw Hill Education Private Limited, New Delhi. 2008
5	. Thermodynamics – An Engineering Approach – YunusCengel&M.A.Boles, Tata McGraw Hill Publishing Company Limited, New Delhi. 2014.

B. TECH II SEMESTER	L	T	P	C
	3	-	-	3
19EE2T02::ELECTRICAL NETWORKS				

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1	:	Solve electrical networks using various techniques.
CO2	:	Solve electrical networks using network topology concepts.
CO3	:	Solve electrical circuits using network theorems with AC and DC excitations
CO4	:	Analyze the behavior of RLC networks for sinusoidal excitation
CO5	:	Analyze magnetic circuits

SYLLABUS

UNIT-I	:	**FUNDAMENTALS OF ELECTRICAL CIRCUITS**
Active and Passive Components and their V-I Relations - Dependent and Independent Sources - Source Transformation Technique - Network Reduction Techniques-Series, Parallel and Series – Parallel Combination of R, Land C (Each Element Separately) – Star/Delta and Delta/Star Transformation, Nodal Analysis and Mesh Analysis With Dependent and Independent Voltage and Current Sources for Both DC and AC Excitation.		
UNIT-II	:	**NETWORK TOPOLOGY**
Definition- Graph- Node – Branch – Links – Twigs - Tree, Co-Tree Basic Cut-Set and Basic Tie-Set Matrices for Planar Networks — Duality & Dual Networks.		
UNIT-III	:	**SINGLE PHASE A.C CIRCUITS**
Sinusoidal Alternating Quantities – Phase and Phase Difference – Complex and Polar Forms of Representations, J-Notation, R.M.S, Average Values and Form Factor for Different Periodic Wave Forms - Concept of Reactance, Impedance, Susceptance and Admittance - Power Factor and Significance-Real and Reactive Power, Complex Power – Simple Problems. **Resonance:** Resonance-Series, Parallel Circuits, Concept of Band Width and Q Factor.		
UNIT-IV	:	**NETWORK THEOREMS WITH DC & AC EXCITATION**
Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem, Reciprocity Theorem, Millman's Theorem and Compensation Theorem		
UNIT-V	:	**MAGNETIC CIRCUITS**
Basic Definition of MMF, Flux and Reluctance, Analogy Between Electrical and Magnetic Circuits, Faraday's Laws of Electromagnetic Induction – Concept of Self and Mutual Inductance, Dot Convention – Coefficient of Coupling and Composite Magnetic Circuit, Analysis of Series and Parallel Magnetic Circuits.		

TEXT BOOKS:

1	Fundamentals of Electric Circuits "Charles K.Alexander, Mathew N.O.Sadiku, Tata McGraw-Hill sixth edition-2019.
2	Circuits & Networks Analysis & Synthesis by A. Sudhakar and Shyammohan S Palli, Tata McGraw-Hill Fifth edition-2017.
3	3000 Solved Problems in Electrical Circuit by Schaum's solved problem series Tata McGraw-Hill Revised Edition 2018.
4	Circuit Theory by A.ChakrabartiDanapat Rai & Co publisher.Seventh - Revised edition (2018).

REFERENCE BOOKS:

1	Engineering Circuit Analysis by William Hayt and Jack E.Kemmerley,McGraw Hill Company,6th edition Eighth edition (4 August 2013)
2	Network Analysis by N.C.Jagan, C.Lakshmi Narayana BS publications 2nd edition -2017
3	Network Analysis: Van Valkenburg; Prentice-Hall of India Private Ltd.Third edition, 2019.

B. TECH II SEMESTER	L	T	P	C
	-	-	3	1.5
19BS2L02: ENGINEERING CHEMISTRY LAB				

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1	:	Identify the concentration of given solution by different methods of chemical analysis
CO2	:	Analyze the water purity by checking hardness, DO and Acidity.
CO3	:	Estimate the Cu^{+2}, Fe^{+3}, Ca^{+2}, Mg^{+2} ions and Ascorbic acid present in given solution.
CO4	:	Identify the pour and cloud point of lubricants.
CO5	:	Understand the principles of conductometric and potentiometric titrations.

SYLLABUS:

1. Estimation of HCl using standard Na_2CO_3 through acid-base titration.
2. Estimate the total hardness of water using standardized EDTA solution through complex metric titration.
3. Estimation of $KMnO_4$ using standard $H_2C_2O_4$ through redox titration method.
4. Estimation of Dissolved Oxygen in given water sample by Wrinkler's Method
5. Determination of ferric (Fe^{+3}) ions using standard KCr_2O_7 solution
6. Determination of copper (II) using standard hypo solution.
7. Estimation of strong acid by using strong base through conductometric titration method.
8. Estimation of strong acid by using strong base through potentiometric titration method.
9. Preparation of polymer (Demo).
10. Determination of Vitamin 'C'.
11. Determination of Pour and Cloud Point of lubricating oils

TEXT BOOKS:

1	A Textbook of Quantitative Analysis, Arthur J. Vogel.

B. TECH II SEMESTER	L	T	P	C
	-	-	3	1.5

19ME2L01 - ENGINEERING WORKSHOP

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1	:	Model and Develop various basic prototypes in Carpentry trade [K3]
CO2	:	Model and Develop various basic prototypes in Fitting trade [K3]
CO3	:	Perform Various Forging Operations [K3]
CO4	:	Perform various House Wiring Techniques. [K3]
CO5	:	Develop various basic prototypes in the trade of Sheet metal. [K3]

SYLLABUS

UNIT-I	**:**	**CARPENTRY:**
1. CROSS LAP JOINT 2. DOVETAIL JOINT 3. MORTISE and TENNON JOINT		
UNIT-II	**:**	**FITTING:**
1. SQUARE FIT 2. V-FIT 3. HALF ROUND FIT		
UNIT-III	**:**	**FORGING:**
1. ROUND ROD TO SQUARE 2. S-HOOK 3. ROUND ROD TO SQUARE HEADED BOLT		
UNIT-IV	**:**	**HOUSE WIRING:**
1. PARALLEL/SERIES CONNECTION OF THREE BULBS 2. STAIRCASE WIRING 3. FLOURESCENT LAMP FITTING		
UNIT-V	**:**	**SHEET METAL:**
1. SQUARE TRAY 2. HOLLOW CYLINDER 3. OPEN SCOOP		

TEXT BOOKS:

1	Engineering Workshop Practice Lab Manual Prepared by Mechanical Faculty.

B. TECH II SEMESTER	L	T	P	C
	-	-	3	1.5
19ME2L02 : MECHANICAL ENGINEERING LAB				

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1	:	Utilize the knowledge about boilers ,internal combustion engines and dynamometers in various real world problems
CO2	:	Predict major and minor losses in various piping system
CO3	:	Predict performance characteristics of Turbines and Pumps.
CO4	:	Calibrate Venturi meter and Orifice meter.

SYLLABUS

List of Experiments:

1. Study of Cochran and Babcock & Wilcox boilers.
2. Study the working & function of mountings and accessories in boilers.
3. Study of 2-Stroke & 4-Stroke petrol engines.
4. Study of 2-Stroke & 4-Stroke diesel engines.
5. Study the various types of dynamometers.
6. Determination of friction factor for a given pipeline.
7. Calibration of Venturi meter.
8. Calibration of Orifice meter.
9. Performance Test on Pelton Wheel.
10. Performance Test on Single Stage Centrifugal Pump.
11. Performance Test on Reciprocating Pump.
12. Bernoulli's apparatus.

NOTE: Any 10 of the above 12 experiments are to be conducted.

B. TECH II SEMESTER	L	T	P	C
	-	-	3	1.5

19HS2L02: ENGLISH COMMUNICATION SKILLS LAB

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1	:	**a) Reading Skills.** • Addressing explicit and implicit meaning of a text. • Understanding the context. • Learning new words and phrases. • Using words and phrases in different contexts.
CO2	:	**b) Writing Skills:** • Using the basic structure of a sentence. • Applying relevant writing formats to create paragraphs, essays, letters, E-Mails, reports and presentations. • Retaining a logical flow while writing. • Planning and executing an assignment creatively.
CO3	:	**c) Interactive skills:** • Analyzing a topic of discussion and relating to it. • Participating in discussions and influencing them. • Communicating ideas effectively. Presenting ideas coherently within a stipulated time
CO4	:	**d) Life Skills and Core Skills:** • Examining self-attributes and identifying areas that require improvement self-diagnosis, self-motivation. • Adopting to a given situation and developing a functional approach to find solutions-adaptability, problem-solving. • Understanding the importance of helping others-community service, enthusiasm.

SYLLABUS

UNIT-I	:	Oral Activity : JAM, Hypothetical situations, self / peer profile, Common errors in pronunciation, Neutralizing Accent
UNIT-II	:	Oral Activity : Telephonic Etiquette, Role plays, Poster presentations and e-mail Writing
UNIT-III	:	Oral Activity : Oral Presentation Skills, Public Speaking Data Interpretation
UNIT-IV	:	Oral Activity : Group Discussion: Do's and Don'ts –Types, Modalities
UNIT-V	:	Oral Activity : Interview Skills: Preparatory Techniques, FAQ, Mock Interviews Pronunciation : Connected speech (pausing, tempo, tone, fluency etc.,)

TEXT BOOKS:

1	"Infotech" by Maruthi Publications (2019)

REFERENCE BOOKS:

1	How to Face Interviews – by Clive Fletchers
2	The 7 Habits of Highly Effective People – by Stephen Covey

B. TECH III SEMESTER	L	T	P	C
	3	-	-	3
19MA3T06::NUMERICAL METHODS & TRANSFORMS				

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1	:	Evaluate the approximate roots of polynomial and transcendental equations by different algorithms(K3)
CO2	:	apply different algorithms for approximating the solutions of integration and ordinary differential equations to its analytical computations(K3)
CO3	:	express a function as a Fouries series (,K3)
CO4	:	solve the problems on Z-transforms and Fourier transforms (K1,K3)
CO5	:	solve many problems in engineering with the knowledge of Laplace transforms (K3)

SYLLABUS

UNIT-I	:	**Numerical Solutions Equations and Interpolation**

Numerical Solutions Equations - Numerical solutions algebraic and transcendental equations -Bisection Method, Method of False Position, Newton-Raphson Method, useful deduction from Newton-Raphson Method.
Interpolation- Finite differences, Differences of a polynomial, relation between operators, Newton's interpolation formulae, and interpolation with unequal intervals- Newton's divided difference formula, Lagrange's formula

UNIT-II	:	**Numerical Integration and Solutions of Ordinary Differential Equations**

Numerical Integration – Trapezoidal rule, Simpson's $\frac{1}{3}$ rule and Simpson's $\frac{3}{8}$ rule.
Numerical Solution of Ordinary Differential Equations –Taylor's series, Euler's and modified Euler's methods, Runge-kutta method of fourth order for solving first order equations.

UNIT-III	:	**Laplace Transforms**

Introduction – definition – conditions for the existence, Laplace transforms of elementary functions, properties of Laplace transforms, Inverse Laplace transforms , Laplace Transforms of derivatives and integrals, multiplication by t^n , division by t, evaluation of integrals by Laplace transforms, unit step function – Dirac's delta function, Convolution theorem.
Applications : Solutions of ordinary differential equations using Laplace transforms.

UNIT-IV	:	**: Fourier series And Fourier Transforms**

Fourier Series – Definition, Euler's formulae, Conditions for Fourier series expansions (Dirichile's conditions), functions having points of discontinuity, change of interval, Even and Odd functions, Half- range sine and cosine series.
Fourier Transforms- Definition, Fourier integrals- Fourier Sine and cosine integrals, Fourier Transforms, Fourier Sine and cosine transforms, properties of Fourier Transforms, convolution theorem of Fourier Transforms(without proof).

UNIT-V	:	**Z- transforms**

Introduction – definition, some standard Z-transforms, properties – Linearity, Damping rule, Shifting rule , multiplication by , Initial and final value theorems, Inverse Z- transforms, Convolution theorem, application to difference equations.

TEXT BOOKS:

1	B.S.Grewal , Higher Engineering Mathematics , 42/e,Khanna Publishers 2012

REFERENCE BOOKS:

1	ErwinKreyszing, Advanced Engineering Mathematics , 9/e, John Wiley & Sons,2013
2	B.V.Ramana, Higher Engineering Mathematics, Tata McGraw Hill, 2007
3	S.S.Sastry, Introduction Methods of Numerical Analysis , PHI, Fifth Edition ,2013

B. TECH III SEMESTER	L	T	P	C
	3	-	-	3
19EE3T01:ELECTRICAL CIRCUITS AND SYNTHESIS				

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1	:	Solve the Three Phase Circuits under Balanced & Unbalanced Conditions
CO2	:	Analyze the Transient Response of Electrical Circuits for AC and DC Excitations
CO3	:	Determine the Different Parameters of Two Port Network.
CO4	:	Realize the Electrical Equivalent Network for a given Network Transfer Function

SYLLABUS

UNIT-I	:	**THREE PHASE CIRCUITS**
Balanced Three Phase Circuits: Phase Sequence –Relation Between Line and Phase Voltages, and Currents in Star and Delta Connected System-Analysis of Balanced Three Phase System- Measurement of Active and Reactive Power in Three Phase Systems-Problem Solving. **Unbalanced Three Phase Circuits:** Analysis of Three Phase Unbalanced System-Loop Method – Star –Delta Transformation Technique-Two Wattmeter Method for Measurement of Three Phase Power-Problem Solving.		
UNIT-II	:	**TRANSIENT ANALYSIS IN DC CIRCUITS**
Transient Response of R-L, R-C, R-L-C Circuits for DC Excitations, Solution Using Differential Equations and Laplace Transforms-Problem Solving.		
UNIT-III	:	**TRANSIENT ANALYSIS IN AC CIRCUITS**
Transient Response of R-L, R-C, R-L-C Circuits for AC Excitations, Solution Using Differential Equations and Laplace Transforms-Problem Solving.		
UNIT-IV	:	**TWO PORT NETWORKS**
Two Port Network Parameters –Z, Y, ABCD and Hybrid Parameters and their Relations, Cascaded Networks-Pole and Zeros of Network Functions-Problem Solving		
UNIT-V	:	**NETWORK SYNTHESIS**
Positive Real Function - Basic Synthesis Procedure - LC ImmittanceFunctions - RC Impedance Functions and RL Admittance Function - RL Impedance Function and RC Admittance Function - Foster and CauerMethods.		

TEXT BOOKS:

1	Engineering circuit analysis by William Haytand Jack E.Kemmerley, Mc Graw Hill Company, 8th edition, 2013
2	Network synthesis: Van Valkenburg; Prentice-Hall of India PrivateLtd, 3rd edition,2019

REFERENCE BOOKS:

1	Networks Analysis by A. Sudhakar, Shyammohan S. Pillai, The McGraw-Hill Companies, 4th edition, 2017.
2	Circuits by A. Bruce Carlson, Cengage Learning Publications, 1st Edition, 2011.
3	Network Theory Analysis and Synthesis by SmarajitGhosh, PHI publications
4	Networks and Systems by D. Roy Choudhury, New Age International publishers, 2nd Edition,2013.
5	Electric Circuits by David A. Bell, Oxford publications, 7th Edition,2009
6	Circuit Theory (Analysis and Synthesis) by A.chakrabarthi, DhanpatRai&co, 2018
7	Fundamentals of Electric Circuits by Charles K.Alexander, MathwN.O.Sadiku,Mc Graw Hill, 6th Edition 2019

B. TECH III SEMESTER	L	T	P	C
	3	-	-	3
19EE3T02::ELECTRO MAGNETIC FIELDS				

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1	:	Determine Electric Field Intensity and Electric Potential Using Guass's Law
CO2	:	Calculate Magnetic Field Intensity Due to Current
CO3	:	Apply Ampere' s Law, and The Maxwell' s Second and Third Equations in Static Magnetic Field
CO4	:	Analyze the Magnetic Forces and Torque Produced by Currents in Magnetic Field
CO5	:	Understand the Concept of Time Varying Fields and Calculate Induced EMF's

SYLLABUS

UNIT-I	:	**STATIC ELECTRIC FIELD**
Coulomb's Law, Electric Field Intensity, Electrical Field Intensity Due to Point Charges. Line, Surface and Volume Charge Distributions. Maxwell's First Equation $\mathrm{div}(D)=\rho v$, Gauss Law and Its Applications. Potential Difference, Calculation of Potential Differences for Different Configurations, Conservative of Electric Fields, Maxwell's Second Equation Curl (E)=0, Electric Dipole, Electrostatic Energy and Energy Density		
UNIT-II	:	**CONDUCTORS, DIELECTRICS AND CAPACITANCE**
Polarization- Current and Current Density, Ohms Law in Point Form, Continuity of Current, Boundary Conditions of Perfect Dielectric Materials. Capacitance- Capacitance of a Two Wire Line, Poisson's Equation, Laplace's Equation		
UNIT-III	:	**STATIC MAGNETIC FIELDS**
Biot-Savart's Law, Oersted's Experiment -Ampere's- Circuital Law, Magnetic Flux, Magnetic Field Intensity and Magnetic Flux Density, MFI Due to a Straight Current Carrying Filament – MFI Due to Circular, Square and Solenoid Current – Carrying Wires, Maxwell's Third Equation $\mathrm{Curl}(H)=Jc$.		
UNIT-IV	:	**MAGNETIC FORCES, MATERIALS AND INDUCTANCE**
Force on a Moving Charge, Force on a Differential Current Element, Force Between Differential Current Elements, Nature of Magnetic Materials, Magnetization and Permeability, Magnetic Boundary Conditions, Magnetic Circuits, Inductances and Mutual Inductances, Maxwell's Fourth Equation $\mathrm{Curl}(E)=\partial B/\partial t$.		
UNIT-V	:	**TIME VARYING FIELDS AND MAXWELL'S EQUATIONS**
Faraday's Law for Electromagnetic Induction, Displacement Current, Modified Maxwell's Equation in Differential and Integral Forms. Statically and Dynamically Induced EMF's, Maxwell's Equations for Time Varying Fields		

TEXT BOOKS:

1	Elements of Electromagnetics, M. N. O. Sadiku, Oxford University Publication, 2014
2	Engineering Electromagnetics, P.V. W. Hayt, McGraw Hill Education, 2012

REFERENCE BOOKS:

1	Electromagnetism-Problems with solution, A. Pramanik, Prentice Hall India, 2012.
2	Electromagnetism - Theory and applications, A. Pramanik, PHI Learning Pvt. Ltd, New Delhi, 2009.

B. TECH III SEMESTER	L	T	P	C
	3	-	-	3
19EE3T03::ELECTRICAL MACHINES -I				

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1	:	Demonstrate the Construction and Operation of DC Machines.
CO2	:	Understand Various Performance Characteristics of DC Machine
CO3	:	Distinguish Different Types of Speed Control Methods of DC Machine
CO4	:	Determine the Performance of DC Machine Through Different Methods
CO5	:	a. Demonstrate the Construction and Operation of Two Winding Transformer b. Analyze the Performance of Single Phase Transformer and Demonstrate the Operation of Three Phase Transformer. c. Achieve Three Phase to Two Phase Transformation

SYLLABUS

UNIT-I	:	**DC MACHINES**
Introduction-Construction –Principle of Operation of DC Machine –EMF Equation– Classification of DC Machines based on Excitation – Back EMF–Torque Equation– Armature Reaction and Commutation–Problem Solving.		
UNIT-II	:	**PERFORMANCE OF D.C. MACHINES**
Characteristics of Separately-Excited, Shunt, Series and Compound Machines - Losses and Efficiency- Condition for Maximum Efficiency-Applications of DC Machines -		
UNIT-III	:	**STARTING, SPEED CONTROL AND TESTING OF DC MACHINES**
Necessity of Starter – Type of Starters-Two Point, Three Point and Four Point Starters – Speed Control by Armature Voltage, Field Control. Brake Test, Swinburne's Method – Hopkinson's Method - Retardation Test-Separation of Losses- Problem Solving.		
UNIT-IV	:	**SINGLE PHASE AND THREE PASE TRANSFORMERS**
Introduction- Constructional Details - Principle of Operation - EMF Equation - Operation on No Load and on Load – Phasor Diagrams of Transformers – Equivalent Circuit – Regulation – Losses and Efficiency – All Day Efficiency- Introduction to Three Phase Transformers- Tap Changers-Scott Connection-Problem Solving.		
UNIT-V	:	**SINGLE PHASE TRANSFORMERS TESTING**
Polarity Test, Load Test, Open Circuit and Short Circuit Tests – Sumpner's Test – Separation of Losses – Parallel Operation With Equal Voltage Ratios – Auto Transformer - Comparison With Two Winding Transformers - Problem Solving		

TEXT BOOKS:

1	Electrical machines, Nagarath.I.J and Kothari D.P.,TMH Publishing Co.Ltd. New Delhi, Fifth, 2017.
2	Electrical Machines, Abhijit Chakrabarti and SudiptaNath, McGraw Hill Education (India) Private Limited, 2015.

REFERENCE BOOKS:

1	Electrical Machinery and Transformers, I.L.Kosow.Pearson Education; 2-Edition (2007)
2	Electrical Machinery, BimbraP.S.Khanna Publishers, 2011
3	Electrical Machines, J.B.Guptha,katson books, 2014
4	Electrical Machinery and Transformers, B.S.Guru and H.R Hiziroglu, Oxford University Press; Third edition (16 August 2012).

B. TECH III SEMESTER	L	T	P	C
	3	-	-	3
19EC3T04::ANALOG ELECTRONICS				

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1	:	Explain the current voltage characteristics of semiconductor devices and distinguish different type of junction diodes .(K2)
CO2	:	**Compare and analyze different types of Rectifiers and Filters.(K4)**
CO3	:	Describe the V I characteristics of transistors, FET and biasing of same. (K1)
CO4	:	Discuss the applications of diode as Integrator, differentiator circuit also explain about clippers and Clamper circuits. (K2)

SYLLABUS

UNIT-I	:	**SEMICONDUCTOR DIODES**

Band structure of pn junction, current components, Quantitative theory of pn diode, Volt-ampere characteristics and its temperature dependence, Transition and diffusion capacitance of p-n junction diodes, Breakdown of junctions on reverse bias, Zener and Avalanche breakdowns,Special Semiconductor Diodes : Zener Diode,LED,Photodiode,Tunnel Diode and UJT.(Construction, operation and characteristics of all the devices are required to be considered).

UNIT-II	:	**RECTIFIERS AND FILTERS**

Rectifiers: Half wave, full wave: center tap and bridge type, analysis for different parameters: PIV, TUF, efficiency, ripple factor, regulation, etc. Filters: Need of filters, types Harmonic components in a rectifier circuit, Inductor filter, Capacitor filter, L- section filter, Pi- section filter comparison of various filter circuits in terms of ripple factors.

UNIT-III	:	**JUNCTION TRANSISTOR CHARACTERISTICS AND BIASING**

PNP and NPN junction transistors, Characteristics of the current flow across the base regions, Minority and majority carrier profiles, Transistor as a device in CB, CE and CC configurations, and their characteristics. The operating Point, DC & AC load lines, Fixed Bias and problems, Collector Feedback Bias, Emitter Feed Back Bias, Self Bias and problems, Stabilization, various stabilization circuits, Thermal runaway and thermal stability

UNIT-IV	:	**FET & MOSFET**

FET types, construction, operation, characteristics, parameters, MOSFET-construction, characteristics and comparative study of Enhancement and Depletion MOSFET (P-channel& N-channel).Comparison between JFET and MOSFET.

FET & MOSFET BIASING: Introduction, Fixed-Bias configuration, Self-Bias Configuration Voltage-Divider Biasing and stabilization. Relevant problems

UNIT-V	:	**WAVE SHAPING CIRCUITS**

Low pass & high pass RC circuits (square & step response), High pass RC circuit as a Differentiator, Low passes RC circuit as integrator.

Clipping circuits: Classification, diode clippers, transistor clippers, Transfer characteristics, Design & analysis of clipper circuits.

Clamping circuits: Classification, clamping operations, Clamping circuit theorem, practical clamping circuits.

TEXT BOOKS:

1	J. Millman&C.Halkias -'Electronic devices & circuits'-IInd Edition- Tata McGraw Hill Publication.
2	Millman's Pulse, Digital and Switching Waveforms - J. Millman, H. Taub and Mothiki S Prakash Rao, 2nd ed. 2008, TMH

REFERENCE BOOKS:

1	"Robert L Boylestead and Louis Nashelsky", "Electronic Devices and circuit theory", Pearson, Tenth edition 2009
2	Pulse and Digital Circuits –A. Anand Kumar, 2008, PHI.
3	David A. Bell –'Electronic devices & circuits'- IVth Edition- Prentice- Hall India.

B. TECH III SEMESTER	L	T	P	C
	-	-	3	1.5
19EE3L01:ELECTRICAL CIRCUITS AND SIMULATION LAB				

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1	:	Determine self and mutual inductances, and resonance frequency
CO2	:	Solve DC circuits using Network Theorems and mesh and nodal methods .
CO3	:	Compute two port parameters of a given electric circuits
CO4	:	Calculate three phase power and power factor.

SYLLABUS

LIST OF EXPERIMENTS

1. Determination of Self, Mutual Inductances and coefficient of coupling.
2. Series and Parallel Resonance
3. Verification of Superposition theorem
4. Verification of Maximum power transfer theorem
5. Experimental determination of Thevenin's equivalent.
6. Experimental determination of Norton's equivalent circuit.
7. Verification of compensation Theorem.
8. Verification of Reciprocity and Millimann's Theorems.
9. Mesh Analysis& Nodal Analysis
10. Calculate 'Z' & 'Y' parameters of two-port network.
11. Three phase power measurement
12. Three phase reactive power measurement with single-phase wattmeter.

Minimum of Ten Experiments and the same to be verified through any simulation tool.

B. TECH III SEMESTER	L	T	P	C
	-	-	3	1.5
19EC3L04::ANALOG ELECTRONICS LAB				

SYLLABUS

PART A: (Only for viva voce Examination)

ELECTRONIC WORKSHOP PRACTICE (in 2 lab sessions):

1. Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers, Switches (SPDT, DPDT, and DIP) Bread Boards.
2. Identification, Specifications and Testing of Active Devices, Diodes-(PN diode, Zener, Laser, Photo, varactor, tunnel, schottkey), BJTs, Low power JFETs, MOSFETs, Power Transistors, LEDs, LCDs, Optoelectronic Devices, SCR, UJT, DIACs, TRIACs.
3. Single layer and Multi-layer PCBs (Design procedure using PCB 123 software).
4. Study and operation of a) Multimeters (Analog and Digital) b) Function Generator c) Regulated Power Supplies d) Study and Operation of CRO.

PART B: (Any ten experiments)

1. PN Junction diode characteristics a) Forward bias b. Reverse bias (cut in voltage & Resistance calculations).
2. Zener diode characteristics.
3. Zener Diode as a regulator.
4. Transistor CB characteristics (Input and Output).
5. Transistor CE characteristics (Input and Output).
6. Half wave Rectifier without and with filter.
7. Full wave Rectifier without and with filter.
8. FET characteristics (Drain and Transfer)
9. Linear Wave Shaping: RC Low Pass & High Pass Circuits.
10. Clippers using Diodes
11. Clampers.
12. Transistor acts as a Switch.

Equipment Required for Laboratories:

1. Regulated Power supplies (RPS) - 0-30v
2. CROs - 0-20M Hz
3. Function Generators - 0-1 M Hz
4. Multimeters
5. Decade Resistance Boxes/Rheostats
6. Decade Capacitance Boxes
7. Micro Ammeters (Analog or Digital) - 0-20μA, 0-50μA, 0-100μA, 0-200μA
8. Voltmeters (Analog or Digital) - 0-50V, 0-100V, 0-250V
9. Electronic Components - Resistors, Capacitors, BJTs, PN diode, Zener diode, Photo diode, FETs, diodes (Ge & Si Type), transistors (NPN & PNP)

B. TECH III SEMESTER	L	T	P	C
	-	-	4	2.0
19CS3L03::C++ PROGRAMMING LAB				

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1	:	Proficient in Principles of object oriented technology.
CO2	:	The Evolution and Purpose of Object Oriented Programming.
CO3	:	Mastering in basic Object Oriented programming concepts and logic implementations.
CO4	:	. Knowledge in file I/O operations and exceptions
CO5	:	Ability to identify and implement appropriate Solution for a given Problem.
CO6	:	Know the terms Object oriented Programming, Class ,Object ,Constructor, Destructor, friend, static, Data Abstraction, Encapsulation, Inheritance, Polymorphism, File I/O, templates, Exceptions and where they are applicable

SYLLABUS

UNIT-I :

INTRODUCTION: The Object Oriented Technology, Disadvantages of Conventional Programming, Advantages of OOP, Structure of a C++ Program, Differences between C and C++

INPUT AND OUTPUT IN C++: Streams, Stream Classes Hierarchy, Bit Fields, Manipulators. Tokens in C++, Data Types, Constants, L Value and R Values, Operators in C and C++, Scope Access Operator, Comma Operator, This Operator, Reference Variable, Decision and Loop Statements

UNIT-II :

FUNCTIONS IN C++: Passing Arguments to a Function, Default Arguments, Const Arguments, Inputting Default Arguments, Inline Functions, Function Overloading.

CLASSES AND OBJECTS: Class Definition, Declaring Objects, Access specifiers and their scope, Member functions, Outside member functions as inline, Data Hiding or Encapsulation, Memory for Class and Objects, Static Member variables, Static Member Functions, Static Object, Array of Objects, Objects as Function Arguments, Friend Functions, Friend class, Local class, Empty Class, Qualifiers and Nested Classes, Member Function and Non-Member Function.

UNIT-III :

CONSTRUCTORS AND DESTRUCTORS: Introduction of Constructor, Destructor & Characteristics, Parameterized Constructor, Overloading Constructors, Constructor with Default Arguments, Copy Constructor

OPERATOR OVERLOADING: Introduction of Overloading, Overloading Unary Operators, Constraint on Increment and Decrement Operators, Overloading Binary Operators, Overloading with Friend Functions, Overloading Assignment Operator, Rules for Overloading Operators.

UNIT-IV	:

INHERITANCE: Introduction of Inheritance, Access specifiers, Protected Data with Private Inheritance, Types of Inheritances, Virtual Base Class, Constructors and Destructors in Inheritance, Constructor and Destructor in Derived Class, Advantages and Disadvantages of Inheritance.

POLYMORPHISM: Polymorphism, Types, Pointer and Inheritance, Virtual and Pure Virtual Functions, Abstract Classes.

UNIT-V	:

APPLICATIONS WITH FILES: File Stream Classes, File Opening Modes, File Pointers and Manipulators, Sequential Access Files, Binary and ASCII Files, Random Access Files.

TEMPLATES &EXCEPTION HANDLING

Principles of Exception Handling, Keywords, Exception Handling Mechanism, Multiple Catch Statements, Catching Multiple Exceptions.

Generic Programming with Templates, Need for Templates- Definition of class Templates.

Introduction to STL- Containers, Algorithms, Iterators.

TEXT BOOKS:

1	1. Programming in C++,Ashok N Kamthane, Pearson, 4th edition
2	The C++ Programming Language, B. Stroutstrup, Pearson Education. , 4th edition
3	The Complete Reference C++, Herbert Schildt, Tata McGraw Hill, 4th edition

REFERENCE BOOKS:

1	Object Oriented Programming C++, Joyce Farrell, Cengage, 4th edition
2	Mastering C++ , Venugopal, Raj Kumar, Ravi Kumar TMH, 2nd edition
3	Object Oriented Programming with C++, SouravSahay and OXFORD, 2nd edition

B. TECH III SEMESTER	L	T	P	C
	2	-	-	-
19CE0M01::ENVIRONMENTAL SCIENCE				

UNIT-I

MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES:

Definition, Scope and Importance –Sustainability: Stockholm and Rio Summit–Global Environmental Challenges: Global warming and climate change, acid rains, ozone layer depletion, population growth and explosion, effects;.Role of information technology in environment and human health.

Ecosystems: Concept of an ecosystem. - Structure and function of an ecosystem; - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids; Introduction, types, characteristic features, structure and function of Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.

UNIT-II:

NATURAL RESOURCES:

Natural resources and associated problems. Forest resources: Use and over – exploitation, deforestation – 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.

Food resources: World food problems, changes caused by non-agriculture activities-effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity.

Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources.

Land resources: Land as a resource, land degradation, Wasteland reclamation, man induced landslides, soil erosion and desertification; Role of an individual in conservation of natural resources; Equitable use of resources for sustainable lifestyles.

UNIT-III:

BIODIVERSITY AND ITS CONSERVATION:

Definition: genetic, species and ecosystem diversity-classification - Value of biodiversity: consumptive use, productive use, social-Biodiversity at national and local levels. India as a mega-diversity nation - Hot-sports of biodiversity - Threats to biodiversity: habitat loss, man-wildlife conflicts. - Endangered and endemic species of India – Conservation of biodiversity: conservation of biodiversity.

UNIT – IV

ENVIRONMENTAL POLLUTION:

Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards. Role of an individual in prevention of pollution. - Pollution case studies, Sustainable Life Studies. Impact of Fire Crackers on Men and his wellbeing.

Solid Waste Management: Sources, Classification, effects and control measures of urban and industrial solid wastes. Consumerism and waste products, Biomedical, Hazardous and e – waste management.

UNIT – V

SOCIAL ISSUES AND THE ENVIRONMENT:

Urban problems related to energy -Water conservation, rain water harvesting-Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issues and possible solutions. Environmental 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.

Environmental Management: Impact Assessment and its significance various stages of EIA, preparation of EMP and EIS, Environmental audit. Ecotourism, Green Campus – Green business and Green politics.
The student should Visit an Industry / Ecosystem and submit a report individually on any issues related to Environmental Studies course and make a power point presentation.

Text Books:

1. K. V. S. G. MuraliKrishna , Environmental Studies,VGS Publishers, Vijayawada, 2010
2. R. Rajagopalan, Environmental Studies, 2nd Edition, Oxford University Press, 2011
3. P. N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani, Environmental Studies, 2nd Edition , Pearson Education, Chennai,2015

Reference:

1. Deeshita Dave & P. UdayaBhaskar Text Book of Environmental Studies, Cengage Learning, 2011
2. Shaashi Chawla, A Textbook of Environmental Studies, TMH, New Delhi,2017
3. Benny Joseph, Environmental Studies, Tata McGraw Hill Co, New Delhi, 2006
4. Anubha Kaushik, C P Kaushik , Perspectives in Environment Studies, New Age International Publishers, 2014.

B. TECH IV SEMESTER	L	T	P	C
	3	-	-	3
19EE4T01:: ELECTRICAL MACHINES-II				

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1	:	Explain the Construction an Operating Characteristics of an Synchronous Generator
CO2	:	Demonstrate the Principle Operation, Characteristics and the Phenomenon of Synchronous Motor
CO3	:	Explain the Operating Characteristics Three Phase Induction Machines.
CO4	:	Distinguish Different Method of Starting and Speed Control of Three Induction Machines
CO5	:	Differentiate the Starting Methods of Single Phase Induction Motor

SYLLABUS

UNIT-I	:	**SYNCHRONOUS GENERATORS**
Introduction-Constructional Features of Alternators –Principle of Operation –Winding Factors-EMF Equation- Synchronous Reactance-Armature Reaction—Predetermination of Voltage Regulation Using E.M.F, M.M.F, Potier Triangle and ASA Methods–Parallel Operation–Synchronizing Power-Active and Reactive Power Sharing-Alternator on Infinite Bus Bars-Salient Pole Synchronous Machine –Two Reaction Theory-Slip Test–Operating Characteristics-Capability Curves-Problem Solving.		
UNIT-II	:	**SYNCHRONOUS MOTOR**
Introduction-Constructional Features of synchronous Motor – Principle of Operation- Methods of Starting–Torque and Power Developed Equations–Effect of Change in Excitation and Load on Synchronous Motor-V Curves and Inverted V Curves–Hunting and Suppression Methods-Synchronous Condenser-Problem Solving		
UNIT-III	:	**THREE PHASE INDUCTION MOTORS**
Introduction-Construction Details of Cage and Wound Rotor Machines - Production of Rotating Magnetic Field -Principle of Operation - Rotor EMF and Rotor Frequency - Rotor Current and Power Factor at Standstill and During Running Conditions - Rotor Power Input, Rotor Copper Loss and Mechanical Power Developed and their Interrelationship – Equivalent Circuit – Phasor Diagram- Problem Solving		
UNIT-IV	:	**CHARACTERISTICS, STARTING AND TESTING METHODS OF INDUCTION MOTORS**
Torque Equation - Expressions for Maximum Torque and Starting Torque - Torque Slip Characteristic - Double Cage and Deep Bar Rotors - Crawling and Cogging – Speed Control of Induction Motor With *V/f* Method – No Load and Blocked Rotor Tests - Circle Diagram for Predetermination of Performance– Methods of Starting – Starting Current and Torque Calculations – Induction Generator Operation (Qualitative Treatment Only).		
UNIT-V	:	**SINGLE PHASE INDUCTION MOTOR**
Introduction – Constructional Features and Theory of Operation – Equivalent Circuit-Performance Characteristics- Starting Methods, Shaded Pole Motor-Reluctance Motor - Hysteresis Motors-Stepper Motor-AC Series Motor.		

TEXT BOOKS:

1	Electric Machines, Nagrath.I.J. and Kothari.D.P., McGraw Hill Education; 4-Edition, 2010
2	Electric Machinery and Transformers, B. S. Guru and H. R. Hiziroglu, Oxford University Press; Third edition, 2012.

REFERENCE BOOKS:

1	Principle of Electrical Machines, by V.K Mehta (Author), Rohit Mehta (Author), S Chand; Reprint Edn. 2006 edition (1 December 2014)
2	Electric Machinery and Transformers, I. L. Kosow, Prentice Hall of India, New Delhi, Prentice Hall India (2008)
3	Electric Machines, P. S. Bimbhra (Author), Khanna Publishing; Second edition (2017)
4	A Course in "Electrical Machine Design" A.K.Sawhney , Dhanpat Rai & Co. (P) Limited (2016)

B. TECH IV SEMESTER	L	T	P	C
	3	-	-	3
19EE4T02 :: CONTROL SYSTEMS				

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1	:	Derive the Transfer Function of Physical Systems
CO2	:	Apply Block Diagram and Signal Flow Graph Techniques for Determining the Transfer Function.
CO3	:	Analysis a System Using Time Domain and Frequency Domain. Understand the Concepts of Compensators to Improve System Performances
CO4	:	Analyze Absolute and Relative Stability of LTI Systems.
CO5	:	Examine the Concepts of Controllability and Observability

SYLLABUS

UNIT-I	**:**	**MATHEMATICAL MODELING OF CONTROL SYSTEMS**
Introduction- Type of Control Systems -Open Loop and Closed Loop, Classification of Control Systems, Feedback Characteristics, and Transfer Function of Linear Systems, Differential Equations of Electrical Networks, Translational and Rotational Mechanical Systems, Block Diagram Reduction Techniques, Representation by Signal Flow Graph – Reduction Using Mason's Gain Formula.		
UNIT-II	**:**	**TIME RESPONSE ANALYSIS**
Introduction-Standard Test Signals-Time Response of First Order Systems-Time Response of Second Order Systems-Time Domain Specifications, Steady State Errors and Error Constants, Effects of PI, PD and PID Controllers.		
UNIT-III	**:**	**FREQUENCY RESPONSE ANALYSIS AND COMPENSATION**
Introduction-Frequency Domain Specifications- Bode Plot-Polar Plots, Introduction to Lag, Lead and Lag-Lead Compensators		
UNIT-IV	**:**	**STABILITY ANALYSIS**
The Concept of Stability- Location of Poles on s-Plane for Stability- Routh's Stability Criterion- Limitations of Routh's Stability, Root Locus, Nyquist Stability Criterion.		
UNIT-V	**:**	**STATE SPACE ANALYSIS**
Concepts of State, State Variables and State Model - State Space Representation of Transfer Function - State Transitions Matrix and Its Properties - Concept of Controllability and Observability.		

TEXT BOOKS:

1	Nagarath, I.J. and Gopal, M., "Control Systems Engineering", New Age International Publishers, 2017
2	Benjamin C. Kuo, "Automatic Control Systems", Wiley, 2014
3	Katsuhiko Ogata, "Modern Control Engineering", Pearson, 2015

REFERENCE BOOKS:

1	Richard C. Dorf and Bishop, R.H., "Modern Control Systems", Pearson Education,2009. John J.D., Azzo Constantine, H. and HoupisSttuart, N Sheldon, "Linear Control SystemAnalysis and Design with MATLAB", CRC Taylor& Francis Reprint 2009
2	John J.D., Azzo Constantine, H. and HoupisSttuart, N Sheldon, "Linear Control SystemAnalysis and Design with MATLAB", CRC Taylor& Francis Reprint 2009.
3	RamesC.Panda and T. Thyagarajan, "An Introduction to Process Modelling Identification and Control of Engineers", Narosa Publishing House, 2017.
4	M.Gopal, "Control System: Principle and design", McGraw Hill Education, 2012
5	NPTEL Video Lecture Notes on "Control Engineering" by Prof. S. D. Agashe, IIT Bombay.

B. TECH IV SEMESTER	L	T	P	C
	3	-	-	3
19EE4T03::ELECTRICAL AND ELECTRONICS INSTRUMENTATION				

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1	:	Demonstrate the construction and working principles of different types of measuring instruments.
CO2	:	Determine the circuit parameters through DC bridges and AC bridges
CO3	:	Measure the power and energy through watt and energy meters.
CO4	:	Understand the knowledge of potentiometers and digital meters.

SYLLABUS

UNIT-I	:	**INTRODUCTION TO MEASURINGINSTRUMENTS**
Classification–Deflecting,controlanddampingtorques–AmmetersandVoltmeters–PMMC,movingirontype,dynamometerandelectrostaticinstruments–Expressionfor thedeflectingtorqueandcontroltorque–Errorsandcompensation–Extensionofrange using shunts and seriesresistance		
UNIT-II	:	**DC AND AC BRIDGES**
Method of measuring low, medium and high resistance, Wheatstone bridge, Kelvin‘s double bridge, Loss of charge method for measurement of high resistance – Measurement of earth resistance – Measurement of inductance – Maxwell‘s bridge–Hay‘sbridge–Anderson‘sbridge–Measurementofcapacitanceandlossangle–Desauty bridge – ScheringBridge.		
UNIT-III	:	**MEASUREMENT OF POWER AND ENERGY**
Operation and analysis of single phase and three phase dynamometer wattmeter, LPF wattmeter and UPF wattmeter – Extension of range of wattmeter using instrument transformers – Measurement of active and reactive powers in balanced and unbalanced systems. Single phase induction type energy meter – Driving and braking torques – errors and compensations –Testing by phantom loading using R.S.S. meter– Three phase energy meter – Maximum demand meters.		
UNIT-IV	:	**POTENTIOMETERS**
Potentiometers: Principle and operation of D.C Crompton‘s potentiometer – standardization Measurement of unknown resistance-current–voltage-A.Potentiometers: Polar and coordinate types- Standardization-Applications.		
UNIT-V	:	**DIGITALMETERS**
Digital voltmeter – Successive approximation – Measurement of phase difference – frequency–HysteresisloopusinglissajiouspatternsinCRO–Rampandintegratingtype – Digital Frequency meter – Digital multimeter – Digital Tachometer		

TEXT BOOKS:

1	Electrical & Electronic Measurement & Instruments, A.K.SawhneyDhanpat Rai & Co. Publications,2010.
2	A Course in Electronic and Electrical Measurements, J. B. Gupta S. K. Kataria& Sons, Delhi,2013.

REFERENCE BOOKS:

1	ModernElectronicInstrumentationandMeasurementTechniques–A.D.Helfrick andW.D.Cooper,PHI,5thEdition2002
2	Electrical and Electronic Measurements and Instrumentation, R. K. Rajput, S. Chand & Company Ltd2011.
3	Electrical and Electronic Measurements, G. K. Banerjee, PHI Learning Pvt. Ltd. 2012

4	Electronic Instrumentation & Measurements, David Bell,Oxford University Press,2013.

B. TECH IV SEMESTER	L	T	P	C
	3	-	-	3
19EC4T04::DIGITAL ELECTRONICS				

SYLLABUS

UNIT-I	:	**BASICS OF DIGITAL SYSTEMS**
Introduction to Number Systems: Number base conversions, Binary to Octal, Octal to Binary, Binary to Hexadecimal, Hexadecimal to Binary, Unsignedand, Signed Binary arithmetic numbers., Binary codes, Special codes like Gray codes, Excess- 3 codes, 2-4-2-1 codes, Different types of code conversions like Binary to Gray codes and Gray codes to Binary codes.		
UNIT-II	:	**SIMPLIFICATION OF BOOLEAN FUNCTIONS**
Minimization Techniques: Boolean postulates and laws – De-Morgan‟s Theorem – Principle of Duality, Applications of Boolean laws – Boolean expression – Minimization of Boolean expressions — Min-term – Maxterm – Sum of Products (SOP) – Product of Sums (POS) Karnaugh map Minimization- 3,4 and 5 variables. NAND and NOR implementations,Implementation of different logic circuits using only NAND and NOR gates		
UNIT-III	:	**ARITHMATIC LOGIC CIRCUITS**
Half-adder , Full-adder,N- bit Ripple adder, Carry look ahead adder, Carry Save Adder, Parallel-adder , Half-Subtractor, Full-Subtractor, Full-Adder/Subtractor, BCD adder,Multipliers like Array-multipliers, Serial-multipler, Parallel-multiplier, 1-bitMagnitude Comparators, Cascading of N bit Magnitude comparator using 1- bit Magnitude Comparators		
UNIT-IV	:	**COMBINATIONAL LOGIC CIRCUITS**
Decoders, Encoders, Binary Multiplexer, De-multiplexers, Memory devices: Random Access Memory, Read only Memory, Programmable Read only Memory, EPROM, EEPROM, Flash ROM, Programmable Logic Devices: Programmable Logic Array, Programmable Array Logic. Complex Programmable Logic Devices & Field Programmable Gate Arrays		
UNIT-V	:	**SEQUENTIAL CIRCUITS**
Latches,Flip-Flops, truth tables and excitation tables. Flip-Flop conversions, Excitation tables, Synchronous and Asynchronous, Counters(Up-Down), Design of N bit counters, Ripple counter, Differences between Synchronous & Asynchronous, Counters,Ring counter and Johnson counter. Different types of Registers, Shift Registers		

TEXT BOOKS:

1	M. Morris Mano, “Digital Design”, 4th Edition, Prentice Hall of India Pvt. Ltd., 2008 / Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2003.
2	Charles H.Roth. “Fundamentals of Logic Design”, 6th Edition, Thomson Learning, 2013.

REFERENCE BOOKS:

1	John F.Wakerly, “Digital Design”, Fourth Edition, Pearson/PHI, 2008
2	John.M Yarbrough, “Digital Logic Applications and Design”, Thomson Learning, 2006
3	Donald P.Leach and Albert Paul Malvino, “Digital Principles and Applications”, 6th Edition, TMH, 2006

B. TECH IV SEMESTER	L	T	P	C
	3	-	-	3
19CS4T05:: DATA STRUCTURES				

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1	:	Design applications using stacks and implement various types of queues.
CO2	:	Analyze and implement operations on linked lists and demonstrate their applications
CO3	:	Demonstrate operations on trees.
CO4	:	Demonstrate implementation of various types of Graphs and Graph Traversals
CO5	:	Implement various searching and sorting techniques.

SYLLABUS

UNIT-I	:
Introduction: Definition of data structure, types and overview of data structures. **Algorithm:** Preliminaries of algorithm, Algorithm analysis and complexity. **Stacks and Queues:** Stack Representation using Arrays, operations on stack, Applications of stacks - Factorial Calculation, Infix to postfix Transformation, Evaluating Arithmetic Expressions. Queue Representation using Arrays, operations on queues, Applications of queues, Circular queues, Priority queues, Implementation of queue using stack.	
UNIT-II	:
Linked Lists: Introduction, Single linked list, representation of a linked list in memory**,** Operations on a single linked list. Double linked list, Operations on a double linked list. Circular linked list, Operations on a circular linked list. Applications of single linked list.	
UNIT-III	:
Trees: Basic tree concepts. **Binary Trees:** Properties, Representation of Binary Trees using Arrays and Linked List, Binary Tree Traversals, Creation of binary tree from pre-order, in-order and post order traversals, threaded binary tree. **Binary search trees:** Basic concepts, BST operations: Search, insertion, deletion and traversals, Creation of binary search tree from in-order and pre (post)order traversals. **AVL Trees**: Self Balanced Trees, Height of an AVL Trees and AVL Tree Rotations.	
UNIT-IV	:
Graphs: Basic concepts, Representations of Graphs: using Linked list and adjacency matrix, Graph Traversals - BFS & DFS, Applications: Dijkstra's shortest path algorithm, Minimum Spanning Tree using Prim's algorithm and Kruskal's algorithm, Transitive closure, Warshall's algorithm.	
UNIT-V	:
Searching: Linear Search, Binary Search and Fibonacci search. **Sorting:** Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort and Radix sort. **Hashing**: Introduction, Hash Function, Collision Resolution Techniques: Linear Probing, Quadratic Probing, Double Hashing, Rehashing, Separate Chaining, Extendible Hashing.	

TEXT BOOKS:

1	Data Structures: A Pseudo code approach with C by Richard F. Gilberg and Behrouz.A. Forouzan, 2nd edition, Cengage, 2012.
2	Classic Data Structures, Debasissamanta, PHI, 2nd edition, 2016.
3	Data Structures through C, 2nd edition by YashavantKanetker, BPB publications, 2017.
4	Data Structures & Algorithms, Alfred V Aho, John E Hopcraft, Jeffery D Ullman, Pearson

	Education. Ltd., Second Edition 2016.

REFERENCE BOOKS:

1	Data Structure with C, Seymour Lipschutz , TMH, 2017
2	Data Structures and Algorithms, G. A. V. Pai , TMH, 2017
3	Fundamentals of Data Structure in C, Horowitz, Sahani, Anderson Freed, University Press, 2nd edition, 2018.

B. TECH IV SEMESTER	L	T	P	C
	-	-	3	1.5
19EE4L01::ELECTRICAL MACHINES-I LAB				

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1	:	Determine and Predetermine the Performance of DC Machines
CO2	:	Draw Magnetizing Characteristics of DC Generator and Control the Speed of DC Motor.
CO3	:	Determine and Predetermine the Performance of Transformers
CO4	:	Realize Three Phase to Two Phase Transformation

SYLLABUS

LIST OF EXPERIMENTS

1. Brake Test on D.C. Shunt Motor
2. Brake Test on D.C. Series Motor
3. Load Test on DC Generators.
4. Open Circuit Characteristics of DC Generator (Self and Separately Excited)
5. Speed control of D.C. motors using armature control and field control methods
6. Swinburne's test
7. Retardation test on DC shunt motor
8. Separation of losses in DC Machine.
9. Hopkinson test on two identical D.C. machines
10. Open circuit & Short circuit test on single phase transformer
11. Load test on single phase transformer.
12. Sumpner's test on two single phase transformers
13. Parallel operation of Single Phase Transformers
14. Separation of core losses of a single phase transformer
15. Scott connection of single phase transformers

Note: Any ten experiments to be conducted

B. TECH IV SEMESTER	L	T	P	C
	-	-	3	1.5
19EE4L02::ELECTRICAL MEASUREMENTS LAB				

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1	:	Demonstrate the knowledge about construction and working principles of different types of measuring instruments
CO2	:	measure the resistance, inductance and capacitance and test the current transformers and dielectric strength of oil
CO3	:	calibrate and test single phase energy meter, calibrate PMMC voltmeter and calibrate LPF wattmeter and resistance strain gauge
CO4	:	measure three Phase active power and reactive power

SYLLABUS

LIST OF THE EXPERIMENTS

1. Measurement of low resistance using KDB.
2. Measurement of inductance & capacitance.
3. Calibration of single phase energy meter.
4. Measurement of power and power factor using two wattmeter method.
5. Calibration of dynamometer power factor meter.
6. Calibration of LPF wattmeter – by direct loading
7. Measurement of earth resistance.
8. Crompton D.C. Potentiometer – Calibration of PMMC ammeter and PMMC voltmeter
9. Measurement of 3 phases reactive power with single-phase wattmeter.
10. Measurement of parameters of a choke coil using 3 voltmeter and 3 ammeter methods.
11. Measurement of % ratio error and phase angle of given C.T. by comparison
12. Dielectric oil Testing using H.T testing Kit
13. Resistance strain gauge-Strain measurement & calibration

Minimum Ten Experiments from the Above List

REFERENCE BOOKS:

1. Department Laboratory Manual

B. TECH IV SEMESTER	L	T	P	C
	-	-	3	1.5
19EC4L03: DIGITAL ELECTRONICS LAB				

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1	:	Describe and implementation of code conversion(K1)
CO2	:	Explain simple Boolean expressions using the theorems and to minimize the combinational functions.(K2,K3)
CO3	:	Analyze combinational circuits like Adders, Subtractors, Encoders, Decoders etc. (K4)
CO4	:	Construct various types of sequential circuits like Flipflops, counters and Registers (K3)

SYLLABUS

LIST OF EXPERIMENTS:

Minimum of TEN Experiments has to be performed

1. Design and implementation of code conversion from binary -to-gray.
2. Implementing of logic gates with Universal Gates.
3. Design a logic diagram for the given SOP or POS form and verify the De-Morgan laws.
4. Construct and verify the truth tables of Half Adder, Full Adder using two Half Adders
5. & one OR gate.
6. Design a Combinational Logic circuit for
    a. 4x1 MUX and verify the truth table.
    b. 2 - variable function using 4x1 MUX and verify the truth table.
7. Design a Combinational Logic circuit for 1x4 De- MUX and verify the truth table.
8. Design 4-bit Comparator using IC 7485 and verify the Truth Table.
9. Design 3 to 8 Decoder using IC 74138 and verify the Truth Table.
10. Design Universal Shift Register using IC 74194 and verify the Truth Table.
11. Verify the truth tables of all Flip- Flops.
12. Implementation of Master Slave Flip-Flop with J-K Flip- Flop and verify the truth table.
13. Design a Decade Counter using IC 7490 and verify the truth table.
14. Design the Mod 5 counter using any Flip -Flop.
15. Construct 4-bit ring counter using any Flip –Flop and verify the truth table.
16. Design a 8 – bit Shift right Register using D-Flip -Flop and verify the truth table.

Equipment Required For Laboratory:

1. RPS – 0-30 v
2. IC‘s- 7400, 7402, 7485, 74194, 74138, 7408, 7404, 7432, 7468, 74151, 74153, 7490.
3. Digital logic trainers & bread board

B. TECH IV SEMESTER	L	T	P	C
	-	-	3	1.5
19CS4L05::DATA STRUCTURES LAB				

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1	:	Illustrate various linked lists and its operations.
CO2	:	Complete operations on stack application using arrays and linked lists.
CO3	:	State Queue operations and applications using arrays and linked lists.
CO4	:	Demonstrate various operations on binary trees.
CO5	:	Apply various searching techniques for user data.
CO6	:	Apply various sorting techniques for user data.

SYLLABUS

Exercise – I : Linked Lists

1. Program to create and display a singly linked list.
2. Program to create a singly linked list of n nodes and count the number of nodes
3. Program to create a singly linked list of n nodes and display it in reverse order
4. Program to delete a new node from the beginning of the singly linked list
5. Program to delete a new node from the middle of the singly linked list
6. Program to delete a node from the end of the singly linked list
7. Program to find the maximum and minimum value node from a singly linked list
8. Program to insert a new node at the middle of the singly linked list
9. Program to insert a new node at the beginning of the singly linked list
10. Program to insert a new node at the end of the singly linked list
11. Program to remove duplicate elements from a singly linked list
12. Program to search an element in a singly linked list
13. Program to sort the elements of the singly linked list
14. Program to Search an element in a Linked List (Iterative and Recursive)
15. Program to Nth node from the end of a Linked List

Exercise – II Stacks and Queues

Stacks :

16. Program to implement STACK operations using Arrays.
17. Program to implement STACK operations using Linked List.
18. Program to implement STACK operations using QUEUE operations.
19. Program to Reverse the list using STACK operations.
20. Program to convert Infix expression into Postfix expression.
21. Program to evaluate Postfix expression.

22. Program to calculate factorial of a given number using STACK operations

Queues:

23. Program to implement QUEUE operations using Arrays.
24. Program to implement QUEUE operations using Linked List
25. Program to implement QUEUE operations using STACK operations.
26. Program to implement Circular Queues using Arrays.
27. Program to implement Priority Queue using Arrays.

Exercise – III Tress

28. To create a Binary Search Tree of integers, insert, delete and search integers into (from) Binary search tree.
29. Use recursive functions to traverse a binary search tree in preorder, in-order and post-order.
30. Program to Construct a Binary Search Tree and Perform Deletion and In-order Traversal
31. Program to Find the Largest Element in a Binary Tree
32. Program to Find the Smallest Element in a Binary Tree
33. Program to Find the Sum of all the Nodes of a Binary Tree
34. Program to Implement Binary Tree using the Linked List
35. Program to Search a Node in a Binary Tree.

Exercise – IV Searching Techniques

36. Program to search an element in the array using iterative Linear Search.
37. Program to search an element in the array using recursive Linear Search.
38. Program to search an element in the array using iterative Binary Search.
39. Program to search an element in the array using recursive Binary Search.
40. Program to search an element in the array using iterative Fibonacci Search.
41. Program to search an element in the array using recursive Fibonacci Search

Exercise – V Sorting Techniques

42. Program to implement Bubble Sort, to sort a given list of integers in ascending order.
43. Program to implement Selection Sort, to sort a given list of integers in ascending order.
44. Program to implement Insertion Sort, to sort a given list of integers in ascending order.
45. Program to implement Quick Sort, to sort a given list of integers in ascending order.
46. Program to implement Quick Sort, to sort a given list of integers in ascending order using recursion method.
47. Program to implement Merge Sort, to sort a given list of integers in ascending order.
48. Program to implement Merge Sort, to sort a given list of integers in ascending order using recursion method.
49. Program to implement Radix Sort, to sort a given list of integers in ascending order.
50. Program to implement Merge Sort., to sort a given list of integers in ascending order.
51. Program to implement Heap Sort, to sort a given list of integers in ascending order.

Exercise – VI Graphs

52. Program to Implementation of Breadth-First Search Techniques.

53. Program to Implementation of Depth- First Search Techniques.

54. Program to Implementation of Prim's Algorithm.

55. Program to Implementation of Dijkstra's Algorithm.

56. Program to Implementation of Kruskal's Algorithm

TEXT BOOKS:

1	Data Structures Through C 2nd Edition, YashavantKanetker, BPB Publications, 2018
2	Data structures and Algorithm Analysis in C, Mark Allen Weiss, Pearson Education. Ltd., Second Edition 2013.
3	Data Structures & Algorithms, Alfred V Aho, John E Hopcraft, Jeffery D Ullman, Pearson Education. Ltd., Second Edition 2016

REFERENCE BOOKS:

1	Fundamentals of Data Structures in C, S.Sahni, Second Edition, Universities Press, Pvt. Ltd.
2	Data Structures and Algorithms using C by R. S. Salari, Fifth Edition, KHANNA Publishing.
3	Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.
4	Data Structures and Algorithms Made Easy: Second Edition: Data Structure and Algorithmic Puzzles, NarasimhaKarumanchi, Fifth Edition, Career Monk.
5	Data Structures Using C, ReemaThareja, Second Edition, Oxford.
6	Problem-solving with C++, The OOP, Fourth edition, W.Savitch, Pearson education.

B. TECH IV SEMESTER	L	T	P	C
	2	-	-	-
19BM0M02 :: INDIAN CONSTITUTIONS				

UNIT I: Introduction to Indian Constitution-Constitution meaning of the term, Indian Constitution - Sources and constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

UNIT II: Union Government and Administration Structure of the Indian Union: Federalism, Centre State relationship, President: Role, powers and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions

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

UNIT IV:.Local Administration - District's Administration Head - Role and Importance, Municipalities - Mayor and role of Elected Representative - CEO of Municipal Corporation PachayatiRaj: Functions of Pachayat Raj Institution: Zila Panchayat, Elected officials and their roles, CEO Zila Panchayat: Block level Organizational Hierarchy - (Different departments), Village level - Role of Elected and Appointed officials - Importance of grass root democracy.

UNIT V:Election Commission: Election Commission- Role of Chief Election Commissioner and Election Commissionerate -State Election Commission: Functions of Commissions for the welfare of SC/ST/OBC and women.

TEXTBOOKS:

1. Durga Das Basu, Introduction to the Constitution of India, Prentice Hall of India Pvt. Ltd.
2. SubashKashyap, Indian Constitution, National Book Trust
3. J.A. Siwach, Dynamics of Indian Government & Politics

REFERENCE BOOKS:

1. D.C. Gupta, Indian Government and Politics
2. H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication)
3. J.C. Johari, Indian Government andPolitics Hans
4. J. Raj IndianGovernment and Politics
5. M.V. Pylee, Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd.. New Delhi
6. 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

B. TECH V SEMESTER	L	T	P	C
	3	-	-	3
19EE5T01:: POWER GENERATION AND TRANSMISSION SYSTEMS				

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1 : Explain the Basics of electrical power generations from conventional Energy Sources (K2)

CO2 : Analyze the economical aspects of Power generation and different tariff methods (K4)

CO3 : Estimate the expressions for transmission line parameters(R,L,C). (K5)

CO4 : Compare various types of transmission line (short, medium, long) and its performance (K2)

CO5 Estimate the mechanical performance of insulators, sag & tension to a transmission line (K5)

SYLLABUS

UNIT-I : CONVENTIONAL ENERGY SOURCES

Thermal power stations: Selection of site, general layout of a thermal power plant, Types of boilers, economizers, super heaters, condensers and turbines, merits and demerits- ESPs

Hydro electric plants: Selection of site, layout of Hydro stations- types of hydro stations, Merits & Demerits

Gas Power Plants: Introduction -Simple layout, combined cycle, Merits and Demerits.

Nuclear Power Plants: Introduction- layout – Merits & Demerits

UNIT-II : ECONOMIC ASPECTS OF POWER GENERATION & TARIFF

Economic Aspects –load curve, load duration and integrated load duration curves, discussion on economic aspects: connected load, maximum demand, demand factor, load factor, diversity factor, power capacity factor and plant use factor, base and peak load plants.

Tariff Methods– costs of generation and their division into fixed, semi-fixed and running costs, desirable characteristics of a tariff method, tariff methods: simple rate, flat rate, block-rate, two-part, three–part, and power factor tariff methods.

UNIT-III : TRANSMISSION LINE PARAMETERS

Types of conductors – Calculation of resistance for solid conductors – Calculation of inductance for single phase and three phase– Single and double circuit lines– Concept of GMR and GMD–Symmetrical and asymmetrical conductor configuration with and without transposition–Bundled conductors – 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–Single and double circuit lines- Bundled conductors.

UNIT-IV : PERFORMANCE ANALYSIS OF TRANSMISSION LINES

Classification of Transmission Lines – Short, medium, long line and their model representations –Nominal-T–Nominal-Pie and A, B, C, D Constants , Rigorous Solution for long line equations – Surge Impedance and SIL of Long Lines – Representation of Long lines – Equivalent T and Equivalent Pie network models - Mathematical Solutions to estimate regulation and efficiency of all types of lines.

UNIT-V : MECHANICAL DESIGN OF TRANSMISSION LINES

Skin and Proximity effects –Ferranti effect – Charging Current – Corona – Description of the phenomenon–Factors affecting corona–Critical voltages and power loss. Sag and Tension calculations with equal and unequal heights of towers–Effect of Wind and Ice on weight of Conductor – Stringing chart .Types of Insulators – String efficiency and Methods for improvement - Voltage distribution–Calculation of string efficiency – Capacitance grading and Static Shielding.

TEXT BOOKS:

1. A. J. Wood and B. F. Wallenberg, "Power generation, operation and control", Wiley Interscience, 2nd Edition.
2. A Chakrabarti, M. L Soni, P. V. Gupta, U. S. Bhatnagar , "A Text book of Power System Engineering" , Dhanpat Rai Publication
3. V. K. Mehta, Rohit Mehta, "Principles of Power Systems", S. Chand Publication.
4. S. N. Singh, "Electric Power Generation, Transmission and Distribution", PHI Learning, New Delhi

REFERENCE BOOKS:

1. Elements of power system analysis, C.L Wadwa, New age international
2. Electrical Power System, Ashfaq Hussain, CBS Publishers & Distributors
3. Solanki, Chetan S. "Renewable Energy Technologies", PHI Learning, New Delhi.

B. TECH V SEMESTER	L	T	P	C
	3	-	-	3
19EC5T04: LINEAR IC APPLICATIONS				

COURSE OUTCOMES:

Students are able to

CO1: Describe fundamental of ICFabrication process.

CO2: Explain different applications based on operational amplifier.

CO3:Design the applications of waveform generators based on operational amplifier and IC 555 timers.

CO4: Construct D to A & A to D converters.

UNIT- I

INTEGRATED CIRCUITFABRICATION:

IC classification, IC chip size and circuit complexity, fundamental of monolithic IC technology, epitaxial growth, masking and etching, diffusion of impurities. ICPackage Types and temperature ranges. Fabrication of diodes, resistance and capacitance.

UNIT II

OPERATIONAL AMPLIFIER:

Differential Amplifier- Differential Amplifier Configurations and Properties.Characteristics of OP-Amps, Op-amp Block Diagram, Level translator, ideal and practical Op-amp specifications, Op-Amp parameters, AC and DC characteristics of 741 op-amp & its features. Input & Output offset currents and voltages, slew rate, CMRR, PSRR.

UNIT III

LINEAR AND NON-LINEAR APPLICATIONS OF OP- AMPS:

Linear applications of op- amps: Inverting and Non-inverting amplifier, Integrator and differentiator, Difference amplifier, AC amplifier, V to I, I to V converters. Non-linear applications of op- amps: Comparators, Triangular and Square wave generators.

UNIT- IV

TIMERS & PHASE LOCKED LOOPS:

Introduction to 555 timer, functional diagram, Monostable and Astable operations and applications, Schmitt Trigger.Introduction to Phase Locked Loop (PLL565),Voltage Controlled Oscillator (IC566).

UNIT V

D to A & A to D CONVERTERS:

Introduction, basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, Different types of ADCs , parallel comparator type ADC, counter type ADC, successive approximation ADC and dual slope ADC.Specifications of DAC and ADC.

TEXT BOOKS :

1. D. Roy Chowdary, "Linear Integrated Circuits", 2nd Edition, New Age International (p) Ltd,2003.**Unit-I, II, III,IV&V**
2. Ramakanth A. Gayakwad, "Op-Amps & Linear ICs" -, 4th Edition PHI, 2010.**Unit- II, III& IV**

REFERENCES :

1. Sergio Franco, "Design with Operational Amplifiers & Analog Integrated Circuits", McGraw Hill, 1988.
2. S.Salivahana, VSK Bhaskaran," Linear integrated circuits" 1st Edition TMH, 2008.
3. David A Bell "Operational Amplifiers & Linear ICs", 2ndEdition, Oxford Uni. Press,1997.

e-RESOURCES:

1. https://lecturenotes.in/s/899-linear-integrated-circuits-and-applications
2. https://nptel.ac.in/courses/108/108/108108111/

B. TECH V SEMESTER	L	T	P	C
	3	-	-	3
19BM5T01: PRINCIPLES OF ECONOMICS AND MANAGEMENT				

UNITI:

IntroductiontoEconomics: Concept,Nature&Scope-MacroandMicro Economics-Demand Analysis:Demand Determinants- Law of Demand & its exceptions- Elasticity ofDemand-Types-DemandForecasting-Methods.

UNITII:

CostAnalysis: Cost Concepts-Break– EvenAnalysis (simpleproblems).

MarketStructures:TypesofMarkets-Features,PriceoutputdeterminationinPerfectCompetition, Monopoly,Monopolistic Competition,Oligopoly-Pricingmethods.

UNITIII:

IntroductiontoManagement:Concept-FunctionsofManagement-Scientific**Management**-Principles of Management-FunctionalareasofManagement-LeadershipStyles.

Human Resource Management: Concept, Significance and Functions - PM Vs HRM –Recruitment, Selection, Training and Development -Job Analysis - Role and position of HRdepartment– Performance Appraisal.

UNITIV:

MarketingManagement:Definition-Concepts-MarketingMix-RecentTrends-DigitalMarketing-GreenMarketing-Rural Marketing.
ProductionManagement: Concept-TypesofProductionprocesses-PlantLocation&Layout-Statistical Quality Control-Quality Circles-TQM.

UNITV:

FinancialManagement:Concept-ObjectivesofFinance-Wealth MaximizationVs.ProfitMaximization-FunctionsofFinance-Roleoffinancialmanager-FinancialStatements–Contents of Trading Account, Profit and Loss Account – Balance Sheet (Theory only)

Entrepreneurship- Concept– Qualities of a good entrepreneur-EntrepreneurialDevelopment-Project Appraisal- Organizational assistance to entrepreneurs.

TEXTBOOKS:

1. P.G.Ramanujam,B.V.R.Naidu&PVRSastry,**ManagementScience**,HimalayaPublishingHouse,Mumbai
2. A.R.Aryasri,**ManagerialEconomicsandFinancialAnalysis**,TataMcGraw-Hill,NewDelhi.

REFERENCEBOOKS:

1. M.Y.Khan&P.K.Jain, **FinancialManagement**,TATAMcGraw-Hill,NewDelhi.
2. KoontzODonnel,**Management**, TATAMcGraw-Hill, NewDelhi.
3. K.Aswathappa,**Production Mangement**,HimalayaPublishingHouse,Mumbai.
4. P.SubbaRao,**HumanResourceManagement**,HimalayaPublishingHouse,Mumbai.
5. PhilipKotler,**MarketingManagement**,Pearson PrenticeHall,NewDelhi.
6. VasantDesai,**Entreprenuership**,HimalayaPublishingHouse,Mumbai.
7. Varshini&Maheswari,**ManagerialEconomics**,SChand&Co,NewDelhi.

B. TECH V SEMESTER	L	T	P	C
	3	-	-	3
19EE5E01 :: INDUSTRIAL ELECTRICAL SYSTEMS				

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1 : Explain about electrical wiring systems.(K2)

CO2 : Compare different Protective Devices.(K4)

CO3 : Estimate the illumination levels produced by various sources(K5)

CO4 : Adapt with the different types of heating and welding techniques.(K6)

CO5 : Find the speed/time characteristics of different types of traction motors (K1)

SYLLABUS

UNIT-I : ELECTRICAL WIRING SYSTEM

System of supply ,selection of wiring, Rules for wiring, System of wiring, Separation of power and lighting circuits ,Testing of wiring installation, Necessity of Earthing ,Factors governing resistance of Earthing Electrode, System of Earthing ,Rules for Earthing, Double Earthing ,Methods of improving the Earth resistance, Resistance of Earth electrode, Size of Earth continuity conductor.

UNIT-II : ELECTRICAL PROTECTION DEVICES

Introduction, Main features of good protective devices ,Protective relays, Fuses, Types of fuses, Electrical Earthing, Neutral wire, Why grounding is required, Methods of Earthing , Earth Leakage circuit breaker system , Miniature circuit breaker (MCB) system, Advantages of Using MCB over switch fuses , Availability of MCB's , General specification of MCB'S,MCB selection chart for Household Appliances.

UNIT-III : ILLUMINATION

Introduction, Nature of radiation, Definitions, Polar curve, Law of illumination, , photometry, Lumen method, Electric lamp-tungsten lamp, Discharge lamps, MV and SV lamps, Flood lighting and calculation, Street Lighting, LED lighting ,Design of Choke and Capacitor.

UNIT-IV : ELECTRIC HEATING & WELDING

Introduction, classification of methods of electrical heating, Requirements of a good heating material , Design of heating elements, Temperature control of resistance furnace, Electric Arc furnace, Induction Heating, Dielectric Heating ,Electric Welding ,Resistance Welding, Electric arc Welding., electric welding equipment, comparison between A.C. and D.C. Welding.

UNIT-V : ELECTRIC TRACTION

Introduction, Requirements of an ideal traction system, supply system of electric traction ,Train movement-Speed–time curves, Mechanism of train movement ,The traction motors, Traction motor control, Control of single phase series motor, Braking of Electric Motors

TEXT BOOKS:

1 C.L. Wadhwa, "Generation, Distribution and Utilization of electrical Energy", New Age International (P) Limited, Publishers,2015- Revised Third Edition

2 S.L. Uppal and G.C. Garg, "Electrical Wiring, Estimating & Costing", Khanna publishers, 2008.

3 K. B. Raina, "Electrical Design, Estimating & Costing", New age International, 2007.

4 S. Singh and R. D. Singh, "Electrical estimating and costing", Dhanpat Rai and Co., 1997

REFERENCE BOOKS:

1 N.V.Suryanarayana, "Utilization of Electrical Power including Electric drives and Electric traction", New Age International (P) Limited, Publishers, 1996.

2 E. Openshaw Taylor, Orient Longman , "Utilization of Electric Energy".

3 H. Joshi, "Residential Commercial and Industrial Systems", McGraw Hill Education, 2008

4 B.R. Mehta, Y. Jaganmohan Reddy, " Industrial Process Automation Systems"Elsevier Publications 2014.

B. TECH V SEMESTER	L	T	P	C
	3	-	-	3
19EE5E02 :: SPECIAL ELECTRICAL MACHINES				

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1 : Demonstrate the Construction, principle of operation and control of stepping motors (K2)

CO2 : Explain the performance of switched reluctance motor. (K2)

CO3 : Compare the between brush less dc motor and Permanent magnet Dc Motor(K2)

CO4 : Explain the performance of **Permanent Magnet Synchronous Motor**. (K2)

CO5 : Explain the applications of Linear Electrical Machines (K2).

SYLLABUS

UNIT-I : STEPPER MOTOR

Variable Reluctance Stepper Motor, Permanent Magnet Stepper Motor, Hybrid Stepper Motor, Torque Equation, Characteristics of Stepper Motor, Open – loop and Closed – loop Control of Stepper Motor, Microprocessor – Based Control of Stepper Motor, Applications of Stepper Motor.

UNIT-II : SWITCHED RELUCTANCE MOTOR (SRM)

Construction, Principle of Working, Basics of SRM Analysis, Constraints on Pole Arc and Tooth Arc, Torque Equation and Characteristics, Power Converter Circuits, Control of SRM, Rotor Position Sensors, Current Regulators, Microprocessor – Based Control of SRM, Sensor less Control of SRM.

UNIT-III : PERMANENT MAGNET DC MOTOR & BRUSHLESS DC MOTOR

Permanent Magnet DC (PMDC) Motor: Construction, Principle of Working, torque Equation, Equivalent Circuit, Performance Characteristics.

Brushless Permanent Magnet DC (BLDC) Motors: Classification of BLDC, Construction, Principle of Operation, Types of BLDC Motor and its applications.

UNIT-IV : PERMANENT MAGNET SYNCHRONOUS MOTOR (PMSM):

Construction , Principle of operation, EMF Equation, Torque equation, Phasor Diagram, Circle Diagram of PMSM, Comparison of conventional and PMSM, Control of PMSM, Applications.

UNIT-V : LINEAR ELECTRIC MACHINES

Linear Induction motor: Construction-Thrust Equation-Equivalent Circuit-Characteristics,

Linear synchronous motor: Types & Construction- Thrust Equation-Application of LSM.

Linear Reluctance motor –Construction –Working and features of LRM.

TEXT BOOKS:

1 E.G. Janardanan, " Special Electrical Machines" PHI 1st Edition 2014.

2 K VenkataRatham, "Special Electrical Machines" University Press 2009

3 R.Krishnan, 'Switched Reluctance Motor Drives – Modeling, Simulation, Analysis, Design and Application', CRC Press, New York, 2001.

REFERENCE BOOKS:

1 B.R Gupta," Fundamentals of Electric Machines ". New Age International (P) Limited 3rd Edition 2005

2 A.E. Fitzgerald, Charles Kingsley, Stephen.D.Umans, 'Electric Machinery', Tata McGraw Hill publishing Company Ltd, 2003.

3 Kenjo T and Nagamori S Clerendon, "Permanent Magnet and Brushless DC Motors", Press Oxford 2019

4 J.B. Gupta, 'Theory and Performance of Electrical Machines', S.K.Kataria and Sons,2002.

B. TECH V SEMESTER	L	T	P	C
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19EC5E21: SIGNALS AND SYSTEMS				

UNIT 1: INTRODUCTION TO SIGNALS AND SYSTEMS

Introduction to Signals: Continuous time signals and Discrete time signals-Periodic and Aperiodic signals-Even and Odd signals- Energy and Power signals- Deterministic and Random signals-Complex Exponential and Sinusoidal signals,Standard Functions - Unit impulse and Unit step-Unit ramp signal.
Introduction toSystems: Continuous time systems and Discrete time systems-Linear and Non-Linear systems-Time Invariant and Time Variant systems- Causal and Non-causal system- BIBO system.

UNIT 2: FOURIER SERIES AND SAMPLING

Fourier series: Orthogonal Functions-Fourier Series Representation of Continuous-Time Periodic Signals-Properties of Fourier series-Trigonometric and Exponential Fourier series.

Sampling: Sampling Theorem-Time domain and frequency domain statements-Reconstruction of a Signal from its sample- The Effect of under sampling: Aliasing.

UNIT 3: CONVOLUTION, CORRELATION AND LTI SYSTEMS

Convolution and Correlation: Concept of convolution in timedomain and frequency domain, Cross correlation and auto correlation of functions, properties of correlation function.

Continuous-Time and Discrete-Time LTI Systems: Convolution Integral and Convolution Sum. Properties of Linear Time-Invariant Systems. Causal LTI Systems described by Differential and Difference Equations.

UNIT 4: CONTINUOUS-TIME TRANSFORMS

Laplace Transform:Unilateral and bi-lateral Laplace Transforms. ROC, Constraints of ROC,Laplace Transform of standard functions, Properties, Inverse Laplace Transform. Initial and Final Value theorems.

Fourier Transform: Unilateral and bi-lateral Fourier Transform- Properties of Fouriertransform,The Convolution Property, Parseval's Theorem.

UNIT 5: Z-TRANSFORM

Unilateral and bi-lateral z-transform,ROC, Constraints of ROC, Properties of Z-transforms, Convolution Property, Inverse z-Transform(Direct and Indirect methods) . Initial and Final Value theorems, Relation between DTFT and Z-Transform.

TEXT BOOKS

1. Signals and Systems – A.V.Oppenheim, A.S.Willsky and S.H.Nawab, 2nd Edition, Prentice-Hall India.
2. B.P. Lathi, "Principles of Linear Systems & Signals", Oxford Press, Second Edition 2005.

REFERENCE BOOKS

1. John G. Proakis and Manolakis, "Digital Signal Processing, Principles, Algorithms and Applications", PearsonEducation, 3rdedition, 2002.
2. Simon Haykin and Barry Van Veen ,"Signals and Systems", John Wiley & Sons In, 2001.

B. TECH V SEMESTER	L	T	P	C
	3	-	-	3
19CS5E19 :: OPERATING SYSTEM				

COURSE OUTCOMES:

At the end of the course student are able to

1. Define the Basic concepts about Operating System and its functions.
2. Describe Process management,CPU scheduling and Deadlocks.
3. Analyze Memory management
4. Describe and Implement File systems & Disk Structures .
5. Perform Case Study on LINUX,WINDOWS and Android OS

UNIT – I

OPERATING SYSTEMS OVERVIEW

Introduction-OS Concepts – Evolution of OS, OS Structures- Kernel, Shell. Operating-System Services, System Calls, Types of System Calls, System Structure. UNIX- Introduction-Architecture, Logging In, Files and Directories, Input and Output, Programs and Processes, Error Handling, User Identification, Time Values, System Calls and Library Functions, Command-Line Arguments, UNIX File API'S.

UNIT – II

PROCESS MANAGEMENT

Process: Concept, Operations on Processes, Interprocess Communication. Threads-Multithreading Models, Threading Issues, threads .

Synchronization: The Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Critical Regions, Monitors, Classic Problems of Synchronization,

Process Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms- CPU (Uniprocessor) scheduling algorithms, Multiprocessor and Real-time scheduling algorithms.

Deadlocks: Characterization – Prevention – Avoidance - Detection and Recovery

UNIT – III

MEMORY MANAGEMENT

Basic Memory Management, Swapping, Contiguous Memory Allocation, Virtual Memory Concept, Demand Paging - Page Interrupt Fault, Page Replacement Algorithms, Segmentation – Simple, Multi-level, Segmentation with Paging, Memory Management.

UNIT – IV

INFORMATION MANAGEMENT

File system Interface: The concept of a file, Access Methods, Directory structure, File system mounting, file sharing, protection.

File System implementation: File system structure, allocation methods, free-space management

Mass-storage structure: Overview of Mass-storage structure, Disk structure, disk attachment, disk scheduling, Disk Management, Swap-Space Management, RAID Structure.

UNIT – V

CASE STUDY

The Linux System, Microsoft Windows 7, Android Software Platform**:** Android Architecture, Operating System Services, Android Runtime Application Development, Application Structure.

TEXT BOOK:

1. Operating System Concepts, Abraham Silberschatz, Peter Baer Galvin and Greg Gagne 10th Edition, John Wiley and Sons Inc., 2018.
2. Operating Systems – Internals and Design Principles, William Stallings, 7th Edition, Prentice Hall, 2016.
3. Operating Systems-S Halder, Alex A Aravind,SecondEdition,Pearson Education,2016 .

REFERENCE BOOKS:

1."Understanding Operating Systems"Ann McIver McHoes Ida M. Flynn, Sixth Edition,Course Technology-Cengage Learning ,2011.
2. Modern Operating Systems, Andrew S. Tanenbaum, Second Edition, Addison Wesley, 2001.
3. Operating Systems Design and Implementation, Andrew S. Tanenbaum , Albert S. Woodhull - Amherst, Third Edition Prentice Hall, 2006.
4. Advanced Programming in UNIX Environment, by W. Richard Stevens: 2nd Ed, Pearson Education, 2005.
5. UNIX System Programming Using C++,by Terrence Chan: Prentice Hall India, 1999.
6. http://nptel.iitm.ac.in/courses/Webcourse-contents/IIScBANG/Operating%20Systems/New_index1.html

B. TECH V SEMESTER	L	T	P	C
	-	-	3	1.5
19EE5L01 ELECTRICAL MACHINES-II LAB				

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1 : Determine equivalent circuit parameters of 1ph and 3ph Induction motor (K5)

CO2 : Evaluate the efficiency of the 3ph Induction motor by analyzing their test results (K5)

CO3 : Find the Voltage regulation of Alternator by using different methods (K1)

CO4 : Estimate the performance of Synchronous Motor (K5)

CO5 : Adapt the knowledge in Single Phase induction Motor (K6)

LIST OF THE EXPERIMENTS

(Any Ten Experiments have to be Conducted)

1. Brake test on three phase squirrel cage induction Motor
2. Circle Diagram of three phase squirrel cage induction Motor
3. Brake test on 3-phase slip ring induction motor
4. Determination of equivalent circuit parameters, efficiency and regulation of a three phase Induction motor
5. Speed control of induction motor by V/f method.
6. Determination of equivalent circuit parameters of single phase induction motor
7. Determination of efficiency of a single-phase Induction Motor by conducting Brake test.
8. Regulation of a three –phase alternator by EMF &MMF.Methods
9. Regulation of three–phase alternator by Potier triangle method
10. Determination of Xdand Xqof a salient pole synchronous machine
11. Parallel operation of three-phase alternator under no-load and load conditions
12. Efficiency of a three-phase alternator
13. Determination of V and Inverted V curves of a three phase synchronous motor.
14. Determination of efficiency of three-phase alternator by loading with three phase induction motor

REFERENCE BOOKS:

1. Department Manual

B. TECH V SEMESTER	L	T	P	C
	-	-	3	1.5
19EE5L02 :: CONTROL SYSTEMS AND SIMULATION LAB				

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1 : Analyze the response and stability of the closed and open loop systems. (K4)

CO2 : Analyze the performance and working of D.C. & A.C. Servo motors(K4)

CO3 : Develop and analyze state space models(K3)

CO4 : Design P,PI,PD and PID controllers and also lag, lead and lag–lead compensators (K6)

CO5 : Design State Space model for classical transfer function using Matlab(K6)

LIST OF EXPERIMENTS

Part –A

(Any Seven Experiments has to be conducted)

1. Time response of Second order system
2. Characteristics of Synchros
3. Transfer function of Dc Shunt Motor
4. Transfer Function Dc Shunt Generator
5. Design of Lag and lead compensation – Magnitude and phase plot
6. Transfer function of DC motor Effect of P, PD, PI, PID Controller on a second
7. Temperature controller using PID
8. Characteristics of AC servo motor
9. Characteristics of DC servo motor
10. DC position control system

Part –B

(Any Three Experiments has to be conducted)

1. Linear system Analysis (Using Matlab Software)
2. Bode Plot, Root locus, Nyquist Plots for the transfer functions of systems (Using Matlab Software)
3. Digital simulation of P, PI, PD, PID controllers (Using Matlab Software)
4. State Space model for classical transfer function(Using Matlab Software)
5. Lag Compensator, Lead Compensator (Using Matlab Software)

REFERENCE BOOKS:

1. Department Manual

B. TECH V SEMESTER	L	T	P	C
	-	-	4	2
19CS5L04 :: JAVA PROGRAMMING LAB				

Course Outcomes:

At the end of the lab student are able to

1. Implement solutions for a range of problems using object-oriented programming.
2. Develop Java programs that solve simple business applications.
3. Develop Java programs using String and StringBuffer Class
4. Develop Java programs that implement concept of various types of inheritance.
5. Implement Java programs using packages and interfaces.
6. Implement Exception Handling in java.

Note: Use JDK 1.7 or above on any platform.

LAB EXPERIMENTS

1. Installation of JDK, setting CLASSPATH and executing simple java program.
2. Write a Java Program to define a class, describe its constructor, overload the Constructors and instantiate its object.
3. Write a Java Program to define a class, define instance methods for setting and retrieving values of instance variables and instantiate its object.
4. Write a Java Program to define a class, define instance methods and overload them and use them for dynamic method invocation.
5. Write a Java Program to demonstrate use of sub class.
6. Write a Java Program to implement array of objects.
7. Write a Java program to practice using String class and its methods.
8. Write a Java program to practice using String Buffer class and its methods.
9. Write a Java Program to implement inheritance and demonstrate use of method overriding.
10. Write a Java Program to implement multilevel inheritance by applying various access controls to its data members and methods.
11. Write a program to demonstrate use of implementing interfaces.
12. Write a Java program to implement the concept of importing classes from user defined package and creating packages.
13. Write a program to implement the concept of Exception Handling using predefined exception.
14. Write a program to implement the concept of Exception Handling by creating user defined exceptions.

Text Books

1. Herbert Schildt: “Java The complete reference”, 7th Edition, Tata McGraw Hill, 2011.
2. E.Balaguruswamy: “Programming with Java A Primer”, 4th Edition, Tata McGraw Hill, 2009.

B. TECH V SEMESTER	L	T	P	C
	2	-	-	-
19GE0M04:: INTRODUCTION TO CYBER LAW				

UNIT I: Introduction Computers and its Impact in Society-Overview of Computer and Web Technology-Need for Cyber Law-Cyber Jurisprudence at International and Indian Level.

UNIT II: Cyber Law - International Perspectives UN & International Telecommunication Union (ITU) Initiatives Council of Europe - Budapest Convention on Cybercrime- Asia Pacific Economic Cooperation (APEC) -Organization for Economic Co-operation and Development (OECD) -World Bank-Commonwealth of Nations.

UNIT III: Constitutional & Human Rights- Issues in Cyberspace -Freedom of Speech and Expression in Cyberspace- Right to Access Cyberspace – Access to Internet- Right to Privacy-Right to Data Protection

UNIT-IV: Cyber Crimes & Legal Framework-Cyber Crimes against Individuals, Institutions and State-Hacking- Digital Forgery- Cyber Stalking/Harassment- Cyber Pornography- Identity Theft & Fraud-Cyber terrorism-Cyber Defamation-Different offences under IT Act, 2000.

UNIT V: Cyber Torts-Cyber Defamation-Different Types of Civil Wrongs under the IT Act, 2000-Intellectual Property Issues in Cyber Space Interface with Copyright Law- Interface with Patent Law-Trademarks & Domain Names Related issues

TEXTBOOKS:

1. Chris Reed & John Angel, Computer Law, OUP, New York, (2007).
2. Justice Yatindra Singh, Cyber Laws, Universal Law Publishing Co, New Delhi, (2012).
3. JonthanRosenoer, Cyber Law, Springer, New York, (1997).

REFERENCE BOOKS:

1. SudhirNaib, The Information Technology Act, 2005: A Handbook, OUP, New York, (2011)
2. S. R. Bhansali, Information Technology Act, 2000, University Book House Pvt. Ltd., Jaipur (2003).
3. Vasu Deva, Cyber Crimes and Law Enforcement, Commonwealth Publishers, New Delhi, (2003).

Verma S, K, Mittal Raman, Legal Dimensions of Cyber Space, Indian Law Institute, New Delhi, (2004)

B. TECH VI SEMESTER	L	T	P	C
	3	-	-	3
19EE6T01:: POWER SYSTEM ANALYSIS				

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1 : Determine Per unit quantities and to form aYbusand Zbusfor a power system networks. (K5)

CO2 : Illustrate the load flow solution of a power system using different methods (K2)

CO3 : Develop the concepts of Z-bus building algorithm (K3)

CO4 : Categorize the fault currents and sequence components of currents for both balanced and unbalanced power system network (K4)

CO5 : Analyze the steady state, transient and dynamic stability concepts of a power system (K4)

SYLLABUS

UNIT-I : PER-UNIT REPRESENTATION

Per-Unit Representation: Per Unit Quantities–Single line diagram– Impedance diagram of a power system, Graph theory definition – Formation of element node incidence and bus incidence matrices – Primitive network representation – Formation of Y– bus matrix by singular transformation and direct inspection methods.

UNIT-II : POWER FLOW STUDIES

Necessity of power flow studies – Derivation of static power flow equations – Power flow solution using Gauss-Seidel Method – Newton Raphson Method (Rectangular and polar coordinates form) –Decoupled and Fast Decoupled methods – Algorithmic approach –Problems on 3bus system only.

UNIT-III : Z-BUS ALGORITHM & SYMMETRICAL FAULT ANALYSIS

Z-Bus Algorithm: Formation of Zbus**:** Algorithm for the Modification of Zbus Matrix (without mutual impedance).

Symmetrical Fault Analysis: Reactances of Synchronous Machine – Three Phase Short Circuit Currents - Short circuit MVA calculations for Power Systems.

UNIT-IV : SYMMETRICAL COMPONENTS & FAULT ANALYSIS

Definition of symmetrical components - symmetrical components of unbalanced three phase systems – Power in symmetrical components – Sequence impedances: Synchronous generator – Transmission line and transformers – Sequence networks –Various types of faults LG– LL– LLG and LLL on unloaded alternator–unsymmetrical faults on power system.

UNIT-V : POWER SYSTEM 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. Derivation of Swing Equation. Determination of Transient Stability by Equal Area Criterion, Application of Equal Area Criterion, methods to improve steady state and transient stability.

TEXT BOOKS:

1 Power System Analysis by John.J Grainger and Stevenson, Tata McGraw Hill – 2017.

2 Modern Power system Analysis – by I.J.Nagrath&D.P.Kothari: Tata Mc Graw–Hill Publishing Company, 4th edition.

3 Electrical power systems by C.L. Wadhwa, New age- International(P) Ltd., - 7th Edition

4 Power System Analysis and Design by J.Duncan Glover, M.S.Sarma, T.J. Overbye –Cengage Learning India Pvt. Ltd.; 6th edition

5 Modern Power System Analysis with MATLAB Applications, R. Jegatheesan K. Vijayakumar, First Editon, By Pearson, 2020.

REFERENCE BOOKS:

1 Power Systems Analysis, 2nd Edition, Arthur R. Bergen, University of Californa, Berkeley, Vijay Vittal, Lowa State University.

2 Power System Analysis by Hadi and Saadat – TMH Edition

3 Power System Analysis by DrB.R.Gupta, SChandPublications,7th edition.

4 Electrical Power Systems by P.S.R.Murthy, B.S.Publications, 3rd edition

5 Electrical Power Systems by Dr S Sivanagaraju, Laxmi publications

B. TECH VI SEMESTER	L	T	P	C
	3	-	-	3
19EE6T02 :: POWER ELECTRONICS				

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1 : Compare the characteristics of various power semiconductor devices (K2)

CO2 : Explain the operation of 1-Phase converters (K2)

CO3 : Analyze the operation of & 3-Phase converters &AC-AC Converters(K4)

CO4 : Explain the operation of of DC-DC converters. (K2)

CO5 : Explain the working of inverters and Different modulation techniques of PWM inverters (K5)

SYLLABUS

UNIT-I : INTRODUCTION

Basic Theory of Operation - Static Characteristics-Two Transistors analogy -Turn on and Turn off Methods - Methods of SCR Triggering - Dynamic & Gate Characteristics of SCR - Series and Parallel Operation - Snubber circuit - Characteristics of Power MOSFET and IGBT.

UNIT-II : SINGLE PHASE AC-DC CONVERTERS

Single Phase half wave controlled rectifiers - R and RL load with and without freewheelingdiode - Single Phase fully controlled bridge converter with R and RL load -Continuous and Discontinuous conduction - Effect of source inductance in 1-phase fullycontrolled bridge rectifier with continuous conduction – Expression for output voltages – SinglePhase semi Converter with R and RL load– Continuous and Discontinuousconduction - Harmonic Analysis - Single Phase Dual Converters

UNIT-III : THREE PHASE AC-DC CONVERTERS &AC – AC CONVERTERS

Three Phase half wave Rectifier with R and RL load -Three Phase fully controlled rectifier withR and RL load - Three Phase semi converter with R and RL load - Expression for OutputVoltage - Harmonic Analysis - Three Phase Dual Converters

AC voltage controller: Principle of phase control- integral cycle control-Single phase AC voltage controller with R and RL load

Cycloconverter: Principle of cycloconverter-Single phase Step-up &Step-down cycloconverter,

UNIT-IV : DC–DC CONVERTERS

Operation of Basic Chopper - Classification - Control Techniques - Analysis of Buck, Boost and Buck-Boost converters in Continuous Conduction Mode (CCM) and Discontinuous Conduction Modes (DCM) - Output voltage equations using volt-sec balance in CCM & DCM – Expressions for output voltage ripple and inductor current ripple.

UNIT-V : DC–AC CONVERTERS

Introduction - Classification - Single Phase half bridge and full bridge inverters with R and RL loads - Unipolar

&Bipolar Switching - Quasi-square wave pulse width modulation - Three Phase square wave inverters – 120^0 conduction and 180^0 conduction modes of operation - PWM inverters - Sinusoidal Pulse Width Modulation - Current Source Inverter (CSI)

TEXT BOOKS:

1 Power Electronics Devices, Circuits and Applications by Muhammad H.Rashid,Fourth Edition Pearson, 2017

2 Power Electronics: Essentials & Applications by L.Umanand, Wiley, Pvt. Limited, India, 2009

REFERENCE BOOKS:

1 Power Electronics– by Mandal, McGraw Hill Education (1 July 2017).

2 Power Electronics – by P.S.Bhimbra, Khanna Publishers, 2018

3 Power Electronics handbook by Muhammad H.Rashid, Elsevier

4 Power Electronics: converters, applications & design -by Nedmohan, Tore M.Undeland, Robbins by Wiley India Pvt. Ltd.

5 Power Converter Circuits -by William Shepherd, Li zhang, CRC Taylor & Francis

B. TECH VI SEMESTER	L	T	P	C
	3	-	-	3
19EE6E03 :: POWER SYSTEM PROTECTION				

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1 : Define the principle of operation of circuit breaker with arc phenomena and also different types of circuit breaker (K1)
CO2 : Identify different types of relays and circuit breakers depends on applications and electrical equipment which has to be protected [K3]
CO3 : Explain the protection schemes for different power system components.(K2)
CO4 : Identify the basic principles of digital protection.(K3)
CO5 : Explain about Generation of over voltages in power systems (K2)

SYLLABUS

UNIT-I : CIRCUIT BREAKERS

Introduction, Miniature Circuit Breaker(MCB)– Elementary principles of arc interruption– Restrike and Recovery voltages– Restrike phenomenon– Average and Max. RRRV– Current chopping and Resistance switching– Types of circuit breakers– Oil CB ,Air Blast CB, Vacuum and SF6 circuit breakers– CB and specifications– Testing of CB-Auto reclosing.

UNIT-II : PROTECTIVE RELAYS RATINGS

Principle of operation and construction of attracted armature– Balanced beam– Induction disc and induction cup relays– Instantaneous– DMT and IDMT types–Over current relays– Directional relays– Differential relays and percentage differential relays–Distance relays**:** Impedance– Reactance– Mho and offset mho relays– Characteristics of distance relays and comparison.

UNIT-III : EQUIPMENT PROTECTION

Generator Protection: Protection of generators against stator faults– Rotor faults and abnormal conditions– restricted earth fault and inter turn fault protection.

Transformer Protection: Protection of transformers**:** Percentage differential protection– Design of CT's ratio– Buchholz relay protection,

Feeder and Bus bar Protection: Protection of lines**:** Over current– Carrier current and three zone distance relay using impedance relays–Translay relay–Protection of bus bars– Differential protection.

UNIT-IV : STATIC AND DIGITAL RELAYS

Static relays**:** Static relay components– Static over current relay– Static distance relay– Micro processor based digital relays: Over current and Impedance relay, Computer aided protection

UNIT-V : PROTECTION AGAINST OVER VOLTAGE AND GROUNDING

Generation of over voltages in power systems– Protection against lightning over voltages– Valve type and zinc–Oxide lighting arresters– Insulation coordination– BIL– impulse ratio– Standard impulse test wave– volt-time characteristics– Grounded and ungrounded neutral systems–Effects of ungrounded neutral on system performance– Methods of neutral grounding**:** Solid–Resistance–Reactance–Arcing grounds and grounding Practices.

TEXT BOOKS:

1 Protection and Switch Gear by BhaveshBhalja, R.P. Maheshwari, Nilesh G. Chothani, Oxford University Press, Second Edition, 2018

2 Switch Gear and Protection, ArunIngole, Pearson Education, 2018

3 Power system protection- Static Relays with microprocessor applications. by T.S. Madhava Rao, TMH 3.

REFERENCE BOOKS:

1 Power System Protection and Switchgear by Badari Ram, D.N Viswakarma, New Age International (P) Ltd. Second Edition, 2018

2 Fundamentals of Power System Protection by Paithankar and S.R. Bhide, First Edition, PHI, 2003.

B. TECH VI SEMESTER	L	T	P	C
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19EE6E04 :: ELECTRICAL MACHINE DESIGN				

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1 : Explain the basics of design and methods of rotating machines.(K2)

CO2 : Design various parts of dc machines and solve the problems.(K6)

CO3 : Identify the design concepts of transformers and know how to design the parts.(K3)

CO4 : Illustrate the stator and rotor design aspects of Induction motors. (K2)

CO5 : Design the concepts of Synchronous machines and solve the problems related to design.(K6)

SYLLABUS

UNIT-I : FUNDAMENTAL ASPECTS OF ELECTRICAL MACHINE DESIGN

Design of machines - design factors - limitation in design - modern trends in electrical machine design – types of magnetic and insulating materials – modes of heat dissipation – cooling of rotating machines – methods of cooling.

UNIT-II : DESIGN OF DC MACHINES

Construction details – design of different windings – output equation –selection of specific magnetic and electric loadings - separation of D and L – estimation of number of conductors, armature slots and conduct dimensions – choice of number of poles and calculation of length of air gap – design of field systems, interpoles and brushes.

UNIT-III : DESIGN OF TRANSFORMERS

Transformer windings – output equation – determination of number of turns and length of mean term – design of core - choice of flux density – resistance and leakage reactance – no load current calculation – losses and efficiency – design of efficiency - cooling of transformers – calculation of number of tubes.

UNIT-IV : DESIGN OF INDUCTION MOTORS

Comparison between squirrel cage and wound rotors – choice of average flux density and ampere conduction for meter – output equation – design of stator slots and rotor slots – design of no load current – dispersion coefficient and its effects on performance of induction motor.

UNIT-V : DESIGN OF SYNCHRONOUS MACHINES

Types of construction – output equation - main dimensions – short circuit ratio and its effects on the performance – design of rotor – temperature rise and its effects.

TEXT BOOKS:

1 "Electrical Machines Design" , A. K. Sawhney, Dhanpath Rai & Co,2017.
2 **"**Computer Aided Design of Electrical Machines", K.M.V. Murthy, BS Publications, 2008.
3 "Design Of Electrical Machines ", V.N Mittle, Aravind Mittal, Standard Publishers, 2019.

REFERENCE BOOKS:

1 "Theory and Performance and Design of AC Machines", M.G.Say, Pitman, ELBS, 2018.

2 "Performance and Design of DC Machines", Clayton & Hancock, ELBS, 2018.

3 "Electrical Machines Design", V Rajani, V S Nagarajan, Pearson Publications, 2019.

B. TECH VI SEMESTER	L	T	P	C
	3	-	-	3
19EC6E22 :: ANALOG AND DIGITAL COMMUNICATION				

COURSE OUTCOMES

After completion of the course students are able to

CO1:Illustrate the communication system, need for modulation, AM & FM techniques.(K3)

CO2:Describe the various types of Pulse Modulation techniques.(K1)

CO3:Explain the Information Theory And Coding Techniques(K2,K3)

CO4:Analyze the transmission and reception of a signal in a communication system by using differenttypes of transmitters and receivers.(K4)

UNIT-1

ANALOG MODULATION TECHNIQUES:

Introduction to communication system, Need for modulation, Generation of AM waves: Square law Modulator, Switching modulator, Detection of AM Waves: Square law detector, Envelope detector, Generation of DSBSC Waves: Balanced Modulators, Ring Modulator, Coherent detection of DSB-SC Modulated waves. Generation of SSB-SC Modulated waves: Frequency and Phase discrimination methods. Coherent detection of SSB-SC Modulated waves.

UNIT-II

FREQUENCY MODULATION:

Generation of FM Waves, Indirect or Armstrong FM, Direct FM using Hartley oscillator, Detection of FM Waves: Phase discriminator, Zero crossing detector. **PULSE ANALOG MODULATION:** Type's Analog pulse modulation, PAM (Single polarity, double polarity) Generation & detection, PWM: Generation & detection, PPM: Generation & detection.

UNIT-III

PULSE DIGITAL MODULATION:

Elements of digital communication systems, Pulse Code Modulation (PCM) Generation & detection, Differential PCM systems (DPCM) Generation & detection, Delta modulation (DM) Generation & detection, Adaptive Delta modulation (ADM) Generation & detection.

DIGITAL MODULATION TECHNIQUES: Generation & detection of ASK, FSK, PSK, DPSK, QPSK, M-ary PSK, FSK, QAM, Comparison of all digital modulation techniques.

UNIT-IV

INFORMATION THEORY AND CODING:

Average information(Entropy) and its properties. Information rate, Mutual information and its properties.Channel capacity theorem. Matrix description of Linear Block codes, Error detection and correction capabilities of Linear block codes, single error correcting Hamming codes, Encoding of Convolutional codes, time domain approach, transform domain approach. Graphical approach: code tree, trellis and state diagram, and Viterbi decoding.

UNIT-V

TRANSMITTERS AND RECEIVERS:

TRANSMITTERS - Classification of Transmitters, AMTransmitters, Effect of feedback on performance of AM Transmitter, FM Transmitter – Variable reactance type and phase modulated FM Transmitter, frequency stability in FM Transmitter. **RECEIVERS** - Receiver Types - Tuned radio frequency receiver, Superhetrodyne receiver, Intermediate frequency, AGC, FM Receiver and comparison with AM Receiver, Amplitude limiting. Digital FM receivers.ISDN:- Broad band, Narrow Band ISDN.

TEXT BOOKS:

1.George Kennedy and Bernard Davis, Electronic Communication System, TMH, 2004.
2. H Taub. & D. Schilling, GautamSahe, Principles of Communication Systems,3rd Edition, TMH, 2007.
3. Simon Haykin, John Wiley, Digital communications1st Edition**,**TMH,2005.

REFERENCES:

1. Simon Haykin, John Wiley, Principles of Communication Systems -, 2nd Edition.TMH
2.K.SamShanmugam John Wiley Digital and Analog Communication Systems,1st Editon,TMH.2005.

B. TECH VI SEMESTER	L	T	P	C
	3	-	-	3
19CS6E21:: DATABASE MANAGEMENT SYSTEM				

COURSE OUTCOMES

Upon successful completion of this course, students should be able to:
CO1: Explain the basic concepts of database management system and design an Entity-Relationship (E-R) model and convert E-R model to relational model.
CO2: Construct database using Relational algebra and SQL.
CO3: Apply Normalization techniques to normalize the database.
CO4: Discuss transaction management using different concurrency control protocols and Recovery algorithms.
CO5: Illustrate different file organization and indexing methods.

UNIT-1

Introduction-Database System Applications, Purpose of Database Systems, View of Data - Data Abstraction, Instances and Schemas, Data Models, Database Languages , Database Architecture, Database Users and Administrators.

Introduction to Database Design: Database Design and ER Diagrams, Entities, Attributes and Entity sets, Relationships and Relationship sets, Additional features of ER Model, Conceptual Design with the ER Model.

Relational Model: Introduction to the Relational Model - Integrity Constraints over Relations. Enforcing Integrity constraints, querying relational data, Logical data base Design, Views.

UNIT-II

Relational Algebra: Relational Algebra - Selection and Projection, Set operations, Renaming, Joins, Division.

SQL: Form of Basic SQL Query - Examples of Basic SQL Queries, UNION, INTERSECT, and EXCEPT, Introduction to Nested Queries, Correlated Nested Queries, Set Comparison Operators, Aggregate Operators, NULL values - Comparison using Null values - Logical connectives - AND, OR and NOT - Outer Joins, Disallowing NULL values, Triggers.

UNIT-III

SCHEMA REFINEMENT AND NORMAL FORMS: Introduction to Schema Refinement - Problems Caused by redundancy, Decompositions - Problem related to decomposition, Functional Dependencies - Reasoning about FDS, Normal Forms - FIRST, SECOND, THIRD Normal forms - BCNF - Properties of Decompositions - Loss less join Decomposition, Dependency preserving Decomposition, Multi valued Dependencies - FOURTH Normal Form, Join Dependencies, FIFTH Normal form.

UNIT-IV

Transaction Management - The ACID Properties - Transactions and Schedules- Concurrent Execution of Transactions- Lock-Based Concurrency Control- 2PL, Serializability, and Recoverability- Dealing With Deadlocks - Concurrency Control without Locking.

CRASH RECOVERY: Introduction to ARIES- The Log - The Write-Ahead Log Protocol – Checkpoints - Recovering from a System Crash(ARIES) - Media Recovery.

UNIT-V

Overview of Storage and Indexing: Data on External Storage, File Organization and Indexing- Clustered Indexes, Primary and Secondary Indexes, Index data Structures - Hash Based Indexing, Tree based Indexing, Comparison of File Organizations.

Tree Structured Indexing: Intuitions for tree indexes, Indexed Sequential Access Methods (ISAM), B+ Trees: A Dynamic Index Structure, Search, Insert, Delete.

TEXT BOOKS:

1. Data base Management Systems, Raghurama Krishnan, Johannes Gehrke, McGrawHill Education, 3rd Edition, 2014.
2. Data base System Concepts, A.Silberschatz, H.F. Korth, S.Sudarshan, McGraw Hill, 6^{th} edition, 2016.

Reference Books:

1. Fundamentals of Database Systems, RamezElmasri, Shamkant B Navathe-7^{th} Edition, 2016.
2. Introduction to Database Systems, 8/e, C.J. Date, Pearson, 2012.
3. Database System Design, Implementation and Management, 5/e, Rob, Coronel, Thomson, 2012.

B. TECH VI SEMESTER	L	T	P	C
	3	-	-	3
19EE6E05 :: HIGH VOLTAGE ENGINEERING				

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1 : Demonstrate the performance of high voltages with regard to different configurations of electrode systems.(K2)

CO2 : Explain the theory of breakdown phenomena of all types of dielectric materials.(K2)

CO3 : Explain the techniques of generation of AC, DC and Impulse voltages.(K2)

CO4 : Explain the testing of Various Non–destructive materials and electrical apparatus (K2)

CO5 : Distinguish the techniques of testing various Equipment's used in HV Engineering. (K4)

SYLLABUS

UNIT-I : INTRODUCTION TO HIGH VOLTAGE TECHNOLOGY

Electric Field Stresses, Gas/Vacuum Insulator, liquid Dielectrics, Solids and Composites, Estimation and control of electric Stress-Electric Field- Uniform and non–uniform field configuration of electrodes, Numerical methods for electric field computation, Surge Voltages, Distribution & control.

UNIT-II : CONDUCTION & BREAKDOWN IN GASEOUS,LIQUID & SOLID DELECTRICS

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 liquid – Intrinsic breakdown – Electromechanical breakdown – Thermal breakdown Breakdown of solid dielectrics, composite dielectrics used in practice.

UNIT-III : GENERATION AND MEASUREMENTS OF HIGH VOLTAGES & CURRENTS

Generation of high DC voltages – Generation of high alternating voltages – Generation of impulse voltages and currents – Tripping and control of impulse generators.

Measurement of high DC Voltages, high AC and Impulse voltages, Measurement of high Currents-Direct, Alternating and Impulse and Cathode ray oscillographs for Impulse voltage and current measurement.

UNIT-IV : NON–DESTRUCTIVE TESTING OF MATERIAL

Measurement of DC resistivity – Measurement of dielectric constant and loss factor – Partial discharge measurements.

UNIT-V : HIGH VOLTAGE TESTING OF ELECTRICAL APPARATUS

Testing of insulators and bushings – Testing of isolators and circuit breakers – Testing of cables – Testing of transformers – Testing of surge arresters – Radio interference measurements.

TEXT BOOKS:

1 High Voltage Engineering,Fundamentals by E.Kuffel, W.S.Zaengl, J.Kuffel by Elsevier, 2nd Edition, 2000.

2 High Voltage Engineering and Technology by Ryan H U, IET Publishers, 2012.

REFERENCE BOOKS:

1 High Voltage Engineering by M.S.Naidu and V. Kamaraju – TMH Publications, 6th Edition, 2020.

2 Fundamentals of High voltage engineering by Ravindra Arora and Bharat Singh Rajpurohit, Wiley India Pvt.Ltd, 2019.

B. TECH VI SEMESTER	L	T	P	C
	3	-	-	3
19EE6E06 :: LINE COMMUTATED & ACTIVE RECTIFIERS				

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1 : Analyze and design of Diode rectifier circuits.(K4)

CO2 : Analyze and design of Thyristor rectifier circuits.(K4)

CO3 : Explain the operation of 3,6 and 12 multi-pulse converter.(K2)

CO4 : Analyze the power circuit of single-switch ac-dc converter.(K4)

CO5 : Explain the operation of Ac-Dc Flyback Converter.(K2)

SYLLABUS

UNIT-I : DIODE RECTIFIERS

Half-wave diode rectifier with RL and RC loads; 1-phase full-wave diode rectifier with L, C and LC filter; 3-phase diode rectifier with L, C and LC filter; continuous and discontinuous conduction, input current wave shape, effect of source inductance; commutation overlap.

UNIT-II : THYRISTOR RECTIFIERS

Single Phase half wave controlled rectifiers with RLE load - Single Phase semi Converter with RLE load.

Commutation techniques of thyristor- Load commutations and Line commutation

UNIT-III : MULTI-PULSE CONVERTER

Review of transformer phase shifting, generation of 6-phase ac voltage from 3-phase ac, 6- pulse converter and 12-pulse converters with inductive loads, steady state analysis, commutation overlap, notches during commutation.

UNIT-IV : SINGLE-PHASE AC-DC SINGLE-SWITCH BOOST CONVERTER

Review of dc-dc boost converter, power circuit of single-switch ac-dc converter, steady state analysis, unity power factor operation, closedloop control structure.

Review of 1-phase inverter and 3-phase inverter, power circuits of 1- phase and 3-phase ac-dc boost converter, steady state analysis, operation at leading, lagging and unity power factors. Rectification and regenerating modes. Phasor diagrams, closed-loop control structure.

UNIT-V : ISOLATED SINGLE-PHASE AC-DC FLYBACK CONVERTER

Dc-dc flyback converter, output voltage as a function of duty ratio and transformer turns ratio. Power circuit of ac-dc flyback converter, steady state analysis, unity power factor operation, closed loop control structure.

TEXT BOOKS:

1 Power Electronics– by Mandal, McGraw Hill Education (1 July 2017).
2 Power Electronics – by P.S.Bhimbra, Khanna Publishers, 2018
3 G. De, “Principles of Thyristorised Converters”, Oxford & IBH Publishing Co, 1988.
4 J.G. Kassakian, M. F. Schlecht and G. C. Verghese, “Principles of Power Electronics”, AddisonWesley, 1991.
5 L. Umanand, “Power Electronics: Essentials and Applications”, Wiley India, 2009.

REFERENCE BOOKS:

1 N. Mohan and T. M. Undeland, “Power Electronics: Converters, Applications and Design”, John Wiley & Sons, 2007.
2 R. W. Erickson and D. Maksimovic, “Fundamentals of Power Electronics”, Springer Science & Business Media, 2001

B. TECH VI SEMESTER	L	T	P	C
	3	0	0	3
19EC6E23 :: DIGITAL SIGNAL PROCESSING				

COURSE OUTCOMES:

Students are able to

CO1: Analyze the Discrete system in Time and Frequency domain through its respective tools

CO2: Demonstrate about Fourier series, DFT and to solve the FFT using DIT & DIF algorithms

CO3: Apply Z-transform and Discrete Fourier transform to analyze a digital system.

CO4: Design IIR and FIR digital filters and study various applications of DSP.

UNIT I
INTRODUCTION:
Introduction to Digital Signal Processing: Discrete time signals & sequences,
Classification of Discrete time systems , stability of LTI systems, Invertability, Response of LTI systems to arbitrary inputs. Solution of Linear constant coefficient difference equations.Frequency domain representation of discrete time signals and systems. Review of Z-transforms, solution of difference equations using Z-transforms, System function.

UNIT II
DISCRETE FOURIER SERIES & FOURIER TRANSFORMS:
Properties of discrete Fourier series, DFS representation of periodic sequences, Discrete Fourier transforms: Properties of DFT, linear filtering methods based on DFT, Fast Fourier transforms (FFT) - Radix-2 decimation in time and decimation in frequency FFT Algorithms, Inverse FFT.

UNIT III.
DESIGN OF IIR DIGITAL FILTERS& REALIZATIONS:
Analog filter approximations – Butter worth and Chebyshev, Design of IIR Digital filters from analog filters, Design Examples, Analog and Digital frequency transformations. Basic structures of IIR systems, Transposed forms.

UNIT IV
DESIGN OF FIR DIGITAL FILTERS & REALIZATIONS:
Characteristics of FIR Digital Filters, frequency response.Design of FIR Digital Filters using Window Techniques and Frequency Sampling technique, Comparison of IIR & FIR filters. Basic structures of FIR systems, **Lattice structures, Lattice-ladder structures**

UNIT V
DSP APPLICATIONS
General Architecture of DSP, Issues involved in DSP processor design– speed, cost, accuracy, pipelining, parallelism, quantization error, etc Overview of DSP in real world applications such as Digital crossover audio systems, Interference cancellation in ECG, Compact disc recording system, Vibration signature analysis for defective gear teeth, Implementation of Triggering for Converter, D.C.Motor Control, AC Phase Control, Proportional Control.

TEXT BOOKS:

1. Digital Signal Processing, Principles, Algorithms, and Applications: John G. Proakis, Dimitris G.Manolakis,Pearson Education / PHI, 2007.
2. Discrete Time Signal Processing – A.V.Oppenheim and R.W. Schaffer, PHI
3. Digital Signal Processors – Architecture, Programming and Applications,,B.Venkataramani, M.Bhaskar, TATA McGraw Hill, 2002
4. Digital Signal Processing – K Raja Rajeswari, I.K. International Publishing House

Reference Books:

1. Digital Signal Processing: Andreas Antoniou, TATA McGraw Hill , 2006
2. Digital Signal Processing: MH Hayes, Schaum's Outlines, TATA Mc-Graw Hill, 2007.
3. DSP Primer - C. Britton Rorabaugh, Tata McGraw Hill, 2005.
4. Fundamentals of Digital Signal Processing using Matlab – Robert J. Schilling, Sandra L. Harris,Thomson, 2007.
5. Digital Signal Processing – Alan V. Oppenheim, Ronald W. Schafer, PHI Ed., 2006
6. Digital Signal Processing – Ramesh babu, Sci Tech publications

B. TECH VI SEMESTER	L	T	P	C
	3	0	0	3
19CS6E20 :: COMPUER NETWORKS				

COURSE OUTCOMES

At the end of the course students are able to

1. Differentiatenetwork referenc**e** models such as OSI**,** TCP/IP
2. Classify variousData Link Layer protocols such as sliding window.
3. Distinguish various MAC sub Layer Protocls, such as ALOHA, CSMA, CSMA/CD
4. Differentiate variousNetworklayerprotocolsand Its Applications
5. Distinguish various Transport layer protocols and its applications
6. Illustrate various application layer protocols such as WWW and HTTP etc.

UNIT 1:

Data communication Components: Representation of data and its flow of networks, Categories of Networks, Various Connection Topologies, Protocols and Standards, OSI network model, TCP/IP Protocol suit, Transmission Media.

UNIT 2:

Data Link Layer: Error Detection and Error Correction -Fundamentals, Block coding, Hamming Distance, CRC, Flow Control and Error control protocols - Sliding Window Protocols: Stop and Wait, Go back – N ARQ, Selective Repeat ARQ, Piggybacking,

UNIT3:

Medium Access Sub Layer: Random Access, Multiple access protocols -Pure ALOHA, Slotted ALOHA, CSMA/CD, CDMA/CA.

Network Layer: Logical addressing – IPV4, IPV6; Address mapping – ARP, RARP, BOOTP and DHCP– Delivery,

UNIT 4:

Transport Layer: Process to Process Communication, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), Congestion control, Quality of Service, QoS improving techniques: Leaky Bucket and Token Bucket algorithm.

UNIT 5:

Application Layer: Domain Name Space (DNS), DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP.

Text Books:

1. Data Communication and Networking, 5th Edition, Behrouz A. Forouzan, McGrawHill, 2017
2. Computer Networks, 6th Edition, Andrew S. Tanenbaum, Pearson New International Edition, 2021.
3. Data and Computer Communication, 8th Edition, William Stallings, Pearson Prentice Hall India, 2007

Reference Books:

1. Internetworking with TCP/IP, Volume 1, 6th Edition Douglas Comer, Prentice Hall of India.
2. TCP/IP Illustrated, Volume 1, W. Richard Stevens, Addison-Wesley, United States of America.

B. TECH VI SEMESTER	L	T	P	C
		-	3	1.5
19EE6L01 :: POWER ELECTRONICS & SIMULATION LAB				

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1 : Explain the characteristics of various power electronic devices with firing circuits. (K2)

CO2 : Analyze the performance of single phase and three phase full wave converters. (K4)

CO3 : Explain the operation of AC voltage controller and Cyclo converter. (K2)

CO4 : Analyze the performance of 1-Ph bridge inverter, converter and PWM inverter. (K2)

CO5 : Explain the working of Buck, Boost converters, Triac and Diac. (K2)

LIST OF EXPERIMENTS

Part –A
(Any Seven Experiments has to be conducted)

1. Characteristics of Thyristor, MOSFET & IGBT.
2. R, RC & UJT firing circuits for SCR.
3. Single -Phase semi converter with R & RL loads.
4. Single -Phase full converter with R & RL loads.
5. Three- Phase full converter with R &RL loads.
6. Single Phase dual converter in circulating current & non circulating current mode of operation.
7. Single -Phase AC Voltage Controller with R and RL Loads
8. Single Phase step down Cyclo converter with R & RL Loads.
9. Boost converter in Continuous Conduction Mode operation.
10. Buck converter in Continuous Conduction Mode operation.

Part –B
(Any Three Experiments has to be conducted)

1. Simulation of 3 Phase AC voltage controller using MATLAB / SIMULINK.
2. Simulation of Single phase half controlled converter using R and RL load using Matlab / Simulink.
3. Simulation of Single phase fully controlled converter using R and RL load using Matlab / Simulink.
4. Simulation of Three phase fully controlled converter using R and RL load using Matlab / Simulink.
5. Simulation of Single phase AC voltage regulator using MATLAB / SIMULINK.
6. Simulation of Boost and Buck converters using MATLAB / SIMULINK.

REFERENCE BOOKS:

1. Department Manual

B. TECH VI SEMESTER	L	T	P	C
	-	-	3	1.5
19EE6L02 :: INDUSTRIAL AUTOMATION LAB USING PLC				

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1 : Demonstrate basic functions of Siemens PLC's(K2)

CO2 : Construct various ladder logic programs.(K3)

CO3 : Solve plc practical problems.(K3)

CO4 : Design various relay logic circuits to operate the motors.(K6)

CO5 : Develop, rectify errors and download the ladder programs to control the motors (K6)

LIST OF EXPERIMENTS

(Any Ten Experiments have to be Conducted)

1. To study Ladder logic programming of a industrial PLC like SEIMENS / FATEK /MICROLOGIX
2. Verify the logic gates using PLC
3. Verify the latching and blinking concepts in ladder logic diagram with suitable examples
4. Verify the timer counter concepts Using PLC with suitable examples
5. Write a ladder logic program for filling beverage in a bottle using PLC
6. Write a ladder logic program to maintain the water level with valve control using PLC
7. Write a ladder logic program for 4-way traffic signals controller in PLC environment
8. Write a program for filling three different water tanks using PLC
9. Write a ladder logic circuit for star delta starter control using PLC
10. Write a ladder logic program for six lamp sequence operation using PLC
11. Write a ladder logic program for a 3 stage air condition system in function hall using PLC
12. Write a ladder logic program for operating conveyor belt using PLC
13. Write a ladder logic program to generate pulse for controlling dc motor speed using PLC

REFERENCE BOOKS:

1. Department Manual

B. TECH VI SEMESTER	L	T	P	C
	-	-	3	1.5
19CS6L03 :: PYTHON AND APPLICATION LAB				

COURSE OUTCOMES:

CO1: Apply core programming basics and program design with functions using Python programming language.
CO2: Interpret the high-performance programs designed to strengthen the practical expertise.
CO3: Develop applications for real time problems by applying python data structure concepts.
CO4: Test and apply the concepts of packages, handling, multithreading and socket programming.
CO5: Divide the importance of object-oriented programming over structured programming.

Exercise 1 - Basics

a) Running instructions in Interactive interpreter and a Python Script
b) Write a program to purposefully raise Indentation Error and Correct it

Exercise 2 - Operations

a) Write a program to compute distance between two points taking input from the user.
b) Write a program add.py that takes 2 numbers as command line arguments and prints its sum.

Exercise - 3 Control Flow

a) Write a Program for checking whether the given number is a even number or not.
b) Using a for loop, write a program that prints out the decimal equivalents of 1/2, 1/3, 1/4, . . .1/10
c) Write a program using a for loop that loops over a sequence. What is sequence?
d) Write a program using a while loop that asks the user for a number, and prints a countdownfrom that number to zero.

Exercise 4 - Control Flow - Continued

a) Find the sum of all the primes below two million. Each new term in the Fibonacci sequence is generated by adding the previous two terms. Bystarting with 1 and 2, the first 10 terms will be:
1, 2, 3, 5, 8, 13, 21, 34, 55, 89, ...
b) By considering the terms in the Fibonacci sequence whose values do not exceed four million,find the sum of the even-valued terms.

Exercise - 5 - DS

a) Write a program to count the numbers of characters in the string and store them in adictionary data structure
b) Write a program to use split and join methods in the string and trace a birthday with adictionary data structure.

Exercise - 6 DS - Continued

a) Write a program combine lists that combines these lists into a dictionary.
b) Write a program to count frequency of characters in a given file. Can you use characterfrequency to tell whether the given file is a Python program file, C program file or a text file?

Exercise - 7 Files

a) Write a program to print each line of a file in reverse order.
b) Write a program to compute the number of characters, words and lines in a file.

Exercise - 8 Functions

a) Write a function ball collide that takes two balls as parameters and computes if they arecolliding. Your function should return a Boolean representing whether or not the balls arecolliding.

Hint: Represent a ball on a plane as a tuple of (x, y, r), r being the radius
If (distance between two balls centers) <= (sum of their radii) then (they are colliding)
b) Find mean, median, mode for the given set of numbers in a list.

Exercise - 9 Functions - Continued
a) Write a function nearly equal to test whether two strings are nearly equal. Two strings a and b are nearly equal when a can be generated by a single mutation on b.
b) Write a function dups to find all duplicates in the list.
c) Write a function unique to find all the unique elements of a list.

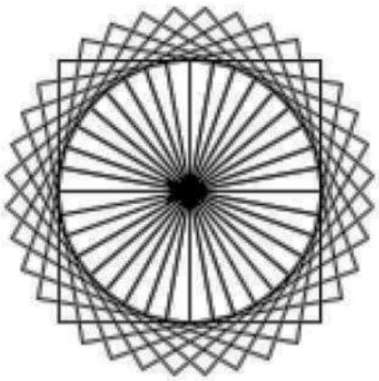
Exercise - 10 - Functions - Problem Solving
a) Write a function cumulative product to compute cumulative product of a list of numbers.
b) Write a function reverse to reverse a list. Without using the reverse function.
c) Write function to compute gcd, lcm of two numbers. Each function shouldn't exceed one line.

Exercise 11 - Multi-D Lists
a) Write a program that defines a matrix and prints
b) Write a program to perform addition of two square matrices
c) Write a program to perform multiplication of two square matrices

Exercise - 12 - Modules
a) Install packages requests, flask and explore them. using (pip)
b) Write a script that imports requests and fetch content from the page.
c) Write a simple script that serves a simple HTTP Response and a simple HTML Page

Exercise - 13 OOP
a) Class variables and instance variable and illustration of the self-variable
i) Robot ii) ATM Machine

Exercise - 14GUI, Graphics
a) Write a GUI for an Expression Calculator using tk
b) Write a program to implement the following figures using turtle.



VI SEMESTER	L	T	P	C
	-	-	2	1.0
19HS6L03: ADVANCED ENGLISH COMMUNICATION SKILLS				

At the end of the course students will be able to prepare themselves for their career which may require them to listen and speak in English both for their professional and interpersonal communication in the globalized context.

Course objectives

- Analyzing a topic of discussion and relating to it.
- Planning and executing an assignment creatively.
- Presenting ideas coherently within a stipulated time.
- Communicating ideas effectively in prescribed oral activities.
- Applying relevant writing formats for resume and presentations.
- Facing interviews with confidence.

Course outcomes

At the end of the course students will be able to

- Gather ideas and organize information relevantly and coherently
- Participate in group discussions and face interviews with confidence
- Write Resume with covering letter
- Make oral presentations and public speaking
- Take part in social and professional communication.

SYLLABUS

The following course content is prescribed for the **Advanced English Communication Skills Lab:**

UNIT I

Communication Skills

- Introduce Yourself
- JAM
- J2M

➢ Identifying one's career objective, projecting strengths and skills, organization of ideas within given time.

UNIT II

Interaction Skills

- Body Language
- Role- Plays

➢ Students start a conversation - Respond appropriately and relevantly in different situations with right body language.

UNIT III

Oral Skills

- Presentations
- Public Speaking

➢ Planning preparation and presentation - organization of ideas with clarity , coherence and style.

UNIT IV

Writing Skills

- Covering Letter
- Resume Writing

- To communicate the ideas relevantly and coherently in writing.

UNIT V

Team Work Skills

- Group Discussion

- Dynamics of Group Discussion - Modulation of voice, Body language , relevance , fluency and coherence.

UNIT VI

Interview Skills

- Pre-interview planning, opening strategies, answering strategies, interview through tele and video conference.

Reference Books:

1. Ashraf Rizvi- Effective Technical Communication - McGraw Hill Education- 2017.
2. MadhaviApte - A Course in English Communication – Prentice - Hall of India- 2007.
3. Dr. ShaliniVerma - Body Language – Your Success Mantra- S. Chand- 2006.
4. Sunita Mishra &C.Murali Krishna- Communication Skills for Engineers - Pearson Education - 2007.

VI SEMESTER	L	T	P	C
	2	-	-	-
19BM0M01: PROFESSIONAL ETHICS AND INTELLECTUAL PROPERTY RIGHTS				

COURSE OUTCOMES:

Students are able to

CO1. Identify the professional roles played by an engineer and illustrate the process of Social experimentation

CO2.Determine Engineer's responsibilities and rights towards the society

CO3.Analyze various aspects of Intellectual Property Rights and recognize the process of protecting the copyrights

CO4.Describe the registration process of Patents and trademarks and also demonstrate the concept of trade secrets and cybercrimes

UNIT-I

ENGINEERING ETHICS:

Importance of Engineering Ethics-–Professional and Professionalism –Professional Roles to be played by an Engineer –Professional Ethics.

UNIT-II

ENGINEERING AS SOCIAL EXPERIMENTATION :

Role of engineering in knowledge society- Knowledge acquired – Conscientiousness – Relevant Information –Engineers as Managers, Consultants, and Leaders.

ENGINEERS' RESPONSIBILITY FOR SAFETY AND RISK: Role and importance of Safety and risk-Types of Risks –Threshold Levels for Risk– RiskBenefit Analysis.

UNIT-III

ENGINEERS' RESPONSIBILITIES AND RIGHTS:

Collegiality-Conflict of Interest-solving conflict problems – Ethical egoism-Collective bargaining - Confidentiality-Acceptance of Bribes/Gifts--Occupational Crimes-industrial espionage-Whistle Blowing-types of whistle blowing.

UNIT IV

INTELLECTUAL PROPERTY AND COPY RIGHTS:

Introduction to Intellectual Property Law - Types ofIntellectual Property – Infringement,Copyrights**:**Introduction to Copyrights – Principles of Copyright – Rights Afforded byCopyright Law –Copyright Formalities and Registration.

UNIT-V

PATENTS AND TRADEMARKS:

Introduction to Patent Law –Rights under Patent Law – Patent Requirements – Patent Application Process and Granting of Patent – Double Patenting – Patent Cooperation Treaty**.** Trademarks:Introduction to Trade Mark – Trade Mark Registration Process – Trade Markmaintenance – Likelihood of confusion

TEXT BOOKS:

1. M.Govindarajan, S.Natarajan and V.S.SenthilKumar- "Engineering Ethics and Human Values" by PHI Learning Pvt. Ltd-2009.
2. Deborah E.Bouchoux, "Intellectual Property". Cengagelearning , NewDelhi, BS Publications (Press)
3. PrabhuddhaGanguli,' Intellectual Property Rights" Tata Mc-Graw – Hill, New Delhi
4.

B. TECH 7TH SEMESTER	L	T	P	C
	3	1	-	4
19EE7T01 :: POWER SYSTEMS OPERATION AND CONTROL				

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1 : Explan the Economic Operation of power system(K2)
CO2 : Explain the hydrothermal Scheduling and Unit commitment Problems(K2)
CO3 : Analyze the power system and to control the power and frequency in power system(K4)
CO4 : Interpret impact of load frequency control and Plan for optimum load dispatch.(K2)
CO5 : Analyze different compensation technique for power system stability(K4)

SYLLABUS

UNIT-I : ECONOMIC OPERATION OF POWER SYSTEMS

Optimal Operation Of Generators In Thermal Power Stations, – Heat Rate Curve – Cost Curve – 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 & UNIT COMMITMENT

Optimal scheduling of Hydrothermal System**:** Mathematical Formulation of short Term Hydro-Thermal Scheduling Problem – Solution Technique, Unit Commitment Problem – Need for unit commitment – Constraints in unit commitment – Cost function formulation – Unit Commitment Solution methods – Priority List Methods – Dynamic programming.

UNIT-III : LOAD FREQUENCY CONTROL-I

Modeling of steam turbine – Generator Load Model – Mathematical modeling of speed governing system – Transfer function – Necessity of keeping frequency constant – Definitions of Control area – Single area control system – Block diagram representation of an isolated power system – Steady state analysis – Dynamic response for Uncontrolled case, Proportional plus Integral control of single area and its block diagram representation – Steady state response.

UNIT-IV : LOAD FREQUENCY CONTROL-II

Block diagram development of Load Frequency Control of two area system uncontrolled case and controlled case, Tie-line bias control, Load Frequency Control and Economic dispatch control.

UNIT-V : COMPENSATION IN POWER SYSTEMS

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 – compensated transmission lines.

TEXT BOOKS:

1 Power System Operation And Control., Dorling Kindersley, S. Sivanagaraju,2015

2 Electrical Power Systems, New Age International (P) Limited, C. L. Wadhwa,2009

3 Power System Analysis: Operation And Control 3Rd Ed. Abhijit Chakrabarti, Sunita Halder, PHI Learning, 30 January 2010

REFERENCE BOOKS:

1 Power System Engineering, Kothari & Nagrath, Mc Graw Hill,2008

2 Power System Analysis, Granger and Stevension, Mc Graw Hill,2017 ,

3 Electric Power Genration operation and control, Wood and Woolenberg, Willey. 3rd Edition,2013

4 Power system stability and Control, P. Kundur , Mc Graw Hill,2006.

B. TECH 7TH SEMESTER	L	T	P	C
	3	-	-	3
19EC7T03 :: MICROPROCESSORS AND MICRO CONTROLLERS				

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1 : Explain architecture, instructions and addressing modes of 8086Microprocessor(K2)

CO2 : Develop Assembly programs for various industrial requirements. (K3)

CO3 : Analyze 8086 interfacing with different peripherals and implement programs.(K4)

CO4 : Design a minimum workable system with 8051Microcontroller. (K3)

SYLLABUS

UNIT-I : 8086 MICROPROCESSOR

Introduction to Microprocessors: Little Endian and Big Endian Formats, Von-Neumann and Harvard architectures, RISC Vs CISC processors, Family of Intel processors. 8086 Microprocessor: Register organization, Architecture and Signal description, Physical memory organization, General bus operation, I/O addressing capability, Special purpose activities.

UNIT-II : 8086 PROGRAMMING

Minimum mode and maximum mode configuration, Timing diagrams, program development steps, Addressing modes of 8086, Instruction set of 8086, Assembler directives, writing simple programs with an assembler, Procedures and Macros.

UNIT-III : BASIC PERIPHERALS AND INTERFACING WITH 8086

Semiconductor memory interfacing, Programmable PeripheralInterface-8255,modes of operation of 8255, Interfacing to D/A and A/D converters, Stepper motor interfacing, Control of high power devices using 8255.

UNIT-IV : SPECIAL PURPOSE PROGRAMMABLE INTERFACING DEVICES

Interrupts and interrupt service routines, Interrupt cycle of 8086, non-maskable interrupt, maskable interrupts, interrupt programming, Programmable interrupt controller 8259A, programmable communication interface 8251, USART, DMA Controller 8257.

UNIT-V : 8051 MICROCONTROLLER

Introduction to microcontrollers, 8051 microcontroller, 8051 pin description, connections, I/O ports, Memory organization, Instruction set, Interrupts, Timers, Serial port, Programming with Embedded C.

TEXT BOOKS:

1 A .K .Ray, K.M.Bhurchandi, "Advanced Microprocessors and Peripherals" 3 rd Edition, Tata McGraw Hill Publishers, 2012.

2 Kenneth Ayala, "8051 Microcontroller", 3 rd Edition, Cengage Learning Publishers, 2007.

REFERENCE BOOKS:

1 Barry B. Brey, "The Intel Microprocessors 8086/8088, 80186/80188, 80286, 80386, 80486, and Pentium processors. Architecture, programming and interfacing", 8th Edition, Pearson Publication, 2012.

2 Doughlas V.Hall, "Microprocessors and Interfacing, Programming and Hardware", 2nd Edition, TMH,2012.

3 Ajay V Deshmukh, "Microcontrollers", 3 rd Edition, TATA McGraw Hill publications, 2012

E-REFERENCES:

1. Microprocessors and Microcontrollers https://www.tutorialspoint.com/microprocessor/index.htm

2. Microprocessors and Microcontrollers, NPTELhttps://nptel.ac.in/courses/108/105/108105102/

B. Tech 7th SEMESTER	L	T	P	C
	3	-	-	3
19EE7E07 :: ELECTRICAL DISTRIBUTION SYSTEM				

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1 : Relate the various concepts of distribution system.(K1)

CO2 : Explain the design of substations and feeders. (K2)

CO3 : Determine the voltage drop and power loss in distribution systems. (K5)

CO4 : Explain the protection and its coordination in distribution system. (K2)

CO5 : Explain the effect of compensation on power factor improvement & voltage control in distribution systems. (K2)

SYLLABUS

UNIT-I : DISTRIBUTION SYSTEMS

Classification of Distribution systems, design features of distribution systems, radial distribution, ring main distribution , voltage drop calculations for various cases : radial DC distributor fed at one end and at both ends (equal and unequal voltages), ring main distributor, stepped distributor and AC Distribution , Comparison of AC and DC Distribution systems.

UNIT-II : SUBSTATIONS & DISTRIBUTION FEEDERS

Location of substations: Rating of distribution substation – Service area with"n" primary feeders – Benefits derived through optimal location of substations.

Design Considerations of distribution feeders: Radial and loop types of primary feeders – Voltage levels – Feeder loading – Basic design practice of the secondary distribution system.

UNIT-III : SYSTEM ANALYSIS

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.

UNIT-IV : PROTECTION AND COORDINATION

Objectives of distribution system protection – Types of common faults and procedure for fault calculations – Protective devices: Principle of operation of fuses – Circuit reclosures – Line sectionalizes and circuit breakers.

Coordination of protective devices: General coordination procedure – Residual current circuit breaker RCCB.

UNIT-V : POWER FACTOR IMPROVEMENT AND VOLTAGE CONTROL

Capacitive compensation for power–factor control – Different types of power capacitors – shunt and series capacitors – Effect of shunt capacitors (Fixed and switched) – Power factor correction – Capacitor allocation – Economic justification – Procedure to determine the best capacitor location.

Equipment for voltage control – Effect of series capacitors – Effect of AVB/AVR –Line drop compensation.

TEXT BOOKS:

1 Electric Power Distribution system, Engineering" – by Turan Gonen, CRC Press, 4th edition, 2018.

2 Electric Power Distribution system by A.S Pabla, 7th Edition, Tata Mc Graw-Hill Publishing company, 2019.
3 Electrical Power Distribution Systems by V.Kamaraju , Tata Mc Graw- Hill Publishing company, 2017.

REFERENCE BOOKS:

1 Electrical Distribution Systems by Dale R.Patrick and Stephen W.Fardo, CRC press, 2nd edition, Published by River Publishers 2021.
2 Electrical Distribution Systems by D.Gireesh Kumar & Dr S Saravanan, Notion press, 1st edition, 2020.
3 Smart power distribution systems by Qiang Yang, Ting Yang, Wie Li,1st edition , Imprint academic press, 2018.

B. TECH 7TH SEMESTER	L	T	P	C
	3	-	-	3
19EE7E08 :: CONTROL OF ELECTRIC DRIVES				

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1 : Explain the single phase rectifier fed DC drives and its operation (K2)
CO2 : Illustrate the Speed-Torque characteristics of different motor drives by various power converter topologies(K2)
CO3 : Classify the different quadrant operations of motors by using choppers (K4)
CO4 : Explain control schemes of various drives fed to induction motor(K2)
CO5 : explain speed control mechanism of synchronous motors(K5)

SYLLABUS

UNIT-I : SINGLE PHASE RECTIFIER FED DC DRIVES

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 and Torque expressions – Speed – Torque Characteristics.

UNIT-II : THREE PHASE RECTIFIER FED DC DRIVES

Three phase semi and fully controlled converters connected to d.c separately excited and d.c series motors – output voltage and current waveforms – Speed and Torque expressions – Speed – Torque Characteristics-Four quadrant operation using dual converters

UNIT-III : CONTROL OF DC MOTORS BY CHOPPERS

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

UNIT-IV : CONTROL OF INDUCTION MOTOR

Variable voltage characteristics-Control of Induction Motor by Ac Voltage Controllers – Waveforms – speed torque characteristics- Variable frequency control of induction motor by Voltage source and current source inverter and cyclo converters- PWM control -Closed loop operation of induction motor drives (Block Diagram Only)- Static Scherbius drive – Static Kramer Drive

UNIT-V : CONTROL OF SYNCHRONOUS MOTOR

Separate control and self-control of synchronous motors – Operation of self-controlled synchronous motors by VSI- – Closed Loop control operation of synchronous motor drives (Block Diagram Only),pulse width modulation

TEXT BOOKS:

1 Electric D rives by D.P.Kothari,Rakesh Singh Lodhi,Wiley,Dream tech press-2020.
2 Electric Motor Drives by V.Rajini,V.S.Nagarajan,Pearson Education-2019
3 Power semi conductor drives by S.B Dewan, G.R.Slemon,A.Straughen,Wiley-India Edition,1985.
4 Fundamentals of electric drives-by G.K Dubey ,Narosa publications,1995.

REFERENCE BOOKS:

1 Thyristor Control of Electric drives by Vedam Subramanyam, Tata McGraw Hill Publications,1987

2 Power electronic circuits, devices and applications by M.H.Rashid,PHI. 4th Edition 2018

3 Power electronics handbook by Muhammad H.Rashid,Elsevier,4th Edition 2018

B. TECH 7TH SEMESTER	L	T	P	C
	3	-	-	3
19EC7E24 :: VLSI DESIGN				

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1 : Explain the operation of MOSFET and the fabrication of various MOSFETS
CO2 : Understand the basic electrical properties of MOS circuits
CO3 : Analyze the CMOS circuit design processes and scaling of MOS circuits
CO4 : Design the logic circuits using VHDL, test and understand the Implementation strategies.

SYLLABUS

UNIT-I : INTRODUCTION TO MOS TRANSISTORS AND ITS FABICATION:

IC Technology and its Era. Types of MOSFET - Enhancement and Depletion modes Construction and operation of MOSFET, Fabrication of NMOS, PMOS, CMOS-N well-P well and Bi-CMOS fabrication processes, Introduction to Gallium Arsenide (GaAs) Devices and FinFET.

UNIT-II : BASIC ELECTRICAL PROPERTIES OF MOS CIRCUITS AND SCALING :

Ids-Vds relationships-non saturated region-saturated region, Aspects of MOS transistor Threshold Voltage, Trans-conductance, Output Conductance and Figure of Merit, The pass transistor and NMOS Inverter. Determination of pull-up to pull-down Ratio of NMOS Inverter driven by another NMOS inverter and driven through one or more pass transistors, Latch-up in CMOS circuits. Scaling- Scaling factors for different Device Parameters-Limitations of scaling.

UNIT-III : MOS CIRCUIT DESIGN PROCESSES:

CMOS circuit diagram- Stick Diagram and Layout diagram, Design Rules for layout diagram-Lambda based design rules and micron based design rules, Sheet Resistance, and its concept applied to MOS transistors and Inverters, Area Capacitance of Layers, Standard unit of capacitance, and some examples of its calculations.

UNIT-IV : IMPLEMENTATION STRATEGIES AND TESTING:

ASIC Design using Full custom and Semi custom design, Standard cell design and cell libraries, FPGA building block architectures, FPGA interconnect routing procedures, CPLD. Design for Testability (DFT)-Boundary Scan Test (BST)-Built In Self Test (BIST).

UNIT-V : DIGITAL DESIGN USING HDL:

Introduction to HDL and History of VHDL, VHDL requirements,Various design styles of VHDL- Data flow modelling- Behavioural modelling-Structural modelling, VHDL program to design the circuits using all the three modelling- half adder, full adder, multiplexer, demultiplexer, decoder, encoder, Universal Shift Register and counter .

TEXT BOOKS:

1 Kamran Eshraghian, Eshraghian Dougles and A.Pucknell, and Sholeh Eshraghian, “Essentials of VLSI Circuits and Systems”, 1 st Edition, PHI, 2005.

2 J.Bhaskar, “VHDL Primer”,3rd Edition, Prentice Hall Of India Publications, 2015.

REFERENCE BOOKS:

1 A.Albert Raj & T.Latha, “VLSI Design”, PHI Learing Private Limited, 2015.

2 K.Lal Kishore and V.S.V.Prabhakar, “VLSI Designing”, First Edition, I.K.International Publishing House Private Limited, 2017.

3 Dr.K.V.K.K.Prasad, Kattula Shyamala , “VLSI Design – Black Book”, 2017 Edition, Kogent Learning Solutions Inc. E-REFERENCES

E-REFERENCES:

1. VLSI Design Tutorial, https://www.tutorialspoint.com/vlsi_design/index.htm
2. NPTEL,VLSI Design, https://nptel.ac.in/courses/117/101/117101058/#

B. TECH 7TH SEMESTER	L	T	P	C
	3	-	-	3
19CS7E26 :: PRINCIPLES OF SOFTWARE ENGINEERING				

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1 : Identify, formulate and solve software engineering problems

CO2 : Elicit, analyze and specify software requirements with various stakeholders of a software development project and different software development process models.

CO3 : Apply systematic procedure for software design and deployment.

CO4 : Compare and contrast the various testing methods

CO5 : Identify the key activities in managing a software project.

SYLLABUS

UNIT-I : INTRODUCTION AND SOFTWARE PROCESS:

Evolving Role of Software, Software Characteristics, Changing Nature of Software, Software Myths, Software Engineering- A layered Technology, a Process Framework, Capability Maturity Model Integration(CMMI), Process Assessment, Process Models – Waterfall Model, Incremental Process Models, Evolutionary Process Models, The Unifies Process.

UNIT-II : REQUIREMENTS ANALYSIS AND SPECIFICATION:

Software Requirements: Functional and Non-Functional, User requirements, System requirements, Software Requirements Document – Requirement Engineering Process: Feasibility Studies, Requirements elicitation and analysis, requirements validation, requirements management-Classical analysis: Structured system Analysis, Petri Nets- Data Dictionary

UNIT-III : SOFTWARE DESIGN:

Design process – Design Concepts-Design Model– Design Heuristic – Architectural Design – Architectural styles, Architectural Design, Architectural Mapping using Data Flow- User Interface Design: Interface analysis, Interface Design –Component level Design: Designing Class based components, traditional Components.

UNIT-IV : TESTING AND IMPLEMENTATION:

Software testing fundamentals-Internal and external views of Testing-white box testing- basis path testing-control structure testing-black box testing- Regression Testing – Unit Testing – Integration Testing – Validation Testing – System Testing And Debugging – Software Implementation Techniques: Coding practices-Refactoring.

UNIT-V : PROJECT MANAGEMENT:

Estimation – FP Based, LOC Based, Make/Buy Decision, COCOMO II – Planning – Project Plan, Planning Process, RFP Risk Management – Identification, Projection, RMMM – Scheduling and Tracking –Relationship between people and effort, Task Set & Network, Scheduling, EVA – Process and Project Metrics.

TEXT BOOKS:

1 Software Engineering, A practitioner's Approach- Roger S. pressman, 8th edition, McGraw-Hill lnternational Edition, 2014.

2 Software Engineering, Ian Sommerville, 10th Edition, Pearson Education Asia, 2016.

REFERENCE BOOKS:

1 Software Engineering, PankajJalote, A Precise Approach", Wiley India, 2010.

2 Systems Analysis and Design- Shely Cash man Rosenblatt, 9th Edition,Thomson publications, 2016.

3 Software Project Management, Bob Hughes, Mike Cotterell and Rajib Mall, Fifth Edition, Tata McGraw Hill, New Delhi, 2012

4 https://nptel.ac.in/courses/106101061/

B. TECH 7TH SEMESTER	L	T	P	C
		-	3	1.5
19EE7L01 :: POWER SYSTEM SIMULATION LAB				

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1 : Determine the Parameters of Transmission lines(K5)

CO2 : Analyze the power flow using GS and NR method. (K4)

CO3 : Analyze faults and Transient stability analysis in power system (K4)

CO4 : Estimate the Frequency of single and Two area Power systems (K5)

CO5 : Evaluate the Economic Dispatch with & without losses (K5)

LIS OF EXPERIMENTS

1. Compute the Parameters of the Transmission Lines
2. Formation of Y_{bus} using Direct Inspection method
3. Formation of Z Bus using Z-Bus Building Algorithm.
4. Load flow solution of a power system network using Gauss-Seidel method
5. Load flow solution of a power system network using Newton Raphson method.
6. Load Frequency Control of Single Area with & without control.
7. Load Frequency Control of Two Areas with & without control.
8. Economic load dispatch without losses
9. Economic load dispatch with losses
10. Transient Stability analysis of single machine connected to an infinite bus (SMIB).
11. Determination of Fault Analyses for different faulty Conditions.
12. Modeling of transformer and simulation of lossy transmission line.

REFERENCE BOOKS:

1. Department Manual

B. TECH 7TH SEMESTER	L	T	P	C
		-	3	1.5
19EC7L03 :: MICRO PROCESSORS AND CONTROLLERS LAB				

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1 : Write assembly language programs for various problems. (K1)

CO2 : Design minimum workable system using Microcontroller 8051.(K6)

CO3 : Interface different external devices like keyboard, DAC, ADC, Stepper motor.(K2)

CO4 : Develop the Embedded C programs for simple applications.(K3)

LIS OF EXPERIMENTS

PART-I: MICROPROCESSOR-8086 PROGRAMMING

1. Verify Arithmetic Operations for Multi byte Addition and Subtraction using ALP.
2. Execute ALP for Multiplication and Division for signed and unsigned Arithmetic operations.
3. Develop assembly programs for different ASCII Arithmetic operation.
4. Explain how Logical operations are performed in Microprocessors with the help of TASM Software.
5. Conversion between BCD and ASCII numbers.
6. Develop different programs for checking all String operations.
7. Apply DOS/BIOS to access various system resources for Reading data from keyboard.
8. Execute Sum of squares/cubes of a given n-numbers.
9. Factorial of given numbers.
10. Perform sorting and searching operations.

PART-II: INTERFACING WITH 8086

JJJ.Design an Interfacing circuit for DAC with 8086 µP to generate various waveforms using 8255.

KKK. Write a control word format for 8255 to interface stepper motor with 8086 µP using 8255.

LLL. Keyboard and Display Interface through Intel 8279. MMM.A/D Interface through Intel 8255

PART-III: INTERFACING WITH 8051 MICROCONTROLLER

1. Write an Embedded C program to interface switches and LEDs/Seven Segment display.
2. Demonstrate different modes of Timers in 8051 µC.
3. Verify how Serial Communication Implemented in 8051 µC.
4. Write an ALP to find addition of even numbers from a given array using 8051.
5. Find average of n-numbers using 8051.
6. Design a Traffic Light Controller.

EQUIPMENT REQUIRED FOR LABORATORY

1. MASM/TASM software
2. 8086 Microprocessor Kits
3. D/A Interface
4. A/D Interface
5. Stepper motor
6. 8051 Micro Controller kits
7. Keil Software

B. TECH 7TH SEMESTER	L	T	P	C
		-	6	3
19EE7P01:: MINI PROJECT				

B. TECH 7TH SEMESTER	L	T	P	C
		-	-	1
19EE7I01 :: INTENSHIPS				

B. TECH 8TH SEMESTER	L	T	P	C
	3	-	-	3
19EE8E09 ::RENEWABLE ENERGY SYSTEMS				

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1 : Illustrate the energy scenario and the consequent growths of power generated by wind.(K2)
CO2 : Demonstrate the basic physics of wind power generation. (K2)
CO3 : Analyze solar radiation data, extraterrestrial radiation, radiation on earth's surface and solar thermal systems. (K4)
CO4 : Explain the photovoltaic developing technologies and correlate the power electronic interfaces for wind and solar generation. (K2)
CO5 : Demonstrate the various solar energy storage systems, and applications in various sectors . (K2)

SYLLABUS

UNIT-I : WIND POWER

History of wind power, Indian and Global statistics, Wind physics, Betz limit ratio, stall and pitch control, Wind speed statistics-probability distributions.

UNIT-II : WIND GENERATOR TOPOLOGIES

Review of modern wind turbine technologies, Fixed and Variable speed wind turbine, Induction Generators, Doubly-Fed Induction Generators and their characteristics, Permanent Magnet Synchronous Generators, Power electronics converters. Generator configurations, Converter Control.

UNIT-III : THE SOLAR RESOURCE

Energy conservation principle, Energy scenario (world and India), Solar radiation: Outside earth's atmosphere, Earth surface, Analysis of solar radiation data, Geometry, Radiation on tilted surfaces, Numerical problems.

SOLAR THERMAL SYSTEMS: Liquid flat plate collections: Performance analysis, Introduction to solar air heaters, Concentrating collectors, solar pond, Numerical problems.

UNIT-IV : SOLAR PHOTOVOLTAIC

Solar Photovoltaic cell, Module, Array, Construction, Efficiency of solar cells, Developing technologies, Cell I-V characteristics, Applications and systems, power electronic converter for solar systems, Maximum power point tracking.

UNIT-V : SOLAR ENERGY STORAGE AND APPLICATIONS

Introduction, Solar energy storage systems, Solar Pond. Applications: Introduction, Solar water heating, Space-heating, Space cooling, Solar Thermal Electric Conversion, Solar Electric Power Generation, Agriculture and Industrial Process heat, Solar Distillation, Solar Furnace, Solar Cooking.

TEXT BOOKS:

1. Non conventional sources of Energy by B H Khan, Tata McGraw-Hill education Private Limited, 3rd Edition, 2017.
2. Non conventional sources of Energy by G.D.Rai, Kanna Publications 2017.

3. T. Ackermann, “Wind Power in Power Systems”, John Wiley and Sons Ltd., 2005.
4. G. M. Masters, “Renewable and Efficient Electric Power Systems”, John Wiley and Sons, 2004.

REFERENCE BOOKS:

1 S. P. Sukhatme, “Solar Energy: Principles of Thermal Collection and Storage”, McGraw Hill, 4th Edition, 2017.
2. Solar Photovoltaic Technology and Systems: A Manual for Technicians, Trainers and Engineers by Chetan singh Solanki, PHI Learning Private Limted, 2013
3. H. Siegfried and R. Waddington, “Grid integration of wind energy conversion systems” John Wiley and Sons Ltd., 2006.
4. G. N. Tiwari and M. K. Ghosal, “Renewable Energy Applications”, Narosa Publications, 2004.

B. TECH 8TH SEMESTER	L	T	P	C
	3	-	-	3
19EE8E10 :: ADVANCED CONTROL SYSTEM FOR ELECTRIC DRIVES				

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1 : Analyze the operation of power electronic converters and their control strategies(K4)
CO2 : Explain the vector control strategies for ac motor drives(K2)
CO3 : Illustrate the speed control mechanism of synchronous motor(K2)
CO4 : Explain the speed control mechanism of permanent magnet motor drives(K2)
CO5 : Illustrate the speed control mechanism of switched reluctance motor drives(K2)

SYLLABUS

UNIT-I : POWER CONVERTERS FOR AC DRIVES

PWM control of inverter, selected harmonic elimination, space vector modulation, current control of VSI, three level inverter, Different topologies, SVM for 3 level inverter, Diode rectifier with boost chopper, PWM converter as line side rectifier, current fed inverters with self-commutated devices. Control of CSI, H bridge as a 4-Q drive.

UNIT-II : INDUCTION MOTOR DRIVES

Different transformations and reference frame theory, modeling of induction machines, voltage fed inverter control-v/f control, vector control, direct torque and flux control(DTC).

UNIT-III : SYNCHRONOUS MOTOR DRIVES

Modeling of synchronous machines, open loop v/f control, vector control, direct torque control, CSI fed synchronous motor drives.

UNIT-IV : PERMANENT MAGNET MOTOR DRIVES

Introduction to various PM motors, BLDC and PMSM drive configuration, comparison, block diagrams, Speed and torque control in BLDC and PMSM.

UNIT-V : SWITCHED RELUCTANCE MOTOR DRIVES

Evolution of switched reluctance motors, various topologies for SRM drives, comparison and Closed loop speed and torque control of SRM.

TEXT BOOKS:

1. "Advanced Electric Drive Vehicles" , AliEmadi,CRC press,2017.
2. "Modern Power Electronics and AC Drives", B. K. Bose, Pearson Education, Asia, 2003.
3. "Analysis of Electric Machinery and Drive Systems", P.C. Krause, O. Wasynczuk and S.D. Sudhoff, John Wiley & Sons, 2013.
4. "DSP based Electromechanical Motion Control", H. A. Taliyat and S. G. Campbell CRC press, 2003.
5. "Permanent Magnet Synchronous and Brushless DC motor Drives", R. Krishnan, CRC Press, 2009.

REFERENCE BOOKS:

1. "Advanced Control Systems for Electric Drives",Adel Merabet,Mpdi AG,2020.
2. "DSP based Electromechanical Motion Control", H. A. Taliyat and S. G. Campbell CRC press, 2003.
3. "Permanent Magnet Synchronous and Brushless DC motor Drives", R. Krishnan, CRC Press, 2009.

B. TECH 8TH SEMESTER	L	T	P	C
	3	-	-	3
19EC8E25: EMBEDDED SYSTEMS				

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1 : Acquire a basic knowledge about fundamentals of Embedded Systems
CO2 : Acquire a basic knowledge about various components used in Embedded systems
CO3 : Understand about the PIC, AVR controllers and Processors
CO4 : Perform the design case study of Embedded Systems

SYLLABUS

UNIT-I :

Introduction to Embedded Systems Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification, Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems.

UNIT-II :

Typical Embedded System: Core of the Embedded System: General Purpose and Domain Specific Processors, ASICs, PLDs, Commercial Off-The-Shelf Components (COTS), Memory: ROM, RAM, Memory according to the type of Interface, Memory Shadowing, Memory selection for Embedded Systems, Sensors and Actuators, Communication Interface: Onboard and External Communication Interfaces

UNIT-III :

Embedded Firmware: Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time Clock, Watchdog Timer, Embedded Firmware Design Approaches and Development Languages.

UNIT-IV :

Overview of PIC, AVR controllers and ARM processors: Introduction to PIC family of Microcontroller. Introduction to AVR family of Microcontroller. Introduction to ARM family Processors

UNIT-V :

Design Case studies: Digital clock, Battery operated smartcard reader, Automated meter reading system, Digital camera

TEXT BOOKS:

1. Shibu K.V, "Introduction to Embedded Systems", McGraw Hill, 2014 **(Unit I-V)**

REFERENCE BOOKS:

1. Raj Kamal, “Embedded Systems”, TMH.2003
2. David E Simon, “An Embedded Software Primer”, Pearson Education, 2015

E-REFERENCES:.

1. Embedded Systems
https://archive.org/details/K.ShibuIntroductionToEmbeddedSystemsTmh2009/page/n5/mode/2up?view=theater

B. TECH 8TH SEMESTER	L	T	P	C
	3	-	-	3
19CS8E28: ARTIFICIAL INTELLIGENCE				

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1 : Build intelligent agents for search and games
CO2 : Solve AI problems through programming with Python
CO3 : Learning optimization and inference algorithms for model learning
CO4 : Design and develop programs for an agent to learn and act in a structured environment.

SYLLABUS

UNIT-I : INTRODUCTION:

Concept of AI, history, current status, scope, agents, environments, Problem Formulations, Review of tree and graph structures, State space representation, Search graph and
Search tree.

UNIT-II : SEARCH ALGORITHMS:

Random search, Search with closed and open list, Depth first and Breadth first search, Heuristic search, Best first search, A* algorithm, Game Search.

UNIT-III : PROBABILISTIC REASONING:

Probability, conditional probability, Bayes Rule, Bayesian Networks-representation, construction and inference, temporal model, hidden Markov model.

UNIT-IV : MARKOV DECISION PROCESS:

MDP formulation, utility theory, utility functions, value iteration,policy iteration and partially observable MDPs.

UNIT-V : REINFORCEMENT LEARNING:

Passive reinforcement learning, direct utility estimation, adaptive dynamic programming, temporal difference learning, active reinforcement learning- Q learning.

TEXT BOOKS:

1. Stuart Russell and Peter Norvig, “Artificial Intelligence: A Modern Approach”, 3 rd Edition,Prentice Hall
2 Elaine Rich and Kevin Knight, “Artificial Intelligence”, Tata McGraw Hill
3 Trivedi, M.C., “A Classical Approach to Artifical Intelligence”, Khanna Publishing House,Delhi.
4 Saroj Kaushik, “Artificial Intelligence”, Cengage Learning India, 2011

B. TECH 8TH SEMESTER	L	T	P	C
	3	0	0	3

19EE8E11::FLEXIBLE ALTERNATING CURRENT TRANSMISSION SYSTEMS

After successful completion of this course, students should be able to:

CO1 : Demonstrate power flow control in transmission lines using FACTS controllers. (K2)
CO2 : Illustrate operation and control of Voltage Source and Current Source converters. (K2)
CO3 : Explain the method of shunt compensation using Static VAR compensators. (K2)
CO4 : Analyze the methods of compensations using Series compensators. (K4)
CO5 : Explain Operation and Control of UPFC and IPFC. (K2)

SYLLABUS

UNIT-I : INTRODUCTION TO FACTS

Power flow in an AC System – Loading capability limits – Dynamic stability considerations – Importance of controllable parameters – Basic types of FACTS controllers – Benefits from FACTS controllers – Requirements and characteristics of high-power devices – Voltage and current rating – Losses and speed of switching – Parameter trade–off devices.

UNIT-II : VOLTAGE SOURCE AND CURRENT SOURCE CONVERTERS

Concept of voltage source converter (VSC) – Single phase bridge converter – Square–wave voltage harmonics for a single–phase bridge converter – Three–phase full wave bridge converter.Concept of Current Source Converter (CSC) Three–phase current source converter – Comparison of current source converter with voltage source converter.

UNIT-III : SHUNT COMPENSATORS

Objectives of shunt compensation – Mid–point voltage regulation for line segmentation – End of line voltage support to prevent voltage instability – Improvement of transient stability – Power oscillation damping. Methods of Controllable Var generation- Variable impedance Var generators. Static VAR compensator(SVC) and Static Compensator(STATCOM)

UNIT-IV : SERIES COMPENSATORS

Objectives of Series compensation – Concept of series capacitive compensation – Improvement of transient stability – Power oscillation damping. GTO thyristor-controlled Series Capacitor (GSC) – Thyristor Switched Series Capacitor (TSSC) and Thyristor Controlled Series Capacitor (TCSC).

UNIT-V : COMBINED CONTROLLERS

Operating Principle and Control of Unified Power Flow Controller (UPFC) and itsapplications– Interline Power Flow Controller (IPFC) and its applications.

TEXT BOOKS:

1 "Understanding FACTS", N.G. Hingorani and L. Guygi, IEEE Press. Indian Edition, Standard Publications, 2019
2 "FACTS Controllers in Power transmission and Distribution ", K.R Padiyar –New Age Publications, 2016.

REFERENCE BOOKS:

1 "Flexible ac transmission system (FACTS)" Edited by Yong Hue Song and Allan T Johns, Institution of Electrical Engineers, London

2 Thyristor based FACTS controllers for electrical Transmission systems, R.Mohan Mathur & Rajiv k.Varma, Wiley Publications

3 Flexible Ac Transmission Systems (FACTS),Yong- Hua Song, Allan Johns -IET, 1999 - Technology & Engineering

B. TECH 8TH SEMESTER	L	T	P	C
	3	-	-	3
19EE8E12 :: HYBRID ELECTRIC VEHICLES				

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1 : Explain the models to describe hybrid vehicles and their performance.[K2]
CO2 : Develop basic schemes of electric vehicles and hybrid electric vehicles. [K3]
CO3 : Discuss different energy storage technologies used for hybrid electric vehicles.[K6]
CO4 : Analyze different power converter topology used for electric vehicle application. .[K4]
CO5 : Compare the different strategies related to energy storage systems. [K2]

SYLLABUS

UNIT-I : INTRODUCTION TO HYBRID ELECTRIC VEHICLES

History of hybrid and electric vehicles, social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies.

Conventional Vehicles: Basics of vehicle performance, vehicle power source characterization, transmission characteristics and mathematical models to describe vehicle performance.

UNIT-II : HYBRID ELECTRIC DRIVE-TRAINS

Electric Drive-trains: Basic concept of electric traction, introduction to various electric drive-train topologies, power flow control in electric drive-train topologies, fuel efficiency analysis.

Basic concept of hybrid traction, introduction to various hybrid drive train topologies, power flow control in hybrid drive-train topologies, fuel efficiency analysis.

UNIT-III : ELECTRIC TRAINS

Propulsion unit: Introduction to electric components used in hybrid and electric vehicles,Configuration and control of DC Motor drives, Configuration and control of Induction Motor drives, configuration and control of Permanent Magnet Motor drives, Configuration and control of Switch Reluctance Motor drives, drive system efficiency.

UNIT-IV : ENERGY STORAGE

Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles, Battery based energy storage and its analysis, Fuel Cell based energy storage and its analysis, Super Capacitor based energy storage and its analysis, Flywheel based energy storage and its analysis, Hybridization of different energy storage devices.

UNIT-V : ENERGY MANAGEMENT STRATEGIES

Introduction to energy management strategies used in hybrid and electric vehicles, classification of different energy management strategies, comparison of different energy management strategies.

TEXT BOOKS:

1. T. Denton, “Electric and Hybrid Vehicles”, Routledge, 2016.
2. Mehrdad Ehsani, Yimi Gao, Sebastian E. Gay, Ali Emadi, “Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design”, CRC Press, 2004.

3. Chris Mi, M. Abul Masrur, David Wenzhong Gao, Hybrid Electric Vehicles: Principles and Applications with Practical Perspectives, John Wiley & Sons Ltd. , 2011
4. S. Onori, L. Serrao and G. Rizzoni, "Hybrid Electric Vehicles: Energy Management Strategies", Springer, 2015.

REFERENCE BOOKS:

1. James Larminie, John Lowry, Electric Vehicle Technology Explained, Wiley, 2003.
2. C. Mi, M. A. Masrur and D. W. Gao, "Hybrid Electric Vehicles: Principles and Applications with Practical Perspectives", John Wiley & Sons, 2011.

B. TECH 8TH SEMESTER	L	T	P	C
	3	-	-	3
19EC8E26 :: DIGITAL IMAGE PROCESSING				

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1 : Define basic concepts of image processing and image geometry.
CO2 : Apply various operations on image both in spatial and frequency domains to solve various real time problems by converting them between domains.
CO3 : Differentiate different types of images, such as black & white, grayscale and color images, and can convert image from one color model to other.
CO4 : Analyze different features of the images for the purpose of Compression, authentication and safety.

SYLLABUS

UNIT-I : BASICS OF DIGITAL IMAGE PROCESSING:

Origins of digital image processing, uses digital image processing, fundamental steps in digital image processing, components of an image processing system, digital image fundamentals, Elements of visual perception, light and electromagnetic spectrum, imaging sensing and acquisition, image sampling and quantization. Some basic relationships between pixels**.**

UNIT-II : INTENSITY TRANSFORMATIONS AND SPATIAL FILTERING:

Background, Some basic intensity transformation functions, histogram processing, fundamentals of spatial filtering, smoothing spatial filters, sharpening spatial filters, Filtering in the frequency domain: Preliminary concepts, the discrete Fourier transform (DFT) of one variable, Extension to functions of two variables, some properties of the 2-D Discrete Fourier transform. The Basic of filtering in the frequency domain, image smoothing and sharpening using frequency domain filters.

UNIT-III : IMAGE RESTORATION AND RECONSTRUCTION:

A model of the image degradation Restoration process, Noise models, restoration in the presence of noise only- Spatial Filtering - Mean filters, order statistic filters and adaptive filters.

Periodic Noise Reduction by frequency domain filtering, Linear, Position –Invariant Degradations, Estimating the degradation function, Inverse filtering, Minimum mean

square error (Wiener) filtering, constrained least squares filtering ,geometric mean filter, image reconstruction from projections.

UNIT-IV : MULTI-RESOLUTION PROCESSING AND IMAGE COMPRESSION:

Image pyramids, sub-band coding & Haar transforms multi resolution expressions, wavelet transforms in one dimension. The fast wavelets transform, wavelet transforms in two dimensions, wavelet packets. Image compression: Fundamentals, various compression methods-coding techniques, digital image water marking.

UNIT-V : MORPHOLOGICAL IMAGE PROCESSING, SEGMENTATION AND COLOR IMAGE PROCESSING:

Preliminaries Erosion and dilation, opening and closing, the Hit-or-miss transformation, some Basic Morphological algorithms, Image segmentation- Fundamentals, point, line, edge detection thresholding, region -based segmentation, color fundamentals, color models, pseudo color image processing, basic of full color image processing, color transformations, smoothing and sharpening. Image segmentation based on color, noise in color images, color image compression.

TEXT BOOKS:

1. R. C. Gonzalez and R. E. Woods, "Digital Image Processing, 3rd edition", Prentice Hall, 2008. (UNIT I-V)

REFERENCE BOOKS:

1. R. C. Gonzalez, R. E. Woods and Steven L. Eddins , "Digital Image Processing Using MATLAB" 2nd edition, Prentice Hall, 2009.
2. Jayaraman, S. Esakkirajan, and T. Veerakumar, "Digital Image Processing", Tata McGraw-Hill Education, 2011.

E-REFERENCES:

1. Digital Image Processing, Tutorialspoint https://www.tutorialspoint.com/dip/index.htm
2. Digital Image Processing, Javatpoint https://www.javatpoint.com/digital-image-processing-tutorial

B. TECH 8TH SEMESTER	L	T	P	C
	3	-	-	3
19CS8E30 :: SOFT COMPUTING				

COURSE OUTCOMES:

After successful completion of this course, students should be able to:

CO1 : Analyze and appreciate the applications which can use fuzzy logic.
CO2 : Design inference systems.
CO3 : Identify the difference between learning and programming and explore practical Applications of Neural Networks (NN).
CO4 : Appreciate the importance of optimizations and its use in computer engineering fields and there domains.
CO5 : Explain the efficiency of a hybrid system and how Neural Network and fuzzy logic can be hybridized to form a Neuro-fuzzy network
CO6 : Analyze various applications of Genetic Algorithms.

SYLLABUS

UNIT-I : INTRODUCTION TO SOFT COMPUTING:

Soft computing Constituents, Characteristics of Neuro Computing and Soft Computing, Difference between Hard Computing and Soft Computing, Concepts of Learning and Adaptation.

UNIT-II : NEURAL NETWORKS:

Basics of Neural Networks: Introduction to Neural Networks, Biological Neural Networks, McCulloch Pitt model, **Supervised Learning algorithms:** Perceptron (Single Layer, Multi layer), Linear separability, Delta learning rule, Back Propagation algorithm,**Un-Supervised Learning algorithms:** Hebbian Learning, Winner take all, Self Organizing Maps, Learning Vector Quantization.

UNIT-III : FUZZY SET THEORY :

Classical Sets and Fuzzy Sets, Classical Relations and Fuzzy Relations, Properties of membership function, Fuzzy extension principle, Fuzzy Systems- fuzzification, defuzzification and fuzzy controllers.

UNIT-IV : HYBRID SYSTEMS:

Introduction to Hybrid Systems, Adaptive Neuro Fuzzy Inference System (ANFIS).Introduction to Optimization Techniques: Derivative based optimization- Steepest Descent,Newton method. Derivative free optimization- Introduction to Evolutionary Concepts.

UNIT-V : GENETIC ALGORITHMS AND ITS APPLICATIONS:

Inheritance Operators, Cross over types, inversion and Deletion, Mutation Operator, Bit-wise Operators, Convergence of GA,Applications of GA.

TEXT BOOKS:

1. Timothy J.Ross Fuzzy Logic With Engineering Applications" Wiley.

2 S.N.Sivanandam, S.N.Deepa "Principles of Soft Computing" Second Edition, Wiley Publication.

3 S.Rajasekaran and G.A.Vijayalakshmi Pai "Neural Networks, Fuzzy Logic and Genetic Algorithms" PHI Learning.

4 J.-S.R.Jang Neuro-Fuzzy and Soft Computing" PHI 2003.

5 Jacek.M.Zurada Introduction to Artificial Neural Sytems" Jaico Publishing House

REFERENCE BOOKS:

1. Satish Kumar " Neural Networks A Classroom Approach"; Tata McGrawHill.

2. 2. Zimmermann H.S Fuzzy Set Theory and its Applications" Kluwer Academic Publishers.

3 Davis E.Goldberg, "Genetic Algorithms: Search, Optimization and Machine Learning", Addison Wesley, N.Y., 1989. 4. Hagan, Demuth, Beale, ";Neural Network Design& " CENGAGE Learning, India Edition.

B. TECH 8TH SEMESTER	L	T	P	C
	-	-	18	9
19EE8P01:: PROJECT WORK				