ACADEMIC REGULATIONS

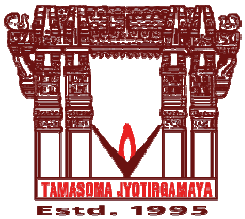
COURSE STRUCTURE AND

DETAILED SYLLABUS

Electrical and Electronics Engineering

B.TECH. FOUR YEAR DEGREE COURSE

(Applicable for the batches admitted from 2013-2014)



VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

An Autonomous Institute
Approved by AICTE & Affiliated to JNTUH
Accredited by NBA and NAAC with 'A' Grade

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VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY
HYDERABAD
Approved by AICTE & Affiliated to JNTUH
Accredited by NBA and NAAC with 'A' Grade

ACADEMIC REGULATIONS FOR B.TECH. DEGREE COURSE

(Applicable for Students admitted from the academic year 2013-2014)

1. Courses of study

The following courses of study are offered at present for specialization for the B. Tech. Course:

Branch Code	Branch
01	Civil Engineering.
02	Electrical and Electronics Engineering
03	Mechanical Engineering
04	Electronics and Communication Engineering
05	Computer Science and Engineering.
10	Electronics and Instrumentation Engineering
12	Information Technology
24	Automobile Engineering

1.1 Eligibility Criteria for Admission

- The eligibility criteria for admission into engineering programmes shall be as mentioned below:
- The candidate shall be an Indian National / NRI
- The candidate should have completed 16 years of age as on 31st December of the academic year for which the admissions are being conducted.
- The Candidate should have passed the qualifying examination (10+2) or equivalent as on the date of admission

1.1 .1 Seats in each programme in the Institution are classified into **Category A** and **Category B** as per the G.Os.

a) Category – A Seats

These seats will be filled through counseling as per the rank at the Common Entrance Test (EAMCET) conducted by the State Government and as per other admission criteria laid down in the G.Os.

1.1.2 Category - B Seats

These seats will be filled by the institute as per the G.Os Issued by State Government from time to time.

1.1.3 Category: Lateral Entry

The candidate shall be admitted into the Third Semester, (2^{nd} year, I^{st} Semester) based on the rank secured by the candidate at Engineering Common Entrance Test (ECET (FDH)) by the Convener, ECET.

2. Distribution and Weightage of Marks

i. The performance of a student in each Semester shall be evaluated subject – wise with **a maximum of 100 marks for theory and 100 marks for practical subjects.** In addition, an Industry oriented mini-project, Seminar, Comprehensive viva-voce, and Project Work shall be evaluated for **100, 100, 100 and 200 marks** respectively.

ii. For theory subjects the distribution shall be **30 marks for Mid Semester Evaluation** and **70 marks for the End Semester Examination**.

For theory subjects, two mid examinations will be conducted in each Semester as per the academic calendar. Each mid examination is evaluated for 25 marks.

For the Mid-Examination the Distribution of Marks (25 Marks) as follows

Part-A: - 4 Marks (4X1 Marks) Compulsory

6 Marks (3X2 Marks) Compulsory

Part-B:- 15 Marks (3X5 Marks) 3 out of 4 Questions

Assignment Test/Assignment: - Two assignments are to be given to students covering the syllabus of First Mid and Second Mid Examinations respectively and are evaluated for 5 marks each.

The first assignment shall be submitted after first mid examinations and second Assignment should be submitted after second mid examination.

At the end of the Semester, Internal Marks (Maximum 30) for the respective subject is assigned as follows:

(a) 25 marks: 80% from the best performed mid examination and 20% from the other mid examination.

(b) 5 marks: Average of the two assignments/assignment tests

iii. For practical subjects there shall be a continuous evaluation during the Semester for 30 **marks and 70 marks for end examination**. Out of the 30 marks, **day-to-day work in the laboratory shall be evaluated for 10 marks**, and 10 marks for practical examination and 10 marks for laboratory record.

NOTE: A. Student who is absent for any assignment/Mid-term examination for any reason what so ever shall be deemed to have secured 'zero' marks in the test/examination and no makeup test/examination shall be conducted.

B. If any student absent for mid exam due to Medical/Acute illness same may be reported in advance to Head of the Department in writing with a request to reconduct the mid-term examination. The committee consisting of HOD/Dean-Academics/Dean-Examinations will take the final decision on the conduct of mid-term examination.

iv For the subjects having design and / or drawing, (such as Engineering Graphics, Engineering Drawing, Machine Drawing, Production Drawing Practice, and Estimation etc.,) the distribution shall be 30 **marks for internal evaluation (15 marks for day-to-day work and 15 marks for Mid examination (**the average of the two examinations will be taken into account**) and 70 marks for end semester examination.**

V There shall be an **industry-oriented mini-Project**, in collaboration with an industry of their specialization, to be taken up during the summer vacation after III year II Semester examination. The **industry oriented mini project shall be evaluated during the IV year I Semester.** The industry oriented mini project shall be submitted in report form and should be presented before a committee, which shall be evaluated for **100 marks.** The committee consists of Head of the Department, the supervisor of mini project and a senior faculty member of the department. There shall be **no mid-term assessment for industry oriented mini project. However, attending the shadow engineering program is a pre – requisite for evaluating industry – oriented mini project**. Students should submit a report on learning outcomes of the shadow engineering and Engineer in Mirror. Every student should attend shadow engineering and Engineer in Mirror programme in an industry for not more than a week days during second year and third year respectively.

vi. There shall be a **Seminar presentation in IV year II Semester**. For the Seminar, the student shall collect the information on a specialized topic other than the project topic and prepare a technical report, showing his understanding of the topic, and submit to the department, which shall be evaluated by a Departmental committee consisting of the Head of the department, Seminar supervisor and a senior faculty member. **The seminar will be evaluated for 100 marks based on the report and presentation made.**

vii. There shall be a **Comprehensive Viva-Voce in IV year II Semester**. The Comprehensive Viva-Voce will be conducted by a Committee consisting of the Head of the Department and three Senior Faculty members of the Department **after submitting M.T.P record in complete**. The Comprehensive Viva-Voce is aimed to assess the student's understanding in various subjects studied during the B.Tech course of study. The Comprehensive Viva-Voce is evaluated **for**

100 marks by the Committee. There will be **no Midterm assessment for the Comprehensive viva-voce.**

viii. The Project work shall be started by the student in the beginning of the IV year I Semester. Out of a total of **200 marks** for the project work, **60 marks shall be for Midterm Evaluation** and **140 marks for the Semester end Examination**. The viva-voce shall be conducted by a committee comprising of an external examiner, Head of the Department and the project supervisor and one senior faculty. The evaluation of project work shall be conducted at the end of the IV year II Semester. **The Midterm Evaluation shall be on the basis of three Seminars conducted during the IV year II Semester for 30 marks by the committee consisting of Head of the Department, project supervisor and senior faculty member of the Department and for 30 marks by the supervisor of the project.**

3. Semester end Examination

(a) Theory Courses

Each course is evaluated for 70 marks. Examination is of 3 hours duration.

Question Paper Pattern is as follows

Part A:- 30 Marks Compulsory

5X1Marks (One question from each unit)

5X2Marks (One question from each unit)

5X3Marks (One question from each unit)

Part B:- 40 Marks (4 out of 6 questions) (At least one question from each unit)

(b) Practical Courses

Each lab course is evaluated for 70 marks. The examination shall be conducted by the laboratory teacher and another senior teacher concerned with the subject of the same/other department/Industry. One of examiner will be appointed by the Controller of Examinations in consultation with HOD as and when required and is evaluated as per standard format.

(c) Supplementary Examinations

Supplementary Examinations will be conducted for the current semester after the declaration of the results of the regular examination of that semester.

4. Attendance Requirements

i. A student shall be eligible to appear for the Semester end examinations if he / she acquire a **minimum of 75% of attendance in aggregate of all the subjects** for Semester.

ii. Condonation of shortage of attendance in aggregate **up to 10% (65% and above and below 75%)** in a semester may be granted by **Institute Academic Committee.**

iii. A student will not be permitted to write the end examination and not promoted to the next Semester unless he satisfies the attendance requirement of the

present Semester, as applicable. He may seek re-admission for that Semester when offered next.

iv. Shortage of Attendance **below 65% in aggregate** shall in **NO case be condoned.**

v. Students whose shortage of attendance is not condoned / not paid the stipulated fee in any Semester are not eligible to take their end semester examination of that Semester.

5. Minimum Academic Requirements

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item No.**4.**

i. A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory or practical design or drawing subject or project, if he secures **not less than 35% (25 out of 70 marks)** of **marks in the end examination and a minimum of 40% of marks in the sum total of the Midterm evaluation and end semester examination taken together.**

ii. A student shall be **promoted from II to III year** only if he fulfills the academic requirement of getting **50 credits from the examinations held upto II Year II Semester including Supplementary examinations of II B.Tech II Semester.**

iii. A student shall be **promoted from III year to IV year** only if he fulfills the academic requirement of getting a total of **75 credits from the examinations held upto III Year II Semester including Supplementary examinations of III B.Tech II Semester .**

Iv. **A** student shall register and put up minimum academic requirement in all 200 credits and earn atleast 192 credits. Marks obtained in these credits shall be considered for the calculation of Cumulative Grade Point Average **(CGPA) and percentage of marks**.

v. The student should obtain two certificate courses during his/her course of study

vi. Students who fail to earn atleast 192 credits as indicated in the course structure **within eight academic years** from the year of their admission shall **forfeit their seat** in B.Tech. Course and their **admission stand Cancelled.**

6. Course pattern

i. The entire course of study is of four academic years. **All I, II, III and IV years are of Semester pattern.**

ii. A student eligible to appear for the end semester examination in a subject, but absent or has failed in the end semester examination may reappear for that subject at the supplementary examination whenever conducted.

iii. When a student is detained due to shortage of attendance in any Semester, he may be re-admitted into that Semester when it is offered next, **with the academic regulations of the batch into which he gets readmitted.**

iv. When a student is detained due to lack of credits in any year, he may be eligible for promotion to the next year after obtaining required number of credits and fulfillment of the academic requirements.

Award of B.Tech. Degree and Class

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

i) Pursued **a course of study for not less than four academic years and not more than eight academic years.**

ii) Registered for **200 credits** and secured a minimum of **192 credits with compulsory subjects as listed in Table.**

Table: Compulsory Subjects

Serial Number	Subject Particulars
1.	All Practical Subjects
2.	Industry oriented mini project
3.	Comprehensive Viva-Voce
4.	Seminar
5.	Project work

iii) The student should obtain two certificate courses during his/her course of study

NOTE: Students, who fail to fulfill all the academic requirements for the award of the degree within eight academic years from the year of their admission, shall forfeit their seat in B.Tech. Course.

7. CGPA System:

Method of awarding absolute grades and grade points:

The **absolute grading method** is followed, based on the total marks obtained in internal and external examinations. Grades and grade points are assigned as per the Table given below

B.Tech Program: The Absolute Grading Method is followed, based on the total marks obtained in internal and external examinations. Grades and Grade points are assigned as given below

Marks Obtained	Grade	Description of Grade	Grade Points(GP) Value Per Credit
>=90	O	Outstanding	10.00
>=80 and <89.99	A+	Excellent	9.00
>=70 and <79.99	A	Very Good	8.00
>=60 and <69.99	B	Good	7.00
>=50 and <59.99	C	Fair	6.00
>=40 and <49.99	D	Pass	5.00
<40	F	Remedial	
Not Appeared the Exam(s)	N	Absent	

The student is eligible for the award of the B.Tech degree with the class as mentioned in the Table.

CGPA	CLASS
>= 7.5	First Class with Distinction
>= 6.5 and <7.5	First class
>= 5.5 and < 6.5	Second Class
>=5.0 and < 5.5	Pass class

Calculation of Semester Grade Points Average (SGPA):

The performance of each student at the end of the each semester is indicated in terms of SGPA. The SGPA is calculated as below:

$$SGPA = \frac{Total\ Earned\ Weighted\ Grade\ Points\ for\ that\ Semester}{Total\ Credits\ for\ the\ Semester}$$

$$SGPA = \frac{\sum_{i=1}^{P} Ci * Gi}{\sum_{i=1}^{P} Ci}$$

Where 'Ci' = Number of Credits allotted to particular subject 'I'

'Gi' = Grade Point corresponding to the letter grade awarded in that subject 'i"

'i"= 1,2,…..P represent the number of subjects for that particular semester

* **SGPA is calculated and awarded for the candidates who pass all the courses in a semester.**

Calculation of Cumulative Grade Point Average (CGPA) for Entire Programme.

The CGPA is calculated as below:

Assessment of the overall performance of a student is obtained by calculating Cumulative Grade Point Average (CGPA), which is weighted average of the grade points obtained in all subjects during the course of study.

$$CGPA = \frac{\sum_{i=1}^{m} Ci * Gi}{\sum_{i=1}^{m} Ci}$$

Where Ci= Number of credits allotted to a particular subject 'I"

Gi = Grade Point corresponding to the letter grade awarded in that subject 'i"

I= 1,2,….m represent the number of subjects of the entire program.

Grade lower than D in any subject is not considered for CGPA calculation. The CGPA is awarded only when the student acquires the required number of credits prescribed for the program.

Grade Card

The grade card issued shall contain the following:

a) The credits for each subject offered in that semester

b) The letter grade and grade point awarded in each subject

c) The **SGPA/CGPA**

d) Total number of credits earned by the student up to the end of that semester.

e) Award list indicating the marks awarded to the student.

8. Withholding of Results

If the student has not paid dues to College, or if any case of indiscipline is pending against him, the result of the candidate may be withheld. The award or issue of the Degree may also be withheld in such cases.

9. **Transitory Regulations**

Students who have discontinued or have been detained for want of attendance or any other academic requirements, may be considered for readmission as and when they become eligible. They have to take up Equivalent subjects, as substitute subject in place of repetition of subjects as decided by the BoS chairman of the respective department. He/She will be admitted under the regulation of the batch in which he/she is readmitted.

10. Minimum Instruction Days

The minimum instruction days for each Semester shall be **90 instruction days.**

11 There shall be **no branch transfers** after the completion of admission process.

12. The decision of the Institute Academic Committee will be final in respect of equivalent subjects for those students who are transferred from other colleges. The transfer of students from other college or from this institute is to approved by the Governing Council.

13. General

i. Where the words “he”, “him”, “his”, occur in the regulations, they include “she”, “her”, “hers”.

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

iii. In the case of any discrepancy/ambiguity/doubt arises in the above rules and regulations, the decision of the Principal shall be final.

iv. The Chairmen Academic Council may change or amend any or all of the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students concerned with effect from the dates notified by the College.

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

(Applicable for students admitted from the academic year 2013-2014)

(i) Registered for 150 credits and secured a minimum of 142 credits with compulsory subjects as listed in table.

Table: Compulsory Subjects

Serial Number	Subject Particulars
1.	All Practical Subjects
2.	Industry oriented mini project
3.	Comprehensive Viva-Voce
4.	Seminar
5.	Project work

(ii) A student who fails to earn a minimum of 142 credits as indicated in the course structure within **six** academic years from the year of their admission shall forfeit their seat in B.Tech. programme and their admission stands cancelled.

(iii) The same attendance regulations are adopted as that of B.Tech. Four year degree course.

(iv) A student shall be promoted from Third year to Fourth year only on fulfilling the academic requirements of securing 50 credits from the examinations held upto III B.Tech II Semester including Supplementary Examinations.

(v) All other regulations as applicable to B.Tech. four year degree course will hold good for B.Tech. (Lateral Entry Scheme).

15. Malpractice Rules

Disciplinary Action for Malpractices/Improper Conduct in Examinations

	Nature of Malpractices/Improper conduct	**Punishment**
	If the candidate:	
1.	(a) Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
	(b)Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled.
3.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance

		of the original candidate who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all end semester examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4.	Smuggles the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all end semester examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
6.	Refuses to obey the orders of the Chief Superintendent/Assistant –	In case of students of the college, they shall be expelled from

	Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates are also debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all end semester examinations including supplementary Examinations. The continuation of the course by the candidate is subject to the academic regulations in connection

		with forfeiture of seat.
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.
9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	If the student belongs to the college, expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.
10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that

		semester/year.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the academic council of the Institute for further action to award suitable punishment.	

Malpractices identified by squad or special invigilators

Punishments to the candidates as per the above guidelines.

Malpractice identified at Spot center during valuation

The following procedure is to be followed in the case of malpractice cases detected during valuation, scrutiny etc. at spot center.

1) Malpractice is detected at the spot valuation. The case is to be referred to the malpractice committee. Malpractice committee will meet and discuss/question the candidate and based on the evidences, the committee will recommend suitable action on the candidate.
2) A notice is to be served to the candidate(s) involved through the Principal to his address and to the candidate(s) permanent address regarding the malpractice and seek explanations.
3) The involvement of staff who are in charge of conducting examinations, invigilators valuing examination papers and preparing / keeping records of documents relating to the examinations in such acts (inclusive of providing in correct or misleading information) that infringe upon the course of natural justice to one and all concerned at the examinations shall be viewed seriously and recommended for award of appropriate punishment after thorough enquire.
4) Based on the explanation and recommendation of the committee action may be initiated.
5) **Malpractice committee:**

i.	Principal	Chairman
ii.	Controller of Examinations	Convener
iii.	Invigilator	Member
iv.	Chief Examiner of the subject/subject expert	Member
v.	Concerned Heads of the Department	Member

Program Education Objectives (PEOs)

I. To provide students with a solid foundation in the mathematics, physics and chemistry by keeping sufficient weightage in the curriculum to understand the electrical engineering fundamentals.

II. To develop effective communication skills, managerial skills, team spirit, multi disciplinary approach with social commitment and with the effective utilization of men, material, and money for the current industrial and social needs as an Electrical Engineer.

III. To develop An ability to analyze and design basic electrical, electronic and digital systems with the understanding for the Generation, Transmission, Distribution, Operation and Control of the Energy systems by providing the sufficient knowledge of electrical machines and power electronics.

IV. To train students with broader scientific and engineering knowledge by providing interdisciplinary courses in the Program so as to achieve ability to comprehend, analyze and design proper systems and develop innovative ideas for the solutions of real life problems with the awareness of ethical and professional responsibilities

V. To establish well acquaintance to the students, with the practical implementation of the theoretical concept learned through well equipped laboratories with the faculty expertise by bringing the real world into the laboratories with VNR protocol to enhance the practical skills and linking it to the real world situations.

VI. To improve the technical and presentation skills through various co-curricular activities, industry oriented mini project, Major projects linking with the current research matching with a strong background and motivation to pursue life-long learning.

Program Outcomes

The program demonstrates that**:**

a) **Engineering Knowledge:** Graduates will be capable of applying mathematics and basic sciences in learning the Electrical and Electronics Engineering subjects and will be proficient in the core principles of Electrical and Electronics Engineering.

b) **Communications:** Graduates will demonstrate improvements in their oral and written communication skills and also will be able to communicate effectively regarding electrical engineering technology activities

c) **Problem Analysis:** Graduates will demonstrate ability to identify, critically analyze, formulate and solve Electrical and Electronics Engineering problems.

d) **Design, Modeling and Control:** Graduates of Electrical and Electronics engineering will demonstrate the ability in the planning, design, operation and Control of various systems and it's applications in the Electrical Engineering Field.

e) **Conduct investigation of Complex Problems:** Graduates of Electrical and Electronics engineering will demonstrate an ability to conduct standard tests and measurements, and to conduct, analyze, and interpret experiments.

f) **Modern Tool Usage:** Graduates will demonstrate skills to use modern engineering tools, equipments, processes, state- of- the- art software packages on modeling and analysis for solving problems.

g) **The engineer and society:** Graduates will demonstrate understanding of impact of engineering solutions on the society to ensure that no ill effects befall and be aware of contemporary issues.

h) **Environment and sustainability:** Graduates will demonstrate the understanding of impact of engineering solutions on the environment to mitigate any ill effects and ensure sustainability of solutions arrived.

i) **Ethics:** Graduates will demonstrate knowledge, understanding and application of professional and ethical responsibilities and human values in all professional transactions.

j) **Individual and Team Work:** Graduates will demonstrate ability to work as an individual as well as a team member on engineering problems and be able to understand group dynamics and play his role appropriately in the group and develop entrepreneurial skills.

k) **Project Management and Finance:** Graduates will demonstrate ability to administer and regulate projects with emphases on time management, financial management and personnel management.

l) **Life Long Learning:** Graduates will demonstrate penchant for self education, inclination for updating with developments, participate in professional societies, interact with stalwarts in the field and continue life-long learning.

VNR Vignana Jyothi Institute of Engineering & Technology

B. TECH ELECTRICAL & ELECTRONICS ENGINEERING

Regulations- R13

I YEAR I SEMESTER **COURSE STRUCTURE**

Subject Code	Subject Name	Lectures	T/P/D	Credits
13MTH001	Advanced Calculus	3	1	3
13PHY001	Engineering Physics	3	1	3
13CSE001	Computer Programming	4	0	4
13ENG001	English	3	0	3
13CED004	Environmental Studies	3	0	3
13MED176	Engineering Drawing	2	4	4
13ENG101	English Language Communication Skills Laboratory	0	3	2
13CSE101	Computer Programming Laboratory	0	3	2
13MED103	IT and Engineering Workshop	0	3	2
Total		**18**	**15**	**26**

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B. TECH ELECTRICAL & ELECTRONICS ENGINEERING

I YEAR II SEMESTER **COURSE STRUCTURE**

Subject Code	Subject Name	Lectures	T/P/D	Credits
13MTH004	Numerical analysis and Graph Theory	3	1	3
13MTH002	Linear Algebra and Ordinary Differential Equations	3	1	3
13EEE001	Circuit Theory	4	1	4
13PHY003	Advanced Engineering Physics	3	1	3
13CHE001	Engineering Chemistry	3	0	3
13ITD002	Data Structures	4	1	4
13EPC101	Engineering Physics and Chemistry Laboratory	0	3	2
13ITD102	Data Structures Laboratory	0	3	2
Total		**20**	**11**	**24**

*** T/P/D: Tutorial/Practical/Drawing Practice**

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B. TECH ELECTRICAL AND ELECTRONICS ENGINEERING

II YEAR I SEMESTER **COURSE STRUCTURE**

Subject Code	Subject Name	Lectures	*T/P/D	Credits
13MTH005	Partial Differential Equations with applications & Complex Analysis	3	1	3
13ECE001	Electronic Devices and Circuits	4	1	4
13EEE002	Network Analysis	3	1	3
13EEE003	Electro Magnetic Field Theory	4	1	4
13EEE004	Electrical Machines-I	3	1	3
13ECE003	Switching Theory and Logic Design	4	1	4
13EEE101	Electrical Circuits and Simulation Laboratory	0	3	2
13ECE101	Electronic Devices and Circuits Laboratory	0	3	2
	Total	**21**	**12**	**25**

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B. TECH ELECTRICAL AND ELECTRONICS ENGINEERING

II YEAR II SEMESTER **COURSE STRUCTURE**

Subject Code	Subject Name	Lectures	*T/P/D	Credits
13EEE005	Electrical Machines – II	4	1	4
13ECE077	Electronic Circuits	4	1	4
13CMS001	Business Economics and Financial Analysis	4	0	4
13EEE006	Power Systems-I	4	1	4
13MED077	Fluid Mechanics and Hydraulic Machines	3	0	3
13EEE102	Electrical Machines - I Laboratory	0	3	2
13ECE180	Electronic Circuits Laboratory	0	3	2
13MED177	Fluid Mechanics and Hydraulic Machines Laboratory	0	3	2
	Total	**19**	**12**	**25**

* T/P/D: Tutorial/Practical/Drawing Practice

VNR Vignana Jyothi Institute of Engineering and Technology

B. TECH ELECTRICAL AND ELECTRONICS ENGINEERING

III YEAR I SEMESTER **COURSE STRUCTURE**

Subject Code	Subject Name	Lectures	*T/P/D	Credits
13EEE007	Electrical Machines – III	4	1	4
13EEE008	Control Systems	4	1	4
13EEE009	Power Systems-II	3	1	3
13EEE010	Power Electronics	4	1	4
13EIE006	Linear and Digital IC Applications	4	0	4
13EEE103	Electrical Machines –II Laboratory	0	3	2
13EEE104	Control Systems and Simulation Laboratory	0	3	2
13EEE105	Power Electronics and Simulation Laboratory	0	3	2
	Total	**19**	**13**	**25**

VNR Vignana Jyothi Institute of Engineering and Technology
B. TECH ELECTRICAL AND ELECTRONICS ENGINEERING

III YEAR II SEMESTER **COURSE STRUCTURE**

Subject Code	Subject Name	Lectures	*T/P/D	Credits
13EEE011	Power Semi Conductor Drives	4	1	4
13EEE012	Power System Analysis	4	1	4
13EEE013	Switchgear and Protection	4	1	4
13ECE009	Microprocessors and Micro Controllers	4	1	4
Open Elective		3	0	3
13EEE015	Renewable Energy Sources			
13CSE016	Intellectual Property Rights			
13CSE012	Cyber Security			
13CED037	Disaster Management			
13CSE030	Professional Ethics and Human Values			
13EEE106	Power Systems Laboratory	0	3	2
13ECE106	Microprocessor & Microcontroller Laboratory	0	3	2
13ENG102	Advanced English Communication Skills Laboratory	0	3	2
	Total	**19**	**13**	**25**

* T/P/D: Tutorial/Practical/Drawing Practice

VNR Vignana Jyothi Institute of Engineering and Technology

B. TECH ELECTRICAL AND ELECTRONICS ENGINEERING

IV YEAR I SEMESTER **COURSE STRUCTURE**

Subject Code	Subject Name	Lectures	*T/P/D	Credits
13EEE014	Electrical Measurements and Instrumentation	4	1	4
13EEE016	Power System Operation and control	3	1	3
13ECE083	Principles of Digital Signal Processing	3	1	3
Elective – I				
13EEE017	High Voltage Engineering			
13EEE018	Modern Power Electronics			
13EEE019	Electrical Machine Design	3	0	3
13EEE020	Advanced Control Systems			
13MED076	Optimization Techniques			
Elective – II				
13EEE021	Electrical Distribution Systems and Automation			
13EEE022	Analysis and Design of Switched Mode Converters	3	0	3
13EEE023	Special Machines and Control			
13EEE024	Artificial Neural Networks and Fuzzy Logic			
13EEE025	Digital Control Systems			
13EEE107	Electrical Measurements and Instrumentation Laboratory	0	3	2
13ECE179	Principles of Digital Signal Processing Laboratory	0	3	2
13EEE108	Computer Applications in Electrical Engineering Laboratory	0	3	2
13EEE201	Industry Oriented Mini Project	0	4	2
	Total	**16**	**16**	**24**

* T/P/D: Tutorial/Practical/Drawing Practice

VNR Vignana Jyothi Institute of Engineering and Technology
B. TECH ELECTRICAL AND ELECTRONICS ENGINEERING

IV YEAR II SEMESTER **COURSE STRUCTURE**

Subject Code	Subject Name	Lectures	*T/P/D	Credits
13CMS002	Management Science	4	0	4
Elective – III				
13EEE026	Power Quality			
13EEE027	HVDC Transmission			
13ECE027	Basics of Nano Science and Technology	3	0	3
13EIE077	Programmable Logic Controllers			
13EEE028	Reliability Engineering and Applications to Power systems			
Elective – IV				
13EEE029	Utilization of Electrical Energy			
13EEE030	Flexible A.C. Transmission Systems	3	0	3
13EEE031	Energy Auditing, Conservation and Management			
13ECE023	Embedded Real Time Operating Systems			
13CSE076	Relational Data Base Management Systems			
13EEE202	Project Work	0	18	12
13EEE203	Technical Seminar	0	3	2
13EEE204	Comprehensive Viva Voce	0	0	2
	Total	**10**	**21**	**26**

* T/P/D: Tutorial/Practical/Drawing Practice

VNR Vignana Jyothi Institute of Engineering & Technology

I Year B.Tech ECE, EEE, EIE – I Sem	**L**	**T/P/D**	**C**
	3	**1**	**3**

(13MTH001) Advanced Calculus

Course prerequisites: Differentiation, integration

Course Objectives:

- Understand Taylor's theorem and its application to maxima and minima of f(x,y)
- Understand the process of curve sketching
- Understand multiple integrals and its applications
- Apply the integral theorems of vector calculus.

Course Outcomes:

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

- Solve problems involving the maxima and minima of f(x,y).
- Apply the curve tracing concepts to find arc length of curves, surface area, volume of solids of revolution.
- Evaluate the multiple integrals using appropriate change of variables.
- Verify the integral theorems.

UNIT I

CALCULUS OF ONE AND SEVERAL REAL VARIABLES

Mean value thoerems **–** Rolle's Thoerem, Lagrange's Mean value thoerem Cauchy's Mean value theorem **,** Taylor's expansion and McLaurin's expansion of functions (without proofs). Partial differentiation, partial derivatives of first and second order in terms of partial derivaties, Jacobian, Euler's theorem on homogeneous functions, change of variables, Taylor's theorem of two variables(without proof) and its application. Maxima and Minima of two variables, Langrange's method of undeterrmined multipliers.

UNIT II

CURVE TRACING AND RELATED APPLICATIONS

Curvature of curves in Cartesian, parametric and polar coordinates. Tracing of curves in Cartesian, parametric and polar coordinates (like conics, astroid, hypocycloid, Folium of Descartes, Cycloid, Circle, Cardiode, Lemniscate). Applications -finding area under the curves, Length of the curves, volume and surface area of solids of revolution

UNIT III

MULTIPLE INTEGRALS

Introduction of Multiple integrals , evaluation of double and triple integrals, change of order of integration change of variables , Cylindrical and Spherical polar coordinates. Application to evaluation of plane areas, volumes and surface areas of solids of revolution.

UNIT-IV

VECTOR DIFFERENTIAL CALCULUS

Scalar and Vector point functions, Gradient, Divergence, Curl with geometrical & physical interpretation, Directional derivatives, Properties.

UNIT-V

VECTOR INTEGRAL CALCULUS

Line integrals and application to Work done and Circulation, Scalar potential function, Surface integrals and Volume integrals, Gauss divergence theorem, Green's theorem , Stokes' theorem (theorems without proof).

TEXT BOOKS

1. Higher Engineering Mathematics – by B. S. Grewal,Khanna publishers.

2. Calculus and Analytic Geometry by Thomas and Finney, 9th edition; Publisher: Pearson Education.

REFERENCES :

1. Elementary Analysis: The Theory of Calculus by Kenneth Ross; Publisher: Springer.

2. Advanced Engineering Mathematics by Erwin Kreyszig, 8th edition; Publisher: John Wiley.

3. Advanced Engineering Mathematics by Peter 'O' Neil, publisher: Cengage Learning .

4. Advanced Engineering Mathematics by R.K.Jain and S.R.K.Iyengar; Narosa Publications

VNR Vignana Jyothi Institute of Engineering & Technology

I Year B.Tech ECE, EEE, EIE – I Sem	**L**	**T/P/D**	**C**
	3	**1**	**3**

(Common for all Branches)

(13PHY001) ENGINEERING PHYSICS

Course Objectives:

- To supplement and enhance the basic concepts in Physics essentially required in the study of materials as well as interaction of light with matter, interaction of light with matter through physical phenomena like interference, diffraction and polarization.
- To know and understand some important applications of lasers and optical fibers.
- To learn the importance of wave and particle nature of light and to understand the behavior of an electron in one dimensional potential box.
- To understand the effect of temperature on Fermi Dirac Distribution Function and also learn the behavior of an electron in a periodic potential, the new concept of Effective mass of an electron and to know the classification of materials into conductors, semiconductors and insulators.

Course Outcomes:

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

- Understand the Phenomenon of Interference, Diffraction& Polarization.
- Learn the principle, working, construction and energy mechanism of various lasers and their applications Explain the light signal propagation and attenuation through optical fiber.
- Understand the differences between particle and wave nature, energy states in one dimensional potential box and also the Consequences of Heisenberg's Uncertainty principle.
- Understand the one dimensional Schrodinger's wave equation and the effect of temperature on Fermi-Dirac Distribution, Kronig Penny model.

UNIT –1:

INTERFERENCE:

Superposition principle, resultant amplitude, coherence, methods to obtain coherent sources, interference, Young's double slit experiment, interference in thin films by reflection, Newton's rings Experiment.

DIFFRACTION-I:

Distinguish between Fraunhofer and Fresnel diffraction, diffraction at single slit (Qualitative and Quantitative (Phasors approach)).

UNIT -2

DIFFRACTION-II

Diffraction at double slit, circular aperture, and multiple slits (grating)(Qualitative Approach), Resolution of spectral lines, Rayleigh criterion, and resolving power of grating.

POLARIZATION

Polarization phenomenon, Brewster's Law and Malus law, examples, types of polarization, double refraction, Nicol prism, Quarter and Half wave plates.

UNIT -3:

LASERS:

Characteristics of Lasers – Spontaneous and Stimulated Emission of radiation, meta stable state, population inversion, lasing action, Einstein's coefficients and relation between them –– Ruby Laser – Helium-Neon Laser –Semiconductor Laser – Applications of lasers.

FIBER OPTICS:

Principle of optical fiber and properties – Acceptance angle and acceptance cone – Numerical aperture –Types of fibers and refractive index profiles – Qualitative analysis of attenuation in optical fibers –Application of optical fibers.

UNIT -4:

ELEMENTS OF STATISTICAL MECHANICS:

Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac statistics (non-mathematical treatment); Photon gas, Planck's law of black body radiation; Deduction of Wien's law and Rayleigh-Jeans law from Plank's law.

PRINCIPLES OF QUANTUM MECHANICS:

Waves and particles – De Broglie hypothesis - Matter waves - Davisson and Germer experiment –Heisenberg's uncertainty principle - Schrodinger Wave Equation – Wave function and its Physical Significance - Particle in one dimensional potential box(wave functions, probability densities and energy states).

UNIT -5

FREE ELECTRON FERMI GAS:

Energy levels in one dimension, Effect of temperature on the Fermi-Dirac distribution, Free electron gas in three dimensions, electrical conductivity & Ohm's law, Electrical Resistivity of Metals (Qualitative).

BAND THEORY OF SOLIDS:

Electron in a periodic potential; Bloch Theorem; Kronig-Penney model (non-mathematical treatment); Origin of energy band formation in solids; Classification of materials into conductors, semiconductors & Insulators; and Concept of effective mass of an electron.

TEXT BOOKS:

1. Physics vol.2, by Halliday, Resnick and Krane; John Wiley & Sons
2. Concepts of Modern physics by Arthur Beiser, McGraw Hill Inc.
3. Introduction to Solid State Physics by Charles Kittel : John Wiley & Sons

REFERENCE BOOKS:

1. Engineering Physics by R.K.Gaur and S.L.Gupta; Dhanpat Rai and Sons
2. Applied Physics by P.K.Mittal, IK International Publishing House (P) Ltd.
3. Optics by Ghatak and Thyagarajan, Tata Mc Graw
4. Engineering Physics by G Sahashra Buddhe; University Press
5. Elements of Solid State Physics by J.P.Srivatsva, PHI Publishers.
6. Introduction to Optical Communication by G. Keiser
7. Quantum Mechanics by Gupta Kumar Sharma

VNR Vignana Jyothi Institute of Engineering and Technology

I Year B.Tech ECE, EEE, EIE – I Sem	**L**	**T/P/D**	**C**
	4	**0**	**4**

(13CSE001) COMPUTER PROGRAMMING

Course objectives

- Learn how to write modular, efficient and readable C programs
- Declare and manipulate single and multi-dimensional arrays of the C data types.
- Describe the techniques for creating program modules in C using functions and recursive functions.
- Create and manage derived data types and perform operations on files.
- Utilize pointers and dynamic memory allocation functions to efficiently solve problems

Course Outcomes

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

- Write, compile and debug programs in C language.
- Design programs involving decision structures, loops, arrays and functions.
- Explain the difference between call by value and call by reference
- Understand the dynamics of memory by the use of pointers.
- Use different file operations to create/update basic data files

UNIT I

Computer fundamentals-Hardware, software, computer language , translators, Program Development steps-Algorithms, Pseudo code, flow charts, basic Linux commands ,Introduction to C Language – History, Simple C Program, Identifiers, Basic data types, user defined data types, Variables, Constants, type qualifiers, Managing Input / Output, Operators, Expressions, Precedence and Associativity, Expression Evaluation, Type conversions, Simple C Programming examples.

UNIT II

Selection Statements – if and switch statements, Repetitive statements – while, for, do-while statements, C Programming examples, other statements related to looping – break, continue, go to, C Programming examples.

Arrays– Basic concepts, one-dimensional arrays, two – dimensional arrays, multidimensional arrays, C programming examples.

UNIT III

Introduction to Structured Programming, Functions- basics, user defined functions, inter function communication, Standard functions, Storage classes-auto, register, static, extern, scope rules, arrays to functions, recursive functions, example C programs.

Strings – Basic concepts, String Input / Output functions, arrays of strings, string handling functions, strings to functions, C programming examples.

UNIT IV

Derived types – Structures – Basic concepts, nested structures, arrays of structures, structures and functions, unions, bit fields, C programming examples. Pointers – Basic concepts, pointers and functions, pointers and strings, pointers and arrays, pointers and structures, self-referential structures , example C programs.

UNIT – V

Preprocessor Directives, Dynamic Memory Allocation.

File I/O – Basic concepts, text files and binary files, file input / output operations, file status functions (error handling), C programming examples, Command-Line Arguments.

TEXT BOOKS:

1. C programming A Problem-Solving Approach by Behrouz A.Forouzan,E.V.Prasad,Richard F.GilbergC How to Program Paul Deitel and Harvey Deitel , PH.

2. Computer Programming and Data Structures by E Balagurusamy, Tata McGraw Hill.

REFERENCES:

1. Let Us C Yashavant kanetkar BPB.

2. The C Programming Language by Brian W. Kernighan, Dennis M. Ritchie.

3. Absolute beginner's guide to C, Greg M. Perry, Edition 2,Publisher: Sams Pub., 1994.

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I Year B.Tech ECE, EEE, EIE – I Sem	**L**	**T/P/D**	**C**
	3	**0**	**3**

(13ENG001) ENGLISH

Introduction

This is the age of information and communication technologies. Engineers and technical professionals need to convey technical information in English for various purposes.

Besides learning General English as an international language, engineering students need to be equipped with adequate writing ability so that they can communicate technical information clearly on at least a basic level. A good English writing proficiency can be a contributing factor to professional recognition and career prospects. This course teaches those writing strategies that scientists, engineers, and others will need in order to write successfully on the job. It initiates the students into Technical Writing. The purposes of technical writing are to inform and persuade. This program aims to train students in writing clear, concise and effective English.

This Syllabus is therefore, a Pragmatic English Writing Program for engineering students with intermediate proficiency. The program covers a syllabus outline and instructional approaches on basic writing skills with particular reference to technical writing.

Course Objectives:

- To equip the students with all the LSRW skills for advanced writing and speaking.
- To equip the students with basic grammar, infrastructural patterns and grammatical constructions required in technical writing as well as oral presentation
- To acquaint the students with the writing process in preparation for academic and workplace writing.
- Equip the students with the concept of coherence and cohesion for meaningful and coherent communication.

Course Outcomes:

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

- Comprehend technical writing produced in the engineering profession
- Understand the writing process and create logical paragraphs
- Use infrastructural patterns in writing and speaking
- Students communicate coherently orally and in writing.

Methodology

A Task-based, process oriented methodology will be used by the teachers to give a practical orientation to the teaching of language. An inductive approach will be used to demonstrate the use of language in context. This should enable the students to internalize the language structures and vocabulary used in context. Students will be exposed to numerous examples and ample practice will be given in the contextual use of language structures.

Syllabus Outline

Unit I : Review of Grammar

i) Common Errors
ii) Subject-Verb Agreement
iii) Adverbs
iv) Transitional Elements
v) Use of Articles and Prepositions
vi) Conjunctions
vii) Pronoun Reference

Unit II : **Prose 1**

1. Heaven's Gate by Pico Iyer
2. The Connoisseur by Nergis Dalal

Unit III . Reading and Writing Skills

i) Reading Comprehension -- Skimming & Scanning
ii) Reading Comprehension -- Intensive Reading
iii) Reading Comprehension -- Critical Analysis
iv) Paragraph Writing
v) Letter Writing
vi) Memo Writing

Unit IV : **Prose 2**

1. The Cuddalore Experience by Anu George
2. The Odds Against Us by Satyajit Ray

Unit V : **Advanced Writing Skills**

1. Comparison and Contrast Pattern
2. Cause and Effect Pattern
3. Classification
4. Analogy
5. Problem-Solution Pattern

Prescribed Text Books

1. Enjoying Everyday English by A. Ramakrishna Rao
2. Effective Technical Communication by Ashraf Rizvi
3. Technical Writing Process and Product by Gerson Sharon J. and Steven Gerson. 3rd edition, New Jersey: Prentice Hall 1999

References

1. M. Raman and S. Sharma, 2004; Technical Communication : Principles and Practices, OUP, (Indian Edition)
2. Blanton, L.L. 1993; Composition Practice, Book 4 ,Second Edition, Heinle & Heinle Publishers, pp. 54
3. Georges, T.M. 1996; A course in Analytical Writing for Science and Technology, http://home.comcast.net/~tgeorges/write/

VNR Vignana Jyothi Institute of Engineering and Technology

I Year B.Tech ECE, EEE,EIE – I Sem	**L**	**T/P/D**	**C**
	3	**0**	**3**

(13CED004) ENVIRONMENTAL STUDIES

Course Objectives:

Student will be able to

- Develop an understanding of the necessity of protection of environment
- Develop an understanding of Natural resources
- Develop an understanding of Biodiversity
- Develop an understanding of Global Environmental problems

Course Outcomes:

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

- Acquire the knowledge on environment
- Acquire the knowledge of various Natural Resources
- Develop skills in understanding of various environmental problems
- Develop skills to protect the Environment

UNIT-I

Environmental Studies:

Introduction, Definition, scope and importance, Ecosystems: Introduction, types, characteristic features, structure and functions of ecosystems. Bio geo chemical cycle, Classification of Eco system.

UNIT-II

Natural Resources :classification of Resources, Land resources, Land as resource, Common property resources, Land degradation, Soil erosion and desertification, Effects of modern agriculture, fertilizer –pesticide problems, Forest resources, Use and over-exploitation.

Mining and dams – their effects on forest and tribal people, Water resources, Use and over- utilization of surface and groundwater, Floods, droughts, Water logging and salinity, Dams –benefits and costs, Conflicts over Water, Energy resources.

UNIT-III

Bio-diversity and its conservation, Value of bio-diversity -consumptive and productive use, social, ethical, aesthetic and option values, Bio-geographical classification of India – India as a mega diversity habitat, Threats to bio-diversity –Hot-spots, habitat loss, poaching of wild life, loss of species, seeds, etc. Conservation of bio-diversity – Insitu and Ex-situ conservation.

UNIT-IV

Environmental Pollution –Local and Global Issues,Nature of thermal pollution and nuclear hazards, Global warming, Acid rain,Ozone depletion., Environmental case studies.

UNIT-V

Environmental Problems in India,Drinking water, sanitation and public health,Effects of the activities on the quality of environment, Water scarcity and groundwater depletion,Controversies on major dams – resettlement and rehabilitation of people: problems and concerns,Rain water harvesting, cloud seeding and watershed management. Economy and Environment,The economy and environment interaction,Economics of development, preservation and conservation, Sustainability: theory and practices,Limits to growth,Equitable use of resources for sustainable life styles, Environmental Impact Assessment.

Text Books

1. Environmental Science - Y.Anjaneyulu, B S Publications.
2. Environmental studies-Deeksha dave, Cengage learning India Pvt. Ltd.,
3. Environmental sciences and Engineering - P. Venugopal Rao, PHI learning Pvt. Ltd.,
4. Environmental Science and Technology by M. Anji Reddy, B S Publications.

Reference books

1. Clark, R.S., Marine Pollution, Clanderson Press, Oxford, 2002.
2. Cunningham, W.P., et al. , Environmental Encyclopedia, Jaico Publishing House, Mumbai, 2003.

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I Year B.Tech (Common to EEE, ECE, EIE, CSE, IT)	**L**	**T/P/D**	**C**
	2	**4**	**4**

(13MED176) ENGINEERING DRAWING

Course Prerequisites: Geometrical construction

Course Objectives:

- Understand the usage of drawing instruments.
- Understand the construction methods for drawing conic sections.
- Identify the significance of curves in engineering practice like bridges, building, arches etc.
- Understand first and third angle projections and methods.

Course Outcomes:

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

- Visualize the objects looking into projections.
- Convert projections for isometric to orthographic and vice versa.
- Work with Auto CAD for the above

UNIT – I

Introduction to Engineering Drawing; Introduction to AutoCAD; Construction of Ellipse, Parabola and Hyperbola – General and Special methods; Cycloidal curves.

UNIT – II

Projections of points; Projections of lines and planes – inclined to one plane and inclined to both the planes.

UNIT – III

Projections of solids: Prism, Pyramid, Cylinder, Cone - axis inclined to one plane and inclined to both the planes.

UNIT – IV

Isometric projections of lines, planes and simple solids.

UNIT – V

Conversion of orthographic views into isometric views and vice-versa.

TEXT BOOKS

1. Engineering Drawing By N.D.Bhatt.
2 Engineering Graphics By K.L. Narayana & P.Kannayya.

REFERENCES

1. Engineering Drawing and Graphics: Venugopal/ New age
2. Engineering Drawing: Johle / TMH

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I Year B.Tech ECE, EEE, EIE – I sem	**L**	**T/P/D**	**C**
	0	**3**	**2**

(13ENG101) ENGLISH LANGUAGE COMMUNICATION SKILLS LABORATORY

The English language Communication Skills Lab aims to provide practice in all the four skills of LSRW, with a special emphasis on listening and speaking skills.

Course Objectives

- Provide ample practice in LSRW skills and train the students in oral presentations, public speaking, role play and situational dialogue.
- Provide practice in word usage, grammatical construction, structural patterns, and improve comprehension abilities in the students.
- Train students to use neutral pronunciation through phonetic sounds, symbols, stress and intonation.
- Enable students to transfer information from verbal to graphic representation and vice versa

Course Outcomes

- Comprehend spoken and written discourse.
- Speak fluently with neutral pronunciation and exhibit interpersonal skills.
- Write accurately, coherently and lucidly making appropriate use of words depending on context and present data clearly.
- Introduce one self to people and be able to speak extempore.

Syllabus for Lab Sessions

Unit 1

Multimedia Lab

1. Grammar : Nouns and Pronouns; Articles; The Present Tense
2. Vocabulary Lesson 1
3. Listening Comprehension

Communication Skills Lab: Introduction of Self and others

Unit 2

Multimedia Lab:

1. Grammar: Concord; Adjectives; The Past Tense
2. Vocabulary: Lesson 2
3. Listening Skills

Communication Skills Lab: Seeking and Giving Information, Giving and Taking Instructions

Unit 3

Multimedia Lab

1. Grammar --- Adverbs, Conjunctions, Prepositions; The Future Tense
2. Vocabulary Lesson 3
3. Telephoning Skills

Communication Skills Lab: Role Play/ Situational Dialogues

Unit 4

Multimedia Lab:

1. Grammar ---- Active and Passive Voice; Language Analysis
2. Vocabulary : Lesson 4
3. Listening Comprehension

   Communication Skills Lab: i) JAM/ Short Talk ii) Information Transfer a) Interpretation of Graph

Unit 5

Multimedia Lab:

1. **Introduction to Technical Writing**
   A. Definition of a Technical Term
   B. Description of a Mechanism
   C. Description of a Technical Process
2. Vocabulary : Lesson 5

   Communication Skills Lab : Presentation Skills: Oral Presentation

Multimedia Lab Requirements

The English Language Lab shall have two parts:

i) **The Computer aided Language Lab** for 60 students with 60 systems, one master console, LAN facility and English language software for self- study by learners.

ii) **The Communication Skills Lab** with movable chairs and audio-visual aids with a P.A System, a T. V., a digital stereo –audio & video system and camcorder etc.

iii) **System Requirement (Hardware component):**
Computer network with Lan with minimum 60 multimedia systems with the following specifications:

i) P – IV Processor
ii) Speed – 2.8 GHZ
iii) RAM – 512 MB Minimum
iv) Hard Disk – 80 GB
v) Headphones of High quality

iv) Suggested Software:

The software consisting of the prescribed topics elaborated above should be procured and used.

List of Software:

- **Clarity Pronunciation Power** – part II
- **Oxford Advanced Learner's Compass**, 7th Edition
- **DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.**
- **Lingua TOEFL CBT Insider**, by Dreamtech

TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)

VNR Vignana Jyothi Institute of Engineering and Technology

I Year B.Tech ECE,EEE,EIE – I Sem	**L**	**T/P/ D**	**C**
	0	**3**	**2**

(13CSE101) COMPUTER PROGRAMMING LABORATORY

Course objectives:

- Gain a working knowledge of C programming to write modular, efficient and readable C programs by Identifying the structural elements and layout of C source code.
- Declare and manipulate single and multi-dimensional arrays of the C data types and derived data types like structures, unions.
- Use functions from the portable C library and to describe the techniques for creating program modules using functions and recursive functions.
- Manipulate character strings in C programs. Utilize pointers to efficiently solve problems, Allocate memory to variables dynamically and Perform operations on text and binary files.

Course Outcomes

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

- understand the basic terminology used in computer programming and to
- write, compile and debug programs in C language.
- design programs involving decision structures, loops ,arrays and functions.
- understand the dynamics of memory by the use of pointers.
- use different file operations to create/update basic data files.

Week 1

a. Basic Linux commands

b. Simple C programs -to implement basic arithmetic operations – sum, average, product, smallest, largest of the numbers, difference, quotient and remainder of given numbers etc.

Week 2

Programs on if, else-if, nested if, else if ladder - largest and smallest of given numbers, to find the grade of a student based on marks, roots of a quadratic equation etc.

Week 3

a. Programs on switch-case – to check the type of a given character, to find the grade of a student etc.

b. Programs on while and do-while- to find factorial, Fibonacci series, GCD, sin(x), cos(x) series , to check whether a given number is an Armstrong, Palindrome, Perfect, number conversion, and Prime number etc.

Week 4

Programs on for loop- sum of n natural numbers, factorial, sin(x), to generate Pascal's triangle etc.

Week 5

a. Programs on nested loops – check for Fibonacci prime, Pyramids of numbers, generation of prime numbers in the given range, multiplication table etc.

b. programs using break, go to, continue.

Week 6

a. Programs on 1-D array-finding Minimum and maximum element ,Sorting and Searching etc.

b. Programs on 2-D array – Sum, product and Multiplication of two Matrices etc.

Week 7

a. Programs on Functions-Implementation of user defined functions categories, passing of arrays to functions etc.

b. Programs on recursion - factorial of a given integer, GCD of two given integers etc.

Week 8

a. Programs on String handling functions-Copying, reverse, substring, concatenation.

b. Programs on structure and unions.

Week 9

Midterm exam

Week 10

Programs using pointers- pointer basic operations, pointers and functions etc

Week 11

Programs on pointers and structures, Pointers and arrays, pointers and strings.

Week 12

Programs on files-Implementation of file handling functions.

Week 13

a. Programs on files error handling.

b. Programs on Dynamic memory allocation

Week 14

Programs on command line arguments.

Week 15

Programs on preprocessor directives

Week 16

Internal Lab Exam

VNR Vignana Jyothi Institute of Engineering and Technology

I Year B.Tech EIE – I Sem	**L**	**T/P/D**	**C**
	0	**3**	**2**

(13MED103) IT AND ENGINEERING WORKSHOP

Course Objectives:

- To study/demonstrate the concepts of computer w.r.t. its hardware, operating system, assembling and disassembling.
- To conduct the experiments related to production engineering technology.
- To demonstrate the usage of power tools, CNC lathe and machine shop for different exercises

Course Outcomes:

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

- Identify, assemble, dissemble, install and write commands for a given configuration of a computer.
- To develop components using the techniques of carpentry, tin smithy, forging, etc. listed in trades for exercises.
- To work out the given models in machine shop and CNC lathe.

IT WORKSHOP

1. Computer Hardware: Identification of Peripherals
2. Assembling and disassembling of a PC
3. Simple diagnostic exercises – Related to hardware
4. Installation of Windows Operating System
5. Installation of Linux Operating System
6. Linux Basic Commands
7. Simple diagnostic exercises –Related to Operating System

TEXTBOOKS:

1. IT Essentials PC Hardware and Software Companion Guide Third Edition by Davis Anfinson and Ken Quamme CISC Press, Pearson Education.
2. PC Hardware and A+ Handbook – Kate J. Chase PHI (Microsoft)

ENGINEERING WORKSHOP

TRADES FOR EXCERCISES

At least **two** exercises from each trade:

1. Carpentry
2. Tin-Smithy
3. Fitting
4. Welding
5. Electrical Wiring

TRADES FOR DEMONSTRATION AND EXPOSURE:

1. Power tools in construction, wood working, electrical engineering and mechanical engineering.
2. Machine shop.
3. CNC Lathe

TEXT BOOKS:

1. Workshop Manual by P.Kannaiah and K.L.Narayana; Publisher: Scitech.

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I Year B.Tech ECE, EEE, EIE – II Sem	**L**	**T/P/D**	**C**
	3	**1**	**3**

(13MTH004) NUMERICAL ANALYSIS AND GRAPH THEORY

Course prerequisites: Numerical Methods, Graph Theory

Course Objectives:

- Understand the solutions of the equations and interpolation concept for the given interval
- Understand the purpose of numerical differentiation and integration
- Apply the explicit and implicit methods to find the numerical solutions of ordinary differential equations
- Know the fundamental concepts of graph theory and it's applications

Course Outcomes:

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

- Find the solution of non linear equations using Bi-Section, Regula-False Position, Iterative and Newton-Rapson methods.
- Solve the problems using numerical differentiation and integration.
- Calculate the numerical solutions of ordinary differential equations using the explicity and implicity methods
- Identify the classification of graphs, trees, minimal spaning tree and it's applications.

UNIT I

Solutions of non-linear systems

Introduction; Mathematical preliminaries; Solution of algebraic and transcendental equations – the iteration method ,the bisection method, the method of false position, Newton - Raphson method, and their order of convergence.

UNIT II

Interpolation

Introduction; Errors in polynomial interpolation; Finite differences; Forward differences; Backward differences; Central differences; Symbolic relations and separation of symbols; Differences of a polynomial; Newton's formulae for interpolation; Central difference interpolation formulae; Gauss's central difference formulae; Lagrange and Hermite interpolation formulae.

UNIT III

Numerical Differentiation and Integration:

Numerical differentiation based on interpolation

Numerical Integration based on Trapezoidal rule, Simpson's 1/3 rule and Simpson's 3/8 rule.

UNIT IV

Numerical solutions of ordinary differential equations:

Solution of initial value problems by Taylor's series - Picard's method of successive approximations, Euler's method, and Runge - Kutta methods; Predictor Corrector methods - Adams Bashforth method,Adams Moulton method and Milne's method.

GRAPH THEORY

UNIT V

Elementary Graph Theory

Graphs, Represntation by matrices: Adjacent matrix, incident matrix- simple, multiple, regular, complete, bipartite and planar graphs-Hamiltonian, Eulerian circuits- Trees – Spanning tree – Minimum spanning tree.

TEXT BOOKS

1. Elementary Numerical Analysis – B.S. Grewal, 3rd edition Publisher: Khanna Publishers
2. Discrete Mathematics -Seymour Lipschutz & Marc Lars Lipson, Schaum's outline series, Publisher: Tata McGraw Hill.

REFERENCES

1. Advanced Engineering Mathematics -Erwin Kreyszig, 8th Edition; Publisher: John Wiley and Sons.
2. Advanced Engineering Mathematics -Peter V. O'Neil, 9th Edition; Publisher: Cengage Learning
3. Elementary Numerical Analysis – an algorithmic approach -Samuel D. Conte and Carl De Boor (2006); 3rd edition; Publisher: Tata McGraw Hill.

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I Year B.Tech ECE, EEE, EIE – II Sem	**L**	**T/P/D**	**C**
	3	**1**	**3**

(13MTH002) Linear Algebra and Ordinary Differential Equations

Course Objectives:

- Understand the Echolen form and Normal form of a matrix and its applications in solving linear system of equations.
- Understand the methods of solving first order differential equations and learn about its applications to L-R and R-C circuits.
- Apply the convolution theorem to evaluate Laplace Transform of the functions.
- Apply Z-Transforms in solving the difference equations.

Course Outcomes:

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

- Find the rank using Echolen form and Normal form.
- Solve the problems in first order and second order differential equations.
- learn Laplace Transform as a tool.
- Evaluate the Z-Transform of the given function.

UNIT-I

LINEAR ALGEBRA – MATRICES:

Rank of matrix, Hermitian and skew – Hermitian matrices, Inverse of matrix by elementary operations. Consistency of linear simultaneous equations, Eigen values and eigen vectors , Diagonalisation of a matrix(including the case of repeated eigen values). Caley – Hamilton theorem (without proof), Quadratic forms - reduction of quadratic form to canonical form by linear transformation.

UNIT-II

ORDINARY DIFFERENTIAL EQUATIONS AND THEIR APPLICATIONS:

Differential equations of first order and first degree - Exact differential equation , Linear and Bernoulli differential equation , Applications of differential equations of first order and first degree - Newton's law of cooling, Law of natural growth and decay, Orthogonal trajectories, and basic circuits(L-R Circuits, R-C Circuits).

UNIT-III

DIFFERENTIAL EQUATIONS OF HIGHER ORDER AND THEIR APPLICATIONS:

Differential equations of higher order - homogeneous and non-homogenous type, differential equations of second order and higher order with constant coefficients with right hand side term of the type e^{ax} sin (ax), cos (ax), polynomials in x, e^{ax} , V(x), x V(x) and method of variation of parameters ; Euler-Cauchy's 2^{nd} order differential equations, applications to spring mass system ,Simple harmonic motion and L-C-R Circuits.

UNIT-IV

LAPLACE TRANSFORMS:

Existence condition, Laplace transform of standard functions, Properties, Inverse Laplace transform of functions using partial fractions, Convolution and Convolution theorem (statement only). Solving linear differential equations using Laplace transform. Unit step function, Impulse function and Periodic function and their transforms.

UNIT- V

Z-TRANSFORMS :

z-transform; Inverse z-transform; Properties, initial, and final value theorems; Convolution theorem(theorems without proofs); Difference equations; Solutions of difference equations using z-transform.

TEXT BOOKS:

1. Higher Engineering Mathematics – B. S. Grewal,Khanna publishers.
2. A First Course in Differential Equations by Dennis G. Zill; Publisher: Brooks Cole publiers .
3. Advanced Engineering Mathematics by R.K.Jain and S.R.K.Iyengar; Narosa Publications.

REFERENCES:

1. Advanced Engineering Mathematics by Erwin Kreyszig, 8th Edition; Publisher: John Wiley.
2.Advanced Engineering Mathematics by Peter V. O'Neil, 9th Edition; Publisher: Cengage Learning

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I Year B.Tech ECE,EEE,EIE – II Sem	**L**	**T/P/D**	**C**
	4	**1**	**4**

(13EEE001) CIRCUIT THEORY

Course Objectives

- To understand the basic concepts of Circuit Analysis.
- To analyze single phase ac circuits and magnetic circuits.
- To apply Network Theorems for Circuit Analysis.
- To understand the graph theory and its properties of circuit

Course Outcomes

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

- Apply basic network reduction techniques for analysis of electrical circuits.
- Analyze ac circuits along with resonance and locus diagrams.
- Appreciate the application of network theorems
- Analyze graph theory and topology solutions.

UNIT–I

INTRODUCTION TO ELECTRICAL CIRCUITS

Circuit Concept – R-L-C parameters – Voltage and Current sources – Independent and dependent sources-Source transformation – Voltage – Current relationship for passive elements (for different input signals-square, ramp, saw tooth, triangular). Kirchhoff's laws – network reduction techniques – series, parallel, series parallel, star-to-delta or delta-to-star transformation. Nodal analysis, Mesh analysis, Super Node and Super Mesh analysis of Networks with Independent and Dependent voltage and current sources.

UNIT–II

MAGNETIC CIRCUITS

Magnetic Circuits – Faraday's laws of electromagnetic induction – concept of self and mutual inductance – dot convention – coefficient of coupling – composite magnetic circuit - Analysis of series and parallel magnetic circuits

UNIT–III

SINGLE PHASE A.C CIRCUITS

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

UNIT-IV

LOCUS DIAGRAMS AND RESONANCE

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

UNIT–V

NETWORK TOPOLOGY AND NETWORK THEOREMS

Definitions – Graph – Tree, Basic cutset and Basic Tieset matrices for planar networks - Duality and Dual networks. Superposition, Reciprocity, Thevenin's, Norton's, Maximum Power Transfer, Tellegen's, Millman's and Compensation theorems for d.c. and a.c. excitations.

TEXT BOOKS

1. Engineering circuit analysis by William Hayt and Jack E. Kemmerly, Mc Graw Hill Company, 6th Edition.
2. Network Analysis by A. Sudhakar, Shyammohan Palli, Mc Graw Hill Company,
3. Circuit Theory by A. Chakrabarti, Dhanipat Rai and Co., 6th Edition.

REFERENCES

1. Network Analysis by M. E Van valkenburg, PHI.
2. Linear circuit analysis (time domain phasor, and Laplace transform approaches) by RAYMOND A.DECARLO and PEN-MIN-LIN, Oxford University Press. 2nd Edition, 2004.
3. Network Theory by N.C. Jagan and C.Lakshminarayana, B.S Publications.
4 . Electrical Circuit theory by K. Rajeswaran, Pearson Education 2004.
5. Basic Circuit analysis by D.R, Cunningham and J.A Stuller, Jaico Publications.

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I Year B.Tech ECE, EEE, EIE – II Sem	**L**	**T/P/D**	**C**
	3	**1**	**3**

(13PHY003) ADVANCED ENGINNERING PHYSICS

Course Objectives:

- To learn different semiconductors and to calculate their carrier concentration
- To learn the structure of solids, crystal systems, packing and arrangement of particles in crystals, simple planes and directions in solids, defects in crystals
- To learn the properties of magnetic materials and classification, Dielectric materials
- To learn the concept and applications of superconductors

Course Outcomes:

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

- Identify different semiconductors and to calculate their carrier concentration.
- Identify different crystal types various planes and directions in crystals and estimate one dimentional crystal defects
- Learn the magnetic properties of materials,classify the magnetic materials into Dia, Para and ferro.
- Learn the characteristics, properties and applications of superconductors and magnetic materials

UNIT -1

SEMICONDUCTOR PHYSICS:

Fermi level in Intrinsic and Extrinsic semiconductors - Intrinsic semiconductor and carrier concentration – Extrinsic semiconductor and carrier concentration – Equation of continuity – Direct and indirect band gap semiconductors - Hall Effect. Formation of p-n junction – open circuit p-n junction – Energy diagram of diode – i/v characteristics of p-n junction diode – Diode equation.

UNIT -2:

CRYSTAL STRUCTURES:

Space lattice – Unit cell – Lattice parameter – Crystal systems – Bravais lattice, Atomic radius – Co-ordination number - Structures and Packing fractions of Simple Cubic – Body Centered Cubic – Face Centered Cubic – Hexagonal closed packed & diamond Cubic Crystals.

BONDING IN SOLIDS:

Force and energy between two approaching atoms, primary and secondary bonds, binding energy and cohesive energy, Madelung constant, cohesive energy and Madelung constant for NaCl crystal

UNIT -3

DIRECTIONS, PLANES AND X-RD:

Miller Indices for Crystal planes and directions – Inter planar spacing of orthogonal crystal systems –Diffraction of X-rays by crystal planes and Bragg's law– Laue method – Powder method – Applications of X-ray diffraction

DEFECTS IN SOLIDS:

Imperfections in crystals – Point defects (Vacancies, Interstitial and Impurities) Schottky and Frenkel defects – (with mathematical treatment)- Line imperfections – Edge and Screw dislocation – Burger vector – Surface defects and volume defects (Qualitative Treatment).

UNIT -4

MAGNETIC PROPERTIES OF MATERIALS:

Permeability, Field intensity, magnetic field induction, Magnetization and Magnetic susceptibility – Origin of magnetic moment, Bohr magneton – Classification of magnetic materials (Dia, Para and Ferro)- Domain theory of ferromagnetism, Hysteresis curve – Soft and Hard magnetic materials – Ferrites and their applications.

UNIT -5

DIELECTRIC PROPERTIES:

Electric dipole, Dipole moment, Dielectric constant, Electronic, Ionic and Orientation Polarization – Calculation of Polarizibilities – Internal fields – Claussius – Mossotti equation –Piezo and Ferro electricity

SUPERCONDUCTORS:

Experimental survey and superconductivity phenomenon, – Meissner effect – Critical fields and Persistent currents, Type I and Type II superconductors - London equations-flux quantization-BCS Theory, Applications of Superconductors.

TEXT BOOKS:

1. Introduction to Solid State Physics by Charles Kittel , Publishers: John Wiley & Sons
2. Applied Physics by P.K.Mittal, IK International Publishing House (P) Ltd

References

1. Solid State Physics by A.J.Dekker; Macmillan Publishers India Ltd.
2. Engineering Physics by G Sahashra Buddhe; University Press
3. Elements of Solid State Physics by J.P.Srivatsva, PHI Publishers
4. Engineering Physics by M.R.Srinivasan, New Age Publishers
5. Solid State Physics by M.A. Wahab.

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I Year B.Tech ECE, EEE, EIE – II sem	**L**	**T/P/D**	**C**
	3	**0**	**3**

(13CHE001) ENGINEERING CHEMISTRY

Course prerequisites – General chemistry

Course Objectives:

- Understand electrochemistry which deals with the utilization of electrical energy of an external source for bringing about a physical or chemical change.
- Knowledge of "Corrosion engineering education" and Usage of polymers in modern world as an integral part of every human's life.
- Knowledge of purification techniques and various applications of soft water in industries.
- Usage of nano materials as emerging scientific components with amazing potential applications in various fields.

Course Outcomes:

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

- Visualize the chemical applications of electricity.
- Prevention of corrosion of metals and applications of polymers from domestic articles to sophisticated scientific and medical instruments.
- Benefits of treated water as source in steam generation and other fields like production of steel, paper, textiles, atomic energy etc.
- The applicability and greater efficiency of using a material at nanoscale in different engineering fields.

UNIT I

ELECTROCHEMICAL CELLS AND BATTERIES

Conductance-factors effecting conductance, conductometric titrations; cells: types of cells, cell representation, electrode potential; Standard electrode potential; Electrochemical series; Nernst equation; Reference electrodes – hydrogen, calomel electrode; Ion selective electrodes (glass electrode & flouride electrode); Numerical problems.

BATTERIES

Primary and secondary cells (lead-acid cell; Ni-Cd cell; lithium cells); Applications of batteries; Fuel cells – methanol – oxygen fuel cells, advantages of fuel cells; Solar cells - principle, and applications.

UNIT II

CORROSION AND ITS CONTROL

Introduction; Causes and effects of corrosion; Different types of corrosion; Theories of corrosion – chemical, electrochemical corrosion (reactions); Factors affecting corrosion – nature of metal (galvanic series; over voltage; purity of metal; nature of oxide film; nature of corrosion product), and nature of environment (effect of temperature; effect

of pH; humidity; effect of oxidant). Corrosion control methods – cathodic protection, sacrificial anode, and impressed current cathode;

Surface coatings – methods of application on metals (hot dipping; galvanizing; tinning; cladding; electroplating), and organic surface coatings (paints - constituents and functions).

UNIT III

A) POLYMERS

Introduction**;** Types of polymerization; Plastics - thermoplastic resins, and thermoset resins; Compounding & fabrication of plastics; Preparation, properties, and engineering applications of polyethylene, PVC, PS, Teflon, bakelite, nylon.

B) RUBBER

Natural rubber- processing, vulcanization; Elastomers (Buna-s; Butyl rubber; Thiokol rubbers); Fiber reinforced plastics (FRP) and their applications.

UNIT IV

WATER

Introduction; Hardness - causes, expression of hardness, units, types of hardness, estimation of temporary & permanent hardness of water, and numerical problems; Boiler troubles – scale & sludge formation, caustic embrittlement, corrosion, priming & foaming; Softening of water (Internal & external treatment - lime soda, zeolite, ion exchange process, and numerical problems); Reverse osmosis and Electro dialysis (desalination processes).

UNIT V

NANOMATERIALS

Introduction; Preparation and applications of nanomaterials with special reference to carbon nanotubes.

INSULATORS

Classification of insulators; characteristics of thermal & electrical insulators and their applications; Superconductors - $YBa_2 Cu_3 O_{7-x}$; Applications of superconductors.

TEXT BOOKS

1. Text Book of Engineering Chemistry by Y.Bharathi Kumari, Jyotsna Cherukuri; Publisher: VGS Book Links.
2. Engineering Chemistry by P.C.Jain & Monica Jain, Publisher: Dhanpatrai Publishing Company.

REFERENCES

1. Text Book of Engineering Chemistry by S.S. Dhara & Mukkanti; Publisher: S.Chand & Co.
2. Engineering Chemistry by O G Palanna
3. Text Book of Engineering Chemistry by R.Gopalan, D.Venkappayya, Sulochana Naga Rajan; Publisher: Vikas Publishers.
4. Engineering Chemistry by R.P.Mani, S.N. Mishra, B.Rama Devi ,Cengage Learning Publications.

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I Year B.Tech CSE , IT,ECE,EEE,EIE – II Sem	**L**	**T/P/D**	**C**
	4	**1**	**4**

(13ITD002) DATA STRUCTURES

Course Objectives:

- To teach efficient storage mechanisms of data for an easy access.
- To design and implementation of various basic and advanced data structures.
- To introduce various techniques for representation of the data in the real world.
- To develop application using data structures and to improve the logical ability

Course Outcomes:

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

- Student will be able to choose appropriate data structure as applied to specified problem definition.
- Student will be able to handle operations like searching, insertion, deletion, traversing mechanism etc. on various data structures.
- Students will be able to apply concepts learned in various domains like DBMS, compiler construction etc.
- Students will be able to use linear and non-linear data structures like stacks, queues, and linked list.

UNIT-I

Data Structures – Introduction to Data Structures, abstract data types, Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, circular linked list implementation, Double linked list implementation, insertion, deletion and searching operations. Applications of linked lists.

UNIT –II

Stacks-Operations, array and linked representations of stacks, stack applications-infix to postfix conversion, postfix expression evaluation, recursion implementation.

UNIT-III

Queues-operations, array and linked representations. Circular Queue operations, Dequeue, applications of queue.

UNIT-IV

Trees – Definitions, Binary tree representation, Binary search tree, binary tree traversals.

Graphs – Definitions, Graph representations, Graph traversals.

UNIT-V

Searching and Sorting – Big O Notation, Sorting- selection sort, bubble sort, insertion sort, quick sort, merge sort,

Searching-linear and binary search methods.

TEXT BOOKS:

1. C Programming & Data Structures, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.
2. Data Structures Using C (Paperback) by Aaron M. Tenenbaum

REFERENCE BOOKS:

1. C& Data structures – P. Padmanabham, Third Edition, B.S. Publications.
2. Data Structures using C – A.M.Tanenbaum, Y.Langsam, and M.J. Augenstein, Pearson Education
3. C Programming & Data Structures, E. Balagurusamy, TMH.
4. C Programming & Data Structures, P. Dey, M Ghosh R Thereja, Oxford University Press
5. C& Data structures – E V Prasad and N B Venkateswarlu, S. Chand&Co.

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I Year B.Tech ECE, EEE, EIE – II Sem	**L**	**T/P/D**	**C**
	0	**3**	**2**

(13EPC101) ENGINEERING PHYSICS & CHEMISTRY LABORATORY

ENGINEERING PHYSICS LABORATORY

COURSE OBJECTIVES:

- To practically learn interaction of light with matter through physical phenomena like interference, diffraction and dispersion.
- To expose to the principle of superposition and resonance.
- To demonstrate the formation of standing waves and to understand the mechanical wave behavior and to determine Rigidity Modulus of different material s of wires .
- To demonstrate basic discharge phenomenon in capacitors and to know the characteristics of the circuit elements, like resistors, capacitors and inductors.

Course Outcomes:

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

- Understand clearly the interference principle in wave theory of light and able to relate it to the formation of Newton Rings and Obtain a pure spectrum when light passes through prism
- Understand the formation and propagation of mechanical waves
- Study simple oscillations of a load attached to a string and relate it to nature of material of string
- Understand the physical significance of time constant and related uses

Any Eight Experiments from the following:

1. Dispersive Power of the material of a Prism using Spectrometer
2. Diffraction Grating (both with Laser and non laser source)
3. Single Slit with laser light
4. Newton's Rings
5. Finding thickness of a thin wire or sheet by forming a wedge shaped film
6. Energy gap of a semiconductor material
7. To determine the rigidity modulus of material of a wire
8. Melde's experiment
9. Sonometer Experiment
10. AC frequency by sonometer method
11. Numerical Aperture and Acceptance angle of an optical fiber cable
12. Attenuation and Bending losses in optical fiber
13. Stewart Gee's experiment
14. Characteristics of LED/Laser Diode.
15. Photo cell/ Solar Cell
16. RC circuit

Book: Essential Practical Lab Manual in Physics: by P.Raghavendra Rao

ENGINEERING CHEMISTRY LABORATORY

Course Objectives:

- Estimation of hardness of water is essential for drinking water and in industries to avoid boiler troubles.
- Knowledge of instrumentation in Colorimeter, Redwood viscometer, Conductivity meter and pH meter.
- Knowledge of preparation of soap.

Course Outcomes:

- Understand the extent of hardness range present in a water sample and its consequences if used for various industrial operations.
- Determination of strength of solutions ,pH of various solutions, lubricants usage in machinery to prevent wear and tear.
- Understanding the composition of soap used for washings.

1. TITRIMETRY

Estimation of hardness of water by EDTA method.

2. INSTRUMENTAL METHODS

(i) Conductometry

Conductometric titration of strong acid Vs Strong base

(ii) Colorimetry

Estimation of copper by colorimetric method

(iii) p^H Metry

Titration of strong acid Vs Strong base by pH Metry

3. PHYSICAL PROPERTIES

Determination of viscosity of sample oil by Redwood viscometer.

4. PREPARATIONS

Preparation of i) soap ii) Nano-particles

TEXT BOOKS:

1. Laboratory Manual on Engineering Chemistry by S.K.Bhasin and Sudha Rani, Dhanpat Rai Publishing Company.
2. Laboratory Manual on Engineering Chemistry by Y.Bharathi Kumari, Jyotsna Cherukuri, VGS Book Links, Vijayawada

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I Year B.Tech CSE, IT, ECE, EEE, EIE – II Sem	**L**	**T/P/D**	**C**
	0	**3**	**2**

(13ITD102) DATA STRUCTURES LABORATORY

Course Objectives:

- To develop skills to design and analyze simple linear data structures
- To develop skills to design and analyze simple nonlinear data structures
- To strengthen the ability to identify and apply the suitable data structure for the given real world problem
- To gain knowledge in practical applications of data structures

Course Outcomes:

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

- design and analyze the time efficiency of the data structure
- design and analyze the space efficiency of the data structure
- identity the appropriate data structure for given problem
- Have practical knowledge on the application of data structures

TASK 1:

1. Write a program for creation, Search and Traversal of Single Linked List
2. Write a program to perform insertion and deletion operations in Single Linked List
3. Write a program to merge two single linked lists

TASK 2:

1. Write a program for creation, Search and Traversal of Circular Linked List
2. Write a program to perform insertion and deletion operations in Circular Linked List

TASK 3:

1. Write a program for creation, Search and Traversal of Double Linked List
2. Write a program to perform insertion and deletion operations in Double Linked List

TASK 4:

1. Write a program to implement stack using Arrays
2. Write a program to implement stack using Linked List

TASK 5:

1. Write a program to convert infix expression to postfix expression using stack
2. Write a program to evaluate postfix expression

TASK 6:

1. Programs using recursion
2. Write a program to convert infix expression to prefix expression using stack

TASK 7:

1. Write a program to implement Linear queue using Array
2. Write a program to implement Linear queue using Linked List

TASK 8:

1. Write a program to implement insertions and deletions in a circular Queue
2. Write a program to perform search and count operations in a circular queue

TASK 9:

1. Write a program to implement insertions and deletions in a Dequeue
2. Write a program to perform search and count operations in Dequeue

TASK 10:

1. Write a program to implement Linear search
2. Write a program to implement Binary Search

TASK 11:

1. Write a program to implement Selection sort
2. Write a program to implement Bubble sort
3. Write a program to implement Insertion sort

TASK 12:

1. Write a program to implement Merge sort
2. Write a program to implement Quick sort

TASK 13:

1. Implementation of a binary tree representation using Arrays
2. Write a program to implement tree traversals.

TASK 14:

1. Implementation of a Graph representation using Adjacency Matrix
2. Write a program to implement graph traversals.

TEXT BOOKS:

1. C Programming & Data Structures, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.
2. Data Structures Using C (Paperback) by Aaron M. Tenenbaum

REFERENCE BOOKS:

1. C& Data structures – P. Padmanabham, Third Edition, B.S. Publications.
2. Data Structures using C – A.M.Tanenbaum, Y.Langsam, and M.J. Augenstein, Pearson Education / PHI
3. C Programming & Data Structures, E. Balagurusamy, TMH.
4. C Programming & Data Structures, P. Dey, M Ghosh R Thereja, Oxford University Press
5. C& Data structures – E V Prasad and N B Venkateswarlu, S. Chand&Co.

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II Year B.Tech EEE – I Sem	**L**	**T/P/D**	**C**
	3	**1**	**3**

(13MTH005) Partial Differential Equations with applications & Complex Analysis

Course prerequisites: Differentiation, integration

Course Objectives:

- Derive the Fourier coefficients for the sine and cosine series.
- Apply Separation of Variables to solve elementary examples of linear second order Partial Differential Equations (heat , Laplace and wave equations).
- Understand the properties of Fourier transforms.
- Apply Cauchy theorem, Cauchy's Integral formula, Residue theorem of complex functions.

Course Outcomes:

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

- Solve the second order linear partial differential equations by using separation of variables method.
- Solve problems in Fourier half range sine and cosine series
- Evaluate simple problems of finite Fourier sine and cosine transforms, Inverse Fourier sine and cosine transform problems and apply to heat , wave and Laplace equations
- Evaluate the line integrals using residue theorem,Cauchy's theorem and Cauchy's integral formula

Unit-I

Fourier Series: Fourier Series of periodic functions, Euler's formulae, Fourier series of even and odd functions, having arbitrary periods, half range Fourier series.

Unit-II

Fourier Transforms: Fourier transform, Sine and Cosine transforms and their properties , Finite fourier Transforms and Parsavel's Identity.

Unit-III

Standard Partial Differential Equations:

Method of seperation of variables ,Applications:Problems of vibrating string- wave equation, Problems of one-dimensional heat equation,Problems of steady state two dimensional heat flow-Laplace equation.

UNIT – IV

Functions of a complex variable: Functions of a complex variable, Continuity, Differentiability, Analyticity, Cauchy-Riemann equations in Cartesian and polar coordinates, Harmonic and conjugate harmonic functions, Milne – Thompson method. Exponential, trigonometric, hyperbolic functions and their properties, z^c and Logz .

UNIT – V

Integration of complex function, Power series and Residues:

Line integral, evaluation along a path and by indefinite integration. Cauchy's integral theorem, Cauchy's integral formula. Expansion of Taylor's series and Laurent series (without proofs). Singular point, Isolated singular point, pole of order m , essential singularity. Residues – Evaluation of residue by formulae, Residue theorem, Evaluation of real integrals.

TEXT BOOKS:

1. Higher Engineering Mathematics – B. S. Grewal,Khanna publishers.
2. Complex Variables & Its Applications- Churchill and Brown, (1996), International Edition, McGraw Hill.

REFERENCES:

1. Advance Engineering Mathematics - Peter O'Neil,(2000),5th Edition, Cengage Learning
2. Schaum's Outline Of Complex Variables - Murray.R.Spiegel,(2011), 2nd Edition, Tata McGraw Hill.

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II Year B.Tech EEE – I Sem	**L**	**T/P/D**	**C**
	4	**1**	**4**

(13ECE001) ELECTRONIC DEVICES AND CIRCUITS

Course Objectives

- To learn principle of operation, construction and characteristics of various electronic devices.
- To study operation and characteristics of Rectifiers with filters.
- To understand the analysis of small signal low frequency amplifiers.
- To provide the concepts involved in design of electronic Circuits.

Course Outcomes

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

- Understand the operation and characteristics of various electronic devices.
- Develop few applications of devices.
- Understand the importance of biasing and stabilization.
- Analyze small signal model for BJTand FETamplifiers.

UNIT I

P-N JUNCTION DIODE AND APPLICATIONS

Review of Semi Conductor Materials, Theory of p-n Junction, p-n Junction as a Diode, Diode Equation, Volt-Ampere Characteristics, Temperature dependence of V-I characteristic, Ideal and Practical Diode Equivalent Circuits, Static and Dynamic Resistance levels , Transition and Diffusion Capacitances.

The p-n diode as a rectifier, Half wave Rectifier, Full wave rectifier, Bridge Rectifier, Harmonic components in a Rectifier Circuit, Inductor filters, Capacitor filters, L- Section Filters, Π- section filters, Comparison of Regulation Characteristics of different Filters, Breakdown Mechanisms in Semi Conductor Diodes, Zener Diode Characteristics, Shunt Voltage Regulation using Zener Diode.

UNIT II

TRANSISTORS, BIASING AND STABILIZATION

The Bipolar Junction Transistor(BJT), Transistor Current Components, Transistor Construction, BJT Operation, Common Base, Common Emitter and Common Collector Configurations, Limits of Operation, Transistor as an Amplifier, BJT Specifications, Principle of series voltage regulators.

The DC and AC Load lines, Quiescent operating Point, Need for Biasing, Fixed Bias, Collector Feedback Bias, Emitter Feedback Bias, Collector-Emitter Feedback Bias, Voltage Divider Bias, Bias Stability, Stabilization Factors, Stabilization against variations in $V_{BE,}$ β_1 and I_{CO}. Bias Compensation using Diodes, Thermistors and Sensistors, Thermal Runway, Thermal Stability.

UNIT III

SMALL SIGNAL LOW FREQUENCY BJT AMPLIFIERS

Small signal low frequency transistor amplifier circuits: h-parameter representation of a transistor, Analysis of single stage transistor amplifiers CE, CC, CB configurations using h-parameters: voltage gain, current gain, Input impedance and Output impedance. Comparison of CB, CE, CC configurations in terms of A_I, R_i, A_V, R_O.

UNIT IV

FET, BIASING AND AMPLIFIERS

Construction and operation of Junction Field Effect Transistor (JFET), Volt-Ampere characteristics - Drain and transfer Characteristics, FET as Voltage Variable Resistor, Biasing FET, The JFET Small Signal Model, FET Common Source Amplifier, Common Drain Amplifier, Construction and operation of MOSFET , MOSFET Characteristics in Enhancement and Depletion modes. Comparison of BJT and FET amplifiers.

UNIT V

SPECIAL PURPOSE ELECTRONIC DEVICES

Principle of Operation and Characteristics of Tunnel Diode (with the help of Energy Band Diagram), Varactor Diode and schotky barrier diode. Principle of Operation and Characteristics of UJT, UJT Relaxation Oscillator. Principle of Operation of SCR, Schockley Diode, Diac and Triac. Principle of Operation of Semiconductor Photo Diode, PIN Diode ,Photo Transistor ,LED and LCD.

TEXT BOOKS

1. Electronic Devices and Circuits by J.Millman, C.C.Halkias, and Satyabratha Jit, Tata McGraw Hill, 2nd Edition, 2007.
2. Electronic Devices and Circuits by R.L. Boylestad and Louis Nashelsky, Pearson/Prentice Hall, 11th Edition, 2006.
3. Electronic Devices and Circuits by David A Bell, Oxford University Press, 5th edition 2008

REFERENCES

1. Integrated Electronics - J.Millman and Christos.C.Halkias, and Satyabratha, Jit Tata McGraw Hill, 2nd Edition, 2008.
2. Electronic Devices and Circuits – T.F. Bogart Jr., J.S.Beasley and G.Rico, Pearson Education, 6th Edition, 2004.
3. Electronic Devices and Circuits- S. S Salivahanan, N. Sursh Kumar, A. Vallava Raju,2nd Edition., TMH, 2010.

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II Year B.Tech EEE – I Sem	**L**	**T/P/D**	**C**
	3	**1**	**3**

(13EEE002) NETWORK ANAYSIS

Course Objectives:

- To understand Three phase circuits.
- To analysis transients in Electrical systems.
- To evaluate Network parameters of given Electrical network and design of filters.
- To apply Fourier analysis to Electrical systems.

Course Outcomes:

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

- Describe The importance of three phase circuit for balanced and unbalanced conditions
- Analyze the transient behavior of electrical networks in time domain and frequency domain.
- Illustrate the concept of complex frequency, transform impedance, significance of poles and zeros of a given transfer function and network synthesis.
- Describe The properties of Fourier transforms and their applications to Electrical Systems.

UNIT–I

THREE PHASE CIRCUITS

Three phase circuits: Phase sequence – Star and Delta connection – Relation between line and phase voltages and currents in balanced systems – Analysis of balanced and Unbalanced 3 phase circuits – Measurement of Active and Reactive Power- Different methods-Problems

UNIT–II

TRANSIENT ANALYSIS

Transient response of R-L, R-C, R-L-C circuits (Series and parallel combinations) for D.C. and sinusoidal excitations – Initial conditions - Solution using differential equation approach and Laplace transforms.

Response of R-L, R-C, R-L-C circuits for step, ramp, pulse and impulse excitation using Laplace Transform Methods.

UNIT–III

NETWORK FUNCTIONS & SYNTESIS

The Complex Frequency- concept -Physical interpretation - Transform Impedance and Transform Circuits, Series and parallel Combination of Elements, Terminal Pairs or Ports, Network Functions for One-port and Two-port, Poles and Zeros of Network Functions, Significance of poles and Zeros, Properties of Driving Point Functions,

Properties of Transfer functions, Necessary Conditions for Transfer Functions, Time Domain Response from Pole Zero Plot.
Synthesis of one port LC, RL and RC networks – Foster and Cauer methods.

UNIT–IV

NETWORK PARAMETERS & FILTERS

Impedance parameters, Admittance parameters, Hybrid parameters, Transmission (ABCD) parameters, conversion of Parameters from one form to other, Conditions for Reciprocity and Symmetry, Interconnection of Two Port networks in Series, Parallel and Cascaded configurations, Image Parameters, Illustrative problems.

Classification of filters – Low pass, High pass, Band pass and Band Elimination, Constant-k and M-derived filters-Low pass and High pass Filters (qualitative and quantitative treatment) and Band pass and Band elimination filters (quantitative treatment only), Illustrative problems.

UNIT–V

FOURIER ANALYSIS OF A. C. CIRCUITS

The Fourier theorem, consideration of symmetry, exponential form of Fourier series, line spectra and phase angle spectra, Fourier integrals and Fourier transforms, properties of Fourier transforms.

Application to Electrical Systems – Effective value and average value of non sinusoidal periodic waveforms, power factor, effect of harmonics,

TEXT BOOKS

1. Engineering circuit analysis by William Hayt and Jack E. Kemmerly, Mc Graw Hill Company, 6th edition.
2. Network Analysis by A. Sudhakar, Shyammohan Palli, Mc Graw Hill Company,
3. Circuit Theory by A. Chakrabarti, Dhanipat Rai and Co., 6th edition.
4. Electric circuit analysis by B. Subrahmanyam, I. K international.

REFERENCES

1. Network Analysis by M. E Van valkenburg, PHI.
2. Electric circuit analysis by C. L. Wadhwa, New Age international.
3. Electrical Circuits by David A. Bell, Oxford University press.
4. Basic circuit analysis by D. R, Cunningham and J. A Stuller, Jaico Publications.
5. Electrical Circuit theory by K. Rajeswaran, Pearson Education 2004.
6. Network Theory and Filter Design by Vasudev K. Aatre, Eastern Wiley Publishers, 1993.
7. Electric Circuits by Mahmood Nahvi, Joseph A edmister, Schaum's Outline, Fifth Edition.

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II Year B.Tech EEE – I Sem	**L**	**T/P/D**	**C**
	4	**1**	**4**

(13EEE003) ELECTROMAGNETIC FIELD THEORY

Course Objectives:

- To introduce the concepts of electric field
- To introduce the concepts magnetic fields
- To introduce the concept of time varying field
- To use field applications which will be utilized in the development of the theory for power transmission lines and electrical machines.

Course Outcomes:

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

- Electrostatics, Conductors, Dipole, Dielectric and Capacitance.
- Magneto Statics, Ampere's Circuital law and it's application
- Concept of inductance and capacitance
- Magnetic forces, Magnetic Potential and Time Varying Fields.

UNIT – I

ELECTROSTATICS

Electrostatic Fields – Coulomb's Law – Electric Field Intensity (EFI) – EFI due to a line and a surface charge – Work done in moving a point charge in an electrostatic field – Electric Potential – Properties of potential function – Potential gradient – Gauss's law – Application of Gauss's Law – Maxwell's first law, div $\mathbf{D}=\rho_v$ Laplace's and Poisson's equations – Solution of Laplace's equation in one variable.

UNIT – II

CONDUCTORS , DIPOLE, DIELECTRIC & CAPACITANCE

Electric dipole – Dipole moment – potential and EFI due to an electric dipole – Torque on an Electric dipole in an electric field – Behavior of conductors in an electric field – Conductors and Insulators.

Electric field inside a dielectric material – polarization – Dielectric – Conductor and Dielectric – Dielectric boundary conditions, Capacitance – Capacitance of parallel plate and spherical and co-axial capacitors with composite dielectrics – Energy stored and energy density in a static electric field – Current density – conduction and Convection current densities – Ohm's law in point form – Equation of continuity.

UNIT – III

MAGNETO STATICS

Static magnetic fields – Biot-Savart's law – Magnetic field intensity (MFI) – MFI due to a straight current carrying filament – MFI due to circular, square and solenoid current – Carrying wire – Relation between magnetic flux, magnetic flux density and MFI – Maxwell's second Equation, div $\mathbf{B}=0$. Ampere's circuital law and its applications viz.

MFI due to an infinite sheet of current and a long current carrying filament – Point form of Ampere's circuital law – Maxwell's third equation, Curl $\mathbf{H}=J_c$.

UNIT – IV

FORCE IN MAGNETIC FIELDS AND MAGNETIC POTENTIAL

Magnetic force - Moving charges in a Magnetic field – Lorentz force equation – force on a current element in a magnetic field – Force on a straight and a long current carrying conductor in a magnetic field – Force between two straight long and parallel current carrying conductors – Magnetic dipole and dipole moment – a differential current loop as a magnetic dipole – Torque on a current loop placed in a magnetic field

Scalar Magnetic potential and its limitations – vector magnetic potential and its properties – vector magnetic potential due to simple configurations – vector Poisson's equations.

Inductance of solenoids, toroids and cables – Mutual inductance – energy stored in magnetic field and energy density

UNIT – V

TIME VARYING FIELDS

Time varying fields – Faraday's laws of electromagnetic induction – Its integral and point forms – Maxwell's fourth equation, Curl $E=-\partial B/\partial t$ – Statically and Dynamically induced EMFs – Simple problems -Modification of Maxwell's equations for time varying fields – Displacement current – Poynting Theorem and Poynting vector.

TEXT BOOKS

1. Engineering Electromagnetics by William H. Hayt & John. A. Buck Mc. Graw-Hill Companies, 7th Editon.2006.
2. Electro magnetic Fields" by Sadiku, Oxford Publications

REFERENCES

1. Introduction to Electro Dynamics by D J Griffiths, Prentice-Hall of India Pvt.Ltd, 2nd editon
2. Electromagnetics by J. D Kraus Mc Graw-Hill Inc. 4th edition 1992.
3. Electromagnetic fields, by S. Kamakshaiah, Right Publishers, 2007.

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II Year B.Tech EEE – I Sem	**L**	**T/P/D**	**C**
	3	**1**	**3**

(13EEE004) ELECTRICAL MACHINES-I

Course objectives:

- To understand the construction of DC machines
- To know the different testing methods for dc machines
- To understand the operation of DC machines
- To know the behavior of DC machines

Course Outcomes :

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

- To specify the constructional aspects of DC machines
- To carry out different testing methods to predetermine the efficiency of DC machines
- To select a DC machine for particular application
- To control voltage and speed of a DC machine

UNIT-I

ELECTROMECHANICAL ENERGY CONVERSION

Law of energy conservation- Need of Electromechanical energy Conversion-Definition of Generator and Motor-Coupling medium-Role-Electromagnetic machines-Electrostatic machines concept-Energy balance equation of a motor and generator-Singly excited electromagnetic systems-Energy-Coenergy- force expression-Multi excited systems-Torque expression-Problems

UNIT-II

D.C GENERATORS (PART –I)

D.C generator-principle-simple loop generator-Construction-Homo polar and Hetero polar machines-differences-DC Armature Windings-Lap and Wave windings-Development-Differences-Simplex, Duplex and Triplex windings-Emf equation-Classification of D.C. Generators -self excitation-open circuit characteristics-critical resistance and critical speed-problems.

UNIT-III

D.C.GENERATORS (PART –II)

Armature Reaction-Effects-Distribution of Field mmf and Armature mmf-Demagnetising and Cross magnetizing AT/pole-Compensating Windings-Problems-Commutation-Methods of Improving Commutation-Generator Characteristics-Power Stages- Losses-Efficiency-Parallel Operation-Problems

UNIT-IV

D.C.MOTORS (PART –I)

D.C.Motor-Principle-Function of Commutator-Types-Back emf-Voltage Equation-Mechanical Power developed-Condition for maximum mechanical power developed-Torque equation-Motor characteristics-Power stages- Efficiency-Condition for maximum efficiency-problems.

UNIT-V

DC MOTORS (PART –II)

Speed control-Field and Armature control methods - Ward Leonard System-starting of D.C.Motors-3 point and 4 point starters-Design of starter steps-problems-Testing of D.C.Machines: Brake Test, Swin-Burne's Test, Hopkinson'sTest, Field's Test and Retardation Test, Problems, concept of Electrical Braking [Elementary Treatment only].

TEXT BOOKS

1. Electric Machines by P.S. Bimbra-Khanna publishers
2. Electrical Machines by A.E Fitzgerald, C.kingsely and S.Umans, MGH, 5th edition

REFERENCES

1. Performance and Design of D.C machines by Clayton and Hancock, BPB publishers
2. Electrical machines by I.J Nagrath and D.P Kothari, TMH Publishers, 3rd edition
3. Fundamentals of Electrical machinery by Stephen Chapman, TMH Publishers
4. Electrical machines by Gordon.R.Slemon, Alan straughen, Addison – Wesley.co., 1980, 1st edition

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II Year B.Tech EEE – I Sem	**L**	**T/P/D**	**C**
	4	**1**	**4**

(13ECE003) SWITCHING THEORY AND LOGIC DESIGN

Course Objectives

- To understand the concepts of number systems, codes and design of various combinational and synchronous sequential circuits
- To learn various methods to minimize the Boolean expressions for reducing the number of gates and cost
- To realize logic networks, digital computers using PROM, PLA, PAL devices.
- To design state machines and ASM charts

Course Outcomes

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

- Use the concepts of Boolean Algebra for the analysis and various number systems for digital data representations
- Design combinational, sequential circuits
- Design ASM charts for digital systems
- Implement designs on PLDs

UNIT I

NUMBER SYSTEMS & CODES

Philosophy of number systems – complement representation of negative numbers-binary arithmetic-binary codes-error detecting & error correcting codes –hamming codes.

BOOLEAN ALGEBRA

Fundamental postulates of Boolean Algebra - Basic theorems and properties

UNIT II

SWITCHING FUNCTIONS

Canonical and Standard forms-Algebraic simplification , Digital logic gates, properties of XOR gates –universal gates-Multilevel NAND/NOR realizations.

MINIMIZATION OF SWITCHING FUNCTIONS

Map method, Prime implicants, Don't care combinations, Minimal SOP and POS forms, Tabular Method, Prime –Implicant chart, simplification rules.

UNIT III

COMBINATIONAL LOGIC DESIGN

Design using conventional logic gates, Encoder, Decoder, Multiplexer, De-Multiplexer, Modular design using IC chips, MUX Realization of switching functions Parity bit generator, Code-converters, Hazards and hazard free realizations.

PROGRAMMABLE LOGIC DEVICES

Basic PLD's-ROM, PROM, PLA, PLD Realization of Switching functions using PLD's.

UNIT IV

SEQUENTIAL CIRCUITS – I

Classification of sequential circuits (Synchronous, Asynchronous, Pulse mode, Level mode with examples) Basic flip-flops-Triggering and excitation tables. Steps in synchronous sequential circuit design. Design of modulo-N Ring & Shift counters, Serial binary adder, sequence detector.

UNIT V

SEQUENTIAL CIRCUITS – II

Finite state machine-capabilities and limitations, Mealy and Moore models-minimization of completely specified and incompletely specified sequential machines, Partition techniques and Merger chart methods-concept of minimal cover table. Introduction to ASM charts, simple examples, system Design using data path and control subsystems, ASM charts for Flip Flops and Binary multiplier.

TEXTBOOKS

1. Switching & Finite Automata theory by Zvi Kohavi, TMH,2nd Edition.
2. Digital Design by Morris Mano, PHI, 3rd Edition, 2006.

REFERENCES

1. An Engineering Approach To Digital Design by Fletcher, PHI. Digital Logic – Application and Design by John M. Yarbrough, Thomson.
2. Fundamentals of Logic Design by Charles H. Roth, Thomson Publications, 5th Edition, 2004.
3. Digital Logic Applications and Design by John M. Yarbrough, Thomson Publications, 2006

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II Year B.Tech EEE – I Sem	**L**	**T/P/D**	**C**
	0	**3**	**2**

(13EEE101) ELECTRICAL CIRCUITS AND SIMULATION LABORATORY

Course Objectives:

- To design electrical systems
- To analyze a given network by applying various methods like Theorem applications
- To measure Three phase Active and Reactive power.
- To understand the locus diagrams

Course Outcomes :

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

- Analyze complex DC and AC linear circuits
- Apply concepts of electrical circuits across engineering
- Evaluate response in a given network by using theorems
- Simulate the electrical circuits using PSPICE software

1. Verification of Thevenin's, Norton's and Maximum Power Transfer Theorems
2. Verification of Superposition theorem and RMS value of complex wave
3. Verification of Compensation Theorem
4. Verification of Reciprocity and Millmann's Theorems
5. Locus Diagrams of RL and RC Series Circuits
6. Series and Parallel Resonance
7. Determination of Self, Mutual Inductances and Coefficient of coupling
8. Determination of Z and Y Parameters
9. Determination of Transmission and hybrid parameters
10. Measurement of Active Power for Star and Delta connected balanced loads
11. Measurement of Reactive Power for Star and Delta connected balanced loads
12. Measurement of 3-phase Power by two Wattmeter Method for unbalanced loads

Any Ten experiments are to be conducted

PART-B

1. Simulation of DC Circuits
2. Transient Analysis
3. Mesh and Nodal Analysis
4. Thevinen's Theorem verification
5. Measurement of active Power of three phase circuit for balanced and unbalanced load

Any Eight experiments from PART-A and any Two from PART-B are to be conducted

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II Year B.Tech EEE – I Sem	**L**	**T/P/D**	**C**
	0	**3**	**2**

(13ECE101) ELECTRONIC DEVICES AND CIRCUITS LABORATORY

Course Objectives

- To identify various components and testing of active devices.
- To study and operation of multimeters, function generators ,regulated power supplies and CRO
- To know the characteristics of various active devices.
- To study frequency response Amplifier.

Course Outcomes,

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

- Calculate various parameters of devices from characteristics.
- Use devices in real life applications
- Calculate h-parameters of BJT under various configurations.
- Compute frequency of various amplifiers.

Part A: (Only for viva-voce Examination)

ELECTRONIC WORKSHOP PRACTICE (in 2 lab sessions):

1. Identification, Specification, testing of R,L,C components (color codes), Potentiometers (SPDT, DPDT, and DIP),Coils, Gang Condensers, Relays, Bread Board, PCB's
2. Identification, Specification, testing of Active devices : Diodes, BJT, Low power JFET's, MOSFET's, Power Transistors, LED's, LCD's, SCR, UJT.
3. Study and operation of :
   - Multimeters (Analog and Digital)
   - Function Generator
   - Regulated Power Supplies
   - CRO

Part B: (For Laboratory Examination – Minimum of 10 experiments)

1. Forward and Reverse Bias V-I characteristics of PN junction Diode.
2. Zener diode V-I characteristics and Zener diode as voltage regulator.
3. Half Wave, and Full wave with and without filters.
4. Characteristics of a BJT under CE configuration and calculation of h-parameters.
5. Characteristics of a BJT under CC configuration and calculation of h-parameters.
6. Characteristics of a BJT under CB configuration and calculation of h-parameters.

7. FET characteristics under CS configuration.
8. Frequency response of CE Amplifier.
9. Frequency response of CC Amplifier.
10. Frequency response of CS FET Amplifier.
11. SCR characteristics.
12. UJT characteristics and Relaxation Oscillator.

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II Year B.Tech EEE – II Sem	**L**	**T/P/D**	**C**
	4	**1**	**4**

(13EEE005) ELECTRICAL MACHINES – II

Course objectives:

- To understand the construction and operation of transformers
- To know the importance of transformers in power systems for reducing transmission losses
- To know the different testing methods for transformers
- To examine how induction motors are useful for electro-mechanical energy conversion

Course Outcomes :

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

- To specify the constructional aspects of transformers
- To carry out different testing methods to predetermine the efficiency of transformers
- To draw the circle diagram for an induction motor to assess its performance
- To control the speed of an induction motor

UNIT – I

TRANSFORMERS (PART-I)

Transformer principle-Need of Transformer-construction-types of transformers-Emf equation-core losses- Ideal Transformer, practical transformer on No-load-phasor diagram- Excitation phenomenon, practical Transformer on load-phasor diagrams-Equivalent circuit - Inrush currents

UNIT – II

TRANSFORMERS (PART-II)

Voltage Regulation-Dependency of voltage Regulation on load power factor-losses-Efficiency-Condition for maximum efficiency- Testing of Transformers- Polarity Test - OC Test-SC Test- Sumpner's Test - Auto transformer- Power and Distribution Transformers differences-All day efficiency.

UNIT – III

PARALLEL OPERATION AND THREE PHASE TRANSFORMERS

Parallel operation – conditions - problems - construction of three phase transformer - Poly-phase connections - Y/Y, Y/Δ, Δ/Y, Δ/Δ and open Δ, Zig-Zag Connections - Third harmonics in phase voltages-three winding transformers- Scott connection - On load tap changer, OFF load tap changer -cooling of a transformer.

UNIT – IV

POLY PHASE INDUCTION MOTORS (PART-I)

Three phase induction motors - construction – Types of rotors – Rotating Magnetic field – Principle of operation – Slip – Rotor frequency – Rotor Equivalent Circuit – Rotor Input – Mechanical Power developed- Complete equivalent circuit –Phasor diagrams at starting and running conditions – Losses and power flow –Efficiency-Torque Equation – Starting and maximum torque – Torque Slip Characteristics – Deep bar and double cage rotors.

UNIT – V

POLY PHASE INDUCTION MOTORS (PART-II)

Circle diagram: No load and Blocked rotor tests-Performance Analysis from circle diagram – starting of Induction motors – Different Starters – Speed control – Control from stator and rotor sides – Crawling and cogging -Induction Generator.

TEXT BOOKS

1. Electrical machines by PS Bhimbra, Khanna Publishers.
2. Electric machinery by A.E. Fritzgerald, C.Kingsley and S.Umans, Mc Graw Hill Companies, 5th edition

REFERENCES

1. Performance and Design of AC Machines by MG.Say, BPB Publishers
2. Theory of Alternating Current Machinery by Langsdorf, Tata McGraw-Hill Companies, 2nd edition.
3. Electric Machines by I.J.Nagrath and D.P.Kothari,Tata Mc Graw Hill, 7th Edition.2005
4. Electromechanics-II (transformers and induction motors) by S. Kamakashaiah, Hitech publishers.

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II Year B. Tech EEE – II Sem	**L**	**T/P/D**	**C**
	4	**1**	**4**

(13ECE077) ELECTRONIC CIRCUITS

Course Learning Objectives

- To explain the operation, design and Analysis of multistage amplifiers using BJT and MOSFET.
- To analyze feedback amplifiers, large signal and oscillators.
- To explain the operation of linear and non linear wave shaping circuits
- To understand the switching characteristics of diode and transistor

Course Outcomes

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

- Apply the knowledge of BJT to design practical amplifier circuits.
- Design electronic sub systems such as feedback amplifiers, oscillators and power amplifiers to meet the required specifications.
- Design linear and non linear wave shaping circuits with different inputs.
- Analyze multi vibrators using transistors.

UNIT –I

MULTI STAGE AMPLIFIERS

Multi Stage Amplifiers Methods of Inter Stage Coupling, n – Stage Cascaded Amplifier, Equivalent Circuits, Miller's Theorem, Frequency Effects, Amplifier Analysis, Transistor Circuits. Cascade – Transistor Configuration, CE-CC Amplifiers (Darlington Pair), Two Stage RC Coupled JFET amplifier (in Common Source configuration), Difference Amplifier.

BJT and FET FREQUENCY RESPONSE

Logarithms- Decibels- General frequency consideration- Low frequency analysis- Low frequency response of BJT amplifiers – Low frequency response of FET amplifier- Miller effect capacitance – High frequency response of BJT amplifier

UNIT – II

FEEDBACK AMPLIFIERS

Concept of feedback, Classification of feedback amplifiers, General characteristics of negative amplifiers, Effect of feedback on Amplifier characteristic- Voltage series- Voltage shunt, current series and Current shunt Feedback configurations- Simple problems

OSCILLATORS

Conditions for oscillations, RC and LC type Oscillators, Crystal oscillators, Frequency and amplitude stability of oscillators, Generalized analysis of LC oscillators, Quartz, Hartley and Colpitts Oscillators, RC-Phase shift and wein- bridge oscillators.

UNIT-III

LARGE SIGNAL AMPLIIFERS

Class-A Power Amplifier, Maximum Value of Efficiency of Class-A Amplifier, Transformer coupled amplifier- Push Pull Amplifier- Complimentary Symmetry Circuits (Transformer Less Class B Power Amplifier)-Phase Inverters, Transistor Power Dissipation, Thermal Runway, Heat Sinks.

LINEAR WAVESHAPING

High pass, Low pass RC circuits their response for sinusoidal, step pulse, square and ramp inputs.

UNIT –I V

CLIPPERS AND CLAMPERS

Diode clippers, Transistor clippers, clipping at two independent levels, Transfer characteristics of clippers, Emitter coupled clipper, Comparators, Applications of voltage comparators, clamping operation, clamping circuits using diode with different inputs, Clamping circuit theorem, practical clamping circuits, effect of diode characteristics on clamping voltage, Transfer characteristics of clampers.

SWITCHING CHARACTERISTICS OF DEVICES

Diode as a switch, piecewise linear diode characteristics, Transistor as a switch, Break down voltage consideration of transistor, saturation parameters of Transistor and their variation with temperature, Design of transistor switch, transistor- switching times.

UNIT – V

MULTIVIBRATORS

Analysis and Design of Bistable, Monostable, Astable Multivibrators and Schmitt trigger using transistors.

TEXT BOOKS

1. Electronic Device and Circuit Theory, Robert L.Boylestad, Louis Nasheisky, 9th Edition 2007, Pearson Education
2. Electronic Devices and Circuits by S.Salivahanan, N.Suresh Kumar and A.Vallavaraj, 2nd edition 2008, Tata McGraw Hill Companies.
3. Solid State Pulse Circuits by David A Bell 4th Edition, Prentice Hall of India.

REFERENCES

1. Introductory Electronic Devices and Circuits(Conventional flow version) – Robert T.Paynter, 7 Edition 2009,PEI.
2. Electronic Devices and Circuits, Anil K.Malin, Varsha Agrawal, Ist Edition,WILEY
3. Pulse, Digital and Switching Waveforms by Jacob Milliman , Harbert Taub and Mothiki S.Prakash rao, 2nd edition 2008, Tata McGraw Hill Companies.

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II Year B.Tech EEE – II Sem	**L**	**T/P/D**	**C**
	4	**0**	**4**

(13CMS001) BUSINESS ECONOMICS AND FINANCIAL ANALYSIS

Course Objectives:

- To explain different forms of organizing private and public sector business enterprises and to analyze the significance of Business Economics in solving the problems of business enterprise. Also to define and analyze the concepts of Demand, Elasticity of Demand and Demand Forecasting Methods.
- To analyze the various types of costs and to determine the level of output at which there is neither profit nor loss. To estimate capital requirements and to describe various sources of mobilizing funds. Also to identify least cost combinations of inputs produce desired quantity of output.
- To describe the features of different market structure and pricing strategies.
- To explain the basic accounting concepts and conventions. To elaborate the importance of finance function for evaluating the economic status of a business unit.

Course Outcomes

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

- Select the suitable form of business organization which meets the requirement of selected business also perform decision – making function effectively in an uncertain frame work by applying concepts of Managerial Economics. Meet and manipulate the demand efficiently and plan the future course of action.
- Apply right kind cost to reduce cost by paying attention towards the costs which can be reduced. Take decision whether to buy or produce? Reduce the cost of capital by selecting best source of fund mobilization and select best investment opportunity which yields higher rate of return.
- Fix the right price which can best meets the predetermined objectives of the business firm under different market conditions. Able to select best combination of inputs to produce required quantity of output.
- Prepare books of accounts and know over all financial position of the business enterprise which enables the concerned to take appropriate measures to improve the situation. Also interpret the financial position from difference angles and initiates the measures/ efforts in that direction.

UNIT - I

BUSINESS AND NEW ECONOMIC ENVIRONMENT

Characteristic features of business; Features and evaluation of sole proprietorship; Partnership; Joint stock company; Public enterprises and their types; Changing business environment in post- liberalization scenario.

UNIT - II

INTRODUCTION TO BUSINESS ECONOMICS AND DEMAND ANALYSIS

Definition; Nature and scope of managerial economics - demand analysis determinants; Law of demand and its exceptions.

ELASTICITY OF DEMAND AND DEMAND FORECASTING

Definition; Types; Measurement and significance of elasticity of demand; Demand forecasting; Factors governing demand forecasting; Methods of demand forecasting - Survey methods, statistical methods, Expert opinion method, Test marketing, Controlled experiments, and Judgmental approach to demand forecasting.

UNIT - III

COST ANALYSIS

Cost concepts - Opportunity cost, Fixed vs. Variable costs, Explicit costs vs. Implicit costs, and Out of pocket costs vs. Imputed costs; Break-even analysis (BEA) - determination of break-even point (simple problems), managerial significance, and limitations of BEA.

CAPITAL AND CAPITAL BUDGETING

Capital and its significance; Types of capital; Estimation of fixed and working capital requirements; Methods and sources of raising finance.

Nature and scope of capital budgeting; Features of capital budgeting proposals; Methods of capital budgeting - payback method, Accounting Rate of Return (ARR), and Net Present Value method (simple problems)

UNIT - IV

THEORY OF PRODUCTION

Production function - isoquants and isocosts, least cost combination of inputs, and laws of returns; Internal and external economies of scale.

MARKET STRUCTURES

Types of competition; Features of perfect competition, Monopoly, and Monopolistic competition; Price-output determination in case of perfect competition and Monopoly.

PRICING POLICIES AND METHODS

Cost plus pricing; Marginal cost pricing; Sealed bid pricing; Going rate pricing, Limit pricing, Market skimming pricing, Penetration pricing, Two-part pricing, Block pricing, Bundling pricing, Peak load pricing, Cross subsidization.

UNIT V

INTRODUCTION TO FINANCIAL ACCOUNTING

Double-entry book keeping; Journal; Ledger; Trial balance; Final accounts - trading account, profit and loss account, and balance sheet with simple adjustments.

FINANCIAL ANALYSIS THROUGH RATIOS

Computation; Analysis and interpretation of liquidity ratios - current ratios, and quick ratio; Activity ratios - Inventory Turnover ratio, and Debtor Turnover ratio; Capital structure ratios – Debt-Equity ratio, and Interest Coverage Ratio; Profitability ratios - Gross profit Ratio, Net Profit Ratio, Operating Ratio, P/E ratio, and EPs.

TEXT BOOKS

1) Managerial Economics and Financial Analysis by Aryasri, Tata McGraw Hill, 2009.
2) Managerial Economics by Varshney & Maheswari, Sultan Chand, 2009

REFERENCE BOOKS

1. Financial Accounting for Management: An analytical perspective by Ambrish Gupta, Pearson Education, 2010.
2. Managerial Economics by H. Craig Peterson & W. Cris Lewis, Prentice Hall of India.

VNR Vignana Jyothi Institute of Engineering and Technology

II Year B.Tech EEE – II Sem	**L**	**T/P/D**	**C**
	4	**1**	**4**

(13EEE006) POWER SYSTEMS-I

Course Objectives:

- To explain the various generation sources such as Hydro, Thermal, Nuclear and Gas Power plants
- To describe DC and AC distribution systems and its voltage drop calculations
- To illustrate various Economic aspects of the Power plant erection, operation and different Tariff methods.
- To describe various power system improvement methods.

Course Outcomes

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

- Draw and explain the layouts of Hydro Power Plant, Thermal Power station Nuclear Power Plant and Gas Power plant
- Derive the equations for voltage drops in DC and AC distribution systems
- Define Load, diversity, demand and Plant use factors
- Describe various Tariff methods and various Power factor improvement methods

UNIT-I

HYDRO POWER PLANTS

Hydro Power Stations: Choice of site, arrangement of hydroelectric installations, Hydrology, Mass curve, flow duration curve, classification of Hydro Power Plants, pumped storage plants.

UNIT-II

THERMAL POWER STATIONS

Line diagram of Thermal Power Station (TPS) showing paths of coal, steam, water, air, ash and flue gasses - Description of TPS components: Economizers, Boilers, Super heaters, Turbines, Condensers, Electrostatic Precipitators, Chimney, and Cooling towers.

UNIT-III

NUCLEAR AND GAS POWER PLANTS

Nuclear Power Stations: Nuclear Fission and Chain reaction - Nuclear fuels - Principle of operation of Nuclear reactor - Reactor Components: Moderators, Control rods, Reflectors and Coolants - Radiation hazards: Shielding and Safety precautions - Brief description of PWR, BWR and FBR.

Gas Power Plants: Principle of Operation and Components (Block Diagram Approach Only).

UNIT-IV

DISTRIBUTION SYSTEMS

Classification of Distribution Systems - Comparison of DC Vs AC Distribution Systems - Requirements and Design features of Distribution Systems-Voltage Drop Calculations in D.C Distribution system for the following cases-Radial system - fed at one end - fed at both the ends for equal and unequal Voltages, Ring Main Distribution system. Voltage Drop Calculations in A.C. Distribution system for the following cases - Power Factors referred to receiving end voltage, with respect to respective load voltages, Numerical problems

UNIT-V

ECONOMIC ASPECTS OF POWER PLANTS

Load curve and Load duration curves-load, demand, diversity, capacity, utilization and plant use factors- Numerical Problems. Desirable Characteristics of a Tariff Method-Tariff Methods: Flat Rate, Block- Rate, two-part, three –part, and power factor tariff methods, effect of load factor, demand and diversity factors on the cost of electrical energy and power factor improvement, Economical Power factor- problems.

TEXT BOOKS

1. Generation and utilization of Electrical Energy – C.L.Wadhawa, New age International (P) Limited, Publishers 1997.
2. Electrical Power Systems by C.L.Wadhawa New age International (P) Limited, Publishers 1997.
3. A Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, U.S.Bhatnagar and A.Chakraborti, Dhanpat Rai and Co. Pvt. Ltd, 1999.

REFERENCES

1. Elements of Power Station design and practice by M.V. Deshpande, Wheeler Publishing.
2. Electrical Power Generation, Transmission and Distribution by S.N.Singh., PHI, 2003.
3. Principles of Power Systems by V.K Mehta and Rohit Mehta S.Chand & Company Ltd, New Delhi, 2004.

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II Year B.Tech EEE – II Sem	**L**	**T/P/D**	**C**
	3	**0**	**3**

(13MED077) FLUID MECHANICS & HYDRAULIC MACHINES

Course Prerequisites: Maths, Physics and Engineering Mechanics

Course Objectives:

- Understand the properties of fluids, principles of buoyancy, flow, force and head calculations.
- Understand the hydro dynamic force and impact of jet.
- Principles of operation of different types of hydraulic turbines.
- Principles of operation of different types of hydraulic pumps.

Course Outcomes:

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

- Apply the knowledge of fluids and properties to solve flow, force and velocity problems.
- Apply the knowledge to find the head loss due to friction in pipe and other losses
- Apply the knowledge of fluid flow and dynamics in solving problems in hydraulic machines.
- Perform model analysis of hydraulic machinery and select appropriate machines for hydro power plant.

UNIT - I

FLUID STATICS

Properties of fluid – specific gravity, viscosity surface tension, vapor pressure and their influence on fluid motion, Pressure at a point, measurement of pressure.

FLUID KINEMATICS

Classification of flows, acceleration equations, Streamline, path line and streak lines and stream tube, continuity equation, Stream function, velocity potential function.

UNIT - II

FLUID DYNAMICS

Surface and body forces – Euler's and Bernoulli's equation, Venturimeter, Orifice meter, Pitot tube, Reynolds experiment –Darcy Weisbach equation – Minor losses in pipes – pipes in series and pipes in parallel. Momentum equation.

UNIT - III

BASICS OF TURBO MACHINERY

Hydrodynamic force of jets on flat, inclined and curved vanes - jet striking centrally and at tip, flow over radial vanes.

ELEMENTS OF HYDROELECTRIC POWER STATION

Types of power plants, storage requirements, estimation of power from a given catchment area, head and efficiency.

UNIT - IV

HYDRAULIC TURBINES

Classification of turbines, design of Pelton wheel, Francis turbine and Kaplan turbine – working proportion, work done, efficiency, draft tube-theory, functions and efficiency. Geometric similarity, Unit and specific quantities, characteristic curves, governing of turbines, selection of type of turbine, cavitation, surge tank and water hammer.

UNIT - V

HYDRAULIC PUMPS

Classification, centrifugal pumps – types, working, work done, manometric head, losses and efficiency, specific speed – pumps in series and parallel – performance characteristic curves, NPSH. Reciprocating Pump – types, Working, Discharge, slip, indicator diagrams.

TEXT BOOK

1. Hydraulics And Fluid Mechanics Including Hydraulics Machines by Dr. P.N.Modi, Dr. S.M. Seth, Standard book house,2009.

REFERENCE BOOKS

1. Fluid Mechanics & Hydraulic Machines by R.K.Rajput, S Chand & Co Ltd, 3rd Rev. Edition, 2006.
2. Fluid mechanics - fundamentals & applications by Yunus A. Çengel, John M. Cimbala, McGraw-Hill Higher Education, 2006
3. Fluid Mechanics and Hydraulic Machines by R.K. Bansal, Lakshmi Publications, 2005

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II Year B.Tech EEE – II Sem	**L**	**T/P/D**	**C**
	0	**3**	**2**

(13EEE102) ELECTRICAL MACHINES-I LABORATORY

Course Objective:

- To expose the students to the operation of DC Generator
- To expose the students to the operation of DC Motor.
- To perform OC and SC tests on single phase Transformer
- To examine the self excitation in DC generators.

Course Outcomes:

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

- Differentiate between Different types of DC Machines.
- Analyze the characteristics of DC Generator.
- Analyze the characteristics of DC Motor.
- control the speed of DC motors.

Part - A

1. Magnetization characteristics of DC shunt generator
2. Swinburne's Test on D.C.Shunt Machine
3. Brake test on D.C.Shunt motor
4. Speed control of D.C.Shunt Motor
5. Separation of losses of a D.C. Shunt Machine
6. Load Test on D.C.Shunt Generator
7. Load Test on D.C.Series Generator
8. Hopkinson's Test on a Pair of Identical D.C. Shunt Machines
9. Field's Test on a pair of Identical D.C. Series Machines
10. Open circuit and short circuit tests on single phase Transformer

Part - B

11. Load Test on single phase Transformer
12. Magnetization Characteristics of D.C.Series Generator
13. Retardation Test on D.C.Shunt Motor
14. Load Characteristics' of D.C.Compound Generator
15. Brake Test on D.C.Compound Motor
16. No load and Load Characteristics of Separately Excited D.C.Generator

Any Eight experiments from Part - A and any Two from Part - B are to be conducted

VNR Vignana Jyothi Institute of Engineering and Technology

II Year B.Tech EEE – II Sem	**L**	**T/P/D**	**C**
	0	**3**	**2**

(13ECE180) ELECTRONIC CIRCUITS LABORATORY

Course Objectives

- To design and simulate various BJT and FET Voltage and Power amplifiers.
- To design and simulate various BJT Feedback amplifiers.
- To design and simulate various BJT Oscillators.
- To design and simulate linear and non linear wave shaping circuits.

Course Outcomes

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

- Apply the concepts of amplifiers in the design of Public Addressing System
- Generate Sinusoidal wave forms
- Design stable system using feedback concepts.
- Design multi vibrator using transistor

1. CE Amplifier.
2. CC Amplifier.
3. FET Amplifier.
4. Linear wave shaping.
5. Non Linear wave shaping – Clippers.
6. Non Linear wave shaping – Clampers.
7. Transistor as a switch.
8. Study of Logic Gates and Some applications.
9. Study of Flip-Flops and some applications.
10. Astable Multivibrator.
11. Monostable Multivibrator.
12. Bistable Multivibrator.
13. Hartley Oscillator
14. RC phase shift Oscillator using BJT.
15. Current shunt and voltage series feedback amplifier.

Any Ten of the above experiments are to be conducted.

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II Year B.Tech EEE –II Sem	**L**	**T/P/D**	**C**
	0	**3**	**2**

(13MED177) FLUID MECHANICS AND HYDRAULIC MACHINES LABORATORY

Course Prerequisites: Fluid Mechanics& Hydraulic Machines course

Course Objectives:

- Conduct the experiments to understand the concept, find the values and obtain the result of experiments.
- Apply fundamental principles of fluid mechanics for the solution of practical mechanical engineering problems of water conveyance in pipes, orifices, mouth pieces, notches & weirs.
- Understand various pumps, water turbines, pipes and pressure measurement devices.
- Understand the various types of Flows.

Course Outcomes:

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

- Verification of Bernoulli theorem Model and analyze fluid flow problems in mechanical engineering.
- Conduct experiments in pipe flows and open-channel flows and interpreting data from model studies to prototype cases.
- Correlate the experimental results with theoretical concepts.
- Design a model of any one type of Turbine or Pump

1.
2. Calibration of venturimeter - orifice meter.
3. Calibration of triangles notches.
4. Determination of friction factor for a given pipe line.
5. Determination of Minor losses for the given pipe fittings
6. Impact of jets on vanes.
7. Performance test on Pelton wheel.
8. Performance test on Francis turbine.
9. Performance test on Kaplan turbine.
10. Performance test on single stage centrifugal pump.
11. Performance test on multi stage centrifugal pump.
12. Performance test on reciprocating pump.

Any Ten experiments are to be conducted.

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III Year B.Tech EEE – I sem	**L**	**T/P/D**	**C**
	4	**1**	**4**

(13EEE007) ELECTRICAL MACHINES – III

Course objectives:

- To examine how synchronous machines are useful for electro-mechanical energy conversion
- To understand different methods to start synchronous motors
- To know how the active and reactive power generations get controlled
- To understand the operation of fractional HP machine.

Course Outcomes :

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

- To make different armature windings for synchronous machines
- To control the both active and reactive powers generated by a synchronous generator
- To operate single phase machines
- To synchronize an alternator with supply lines.

UNIT – I

FUNDAMENTALS OF SYNCHRONOUS GENERATORS

Constructional Features of round rotor and salient pole machines – Armature windings – Integral slot and fractional slot windings; Distributed and concentrated windings – distribution, pitch and winding factors – E.M.F Equation. Harmonics in generated e.m.f. – suppression of harmonics – armature reaction - leakage reactance, synchronous reactance and impedance –phasor diagram – load characteristics.

UNIT – II

REGULATION OF SYNCHRONOUS GENERATORS

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

UNIT – III

PARALLEL OPERATION OF SYNCHRONOUS GENERATORS

Synchronization of Alternators with infinite bus – Methods of Synchronization-synchronizing power and torque –load sharing – Numerical Problems - Effect of change of excitation and mechanical power input. Short circuit Analysis – determination of sub-transient, transient and steady state reactances.

UNIT – IV

SYNCHRONOUS MOTORS

Construction and types of Synchronous Motors – Methods of Starting – Synduction Motor. Variation of current and power factor with excitation control – phasor diagrams –

V and Inverted V Curves. Synchronous condenser – Applications - Problems - Mathematical analysis for power developed. Excitation and power circles – hunting and its suppression.

UNIT – V

SINGLE PHASE MOTORS

Single phase induction motor – Double field revolving theory – Elementary idea of cross-field theory – split-phase – Capacitor start – Capacitor run motors - shaded pole motors. Principle and performance of A.C. Series motor-Universal motor – Principle of permanent magnet and reluctance motors, Stepper Motor.

TEXT BOOKS

1. Electric Machines by I.J.Nagrath and D.P.Kothari, Tata Mc Graw Hill Publishers, 7th Edition 2005.
2. Electrical Machines by P.S. Bimbra, Khanna Publishers.

REFERENCE BOOKS

1. The Performance and Design of A.C.Machines by M.G.Say, ELBS and Ptiman and Sons.
2. Electric Machinery by A.E. Fitzgerald, C.Kingsley and S.Umans, Mc Graw-Hill Companies, 5th edition, 1990.
3. Theory of Alternating Current Machinery by Langsdorf, Tata Mc Graw-Hill, 2nd edition.
4. Fundamentals of Electrical Machines by Stephen Chapman, Tata Mc Graw-Hill Publishers .
5. Electromachanics-III (Synchronous and single phase machines) by S.Kamakashiah, Right Publishers.

VNR Vignana Jyothi Institute of Engineering and Technology

III Year B.Tech EEE – I Sem	**L**	**T/P/D**	**C**
	4	**1**	**4**

(13EEE008) CONTROL SYSTEMS

Course objectives:

- To understand the different ways of system representations such as Transfer function representation and state space representations and to assess the system dynamic response
- To assess the system performance using time domain analysis and methods for improving it
- To assess the system performance using frequency domain analysis and techniques for improving the performance
- To design various controllers and compensators to improve system performance

Course outcomes:

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

- How to improve the system performance by selecting a suitable controller and/or a compensator for a specific application
- Apply various time domain and frequency domain techniques to assess the system performance
- Apply various control strategies to different applications (example: Power systems, electrical drives etc…)
- Test system Controllability and Observability using state space representation and applications of state space representation to various systems.

UNIT – I

INTRODUCTION

Concepts of Control Systems- Open Loop and closed loop control systems and their differences- Different examples of control systems- Classification of control systems.

Mathematical models – Differential equations, Impulse Response and transfer functions - Translational and Rotational mechanical systems

UNIT II

TRANSFER FUNCTION REPRESENTATION AND TIME RESPONSE ANALYSIS

Transfer Function of DC Servo motor - AC Servo motor- Synchro transmitter and Receiver, Block diagram representation of systems considering electrical systems as examples -Block diagram algebra – Representation by Signal flow graph - Reduction using Mason's gain formula.

Feed-Back Control System Characteristics, standard test signals - Time response of first order systems –Transient response of second order systems, Characteristic Equation of Feedback control systems, Time domain specifications – Steady state

response - Steady state errors and error constants – Effects of proportional derivative, proportional integral systems.

UNIT –III

STABILITY ANALYSIS IN S-DOMAIN

The concept of stability – Routh's stability criterion – qualitative stability and conditional stability – limitations of Routh's stability.

ROOT LOCUS TECHNIQUE

The root locus concept - construction of root loci-effects of adding poles and zeros to G(s) H(s) on the root loci.

UNIT – IV

FREQUENCY RESPONSE AND STABILITY ANALYSIS IN FREQUENCY DOMAIN

Introduction, Frequency domain specifications-Bode plot-Determination of Frequency domain specifications and transfer function from the Bode plot-Phase margin and Gain margin-Stability Analysis from Bode Plots. Polar Plots-Nyquist Plots-Stability Analysis.

UNIT – V

CLASSICAL CONTROL DESIGN TECHNIQUES AND STATE SPACE ANALYSIS OF CONTINUOUS SYSTEMS

Compensation techniques – Lag, Lead and Lead-Lag Controllers design in frequency Domain, PD, PI and PID Controllers.

Concepts of state, state variables and state model, derivation of state models from block diagrams, Diagonalization- Solving the Time invariant state Equations- State Transition Matrix and it's Properties – Concepts of Controllability and Observability.

TEXT BOOKS

1. Control Systems Engineering by I. J. Nagrath and M. Gopal, New Age International (P) Limited, Publishers, 2nd edition.
2. Automatic Control Systems 8th edition by B. C. Kuo 2003– John wiley and son's.,

REFERENCES

1. Modern Control Engineering by Katsuhiko Ogata, Prentice Hall of India Pvt. Ltd., 3rd edition, 1998.
2. Control Systems by N.K.Sinha, New Age International (P) Limited Publishers, 3rd Edition, 1998.
3. Control Systems Engineering. by NISE, John wiley, 3rd Edition.
4. Modelling and Control Of Dynamic Systems by Narciso F. Macia George J. Thaler, Thomson Publishers.
5. Modern control system theory by M.Gopal, New age international publishers, Revised second edition.

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III Year B.Tech EEE – I sem	**L**	**T/P/D**	**C**
	3	**1**	**3**

(13EEE009) POWER SYSTEMS-II

Course Objectives:

- To describe Transmission line parameters and derive its expressions for various configurations and analyze different types of Transmission lines
- To describe Traveling wave theory and derive expressions for reflection and refraction coefficients with various terminations of the lines
- To perform sag-tension calculations and also describe various types of Insulators
- To illustrate different types of cable and also describe grading of cables

Course Outcomes

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

- Derive L and C expressions for various configurations and analyze different types of Transmission lines
- Describe Traveling wave theory and derive expressions for reflection and refraction coefficients with various terminations of the lines
- Derive expressions for sag with equal and unequal height towers and describe various types of Insulators and also explain various string efficiency methods
- Illustrate different types of cables and derive capacitance expressions and describe grading of cables

UNIT-I

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 - Skin and Proximity effects - Numerical Problems.

Calculation of capacitance for 2 wire and 3 wire systems, effect of ground on capacitance, capacitance calculations for symmetrical and asymmetrical single and three phase, single and double circuit lines - Numerical Problems.

UNIT-II

PERFORMANCE OF TRANSMISSION LINES

Classification of Transmission Lines, Performance of Short, medium lines - Nominal-T, Nominal-Π and A, B, C, D Constants for symmetrical and Asymmetrical Networks - Numerical Problems.

Long Transmission Line-Rigorous Solution, evaluation of A,B,C,D Constants, Representation of Long Lines - Equivalent-T and Equivalent-Π network models-Ferranti effect - Numerical problems.

UNIT – III

POWER SYSTEM TRANSIENTS AND CORONA

Types of System Transients - Travelling wave theory - Attenuation, Distortion, Reflection and Refraction Coefficients - Termination of lines with different types of conditions - Open Circuited Line, Short Circuited Line, T-Junction, Lumped Reactive Junctions. Bewley's Lattice Diagrams-Numerical Problems.

Corona - Description of the phenomenon, factors affecting corona, critical voltages and power loss, Radio Interference - Problems.

UNIT-IV

MECHANICAL DESIGN AND OVERHEAD LINE INSULATORS

Sag and Tension Calculations with equal and unequal heights of towers, Effect of Wind and Ice on weight of Conductor, Numerical Problems - Stringing chart and sag template and its applications.

Types of Insulators, String efficiency and Methods of improvement- Capacitance grading and Static Shielding - Numerical Problems.

UNIT-V

UNDERGROUND CABLES

Construction, types of Insulating materials, Types of Cables, Insulation resistance, Capacitance of Single and 3-Core belted cables-Numerical Problems.

Grading of Cables - Capacitance grading, Description of Inter-sheath grading - Numerical Problems. Comparison of Over Head Lines and Under Ground Cables.

TEXT BOOKS

1. Power System Engineering by I.J.Nagarath and D.P.Kothari, Tata Mc Graw Hill.
2. Electrical power systems by C.L.Wadhwa, New Age International (P) Limited, Publishers,1998.
3. A Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, S.Bhatnagar, A.Chakrabarthy, Dhanpat Rai and Co Pvt. Ltd.

REFERENCES

1. Power system Analysis-by John J Grainger William D Stevenson, TMC Companies, 4th edition
2. Power System Analysis and Design by B.R.Gupta, Wheeler Publishing.
3. Modern Power system Analysis by I.J.Nagrath and D.P.Kothari: Tata McGraw-Hill Publishing Company, 2nd edition.
4. Power System Analysis by Hadi Saadat, TMH Edition.

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III Year B.Tech EEE – I sem	**L**	**T/P/D**	**C**
	4	**1**	**4**

(13EEE010) POWER ELECTRONICS

Course objectives:

- To understand the construction details of SCR
- To understand the concepts of power converters
- To understand the application of phase controlled rectifiers
- To understand the importance of ac voltage controllers, cyclo converters and inverters for various industrial applications

Course Outcomes

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

- Differentiate the static and dynamic characteristics of SCR
- Analyze operating principles of different converters
- Choose the appropriate converter for various applications
- Select the proper controller/converter for variable speed applications

UNIT-I

POWER SEMICONDUCTOR DEVICES

Thyristors – Silicon Controlled Rectifiers (SCR's) – BJT – Power MOSFET – Power IGBT and their characteristics

Basic theory of operation of SCR – Static and Dynamic characteristics of SCR - Salient points - Two transistor analogy - UJT firing circuit – Series and Parallel connections of SCRs - Snubber circuit details – Specifications and Ratings of SCRs, BJT, MOSFET, IGBT, Numerical problems, natural and forced commutation (Principle only).

UNIT-II

SINGLE PHASE CONTROLLED CONVERTERS

Single Phase Half Controlled Converters: Half controlled converters with R, RL and RLE loads – Derivation of average load voltage and current - without and with free-wheeling Diode – Numerical problems

Single Phase Fully controlled Converters: Mid point and Bridge connections with R, RL and RLE loads- Derivation of average load voltage and current - Performance parameter of single phase full bridge converter, Effect of source inductance – Derivation of load voltage and current- Numerical problems.

UNIT-III

THREE PHASE CONTROLLED CONVERTERS

Three Phase Converters – Three pulse and six pulse converters – Mid point and bridge connections, average load voltage with R and RL loads – Effect of Source inductance – Numerical Problems.

UNIT-IV

AC VOLTAGE CONTROLLERS

Single phase AC voltage controllers with R and RL loads-wave forms – Modes of operation of Triac – Triac with R and RL loads – Derivation of RMS load voltage, current and power factor – Numerical problems

CYCLO CONVERTERS

Cyclo converters – Single phase mid point cyclo converters with Resistive and inductive load (Principle of operation only)-Bridge configuration of single phase cyclo converter (Principle of operation) – Wave forms

Unit -V

CHOPPERS

Time ratio control and Current limit control strategies – Analysis of Buck and Boost converter with continuous mode of operation - Numerical Problems.

INVERTERS

Single phase inverter –half and full bridge inverter – Wave forms—performance parameters of inverters– Voltage control techniques for inverters, Pulse width modulation techniques-single, multiple and sinusoidal PWM Numerical Problems-Three Phase Inverters : analysis of 180 degree and 120 degree modes of operation with resistive, inductive loads - Numerical Problems.

TEXT BOOKS

1. Power Electronics by Mohammed H. Rashid, Pearson Education, Third Edition, First Indian reprint 2004.
2. Power electronics, by P S Bimbhra, Khanna Publishers.
3. Thyristorised Power Controllers by S R Doradla, A Joshi,R .M K Sinha G K Dubey, New Age Books

REFERENCE BOOKS

1. Fundamentals of Power electronics and Drives by A.Chakrabarti, Dhanpat Rai & Co, 2008
2. Power electronics, by P C Sen, Tata McGraw-Hill Education.
3. Power Electronics by Ned Mohan, Tore M. Undeland and William P. Robbins, John Wiley and Sons, Second Edition.
4. Power Electronics by M D SINGH, K B KANCHANDHANI, Tata McGraw-Hill Publishing Company, second edition, 2006
5. Power Electronics by Vedam Subramanyam, New Age International Pvt Ltd Publishers, Revised Second Edition, 2008

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III Year B.Tech EEE – I Sem	**L**	**T/P/D**	**C**
	4	**0**	**4**

(13EIE006) LINEAR AND DIGITAL IC APPLICATIONS

Course Objectives

- To Study about electrical properties of analog ICs like Op-Amps, IC 555 timer, PLL.
- To understand the functionality of specific ICs: 555 timer, 565, voltage regulators
- To Analyze and know the design concepts of various applications of ICs.
- To Study the design concepts Digital circuits using ICs.

Course Outcomes

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

- Design various applications of Op-Amps.
- Design the circuits using special ICs like 555 timer, 723 voltage regulator and 565 PLL.
- Design A/D and D/A Converters using ICs.
- Design digital circuits using digital ICs.

UNIT I

INTEGRATED CIRCUITS

Classification, chip size and circuit complexity, basic information of Op-amp, ideal and practical Op-amp, internal circuits, Op-amp characteristics, DC and AC characteristics, 741 op-amp and its features, modes of operation-inverting, non-inverting, differential.

OP-AMP APPLICATIONS

Basic application of Op-amp, instrumentation amplifier, ac amplifier, V to I and I to V converters, sample and hold circuits, Log and antilog amplifier, Precision rectifiers, Differentiators, Integrators, Peak Detectors and comparators, sample and hold circuits.

UNIT II

ACTIVE FILTERS and OSCILLATORS

Introduction, 1st order LPF, HPF filters. Band pass, Band reject and all pass filters. Oscillator types and principle of operation – RC and Wien bridge, waveform generators – triangular, square wave and VCO. Comparators.

UNIT III

SPECIAL ICs

Introduction to 555 timer, functional diagram, monostable and astable operations and applications, Schmitt Trigger. PLL - introduction, block schematic, principles and description of individual blocks of 565, introduction to voltage regulators.

D-A AND A- D CONVERTERS

Introduction, basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, and IC 1408 DAC, Different types of ADCs - parallel comparator type ADC, counter type ADC, successive approximation ADC and dual slope ADC. DAC and ADC specifications.

UNIT IV

LOGIC FAMILIES

Classification of Integrated circuits, comparision of TTL and CMOS logic families, standard TTL NAND Gate- Analysis and characteristics, TTL open collector O/Ps, Tristate TTL, MOS and CMOS open drain and tristate outputs, CMOS transmission gate, IC interfacing- TTL driving CMOS and CMOS driving TTL .

UNIT V

COMBINATIONAL CIRCUIT DESIGN

Design using TTL-74XX series ICs - Code Converters, Decoders, Demultiplexers, Encoders, priority Encoders, multiplexers and their applications, Priority Generators. Arithmetic circuit ICs-parallel binary Adder/Subtractor circuits using 2's-Complement system. Digital comparator circuits.

SEQUENTIAL CIRCUITS

Commonly available 74XX series ICs-RS, JK, JK Master Slave, D and T Type Flip-Flops & their conversions, Design of Synchronous and Asynchrounous counters, Decade counter, shift registers and applications using TTL-74XX series ICs.

TEXT BOOKS

1. Linear Integrated Circuits by D. Roy Chowdhury, New Age International (p) Ltd, 2nd Edition, 2008..
2. Digital Fundamentals by Floyd and Jain, Pearson Education, 8th Edition, 2005.
3. Op-Amps and Linear ICs by Ramakanth A. Gayakwad, PHI, 1987.

REFERENCES

1. Operational Amplifiers and Linear Integrated Circuits by R.F. Coughlin and Fredrick F. Driscoll, PHI, 1977.
2. Operational Amplifiers and Linear Integrated Circuits:4/e William D Stanley PEI 2009.
3. Op Amps and Linear Integrated Circuits: Concepts and Applications by James M. Fiore, Cengage/ Jaico, 2/e, 2009.
4. Operational Amplifiers and Linear Integrated Circuits by K.Lal Kishore - Pearson education, 2008.
5. Modern Digital Electronics RP Jain 4/e TMH 2010.

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III Year B.Tech EEE – I sem	**L**	**T/P/D**	**C**
	0	**3**	**2**

(13EEE103) ELECTRICAL MACHINES- II LABORATORY

Course Objectives:

- To understand the operation of synchronous machines
- To understand the analysis of power angle curve of a synchronous machine
- To understand the equivalent of a single phase induction motor
- To understand the circuit diagram of an induction motor by connecting a blocked rotor test of an induction motor

Course Outcomes:

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

- To perform the brake tests on three phase and single phase induction motors to obtain the performance curves
- To convert the phase from 3 to 2 vice-versa using Scott connection
- To test the transformers and induction motors
- To start the induction motors by different methods and to synchronize the given alternator across the supply lines

Part – A

1. Sumpner's test on two identical single-phase transformers
2. Separation of iron losses of a single-phase transformer
3. Scott-connected Transformer
4. No-Load and blocked rotor tests on three-phase squirrel-cage Induction Motor
5. Brake test on three phase squirrel cage induction motor
6. Regulation of three-phase Alternator by synchronous impedance method.
7. Regulation of three-phase Alternator by ZPF Method
8. Slip test on three-phase salient pole Alternator
9. **V** and inverted **V** curves of a three-phase synchronous motor
10. speed control of three-phase slip ring Induction Motor

Part - B

11. Regulation of three-phase Alternator by MMF Method
12. Regulation of three-phase Alternator by ASA method
13. Power angle curve and efficiency of three-phase synchronous machine
14. Parallel operation of three-phase Alternator with grid
15. Equivalent circuit and Brake test on Single-phase Induction Motor
16. Sequence impedances of synchronous machines
17. Power factor improvement of three-phase squirrel cage Induction Motor
18. Vector group test and parallel operation of three-phase transformer

Any Eight from Part – A and any Two from Part – B are to be conducted

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III Year B.Tech EEE – I sem	**L**	**T/P/D**	**C**
	0	**3**	**2**

(13EEE104) CONTROL SYSTEMS AND SIMULATION LABORATORY

Course objectives:

- To understand the different ways of system representations such as Transfer function representation and state space representations
- To get the transfer functions of various physical and laboratory based systems.
- To design various controllers and compensators to improve system performance and test them in the laboratory
- To get the performance of various devices (Magnetic amplifiers, Servo motors and stepper motors etc.)

Course Outcomes:

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

- Solve electrical engineering problems using MATLAB Programming and SIMULINK Models
- Design various controllers and compensators to improve system performance and test them in the laboratory
- To choose various devices (Magnetic amplifiers, Servo motors and stepper motors etc.) for different applications in Electrical Systems
- To design the state space model of DC motor.

Part - A

1. Time response of Second order system including MATLAB Programming and Simulink Model
2. Characteristics of Synchros
3. Programmable logic controller – Study and verification of truth tables of logic gates, simple Boolean expressions
4. Effect of feedback on DC servo motor.
5. Transfer function of DC motor
6. Effect of P, PD, PI, PID Controller on a second order systems.
7. Lag and lead compensation – Magnitude and phase plot.
8. Transfer function of DC generator
9. Temperature controller using PID Controller
10. Characteristics of magnetic amplifiers
11. Characteristics of AC servo motor
12. Stepper Motor characteristics
13. Study of open loop and closed loop configurations of Control Systems

Part - B

14. (a) MATLAB Simulation of P, PI, PID Controller.

(b) Linear system analysis (Time domain analysis, Error analysis) using MATLAB

14 Stability analysis (Bode, Root Locus, Nyquist) of Linear Time Invariant system using MATLAB

15 State space model for classical transfer function using MATLAB– Verification.

16 Design of Lead-Lag compensator for the given system and with specification using MATLAB.

Any Eight experiments from Part – A and any Two experiments from Part – B are to be conducted

REFERENCES

1. Simulation of Electrical and electronics Circuits using PSPICE by M.H.Rashid, M/s PHI Publications.

2. MATLAB and its Tool Box user's manual and – Mathworks, USA.

3. Modern Control Engineering by Katsuhiko Ogata – Prentice Hall of India Pvt. Ltd., 3rd edition, 1998.

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III Year B.Tech EEE – I Sem	**L**	**T/P/D**	**C**
	0	**3**	**2**

(13EEE105) POWER ELECTRONICS AND SIMULATION LABORATORY

Course Objectives

- To know the impact of power electronic control circuits on utility supply
- To understand the application of phase controlled rectifiers
- To understand the importance of ac voltage controllers, cyclo converters
- To understand the importance of choppers and inverters for various industrial applications

Course Outcomes

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

- To analyze operating principles of different converters
- To choose the appropriate converter for various applications
- Use power electronics simulation packages for analyzing and designing power converters
- To simulate different converters using PSPICE software.

PART A

1. Study of Characteristics of SCR, MOSFET & IGBT
2. Study of UJT gate firing circuit for SCR
3. Single Phase AC Voltage Controller with R and RL Loads
4. Single Phase fully controlled bridge converter with R and RL loads
5 Single Phase Cyclo-converter with R and RL loads
6. Single Phase half controlled converter with R load
7. Three Phase half controlled bridge converter with R-load
8. Single Phase Bridge inverter with R and RL loads
9. Single Phase dual converter with RL loads
10. Study of buck converter
11. Study of boost converter

PART B

1. (a)Simulation of single-phase Half wave converter using R and RL loads
   (b)Simulation of single-phase full converter using R, RL and RLE loads
   (c)Simulation of single-phase Semi converter using R, RL and RLE loads
2. (a)Simulation of Single-phase AC voltage controller using R and RL loads
   (b)Simulation of Single phase Cyclo-converter with R and RL-loads
3. Simulation of Buck chopper
4. Simulation of single phase Inverter with PWM control

5. Simulation of three phase fully controlled converter with R and RL loads, with and without freewheeling diode. Observation of waveforms for Continuous and Discontinuous modes of operation.
6. Study of PWM techniques

Any Eight experiments from Part – A and any Two experiments from Part – B are to be conducted

REFERENCES

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

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III Year B.Tech EEE – II Sem	**L**	**T/P/D**	**C**
	4	**1**	**4**

(13EEE011) POWER SEMICONDUCTOR DRIVES

Course Objectives

- To introduce the drive system and operating modes of drive and its characteristics
- To understand Speed –torque characteristics of different motor drives by various power converter topologies
- To Understand the motoring and braking operations of drive
- To Understand the differences between DC drives and AC drives

Course Outcomes:

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

- Indentify the drawbacks of speed control of motor by conventional methods.
- Differentiate Phase controlled and chopper controlled DC drives speed-torque characteristics merits and demerits
- Understand Ac motor drive speed–torque characteristics using different control strategies its merits and demerits
- Describe Slip power recovery schemes

UNIT – I

CONTROL OF DC MOTORS BY SINGLE PHASE AND THREE PHASE CONVERTERS

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

UNIT – II

FOUR QUADRANT OPERATION OF DC DRIVES

Introduction to Four quadrant operation – Motoring operations, Electric Braking – Plugging, Dynamic and Regenerative Braking operations. Four quadrant operation of D.C motors by single phase and three phase dual converters – Closed loop operation of DC motor (Block Diagram Only)

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-III

CONTROL OF INDUCTION MOTOR THROUGH STATOR VOLTAGE AND STATOR FREQUENCY

Variable voltage characteristics-Control of Induction Motor by Ac Voltage Controllers – Waveforms – speed torque characteristics.

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

UNIT – IV

ROTOR SIDE CONTROL OF INDUCTION MOTOR

Static rotor resistance control – Slip power recovery – Static Scherbius drive – Static Kramer Drive – their performance and speed torque characteristics – advantages, applications, problems.

UNIT –V

CONTROL OF SYNCHRONOUS MOTORS

Separate control and self control of synchronous motors – Operation of self controlled synchronous motors by VSI, CSI and cycloconverters. Load commutated CSI fed Synchronous Motor – Operation – Waveforms – speed torque characteristics – Applications – Advantages and Numerical Problems – Closed Loop control operation of synchronous motor drives (Block Diagram Only), variable frequency control - Cyclo converter, PWM based VSI & CSI.

TEXT BOOKS

1. Fundamentals of Electric Drives by G K Dubey, Narosa Publications.
2. Electric motor drives - modeling, Analysis and control by R.Krishnan, Prentice Hall PTR, 2001
3. Modern Power Electronics and AC Drives by B.K.Bose, PHI.
4. Thyristor Control of Electric drives by Vedam Subramanyam, Tata McGraw Hill Publications.

REFERENCES

1. A First course on Electrical Drives – S K Pillai New Age International (P) Ltd. 2nd Edition.
2. Thyristor DC Drives by P.C.Sen, Wiley-Blackwell, 1981

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III Year B.Tech EEE – II sem	**L**	**T/P/D**	**C**
	4	**1**	**4**

(13EEE012) POWER SYSTEM ANALYSIS

Course Objectives:

- To describe load flow methods
- To analyze symmetrical and unsymmetrical faults
- To describe stability types
- To learn different methods of stability analysis.

Course Outcomes

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

- Solve Load flow problems
- Apply symmetrical components for symmetrical and unsymmetrical fault analysis Analyze the different load flow methods
- Analyze the swing equation and stability
- Analyze different types of stability.

UNIT-I

POWER SYSTEM NETWORK MATRICES

Graph Theory: Basic Concepts-Branch, Link, Incidence Matrix, Bus Impedence Matrix and Admittance Matrix - Numerical Problems. Formation of Z_{Bus}: Partial network, Algorithm for Modification of Z_{Bus} Matrix for addition of an element for the following cases- Addition of an element as a link, Addition of an element as a tree branch, Derivations and Numerical Problems.

UNIT –II

POWER FLOW STUDIES

Introduction, Classification of buses, Formulation of static load flow equations, Solution techniques using Gauss Seidel Method - Algorithm and Flowchart. Numerical problems - Load flow Solution for Simple Power Systems- Determination of Bus quantities, finding Line Flows/Losses for the given Bus Voltages (Computation upto two iterations only and limited to 3 bus power system networks).

Newton Raphson Method in Rectangular and Polar Co-ordinates Form - Load Flow Solution - Algorithm and Flowchart, Numerical Problems.

Principles of Decoupled and Fast Decoupled Methods- Comparison of Different Methods.

UNIT – III

SHORT CIRCUIT ANALYSIS

Per-Unit System of Representation. Per-Unit equivalent reactance network of a three phase Power System, Numerical Problems.

Symmetrical fault Analysis: Short Circuit Current and MVA Calculations, Fault levels, Reactors-Numerical Problems.

Symmetrical Component Theory: Symmetrical Component Transformation, Sequence Networks: Positive, Negative and Zero sequence Networks for transformers, transmission line and synchronous machine, Numerical Problems.

Unsymmetrical Fault Analysis: LG, LL, LLG faults, Interconnection of sequence networks, effect of fault impedance, Numerical Problems.

UNIT –IV

STABILITY ANALYSIS I

Introduction, Concepts of small and large disturbance, Stability: Concept of steady state, Dynamic and Transient Stability. Steady State Stability Limit, Transfer Reactance, Synchronizing Power Coefficient, Power Angle Curve, Determination of Steady State Stability limit and Methods to improve steady state stability, Numerical problems.

UNIT –V

STABILITY ANALYSIS II

Derivation of Swing Equation. Determination of Transient Stability by Equal Area Criterion, Application of Equal Area Criterion, Critical Clearing Angle Calculation, Solution of Swing Equation: Point-by-Point Method. Methods to improve Stability - Application of Auto Reclosing and Fast Operating Circuit Breakers, Numerical analysis.

TEXT BOOKS

1. Elements of Power System by Stevenson, Tata McGraw Hill
2. Computer Techniques in Power System Analysis by M.A.Pai, TMH Publications.
3. Modern Power system Analysis by I.J.Nagrath and D.P.Kothari: Tata McGraw-Hill Publishing Company, 2nd edition.

REFERENCES

1. Power System Analysis by Grainger and Stevenson, Tata McGraw Hill.
2. Power System Analysis by A.R.Bergen, Prentice Hall, Inc.
3. Power System Analysis by Hadi Saadat, TMH Edition.
4. Power System Analysis by B.R.Gupta, Wheeler Publications.

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III Year B.Tech EEE – II Sem	**L**	**T/P/D**	**C**
	4	**1**	**4**

(13EEE013) SWITCH GEAR AND PROTECTION

Course Objectives:

- Introduce students to power system protection and switch gear.
- To introduce all kinds of circuit breakers and relays for protection of Generators, Transformers and feeder bus bars from Over voltages and other electrical hazards.
- Describe neutral grounding for overall protection of electrical systems.
- To enhance students knowledge of overvoltage protection and data transmission.

Course Outcomes:

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

- Students are knowledgeable in the field of power system protection and circuit breakers.
- Students are knowledgeable in the field of relays
- Students will demonstrate and ability to design the relevant protection systems for the main elements of power systems
- Students are knowledgeable in the field of over voltage protection and the basics of data transmission.

UNIT – I

CIRCUIT BREAKERS

Circuit Breakers: Elementary principles of arc interruption, Recovery, Restriking Voltage and Recovery voltages. - Restriking Phenomenon, Average and Max. RRRV-Numerical Problems. Current Chopping, Auto reclosures and Resistance Switching - CB ratings and Specifications: Types, testing of circuit breakers - Numerical Problems.

Description and Operation of following types of circuit breakers: Minimum Oil Circuit breakers, Air Blast Circuit Breakers, Vacuum and SF6 circuit breakers.

UNIT – II

ELECTROMAGNETIC AND STATIC RELAYS

Principle of Operation and Construction of Attracted armature, Balanced Beam, induction Disc and Induction Cup relays. Relays Classification: Instantaneous, DMT and IDMT types.

Application of relays: Over current / under voltage relays, Direction relays, Differential Relays and Percentage Differential Relays. Universal torque equation, Distance relays: Impedance, Reactance and Mho and Off-Set Mho relays, Characteristics of Distance Relays and Comparison.

Static Relays: Static Relays versus Electromagnetic Relays.

UNIT – III

EQUIPMENT PROTECTION

Protection of generators against Stator faults, Rotor faults, and Abnormal Conditions. Restricted Earth fault and Inter-turn fault Protection - Numerical Problems. Protection of transformers: Percentage Differential Protection, Numerical Problem on Design of CT's Ratio, Buchholtz relay Protection. Protection of Lines: Over Current, Carrier Current and Three-zone distance relay protection using Impedance relays. Translay Relay. Protection of Bus bars – Differential protection Feeder Protection and Relay coordination

UNIT – IV

NEUTRAL GROUNDING

Grounded and Ungrounded Neutral Systems.- Effects of Ungrounded Neutral on system performance. Methods of Neutral Grounding: Solid, Resistance, Reactance - Arcing Grounds and Grounding Practices.

UNIT – V

PROTECTION AGAINST OVER VOLTAGES

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.

TEXT BOOKS

1. Switchgear and Power System Protection by Ravindra P.Singh, PHI, 2009.
2. Switch gear and Protection, by Haroon Asf, Khanna Book Publishing Co.(P)Ltd, 2nd edition.
3. Power System Protection and Switch Gear by Badri Ram and D.N.Vishwakarma, McGraw – Hill professional.
4. Switchgear Protection and Power system by Sunil. S. Rao, Khanna Book Publishing Co.(P)Ltd, 13th Edition.

REFERENCE BOOKS

1. Fundamentals of Power Sytems, Y.G.Paitankar, S.R.Bhinde, PHI Publications, 2nd Edition.
2. Advanced Power System Analysis and Dynamics by L.P.Singh, New Academic Science, 6th Edition

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III Year B.Tech EEE – II Sem	**L**	**T/P/D**	**C**
	4	**1**	**4**

(13ECE009) MICROPROCESSORS AND MICROCONTROLLERS

Course Objectives

- To understand characteristics and architectures of various microprocessors and microcontrollers.
- Understand basic programming concepts and software tools
- Learn various interfacing circuits necessary for various applications
- To learn various interfacing concepts.

Course Outcomes

- Demonstrate the ability to design a system, component or a process as per needs and specifications
- Select the proper architecture for the implementation of digital designs
- Write various assembly language programs for a given task using 8086, 8051 and ARM processors.
- Design and implement microprocessor and microcontroller based systems.

After going through this course the student will be able to

- Select the proper architecture for the implementation of digital designs
- Write various assembly language programs for 8086 and 8051.
- Design and implement microprocessor and microcontroller based systems.
- Hardware and software interaction and integration.

UNIT I

Introduction to 8085 Microprocessor, Architecture of 8086 Microprocessor, Addressing modes of 8086, Instruction set of 8086, Assembler directives, simple assembly language programs, procedures, and macros. Pin diagram of 8086-Minimum mode and maximum mode of operation.

UNIT II

Memory and I/O organization of 8086, 8255 PPI – various modes of operation and interfacing to 8086, D/A and A/D converter to 8086 using 8255, memory interfacing to 8086.

UNIT III

Serial Communication standards, serial data transfer schemes, 8251 USART architecture and interfacing, RS-232, IEEE 488 standards. Interrupt structure of 8086, Interrupt Vector Table. Need for 8259 Programmable Interrupt Controller.

UNIT IV

Introduction to Microcontrollers, 8051 Microcontroller Architecture, I/O ports, memory organization, counters and Timers, Serial data Input/Output, Interrupts. Addressing modes, Instruction set of 8051, Simple programs.

Timer, serial port and Interrupts programming: Programming 8051 timers/counters, 8051 serial port programming, programming timer interrupts, programming External hardware interrupts, programming serial communication interrupts.

UNIT V

Interfacing to 8051: A/D and D/A Converter, Stepper Motor Interface, Key Board Interfacing, LCD Interfacing.

ARM Processor:Fundamentals, Registers, current program status register, pipeline, Exceptions, Interrupt and the vector table.

TEXT BOOKS

1. Microprocessors and interfacing – Douglas V. Hall, TMH, 2nd Edition, 1999.
2. The 8051 microcontrollers and Embedded systems- Mazidi and mazidi, PHI, 2000.
3. ARM System Developer's Guide: Designing and Optimizing System Software- Andrew N. Sloss, Dominic Symes, Chris Wright, Elsevier Inc., 2007

REFERENCES

1. Micro computer systems, The 8086/8088 Family Architecture, Programming and Design – Y.Liu and G.A. Gibson, PHI, 2nd edition.
2. Advanced microprocessors and Peripherals – A.K.Ray and K.M.Bhurchandi, TMH, 2000.
3. Micro Computer System 8086/8088 Family Architecture Programming and Design – By Liu and GA Gibson PHI, 2ndEdition
4. Microcontrollers and Applications, Ajay . V. Deshmukh, TMGH,2005.
5. The 8085 Microprocessor : Architecture Programming and Interfacing – K.Uday Kumar, B.S Umashankar, Pearson , 2008.

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III Year B.Tech EEE – II Sem	**L**	**T/P/D**	**C**
	3	**0**	**3**

Open Elective

(13EEE015) RENEWABLE ENERGY SOURCES

Course Objectives:

- To inculcate the awareness of energy conservation in students
- To understand the use of renewable energy sources for electrical power generation
- To know different energy storage methods
- To learn about environmental effects of energy conversion

Course Outcomes:

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

- To use different renewable energy sources to produce electrical power
- To minimize the use of conventional energy sources to produce electrical energy
- To identify the fact that the conventional energy resources are depleted
- To store energy and to avoid the environmental pollution

UNIT- I

PRINCIPLES OF SOLAR RADIATION

Role and Potential of New and Renewable source, the solar energy option, Environmental impact of solar power, Physics of the Sun, The solar constant, Extraterrestrial and Terrestrial solar radiation, Solar radiation on titled surface, Instruments for measuring solar radiation and sun shine, solar radiation data.

UNIT- II

SOLAR ENERGY COLLECTION & APPLICATIONS

Flat Plate Collectors and Concentrating Collectors, Classification of concentrating collectors, Orientation and Thermal analysis, advanced collectors, Solar ponds, Solar Energy Applications - solar heating/cooling techniques, solar distillation and drying, Photovoltaic Energy Conversion.

UNIT- III

WIND ENERGY

Sources and potentials, Horizontal and Vertical axis wind mills - Types, Blade Design, Performance characteristics, Betz criteria, Induction Generators for Wind power Generation, MHD Generation.

UNIT - IV

BIO-MASS & DEC

Principles of Bio-Conversion, Anaerobic/aerobic digestion, Types of Bio-gas Digesters, gas yield, Combustion characteristics of bio-gas, Utilization for cooking, Economic aspects.

Direct Energy Conversion, Need for DEC, Principles of DEC, Carnot Cycle and Limitations.

UNIT - V

HARNESSING GEOTHERMAL ENERGY & OCEAN ENERGY

Resources of Geothermal Energy, Types of wells, Methods of harnessing the energy, potential in India, Ocean Thermal Energy Conversion, Principles, Utilization, Setting of OTEC plants, Thermodynamic cycles, Tidal and Wave energy: Potential and Conversion Techniques, Mini-Hydel Power plants.

TEXT BOOKS

1. Non-Conventional Energy Sources by G.D.Rai, Khanna Publishers.
2. Renewable Energy Resources by Twidell and Wier, CRC Press (Taylor and Francis).
3. Non- Conventional energy resources by B.H.Khan, Tata Mc Graw-Hill, 2006.

REFERENCE BOOKS

1. Renewable Energy Resources by Tiwari and Ghosal, Narosa.
2. Renewable Energy Technologies by Ramesh and Kumar, Narosa.
3. Non-Conventional Energy Systems by K Mittal, Wheeler Publishing House.
4. Renewable Energy Sources and Emerging Technologies by D.P.Kothari, K.C.Singhal, PHI.

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III Year B.Tech EEE – II Sem	**L**	**T/P/D**	**C**
	3	**0**	**3**

Open Elective

(13CSE016) INTELLECTUAL PROPERTY RIGHTS

Course Objectives:

- To make students familiar about the different intellectual property rights; copyright, patents, trademarks, trade dress, designs and know-how the different levels of intellectual property strategy.
- To analyze the appropriate intellectual property strategy in a given market.
- To understand innovations in engineering and other domains.
- To know the issues and challenges involved with intellectual property valuation and the strategic requirements of intellectual property transactions
- To be familiar with patents, copyrights and various acts related to innovations.

Course Outcomes:

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

- Define and identify various terms related to IPRs, obtain, use and protect the various IPRs in a business environment to form an appropriate IP strategy for the relevant market
- To analyze the situation of IPR in the Indian context with that of global scenario and understand the patenting process through various case studies.
- Identify and explain the tasks and significance of an IP manager and demonstrate competence in critical reasoning, problem solving and decision making
- Demonstrate a deep understanding of the language of IP law and how to make the best use of legal professionals involved in IPRs
- Demonstrate a critical understanding of the issues involved in and choose appropriate methods for extracting value from an organizations IPR (licensing, joint venture, borrowing, raising capital etc.)..

UNIT I

Introduction – Invention and Creativity – Intellectual Property (IP) – Importance – Protection of IPR – Basic types of property i. Movable Property ii. Immovable Property and iii. Intellectual Property.

UNIT II

IP – Patents – Copyrights and related rights – Trade Marks and rights arising from Trademark registration – Definitions – Industrial Designs and Integrated circuits – Protection of Geographical Indications at national and International levels – Application Procedures..

UNIT III

International convention relating to Intellectual Property – Establishment of WIPO – Mission and Activities – History – General Agreement on Trade and Tariff (GATT).

UNIT IV

Indian Position Vs WTO and Strategies – Indian IPR legislations – commitments to WTO-Patent Ordinance and the Bill – Draft of a national Intellectual Property Policy – Present against unfair competition.

UNIT V

Case Studies on – Patents (Basumati rice, turmeric, Neem, etc.) – Copyright and related rights – Trade Marks – Industrial design and Integrated circuits – Geographic indications – Protection against unfair competition.

TEXT BOOKS

- Subbaram N.R. "Handbook of Indian Patent Law and Practice ", S. Viswanathan Printers and Publishers Pvt. Ltd., 1998.

REFERENCES

- P. Narayanan; Law of Copyright and Industrial Designs; Eastern law House, Delhi, 2010
- Prabhuddha Ganguli: ' Intellectual Property Rights" Tata Mc-Graw –Hill, New Delhi
- M.Ashok Kumar and Mohd.Iqbal Ali: "Intellectual Property Right" Serials Pub.

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III Year B.Tech EEE – II Sem	**L**	**T/P/D**	**C**
	3	**0**	**3**

Open Elective

(13CSE012) CYBER SECURITY

Course Objectives

- Expose to computer science terminology related to coding, password protection, social engineering, and network security.
- Learn overview of Information Security and Assurance over the Internet.
- Describe how encryption works to protect privacy and know recent network security breaches.
- Expose to the spectrum of security activities, methods, methodologies, and procedures.
- Learn Service Processes, storage and security management, Cyber Forensics standard, laws and Acts for Information Security**.**

Course Outcomes

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

- Understand security principles, threats, attack techniques & realize various information security laws and standards
- Explain why the term “hacker” is extremely flexible and the variety of roles that hackers play
- Depict reference monitors, security models, authentication and access control
- Comprehend Service Delivery and support process and know the importance of network security and operating system security
- Identify with Cyber forensics tools for imaging and recovery & know the storage and security management

UNIT-I

INTRODUCTION: Introduction and Overview of Cyber Crime, Nature and Scope of Cyber Crime, Types of Cyber Crime: Social Engineering, Categories of Cyber Crime, Property Cyber Crime. CYBER CRIME ISSUES: Unauthorized Access to Computers, Computer Intrusions, White collar Crimes, Viruses and Malicious Code, Internet Hacking and Cracking, Virus Attacks, Pornography, Software Piracy, Intellectual Property, Mail Bombs, Exploitation ,Stalking and Obscenity in Internet, Digital laws and legislation, Law Enforcement Roles and Responses. Security Policy Design, Designing Security Procedures, Risk Assessment Techniques, Security standards, Biba Model, Chinese wall, Bell La Pedula Model.

UNIT-II

SERVICE DELIVERY PROCESS- Service Delivery Process, Service Level Management, Financial Management, Service Management, Capacity Management, Availability Management.

SERVICE SUPPORT PROCESS- Service Support Process, Configuration Management, Incident Management, Problem Management, Change Management, Release Management.

UNIT-III

STORAGE MANAGEMENT- Backup & Storage, Archive & Retrieve, Disaster Recovery, Space Management, Database & Application Protection, Bare Machine Recovery, Data Retention

SECURITY MANAGEMENT- Security, Computer and internet Security, Physical Security, Identity Management, Access Management. Intrusion Detection, Security Information Management.

UNIT-IV

CYBER FORENSICS- Introduction to Digital Forensics, Forensic Software and Hardware, Analysis and Advanced Tools, Forensic Technology and Practices, Forensic Ballistics and Photography, Face, Iris and Fingerprint Recognition, Audio Video Analysis, Windows System Forensics, Linux System Forensics, Network Forensics Evaluation of crime scene and evidence collection ,Usage of tools for disk imaging and recovery processes.

UNIT-V

INTRODUCTION TO INFORMATION SECURITY STANDARDS , LAWS AND ACTS: Laws and Ethics, Digital Evidence Controls, Evidence Handling Procedures, Basics of Indian Evidence ACT IPC and CrPC , Electronic Communication Privacy ACT, Legal Policies,ISO 27001,PCI DSS,IT Act, Copy Right Act.

TEXT BOOKS:

1. Nelson Phillips and Enfinger Steuart, “Computer Forensics and Investigations”, Cengage Learning, New Delhi, 2009.
2. "Management of Information Security", M. E. Whitman, H. J. Mattord, Nelson Education / CENGAGE Learning, 2011, 3rd Edition.
3. "Guide to Computer Forensics and Investigations", B. Nelson, A. Phillips, F. Enfinger, C. Steuart, Nelson Education / CENGAGE Learning, 2010, 4th Edition.
4. Goel Ritendra, Computer Application in Management, New Age International Publishers, New Delhi.
5. Chowdhury G.G., Text Retrieval Systems in information Management, New Age International Publishers, New Delhi.

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III Year B.Tech EEE – II Sem	**L**	**T/P/D**	**C**
	3	**0**	**3**

Open Elective

(13CED037) DISASTER MANAGEMENT

Course Objectives:

- Understand the difference between a hazard and disaster
- Know about various disasters and their impacts
- Understand Different approaches of disaster risk reduction
- Understand Disaster risks in India

Course Outcomes:

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

- Acquire the knowledge disaster Management
- Understand the vulnerability of ecosystem and infrastructure due to a disaster
- Acquire the knowledge of Disaster Management Phases
- Understand the hazard and vulnerability profile of India

UNIT-1

Introduction to disaster

Concepts and definitions (Disaster, Hazard, Vulnerability, Resilience, Risks)

UNIT-II

Disasters: Classifications, Causes, Impacts (including social, economic, political, environment, health, psychosocial, etc.)

Differential impacts-in terms of caste, class, gender, age, location, disability Global trends in disasters. Urban disaster, pandemics, complex emergencies, Climate change

UNIT-III

Approaches to disaster Risk reduction

Disaster cycle-its analysis, phase, Culture of safety, prevention, mitigation and preparedness, community based DRR, Structural measures, roles and responsibilities of community. Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), states, center and other stake-holders.

UNIT-IV

Inter-relationship between Disaster and Development

Factors affecting Vulnerabilities, differential impacts, impact of development projects such as dams, embankments, change in land-use etc. Climate change Adaption. Relevance of indigenous knowledge, appropriate technology and local resources.

UNIT-V

Disaster Risk Management in India

Hazard and vulnerability profile of India

Components of Disaster relief: Water, food, sanitation, shelter, health, waste management Institutional arrangements (Mitigation, Response and Preparedness, DM Act Policy, Other related polices, plan, programmes and legislation)

Project Work :(Field Work, Case Studies)

The project/fieldwork is meant for students to understand vulnerabilities and to work on reducing disaster risks and to build a culture of safety. Projects must be conceived creatively based on the geographic location and hazard.

Suggested Reading list:

1. Alexander David, Introduction in 'Confronting Catastrophe', oxford University press, 2000
2. Andharia J. Vulnerability in disaster Discourse, JTCDM, Tata Institute of Social Sciences working paper no.8, 2008
3. Blaikie, P, Cannon T, Davis I, Wisner B 1997. At Risk Natural Hazards, Peoples' Vulnerability and Disaster, Rutledge.
4. Coppola P Damon, 2007. Introduction to International Disaster Management.
5. Carter, Nick 1991.Disaster Management: A Disaster Manager's Handbook. Asian Development Bank, Manila Philippines.
6. Cuny,F.1983. Development and Disasters, Oxford University Press
7. Govt.of India; Disaster Management Act 2005, Government of India, New Delhi.

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III Year B.Tech EEE – II Sem	**L**	**T/P/D**	**C**
	3	**0**	**3**

Open Elective

(13CSE030) PROFESSIONAL ETHICS AND HUMAN VALUES

Introduction

Human values and ethics have a significant role to play in the betterment of our society. Ethics and values are a liberating force, enabling higher performance, better quality relationships and an expanded sense of purpose and identity.

This syllabus aims to present a framework for understanding human values and their role in life, work, business and leadership. It aims to transform individuals from having self-focused, survivalist mindset that has scant regard for ethics, through to compliance with laws and conventions, and then to the aspiration to live a higher ethical and spiritual life.

It mainly focuses on improving the capacities of leadership /management through training in human values and professional ethics. It serves to contribute to good governance in the organizations and foster an environment that supports and encourages just practices and fairplay.

Course Objectives:

- To create an awareness on Engineering Ethics and Human Values.
- To study the moral issues and decisions confronting individuals and organizations engaged in engineering profession.
- To study the related issues about the moral ideals, character, policies, and relationships of people and corporations involved in technological activity.

Course Outcomes:

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

- Students learn the moral issues and problems in engineering ; find the solution to those problems .
- Students learn the need for professional ethics, codes of ethics and roles, concept of safety, risk assessment.
- Students gain exposure to Environment Ethics & computer ethics; know their responsibilities and rights

Outline of Syllabus

UNIT I : Introduction to Human Values and Ethics

Human Values: Morals, Values and Ethics – Integrity – Work Ethic – ServiceLearning – Civic Virtue – Respect for Others – Living Peacefully – caring – Sharing –Honesty – Courage – Valuing Time – Co-operation – Commitment – Empathy – Self-Confidence – Character – Spirituality.

Introduction to Ethical Concepts: Definition of industrial ethics and values, Ethical rules of industrial worker- Values and Value Judgments -- Moral Rights and Moral rules -- Moral character and responsibilities -- Privacy, confidentiality, Intellectual property and the law -- Ethics as law.

UNIT II --- Understanding Engineering Ethics

Ethics: Action Oriented- Ethical Vision- Indian Ethos- Ethics Defined-Engineering Ethics: Various Connotations of Engineering Ethics, Why Study Engineering Ethics?, Personal and Business Ethics-Ethics and the Law-Senses of 'Engineering Ethics' – Variety of moral issues –Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory –Gilligan's theory – Consensus and Controversy – Professions and Professionalism –Professional Ideals and Virtues – Theories about right action – Self-interest –Customs and Religion – Uses of Ethical Theories -Engineering as a Profession -- Professional Societies -- Core Qualities of Professional Practitioners -- Professional Institutions, Operating in a Pluralistic Society - Environments and Their Impact - Economic Environment -- Capital Labor-- Price Levels -- Government Fiscal and Tax Policies – Customers -- Technology

UNIT III : Engineering as Social Experimentation

Engineering as Social Experimentation – Comparison with Standard Experiments, Knowledge Gained Conscientiousness, Relevant Information, Learning from the Past, Engineers as managers, consultants, and Leaders, Accountability, Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law.

Engineers and Managers -- Organizational complaint procedures - Government agencies Resolving Employee concerns – Limits on acceptable behavior in large corporations -- Ethical and legal considerations, Organizational responses to offensive behaviour and harassment.

UNIT IV : Workplace Rights and Responsibilities

Professional Responsibility: The basis and scope of Professional Responsibility -- Professions and Norms of Professional Conduct -- Ethical Standards versus Profession -- Culpable mistakes -- the Autonomy of professions and codes of ethics -- Employee status and Professionalism -- Central Professional Responsibilities of Engineers: The emerging consensus on the Responsibility for safety among engineers, Hazards and Risks.

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and reducing risk - Ethical standards vs. Professional conduct - Collegiality and Loyalty – Respect for Authority – Collective Bargaining –Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights –Employee Rights – Intellectual Property Rights (IPR) – Discrimination - Organizational complaint procedures - Government agencies - Resolving Employee concerns.

UNIT V : Ethics in Global Context

Global Issues: Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership – Sample Code of Ethics like ASME, ASCE, IEEE, Institution of Engineers (India), Indian Institute of Materials Management, Institution of Electronics and Telecommunication Engineers (IETE), India, etc.

Text Books

1. Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw Hill. New York 1996.
2. Ethics in Engineering Practice and Research, Caroline Whitbeck, Elsevier.
3. Govindarajan. M, Natarajan. S, Senthilkumar. V.S, “Engineering Ethics”, Prentice Hall of India, 2004.

Reference Books

1. Charles D Fleddermann, "Engineering Ethics", Prentice Hall, New Jersey,2004 (Indian Reprint).
2. Charles E Harris, Michael S Pritchard and Michael J Rabins, "EngineeringEthics Concepts and Cases", Thompson Learning, United States, 2000 (Indian Reprint now available).
3. John R Boatright, “Ethics and the Conduct of Business”, Pearson Education, New Delhi, 2003.
4. Edmund G Seebauer and Robert L Barry, “Fundamentals of Ethics for Scientists and Engineers”, Oxford University Press, Oxford, 2001.
5. Ethics in Engineering, Fourth Edition, Mike W. Martin, Rolan Schinzinger, Mc Graw Hill publishers
6. Engineering Ethics-An industrial Perspective, Gail Dawn Baura
7. Ethics and Values in Industrial-Organizational Psychology, Joel Lefkowitz

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III Year B.Tech EEE – II sem	**L**	**T/P/D**	**C**
	0	**3**	**2**

(13EEE106) POWER SYSTEMS LABORATORY

Course Objectives:

- To perform experiments on various relays viz. Differential, IDMT and Static relays
- To perform fault analysis on Transmission line models, Generators and transformers
- To perform simulation experiments in various softwares viz. MATLAB/SIMULINK, MiPower and PSCAD Softwares
- To observe the characteristics of solar PV systems.

Course Outcomes

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

- Perform load flow solution by using various methods
- Analyze different relays
- Test CT and PT's, insulator strings.
- Draw characteristics of solar PV systems.

Part - A

1. Differential protection of 1-Φ transformer.
2. IDMT directional and non-directional relays.
3. Static phase sequence detectors.
4. Power circle diagrams of a 3-Φ transmission line model.
5. ABCD constants and Regulation of a 3-Φ transmission line model.
6. Distance protection of transmission lines.
7. Testing of CT and PT's, insulator strings.
8. Finding the sequence impedances of 3-Φ synchronous machine.
9. Finding the sequence impedances of 3-Φ Transformer.
10. Transformer fault analysis, LG, LL, 3-Φ faults and also using PSIM.
11. LG, LL and 3-Φ fault analysis of 3-Φ synchronous machine and also using PSIM.
12. Characteristics of Micro Processor based Over Current/Over Voltage relay.
13. Performance of Digital Relays.
14. (a)Load shedding using SCADA for a Distribution System.
    (b)Voltage Control and Fault Analysis using SCADA.
15. Power factor improvement through SCADA for a given Distribution system.

Part - B

1. (a) Load flow analysis using MIPOWER/POWERWOLRLD.
   (b) Fault analysis of an IEEE 9-bus test system using POWERWORLD or MIPOWER.
2. (a) Transient analysis of 3-Φ fault on a 3-Φ synchronous generator using PSCAD,
   (b) Power system transient analysis of opened line, short circuited line using PSCAD/MATLAB.
3. (a) Voltage profile improvement using shunt compensation using POWERWORLD or MIPOWER.
   (b) Frequency response of a two area Load Frequency control using MATLAB.
4. Characteristics of solar PV Systems.
5. Inverter control for Solar PV based systems.

Any Eight experiments from Part – A and any Two experiments from Part – B are to be conducted.

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III Year B.Tech EEE – II Sem	**L**	**T/P/D**	**C**
	0	**3**	**2**

(13ECE106) MICROPROCESSORS AND MICROCONTROLLERS LABORATORY

Course Objectives

- Devices and circuits to microprocessors and microcontrollers.
- Design and develop both the hardware and software for microprocessor/microcontroller based systems.
- To provide practical introduction to microcontrollers and microprocessors, assembly language programming techniques and interfacing Connect peripheral
- Interpret specifications for any microprocessor or peripheral chip

Course Outcomes

- Develop the basic skills on hardware and software/programming of microprocessor
- Enhance assembly language programming skills for simple and complex calculations used in various engineering disciplines.
- Capable to innovative and design intelligent systems, called embedded systems, using microprocessor for special purpose.
- Involve in verification of functionality, speed and power of microprocessor based system.7

After going through this course the student will be able to

To apply the concepts in the design of microprocessor/microcontroller based systems in real time applications

1. Programs for 16 bit arithmetic operations for 8086 (using Various Addressing Modes).
2. Program for sorting an array for 8086.
3. Program for searching for a number or character in a string for 8086.
4. Program for string manipulations for 8086.
5. Program for digital clock design using 8086.
6. Interfacing ADC and DAC to 8086 / 8051.
7. Interfacing stepper motor to 8086 / 8051.
8. Programming using arithmetic, logical and bit manipulation instructions of 8051.
9. Program and verify Timer/ Counter in 8051.
10. Program and verify Interrupt handling in 8051
11. UART Operation in 8051.
12. Communication between 8051 kit and PC.
13. Interfacing LCD to 8051.
14. Interfacing Matrix / Keyboard to 8051.

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III Year B.Tech EEE –II Sem	**L**	**T/P/D**	**C**
	0	**3**	**2**

(13ENG102) ADVANCED ENGLISH COMMUNICATION SKILLS LABORATORY

Introduction

This course aims to offer students a practical approach to Technical Writing, and provide a relevant, contemporary and authoritative introduction to the dynamic field of technical communication that prepares them for Workplace Communication. Each unit in the syllabus is devised so as to include a writing component as well as an oral component.

Course objectives:

- enable the students to create clear, accurate, and succinct content to write business letters, resume, SOP, Proposals and Technical Reports for academics as well as for workplace
- enable students to adjust technical content to meet the needs of a specific target audience
- groom students to speak accurately and fluently and prepare them for real world activities through behavioral skills
- train students in soft skills through role play and group discussion to improve their EQ.

Course Outcomes:

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

- summarize and synthesize information and produce technical writing that is required in academics as well as in the engineering profession
- write Covering Letters, Resume, SOP, Project Proposals and Technical Reports
- speak fluently and address a large group of audience and participate in debates and discussions
- negotiate terms, manage complex situations through interpersonal skills, persuade people and make quick decisions

Methodology

Writing Component

A Process- Genre methodology will be used in teaching the technical genres. This method would enable students to understand the use of particular lexico-grammatical patterns required of in the context of technical writing. They would learn to use language to express the particular communicative intent that is required of in the context of writing these genres.

Syllabus Outline

Unit I

1. Applications and Covering letters
2. Resume Writing
3. Verbal Ability: Language, Reading and Listening, Reasoning and Analysis
4. Oral Communication :Talking About Yourself

Unit II

1. Writing an SOP
2. Summarizing and Synthesizing Information (Precis Writing)
3. Oral Communication: Making Presentations

Unit III

1. Writing Project Proposals
2. Oral Communication: Group Discussions

Unit IV

1. Writing Project Reports
2. Oral Communication: Interview Skills

Unit V

Behavioral Skills and Personality Development

1. Building a Positive Attitude, Building a Positive Personality, Motivation, Goal Setting & Values & Vision
2. Problem Solving and Decision Making; Negotiation Skills through Role Play
3. Team Building and Leadership Abilities
4. Social Etiquette

REQUIRED TEXT AND MATERIALS

1. Ashraf Rizvi, M (2005). Effective Technical Communication, Tata Mc Graw Hill Publishing Company Limited, New Delhi.
2. Anderson, Paul V. (2003). Reports. In Paul V. Anderson's Technical Communication: A Reader-Centered Approach (5th ed..) (pp. 457-473). Boston: Heinle.
3. William S. Pfeiffer, (2012) Technical Communication: A Practical Approach (7th ed.) Longman

REFERENCES

1. Burnett, Rebecca. Technical Communication. 5th Ed., Heinle, 2001.
2. Gerson Sharon J. and Steven Gerson : Technical Writing Process and Product. 3rd edition, New Jersey: Prentice Hall 1999
3. Markel, Mike**.** Technical Communication: Situations and Strategies (8th EDITION (2006-2007)
4. R. C. Sharma and K. Mohan, Business Correspondence and Report Writing, Third Edition, TMH, 2002. (Indian Edition)
5. M. Raman and S. Sharma, Technical Communication : Principles and Practices, OUP, 2004. (Indian Edition)

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IV Year B.Tech EEE – I Sem	**L**	**T/P/D**	**C**
	4	**1**	**4**

(13EEE014) ELECTRICAL MEASUREMENTS & INSTRUMENTATION

Course Objectives

- To introduce the basic concepts related to the operation of Electrical and Electronic Measuring Instruments.
- To measure high voltages & high currents in distribution systems using Instrument transformers
- To measure unknown inductance, Resistance, capacitance using D.C Bridges & A.C Bridges
- To know the operation of AC and DC potentiometers

Course Outcomes

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

- To apply the knowledge about the instruments to use them more effectively
- Suggest the kind of instrument suitable for typical measurements
- To apply the knowledge about transducers to use them effectively.
- To apply the knowledge about instrument transformers to use them more effectively in distribution systems.

UNIT-I

MEASURING INSTRUMENTS

Classification of measuring Instruments-Deflecting, Control and Damping Torques-PMMC, Moving iron type instruments-Expression for the deflecting torque and control torque-Extension of range using shunts and series resistance, dynamometer type instruments, single phase energy meter, errors and calibration, Measurement of Power and Energy, three ammeter and three voltmeter methods-Electrostatic Voltmeters, Power factor meters

UNIT-II

MEASUREMENT OF RESISTANCE, INDUCTANCE AND CAPACITANCE

Measurement of low, medium and high resistances, insulation resistance measurement, Megger, AC bridges for inductance and capacitance measurement.

UNIT-III

INSTRUMENT TRANSFORMERS

Current and Potential transformers, ratio and phase angle errors, testing, measurement of power using instrument transformers

Potentiometers: AC and DC potentiometers, Calibration of Voltmeters and Ammeters using potentiometers.

UNIT-IV

ELECTRONIC MEASUREMENTS

Electronic Voltmeter, Multimeter, Wattmeter & energy meter. Time, Frequency and phase angle measurements using CRO; Spectrum & Wave analyzer. Digital counter, frequency meter and storage oscilloscope.

UNIT-V

INSTRUMENTATION

Transducers, classification & selection of transducers, strain gauges, inductive & capacitive transducers, piezoelectric and Hall-effect transducers, thermistors, thermocouples, photo-diodes & photo-transistors, encoder type digital transducers, signal conditioning and telemetry, basic concepts of smart sensors and application. Data Acquisition Systems.

TEXT BOOKS

1. Electrical and Electronics measurements And Instrumentation by A.K.Sawhney, Dhanpat rai & co publications.
2. Electrical Measurement and Measuring Instruments by Golding, E.W, Sir Issac Pitman and Sons, 1960, 3rd Edition.
3. Modern Electronic Instrumentation and Measurement Techniques by Helfrick Albert D, Cooper William. DPrentice-Hall of India, Reprint 1992.

REFERENCES

1. Instrumentation Measurement and Feedback by Jones, B.E, Tata McGraw-Hill, 1986.

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IV Year B.Tech EEE – I sem	**L**	**T/P/D**	**C**
	3	**1**	**3**

(13EEE016) POWER SYSTEM OPERATION AND CONTROL

Course objectives:

- To get awareness on economic load scheduling of thermal and hydro power plants
- Impact of frequency on load and generator.
- To get awareness on modeling of load frequency control of a power system
- To get awareness on reactive power control of a power system

Course out comes

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

- Analyze the optimal scheduling of power plants
- Analyze the steady state behavior of the power system for voltage and frequency fluctuations
- Describe reactive power control of a power system
- Should be able to design suitable controller to dampen the frequency and voltage steady state oscillations.

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, Unit commitment.

Optimum generation allocation including the effect of transmission line losses – Loss Coefficients, General transmission line loss formula.

UNIT – II

HYDROTHERMAL SCHEDULING

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

MODELLING OF TURBINE

Modelling of Turbine: First order Turbine model, Block Diagram representation of Steam Turbines and Approximate Linear Models.

UNIT – III

MODELING OF GENERATOR AND AUTOMATIC CONTROLLERS

Modelling of Generator (Steady State and Transient Models): Classical model of Synchronous Machine, Description of Swing Equation (No Derivation) and State-Space second order model of Synchronous Machine.

Modelling of Governor: Mathematical Modelling of Speed Governing System – Derivation of small signal transfer function.

Modelling of Excitation System: Fundamental Characteristics of an Excitation system, Transfer function, Block Diagram Representation of IEEE Type-1 Model.

UNIT –IV

SINGLE AREA LOAD FREQUENCY CONTROL

Necessity of keeping frequency constant. Definitions of Control area – Single area control – Block diagram representation of an isolated power system – Steady state analysis – Dynamic response – Uncontrolled case.

TWO-AREA LOAD FREQUENCY CONTROL

Load frequency control of 2-area system – uncontrolled case and controlled case, tie-line bias control. Proportional plus Integral control of single area and its block diagram representation, steady state response –Automatic Generation Control and Economic dispatch control.

UNIT – V

REACTIVE POWER CONTROL

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

TEXT BOOKS

1. Electrical Power Systems by C.L.Wadhwa, Newage International-3rd Edition
2. Modern Power System Analysis – by I.J.Nagrath and D.P.Kothari Tata M Graw – Hill Publishing Company Ltd, 2nd edition.
3. Electric Energy systems Theory – by O.I.Elgerd, Tata Mc Graw-hill Publishing Company Ltd., Second edition.
4. Operation and Control in Power Systems by P.S.R.Murthy, BS Publications, 2011, Second edition

REFERENCE BOOKS:

1. Power System Analysis and Design by J.Duncan Glover and M.S.Sarma., THOMPSON, 3rd Edition.
2. Power System Analysis by Grainger and Stevenson, Tata McGraw Hill.
3. Power System Analysis by Hadi Saadat , TMH Edition.

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IV Year B.Tech EEE – I Sem	**L**	**T/P/D**	**C**
	3	**1**	**3**

(13ECE083) PRINCIPLES OF DIGITAL SIGNAL PROCESSING

Course Objectives

- To understand characteristics of discrete time signals and systems
- To analyze and process signals using various transform techniques
- To understand various factors involved in design of digital filters
- To understand the features of TMS24XX processors.

Course Outcomes

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

- Analyze and process signals in the discrete domain
- Design filters to suit specific requirements for specific applications
- Perform statistical analysis and inferences on various types of signals
- Design and control the electrical drive using different 24xx processors.

UNIT-I

INTRODUCTION

Classification of continuous time Signals & Systems. Linear shift invariant systems, stability and causality, Sampling of Continuous signals- Introduction to digital signal processing-Sampling process-Sampling theorem.

Classification of discrete time signals and sequences

UNIT – II

FOURIER ANALYSIS

Introduction to Discrete Fourier series, Discrete Fourier Transform: Properties of Discrete Fourier Transform, linear convolution and circular convolution of sequences using DFT, Computation of DFT, Relation between DFT and Z-Transform.

Fast Fourier transform: Radix -2 decimation in time and decimation in frequency FFT algorithms, Inverse FFT.

UNIT – III

Z- TRANSFORM

Introduction to Z-transform, Properties of Z- Transform, Inverse Z- Transform, Application of Z- Transforms for Linear constant coefficient difference equations, Realization of Digital filters, system function – stability criterion.

UNIT – IV

IIR FILTERS

Analog filter approximations-Design of Butterworth Chebyshev filters, Design of IIR digital filter from analog filter using- impulse invariant and bilinear transformation techniques, design examples, realization of IIR filters-direct, canonic, cascade, and parallel forms.

UNIT – V

FIR FILTERS

Characteristics of FIR Digital Filters, Frequency response, Design of FIR filters using – Rectangular, Hamming, Bartlett- windows , frequency sampling technique, comparison of FIR and IIR filters, realization of IIR filters-direct, cascade forms. Architecture and features of TMS 320F 2407, Applications of DSP.

TEXT BOOKS

1. Digital signal processing: principles, algorithms and applications-John G.Proakis, D.G.Manolakis, 3rd edition, PHI-2007.
2. Discrete time signal processing- A.V.Oppenheim and R.W.Schaffer, PHI, 2009.
3. TMS 320F 24xx Manuals

REFERENCES

1. Digital signal processing-Fundamentals and applications-LiTan, Elsevier, 2008.
2. Fundamentals of digital signal processing using MATLAB-Robert J.Schilling, Sandra L.Harris, Thomson, 2007.
3. Digital signal processing-S.Salivahanan, A.Vallavaraj, C.Gnanapriya, TMH, 2009.
4. Discrete systems and digital signal processing with MATLAB-Taan S.ElAli,CRC Press,2009.
5. P Venkata Ramani, M.Bhaskar, “Digital Signal Processor; Architecture, Programming & Application”, TataMcGrawHill-2001

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IV Year B.Tech EEE – I sem	**L**	**T/P/D**	**C**
Elective-I	**3**	**0**	**3**

(13EEE017) HIGH VOLTAGE ENGINEERING

Course Objectives:

- To understand the Gaseous, liquid and solid dielectric behavior under High Voltage.
- To understand the generation methods of High A.C, Dc. & Impulse Voltages required for various application.
- To understand the measuring techniques of High A.C., D.C & Impulse voltages and currents.
- To understand the testing techniques for High Voltage Equipment.

Course Outcomes:

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

- Know how conduction and breakdown will occur in gases, liquids and solids dielectrics and different applications of these insulating materials in electrical power apparatus.
- Know the insulation testing of various components in power systems for different types of voltages, namely power frequency A.C, high frequency, switching or lightning impulses, for which generation of high voltages in laboratories is essential.
- Appreciate the necessity to measure the voltages and currents accurately, ensuring perfect safety to the personnel and equipment.
- Analyze the necessary condition for all the electrical equipment which are capable of withstanding the over voltages which met in service like natural causes lightning or system originated ones switching or power frequency transient voltages.

UNIT- I

INTRODUCTION TO HIGH VOLTAGE TECHNOLOGY AND APPLICATIONS

Electric Field Stresses, Gas / Vacuum as Insulator, Liquid Dielectrics, Solids and Composites, Estimation and Control of Electric Stress, Numerical methods for electric field computation, Surge voltages, their distribution and control, Applications of insulating materials in transformers, rotating machines, circuit breakers, cable power capacitors and bushings.

UNIT- II

BREAK DOWN IN GASEOUS, LIQUID AND SOLID DIELECTRICS

Gases as insulating media, collision process, Ionization process, Townsend's criteria of breakdown in gases, Paschen's law. Liquid as Insulator, pure and commercial liquids, breakdown in pure and commercial liquids.

Intrinsic breakdown, electromechanical breakdown, thermal breakdown, breakdown of solid dielectrics in practice, Breakdown in composite dielectrics, solid dielectrics used in practice.

UNIT- III

GENERATION OF HIGH VOLTAGES AND CURRENTS

Generation of High Direct Current Voltages, Generation of High alternating voltages, Generation of Impulse Voltages, Generation of Impulse currents, Tripping and control of impulse generators.

UNIT- IV

MEASUREMENT OF HIGH VOLTAGES AND CURRENTS

Measurement of High Direct Current voltages, Measurement of High Voltages alternating and impulse, Measurement of High Currents-direct, alternating and Impulse, Oscilloscope for impulse voltage and current measurements. Measurement of D.C Resistivity, Measurement of Dielectric Constant and loss factor, Partial discharge measurements

UNIT- V

OVER VOLTAGE PHENOMENON AND TESTING OF ELECTRICAL APPARATUS

Natural causes for over voltages – Lightning phenomenon, Over voltage due to switching surges, system faults and other abnormal conditions, Principles of Insulation Coordination on High voltage and Extra High Voltage power systems. 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 by M.S.Naidu and V. Kamaraju – TMH Publications, 3rd Edition.
2. High Voltage Engineering: Fundamentals by E.Kuffel, W.S.Zaengl, J.Kuffel by Elsevier, 2nd Edition.

REFERENCE BOOKS

1. High Voltage Engineering by C.L.Wadhwa, New Age Internationals (P) Limited, 1997.
2. High Voltage Insulation Engineering by Ravindra Arora, Wolfgang Mosch, New Age International (P) Limited, 1995.
3. Extra High Voltage A.C. Transmission Engineering by Rakosh Das Begamudre, New Age International, 2007, Revised Edition

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IV Year B.Tech EEE –I Sem	**L**	**T/P/D**	**C**
Elective-I	**3**	**0**	**3**

(13EEE018) MODERN POWER ELECTRONICS

Course Objectives

- To understand the operation of various semi conductor devices
- To analyze resonant pulse converters
- To describe the operation of multi level inverters with switching strategies for high power applications
- To appreciate the design of switch mode power supplies.

Course Outcomes

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

- Comprehend the semiconductor device switch characteristics
- Analyze and assess multilevel inverters and resonant pulse converters
- Design switch mode power supplies
- Analyze and assess resonant pulse converter.

UNIT- I

MODERN POWER SEMICONDUCTOR DEVICES

Modern power semiconductor devices – MOS Turn Off Thyristor (MTO) – Emitter Turn Off Thyristor (ETO) – Intergrated Gate-Commutated Thyristor (IGCTs) – MOS-Controlled Thyristors(MCTs) – Static Induction Thyristors (SITHs) – Power integrated circuits (PICs) – symbol, structure and equivalent circuit – comparison of their features.

UNIT-II

TWO-LEVEL VOLTAGE SOURCE INVERTER

Introduction, Sinusoidal PWM, Modulation Scheme, Harmonic Content, Overmodulation, Third Harmonic Injection PWM, Space Vector Modulation, Switching States, Space Vectors, Dwell Time Calculation, Modulation Index, Switching Sequence, Spectrum Analysis, Even-Order Harmonic Elimination, Discontinuous Space Vector Modulation.

UNIT- III

MULTILEVEL INVERTERS

Need for Multilevel Inverters, Multilevel Concept, Classification of Multilevel Inverters – Diode Clamped Multilevel Inverter- Principle of Operation – Main Features - Flying Capacitor Multilevel Inverter – Principle of Operation – Main Features, Cascaded Multilevel Inverter, Principle of Operation- Features, Applications of Multilevel Inverters.

UNIT-IV

DC-DC SWITCH-MODE CONVERTERS AND SWITCHING DC POWER SUPPLIES

Linear Power Supplies, Overview of Switching Power Supplies, Dc-Dc Converters with Electrical Isolation, Control of Switch Mode Dc Power Supplies, Power Supply

Protection, and Electrical Isolation in the Feedback loop, designing to meet the Power Supply Specifications.

Control Of Dc-Dc Converter, Fly Back, Forward, Full-Bridge Dc-Dc Converter.

UNIT-V

RESONANT CONVERTERS

Introduction to Resonant Converters, Classification of Resonant Converters, Basic Resonant circuit concepts, Series Resonant Circuit-Parallel Resonance Circuit, Resonant Switch Converters: ZCS Resonant Buck Converter, ZVS Resonant Boost Converter

TEXT BOOKS

1. Power electronics circuits, Devices and applications by M.H. Rashid PHI –I edition –1995.
2. Power Electronics converters, Applications and Design by Ned Mohan, Tore M. Undeland and William P. Robbins, A John Wiley Sons, Inc., Publication 3rd Edition.

REFERENCES

1. High-Power Converters and AC Drives by Bin Wu, A John Wiley & Sons, Inc., Publication
2. Switch mode Power Supply Handbook 3/e, Keith Billings, Taylor Morey, Mc GrawHill.
3. Fundamentals of Power Electronics by Robert W. Erickson , Dragan Maksimovic, KLUWER ACADEMIC PUBLISHERS 2nd Edition.
4. Pulse-width Modulated DC–DC Power Converters by Marian K. Kazimierczuk, John Wiley and Sons, Ltd, Publication

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IV Year B.Tech EEE –I Sem	**L**	**T/P/D**	**C**
Elective-I	**3**	**0**	**3**

(13EEE019) ELECTRICAL MACHINE DESIGN

Course objectives:

- To understand the computer aided design of electrical machines
- To get optimum design of electrical machines using different standard design methods
- To understand Finite Difference method and Finite Element Method for machine design

Course Outcomes:

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

- To design different electrical machines using computer aided and standard methods
- To use finite difference and finite element methods for design
- To formulate the field problems mathematically

UNIT - 1

PRINCIPLES OF ELECTRICAL MACHINE DESIGN

Introduction, considerations for the design of electrical machines, limitations. Different types of materials and insulators used in electrical machines.

UNIT - 2

DESIGN OF DC MACHINES

Output equation, choice of specific loadings and choice of number of poles, design of Main dimensions of the DC machines, Design of armature slot dimensions, commutators and brushes, magnetic circuit - estimation of ampere turns, design of yoke and pole, field windings – shunt, series and inter poles.

UNIT - 3

DESIGN OF TRANSFORMERS

(Single phase and three phase)**:** Output equation for single phase and three phase transformer, choice of specific loadings, expression for volts/turn, determination of main dimensions of the core, types of windings and estimation of number of turns and cross sectional area of Primary and secondary coils, estimation of no load current, expression for leakage reactance and voltage regulation. Design of tank and cooling tubes (round and rectangular).

UNIT - 4

DESIGN OF INDUCTION MOTORS

Output equation, Choice of specific loadings, main dimensions of three phase induction motor, Stator winding design, choice of length of the air gap, estimation of number of slots for the squirrel cage rotor, design of Rotor bars and end ring, design of Slip ring induction motor, estimation of No load current, leakage reactance, and circle diagram.

UNIT -5

DESIGN OF SYNCHRONOUS MACHINES

Output equation, Choice of specific loadings, short circuit ratio, design of main dimensions, armature slots and windings, slot details for the stator of salient and non salient pole synchronous machines. Design of rotor of salient pole synchronous machines, magnetic circuits, dimensions of the pole body, design of the field winding, and design of rotor of non-salient pole machine.

TEXT BOOKS

1. A Course in Electrical Machine Design- A.K.Sawhney, Dhanpat Rai & Sons.
2. Design of Electrical Machines- V. N. Mittle- 4/e edition, Standard Publishers Distributors.

REFERENCE BOOKS

1. Performance and Design of AC Machines- M.G.Say, CBS Publishers & Distributors.
2. Principles of Electrical Machine Design- R.K.Aggarwal, CBS Publishers.

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IV Year B.Tech EEE – I Sem	**L**	**T/P/D**	**C**
Elective-I	**3**	**0**	**3**

(13EEE020) ADVANCED CONTROL SYSTEMS

Course Objectives

- To cater the knowledge of basic and modern control system for the real time analysis and design of control systems.
- To provide adequate knowledge of non linear systems.
- Analyzing the concept of stability of nonlinear systems and categorization.
- To provide comprehensive knowledge of optimal control and modern control.

Course Outcomes

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

- Apply the knowledge of basic and modern control system for the real time analysis and design of control systems.
- Understand the concepts of state variables analysis.
- Analyze the concept of stability of nonlinear systems and optimal control.
- Analyze the concepts of optimal control and modern control

UNIT – 1

STATE SPACE ANALYSIS, CONTROLLABILITY AND OBSERVABILITY

State Space Representation, Solution of State Equation, State Transition Matrix, Canonical Forms – Controllable Canonical Form, Observable Canonical Form, Jordan Canonical Form.

Tests for controllability and observability for continuous time systems – Time varying case, time invariant case, Principle of Duality, Controllability and observability form Jordan canonical form and other canonical forms.

UNIT – 2

DESCRIBING FUNCTION ANALYSIS & PHASE-PLANE ANALYSIS

Introduction to nonlinear systems, Types of nonlinearities, describing functions, describing function analysis of nonlinear control systems.

Introduction to phase-plane analysis, Method of Isoclines for Constructing Trajectories, singular points, phase-plane analysis of nonlinear control systems.

UNIT-3

STABILITY ANALYSIS

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

UNIT – 4

MODAL CONTROL & CALCULUS OF VARIATIONS

Effect of state feedback on controllability and observability, Design of State Feedback Control through Pole placement. Full order observer and reduced order observer.

Minimization of functionals of single function, Constrained minimization. Minimum principle. Control variable inequality constraints. Control and state variable inequality constraints. Euler Lagrange Equation.

UNIT –5

OPTIMAL CONTROL

Formulation of optimal control problem. Minimum time, Minimum energy, minimum fuel problems. State regulator problem. Output regulator problem. Tracking problem, Continuous-Time Linear Regulators.

TEXT BOOKS:

1. Modern Control System Theory – by M. Gopal, New Age International Publishers, 2nd edition, 1996

REFERENCE BOOKS:

1. Modern Control Engineering – by K. Ogata, Prentice Hall of India, 3rd edition, 1998

2. Control Systems Engineering by I.J. Nagarath and M.Gopal, New Age International (P) Ltd.

3. Digital Control and State Variable Methods – by M. Gopal, Tata Mc Graw-Hill Companies, 1997.

4. Systems and Control by Stainslaw H. Zak , Oxford Press, 2003.

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IV Year B.Tech EEE – I sem	**L**	**T/P/D**	**C**
	3	**0**	**3**

Elective-I

(13MED076) OPTIMIZATION TECHNIQUES

Course Objectives:

- To understand linear programming
- To understand optimization problem statement.
- To understand single variable and multi variable optimization problems with equality and inequality constraints
- To understand various optimization techniques.

Course Outcomes:

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

- Formulate mathematical statement of optimization problem
- Understand various methods of optimization techniques
- Understand the concept of genetic algorithm

UNIT – I

INTRODUCTION AND CLASSICAL OPTIMIZATION TECHNIQUES

Statement of an Optimization problem – design vector – design constraints – constraint surface – objective function – objective function surfaces – classification of Optimization problems.

CLASSICAL OPTIMIZATION TECHNIQUES

Single variable Optimization – multi variable Optimization without constraints – necessary and sufficient conditions for minimum/maximum – multivariable Optimization with equality constraints.

Solution by method of Lagrange multipliers – multivariable Optimization with inequality constraints – Kuhn – Tucker conditions.

UNIT – II

LINEAR PROGRAMMING

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

TRANSPORTATION PROBLEM

Finding initial basic feasible solution by north – west corner rule, least cost method and Vogel's approximation method – testing for optimality of balanced transportation problems.

UNIT – III

UNCONSTRAINED NONLINEAR PROGRAMMING

One – dimensional minimization methods: Classification, Fibonacci method and Quadratic interpolation method

UNCONSTRAINED OPTIMIZATION TECHNIQUES

Univariate method, Powell's method and steepest descent method.

UNIT – IV

CONSTRAINED NONLINEAR PROGRAMMING

Characteristics of a constrained problem, Classification, Basic approach of Penalty Function method; Basic approaches of Interior and Exterior penalty function methods. Introduction to convex Programming Problem.

UNIT – V

DYNAMIC PROGRAMMING

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

TEXT BOOKS

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

REFERENCES

1. Optimization Methods in Operations Research and systems Analysis – by K.V. Mital and C. Mohan, New Age International (P) Limited, Publishers, 3rd edition, 1996.
2. Operations Research – theory and applications by Dr. S.D.Sharma, Macmillan publishers India Ltd, 4th edition.
3. Operations Research: An Introduction" by H.A. Taha, PHI Pvt. Ltd, 6th edition.
4. Linear Programming by G. Hadley, A. W. Pub.Company, 1962.

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IV Year B.Tech EEE – I sem	**L**	**T/P/D**	**C**
	3	**0**	**3**

Elective-II

(13EEE021) ELECTRICAL DISTRIBUTION SYSTEMS AND AUTOMATION

Course objectives:

- To get awareness of distribution systems for load modeling
- To understand the design & working of substations.
- To know about system protection and the coordination course outcomes.
- To know about Distribution Automation

Course outcomes:

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

- Analyze the electrical distribution system for voltage drop and power loss calculations in lines.
- Analyze optimal conductor selection for distribution systems.
- Describe Distribution Automation objectives and SCADA
- Analyze the effect of series capacitor for voltage control.

UNIT- I

GENERAL CONCEPTS

Introduction to distribution systems, Load modeling and characteristics. Load factor, Coincidence factor, Contribution factor and Loss factor - Relationship between the Load factor and loss factor. Classification of loads (Residential, Commercial, Agricultural and Industrial) and their characteristics.

UNIT- II

DISTRIBUTION FEEDERS AND 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. Substations, Location of Substations: Rating of distribution substation, service area within primary feeders, benefits derived through optimal location of substations.

UNIT - III

DISTRIBUTION 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

Objectives of distribution system protection, types of common faults and procedure for fault calculations. Protective Devices: Principle of operation of Fuses, Circuit Reclosures, Line Sectionalizers, and Circuit Breakers, Coordination of Protective

Devices: General coordination procedure Concepts of Smart grid and Demand Side Management.

UNIT - V

Voltage Control

Equipment for voltage control, effect of series capacitors, effect of AVB/AVR, line drop compensation.

Distribution Automation

Need for DA, Objectives & Functions of DA, SCADA, Consumer information service, GIS, Automatic meter reading

TEXT BOOKS

1. Electric Power Distribution system, Engineering by Turan Gonen, TMH.
2. Electric Power Distribution by A.S. Pabla, Tata Mc Graw-hill Publishing Company, 1997, 6th edition.

REFERENCES

1. Electrical Power Distribution and Automation by S.Sivanagaraju,V.Sankar,Dhanpat Rai and Co.
2. Electrical Power Distribution Systems by V.Kamaraju,TMH Publishers, 2nd Edition.

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IV Year B.Tech EEE – I Sem	**L**	**T/P/D**	**C**
	3	**0**	**3**

Elective-II

(13EEE022) ANALYSIS AND DESIGN OF SWITCHED MODE CONVERTERS

Course objectives:

- To get awareness on various modes of operation of DC-DC Converter
- To get awareness on control aspects of converter
- To get awareness on design aspects of converter
- To get awareness on Heat sink calculations

Course Outcomes :

Upon the completion of this subject, the student will be able

- To analyze various modes of operation of Dc-Dc converter
- To design simulate control topologies for converter
- To design various components of dc-dc converter
- To analyze dc-dc converter in thermal point of view.

UNIT – I

DC-DC SWITCHED MODE CONVERTERS

Review of Buck Converter, Boost Converter, Buck, Boost, CUK & SEPIC converter, Duty cycle derivation, Different conduction modes (CCM & DCM), Voltage and Current waveforms, Calculation of output voltage ripple, Problems.

UNIT – II

SWITCHING DC POWER SUPPLIES

Linear power supplies, Overview of switching power supplies, switching losses, Fly back and Forward Converters. Duty cycle derivation, waveforms, comparison of converters, Problems

UNIT – III

CONTROL ASPECTS

Voltage feed- forward PWM control, Current mode control, Power Supply Protection, Electrical isolation in the feedback loop, Designing to meet Power Supply Specifications

UNIT – IV

CONVERTER DESIGN (for Buck, Boost, Flyback & Forward Converters only)

Selection of output filter capacitor, Selection of energy storage inductor, Design of High Frequency Inductor and High frequency Transformer, Selection of switches. Snubber circuit design, Pulse width modulator circuit, Design of driver circuits, Necessity of EMI filter

UNIT – V

THERMAL MODEL

Thermal Resistance, Selection of Heat sinks, Simple Heat sink calculations

APPLICATIONS

DC/DC converter as Power Factor Corrector (active shaping of the line current) Offline Computer Power Supply System, Uninterruptible AC Power Supplies, Space Craft Power Supply etc

Text Books:

1) Mohan N. Undeland . T & Robbins W., Power Electronics Converters, Application and Design. John Wiley, 3rd edition, 2002
2) Umanand L., Bhat S.R., Design of magnetic components for switched Mode Power Converters. , Wiley Eastern Ltd.,1992
3) Robert. W. Erickson, D. Maksimovic .Fundamentals of Power Electronics., Springer International Edition, 2005
4) Course Material on Switched Mode Power Conversion, V. Ramanarayanan.

Reference books:

1) Krein P.T .Elements of Power Electronics., Oxford University Press
2) M.H.Rashid, Power Electronics. Prentice-Hall of India

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IV Year B.Tech EEE – I sem	**L**	**T/P/D**	**C**
	3	**0**	**3**

Elective-II

(13EEE023) SPECIAL MACHINES AND CONTROL

Course objectives:

- To understand the working and construction of special machines which are not covered under conventional machine courses
- To know the use of special machines in different feed-back systems
- To understand the use of micro-processors for controlling different machines
- To know their applications as control systems components

Course Outcomes :

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

- To use different special machines as part of control system components
- To use special machines as transducers for converting physical signals into electrical signals
- To use micro-processors for controlling different machines
- To select different special machines as control system components

UNIT-I

STEPPER MOTORS

Constructional features, principle of operation, modes of excitation, single phase stepping motors, torque production in variable Reluctance (VR) stepping motor, Dynamic characteristics, permanent magnet type Stepper Motor and Hybrid stepper Motors. Open loop control, Closed loop control of stepping motor, microprocessor based controller.

UNIT-II

SYNCHRONOUS RELUCTANCE MOTORS

Constructional features: axial and radial air gap Motors. Operating principle, reluctance torque –Phasor diagram, motor characteristics, linear induction motors.

UNIT-III

SWITCHED RELUCTANCE MOTORS

Constructional features, principle of operation. Torque equation, Power controllers, Characteristics and control. Microprocessor based controller. Sensor less control.

UNIT-IV

PERMANENT MAGNET BRUSHLESS DC MOTORS

Commutation in DC motors, Difference between mechanical and electronic commutators, Hall sensors, Optical sensors, Multiphase Brushless motor, Square wave permanent magnet brushless motor drives, Torque and emf equation, Torque-speed characteristics, Controllers-Microprocessor based controller. Sensorless control.

UNIT-V

PERMANENT MAGNET SYNCHRONOUS MOTORS

Principle of operation, EMF, power input and torque expressions, Phasor diagram, Power controllers, Torque speed characteristics, Self control, Vector control, Current control schemes. Sensor less control.

TEXT BOOKS

1. Brushless Permanent Magnet and Reluctance Motor Drives by T.J.E. Miller, Clarendon Press, Oxford, 1989.
2. Stepping Motors – A Guide to Motor Theory and Practice by P.P. Aearnley, Peter Perengrinus, London, 1982.

REFERENCE BOOKS

1. T. Kenjo, Stepping Motors and Their Microprocessor Controls, Clarendon Press London, 1984.
2. Permanent Magnet and Brushless DC Motors byT. Kenjo and S. Nagamori, Clarendon Press, London, 1988.
3. Special Electrical Machines by K.Venkataratnam, University press, 2008.
4. Generalized theory of electrical machines by P.S.Bimbra, Khanna Publications, 4th edition.

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IV Year B.Tech EEE – I sem	**L**	**T/P/D**	**C**
	3	**0**	**3**

Elective-II

(13EEE024) ARTIFICIAL NEURAL NETWORKS AND FUZZY LOGIC

Course Objectives

- To cater the knowledge of Neural Networks and Fuzzy Logic Control and use these for controlling real time systems.
- To expose the students to the concepts of feed forward neural networks and about feedback neural networks.
- To teach about the concept of fuzziness involved in various systems and comprehensive knowledge of fuzzy logic control
- To teach the design of fuzzy logic controllers.

Course Outcomes:

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

- The concepts of feed forward neural networks and learning and understanding of feedback neural networks.
- Concept of fuzziness involved in various systems and fuzzy set theory.
- Comprehensive knowledge of fuzzy logic control and adaptive fuzzy logic.
- Adequate knowledge of application of fuzzy logic control to real time systems.

UNIT – I

INTRODUCTION TO NEURAL NETWORKS

Introduction, Humans and Computers, Biological Neuron and organization of the brain, Biological and Artificial Neuron Models, Hodgkin-Huxley Neuron Model, Integrate-and-Fire Neuron Model, Spiking Neuron Model, Characteristics of ANN, McCulloch-Pitts Model and Design of logic gates, Historical Developments, Potential Applications of ANN.

ESSENTIALS OF ARTIFICIAL NEURAL NETWORKS

Artificial Neuron Model, Operations of Artificial Neuron, Types of Neuron Activation Function, ANN Architectures, Classification Taxonomy of ANN – Connectivity, Neural Dynamics (Activation and Synaptic), Learning Strategy (Supervised, Unsupervised, Reinforcement), Learning Rules, Types of Application.

Unit–II

SINGLE LAYER FEED FORWARD NEURAL NETWORKS

Introduction, Perceptron Models: Discrete, Continuous and Multi-Category, Training Algorithms: Discrete and Continuous Perceptron Networks, Perceptron Convergence theorem and concepts, Limitations of the Perceptron Model, Applications.

MULTILAYER FEED FORWARD NEURAL NETWORKS

Credit Assignment Problem, Generalized Delta Rule, Derivation of Back propagation (BP) Training, Summary of Back propagation Algorithm, Learning Difficulties and Improvements.

Unit - III

ASSOCIATIVE MEMORIES

Paradigms of Associative Memory, Pattern Mathematics, Hebbian Learning, General Concepts of Associative Memory (Associative Matrix, Association Rules, Hamming Distance, The Linear Associator, Matrix Memories, Content Addressable Memory), Bidirectional Associative Memory (BAM) Architecture, BAM Training Algorithms: Storage and Recall Algorithm, BAM Energy Function

Architecture of Hopfield Network: Discrete and Continuous versions, Storage and Recall Algorithm, Stability Analysis, Capacity of the Hopfield Network, Applications.

Unit – IV

CLASSICAL AND FUZZY SETS

Introduction to classical sets - properties, Operations and relations; Fuzzy sets, Operations, properties, fuzzy relations, membership functions.

Fuzzy Logic System Components

Fuzzification, Membership value assignment, development of rule base and decision making system, Defuzzification to crisp sets, Defuzzification methods.

UNIT- V

APPLICATIONS

Neural network applications: Process identification, control, fault diagnosis and load forecasting.

Fuzzy logic applications: Fuzzy logic control, Design and Analysis

TEXT BOOKS

1. Neural Networks, Fuzzy logic, Genetic algorithm - synthesis and applications by Rajasekharan and Rai, PHI Publications.
2. Artificial neural networks by B.Yegnarayana, PHI publications.

REFERENCE BOOKS

1. Neural Networks by James A Freeman and Davis Skapura, Pearson Education, 2002.
2. Neural Networks by Simon Hakins , Pearson Education
3. Neural Engineering by C.Eliasmith and CH.Anderson, PHI
4. Neural Networks and Fuzzy Logic System by Bart Kosko, PHI Publications.
5. Introduction to Artificial Neural Systems by J.M.Zurada, Jaico Publishing House.
6. Introduction to Neural Networks using MATLAB 6.0 by S.N.Sivanandam, S.Sumathi, S.N.Deepa, TMH, 2006.

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IV Year B.Tech EEE – I Sem	**L**	**T/P/D**	**C**
	3	**0**	**3**

Elective-II

(13EEE025) DIGITAL CONTROL SYSTEMS

Course objectives:

- To cater the knowledge of basic of digital control system for the real time analysis
- To analyze and design the controllers for digital sytems.
- To provide comprehensive knowledge of concepts of stability analysis and design of discrete time systems.
- To expose the students to the concepts of optimal control for discrete domain

Course Outcomes:

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

- To expose the students to the concepts of Digital control systems.
- To provide adequate knowledge of discrete systems in state variable analysis.
- To teach about the concept of stability analysis and design of discrete time systems.
- To provide comprehensive knowledge of optimal control.

Unit – I

SAMPLING AND RECONSTRUCTION

Introduction, sample and hold operations, sampling theorem, Reconstruction of original sampled signal to continuous –time signal.

THE Z – TRANSFORMS

Introduction, Linear difference equations, pulse response, Z – transforms, Theorems of Z – Transforms, the inverse Z – transforms, Modified Z- Transforms

Z-PLANE ANALYSIS OF DISCRETE-TIME CONTROL SYSTEM

Z-Transform method for solving difference equations; Pulse transfer function, Pulse transfer function of closed loop system, block diagram analysis of sampled – data systems, mapping between s-plane and z-plane: primary strips and complementary strips.

UNIT – II

STATE SPACE ANALYSIS

State Space Representation of discrete time systems, Pulse Transfer Function Matrix solving discrete time state space equations, State transition matrix and it's Properties, Methods for Computation of State Transition Matrix, Discretization of continuous time state – space equations

CONTROLLABILITY AND OBSERVABILITY

Concepts of Controllability and Observability, Tests for controllability and Observability. Duality between Controllability and Observability, Controllability and Observability conditions for Pulse Transfer Function

UNIT – III

STABILITY ANALYSIS

Stability Analysis of closed loop systems in the Z-Plane. Jury stability test – Stability Analysis by use of the Bilinear Transformation and Routh Stability criterion. Stability analysis using Liapunov theorems.

UNIT – IV

DESIGN OF DISCRETE TIME CONTROL SYSTEM BY CONVENTIONAL METHODS

Design based on the frequency response method – Bilinear Transformation and Design procedure in the w-plane, Lead, Lag and Lead-Lag compensators and digital PID controllers. Design of digital control through deadbeat response method.

UNIT – V

STATE FEEDBACK CONTROLLERS AND OBSERVERS

Design of state feedback controller through pole placement – Necessary and sufficient conditions, Ackerman's formula.

State Observers – Full order and Reduced order observers.

LINEAR QUADRATIC REGULATORS

Introduction to adaptive controls, Min/Max principle**,** Linear Quadratic Regulators,Kalman state estimation through Kalman filter.

TEXT BOOKS

1. Discrete-Time Control systems - K. Ogata, Pearson Education/PHI, 2nd Edition
2. Digital Control and State Variable Methods by M.Gopal, TMH

REFERENCE BOOKS

1. Digital Control Systems, Kuo, Oxford University Press, 2nd Edition, 2003.
2. Digital Control Engineering, M.Gopal, New age international publishers

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IV Year B.Tech EEE – I Sem	**L**	**T/P/D**	**C**
	0	**3**	**2**

(13EEE107) ELECTRICAL MEASUREMENTS AND INSTRUMENTATION LABORATORY

Course objectives

- To calibrate LPF Watt Meter, energy meter, P.F Meter using electro dynamo meter type instrument as the standard instrument
- To determine unknown inductance, resistance, capacitance by performing experiments on D.C Bridges &A.C Bridges
- To determine three phase active & reactive powers using single wattmeter method practically
- To determine the ratio and phase angle errors of current transformer and potential transformer.

Course outcomes

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

- get the ability to choose instruments
- can test any instrument
- can find the accuracy of any instrument by performing experiment
- can calibrate PMMC instrument using D.C potentiometer

Part - A

1. Calibration and Testing of single phase energy Meter
2. Measurement of tolerance of batch of low resistances by Kelvin's double bridge
3. Measurement of voltage, current and resistance using dc potentiometer
4. Schering Bridge and Anderson bridge.
5. Measurement of parameters of a choke coil using 3 voltmeter and 3 ammeter methods.
6. Calibration of LPF wattmeter by Phantom testing
7. Measurement of Iron loss in a bar specimen using Epstein square.
8. Dielectric testing of transformer oil
9. Calibration of dynamometer type power factor meter.
10. Measurement of reactive power using single wattmeter in three-phase circuit.

Part - B

1. Measurement of Displacement with the help LVDT
2. Measurement of different ranges of temperatures using i)RTD ii)Thermo couple
3. Measurement of voltage, frequency &phase with the help of CRO
4. Measurement of load with the help of strain gauges
5. Measurement of % ratio error and phase angle of given C.T. by Silsbee's method.

Any Eight experiments from Part – A and any two experiments from Part – B are to be conducted

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IV Year B.Tech EEE – I Sem	**L**	**T/P/D**	**C**
	0	**3**	**2**

(13ECE179) PRINCIPLES OF DIGITAL SIGNAL PROCESSING LABORATORY

Course Learning Objectives

Simulation and implementation on DSP processor

- To verify properties of a discrete system.
- To learn various transforms on digital signals.
- To understand the design of digital filters.
- To understand concepts to design the drives.

Course Outcomes:

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

- To apply knowledge of digital filter design for various applications.
- To analyze various signals in transform domain.
- Design digital filters using different transformation techniques.
- To perform real time experiments on processors such as motor control.

The following experiments are to be performed using MATLAB

1. Generation of various signals and sequences (Periodic and Aperiodic), such as unit Impulse step, Square, Saw tooth, Triangular, Sinusoidal, Ramp.
2. Operations on signals and sequences such as Addition, Multiplication, Scaling, Shifting, Folding, Computation of Energy and Average Power.
3. Verification of Linearity and Time Invariance Properties of a given Continuous / Discrete System.
4. Linear Convolution and Circular Convolution
5. Computation of Unit sample, Unit step and sinusoidal responses of the given LTI system and verifying its Physical reliazability and stability properties.
6. Discrete Fourier Transform / Inverse Discrete Fourier Transform
7. Power Density Spectrum
8. Sampling theorem Verification.
9. Implementation of Filters using IIR
10. Implementation of Filters using FIR

The following Experiments are to be performed using DSP Processor Kit.

1. Generation of sine wave and square wave using DSP trainer kit
2. PWM generation on DSP training kit
3. To Verify Linear Convolution and Circular Convolution
4. Implementation of FIR (Low Pass/High Pass) using Windowing Technique.

a. Using Rectangular Window
b. Using Triangular Window
c. Using Kaiser Window

5. Implementation of IIR Filter (Low Pass and High pass).
6. To compute Power Density Spectrum(PDS) of a Sequence
7. Stepper Motor Control.
8. Three phase IM speed control.
9. Brushless DC Motor Control

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IV Year B.Tech EEE – I sem	**L**	**T/P/D**	**C**
	0	**3**	**2**

(13EEE108) COMPUTER APPLICATIONS IN ELECTRICAL ENGINEERING LABORATORY

Course Objectives

- To model and simulate electrical systems using various softwares viz. MATLAB/SIMULINK, MiPower and PSCAD Softwares
- To develop models for Transmission lines, Generators and transformers
- To model choppers, converters, inverters and circuits
- To design lag and lead compensators

Course outcomes:

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

- Use various softwares viz. MATLAB/SIMULINK, MiPower and PSCAD for electrical engineering applications
- Design Compensators and controllers for system
- Develop models for transmission lines, generators and transformers
- Model various power electronic converter systems

1. Economic Dispatch of Thermal Units.
2. Development of single line diagram of power system components for simulation studies.
3. Formulation of Y-bus for Load flow system.
4. Formulation of Z-bus for Given Power system network.
5. State space model of step-down chopper
6. State space Model of step-up chopper
7. Design of PWM Inverter and square wave for 120 & 180 degree mode of operation.
8. Determination of Performance parameters of 1-Ph full-converter.
9. Design of Lag compensator for given transfer function using Bode plot.
10. Design of Lead compensator for given Transfer function using Root-Locus Technique.
11. Speed control of DC motor using a chopper.
12. Simulation of 1-ph &3-ph full converter.

VNR Vignana Jyothi Institute of Engineering and Technology

IV Year B.Tech EEE – I Sem	**L**	**T/P/D**	**C**
	0	**4**	**2**

(13EEE201) INDUSTRY ORIENTED MINI PROJECT

VNR Vignana Jyothi Institute of Engineering and Technology

IV Year B.Tech EEE – II Sem	**L**	**T/P/D**	**C**
	4	**0**	**4**

(13CMS002) MANAGEMENT SCIENCE

Course Prerequisites: Business Economics and Financial Analysis

Course Objectives:

The objective of this course is to:

- Understand the principles, functions, theories and practices of different management areas and to provide them with practical exposure to cases of success/failure in business.
- Expose with a systematic and critical understanding of organizational theory, structures and design.
- Comprehend conceptual models of strategic management and to familiarize with the tools of operations and project management.
- Understand the role of human relations in the management of operations and to provide basic insights into contemporary management practices.

Course outcomes:

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

- Function effectively in multidisciplinary teams to accomplish a common goal of organizations.
- Apply theories to improve the practice of management.
- Appreciate the management challenges associated with high levels of change in the organizations.
- Develop global vision and management skills at both a strategic level and interpersonal level.

UNIT-I

Introduction to Management: Concepts of Management and organization- nature, importance and Functions of Management, Taylor's Scientific Management Theory, Fayol's Principles of Management, Mayo's Hawthorne Experiments, Maslow's Theory of Human Needs, Douglas McGregor's Theory X and Theory Y, Herzberg's Two-Factor Theory of Motivation, System and Contingency approach to management, Planning: Meaning – Significance – Types of Plans – Decision making & Steps in Decision making Process, Leadership Styles, Social responsibilities of Management.

Organizing: Meaning – Features –process of organization – Principles of organization - Elements of organizations – Organization chart – span of control (Graicunas Formulae), Centralisation and Decentralisation, Types of mechanistic and organic structures of organisation (Line organization, Line and staff organization, functional organization, Committee organization, matrix organization, Virtual Organisation, Cellular Organisation, team structure, boundaryless organization, inverted pyramid structure, lean and flat organization structure) and their merits, demerits and suitability.

UNIT-II

Human Resources Management : Concepts of HRM, Basic functions of HR Manager: Human Resource Planning(definition, objectives and process), Recruitment(definition, sources and techniques), Selection (definition & process), induction and orientation, Training and Development(definition, need and methods),employee exit process, employee relations management, employee compensation and benefits administration, Job Evaluation(objectives, process & methods) and performance appraisals (objectives, process &methods)

UNIT-III

Strategic Management : Mission, Goals, Objectives, Policy, Strategy, Programmes, Elements of Corporate Planning Process, Environmental Scanning, Value Chain Analysis, BCG Matrix, SWOT Analysis, Steps in Strategy Formulation and Implementation, Generic Strategy alternatives, balance score card, Capability Maturity Model (CMM)/People capability maturity model (PCMM).

UNIT-IV

Operations Management: Plant location, Types of Plant Layout-Methods of production (Job, batch and Mass Production), Work Study -Basic procedure involved in Method Study and Work Measurement

Materials Management: Objectives, Need for Inventory control, EOQ, ABC Analysis, Purchase Procedure, value analysis, JIT, six sigma, TQM, supply chain management, Stores Management and Stores Records.

Marketing: Functions of Marketing, Marketing Mix, and Marketing Strategies based on Product Life Cycle, Channels of distribution

UNIT-V

Project Management (PERT/CPM) : Network Analysis, Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), Identifying critical path, Probability of Completing the project within given time, Project Cost Analysis, Project Crashing. (Simple problems)

TEXT BOOKS:

1. Management Science, Aryasri TMH,2009
2. Management, Stoner, Freeman, Gilbert, 6th Ed, Pearson Education, New Delhi, 2004
3. Principles and Practice Management - L.M.Prasad, Sultan chand Publications, New Delhi.

REFERENCE BOOKS:

1. Principles of Marketing , Kotler Philip, Garyarmstrong, Prafullay. Agnihotri, EU Haque, 2010, 13TH Ed, Pearson Education Prentice Hall of India.
2. Human Resource Management, Michael Armstrong, 2010, Kogan Page.
3. Quantitative Techniques in Management" N.D.Vohra, 2010, 4th Ed, TMH
4. Operations Management, Mahadevan. B, 2010, Pearson Education.
5. Strategic Management, V.S.P. Rao and V., Hari Krishna, 2010, Text and Cases, Excel Books, New Delhi.

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IV Year B.Tech EEE – II sem	**L**	**T/P/D**	**C**
	3	**0**	**3**

Elective-III

(13EEE026) POWER QUALITY

Course Objectives

- Study of voltage power quality terms, short and long interruption
- Detail study of characterization of voltage sag magnitude and three phase unbalanced voltage sag.
- Know the behavior of power electronics loads; induction motors, synchronous motor etc by the power quality issues
- Overview of mitigation of power quality issues by the VSI converters.

Course Outcomes

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

- Know the severity of power quality problems in distribution system
- Understand the concept of voltage sag transformation from up-stream (higher voltages) to down-stream (lower voltage)
- Concept of improving the power quality to sensitive load by various mitigating custom power devices
- Should able to monitor the power quality problems.

Unit I: INTRODUCTION

Introduction of the Power Quality (PQ) problem, Terms used in PQ: Voltage, Sag, Swell, Surges, Harmonics, over voltages, spikes, Voltage fluctuations, Transients, Interruption, overview of power quality phenomenon, Remedies to improve power quality, power quality monitoring

Unit II: LONG INTERRUPTIONS

Interruptions – Definition – Difference between failure, outage, Interruptions – causes of Long Interruptions – Origin of Interruptions – Limits for the Interruption frequency – Limits for the interruption duration – costs of Interruption – Overview of Reliability evaluation to power quality, comparison of observations and reliability evaluation.

SHORT INTERRUPTIONS

Short interruptions – definition, origin of short interruptions, basic principle, fuse saving, voltage magnitude events due to re-closing, voltage during the interruption, monitoring of short interruptions, difference between medium and low voltage systems. Multiple events, single phase tripping – voltage and current during fault period, voltage and current at post fault period, stochastic prediction of short interruptions.

Unit III: VOLTAGE SAG – CHARACTERIZATION – SINGLE PHASE

Voltage sag – definition, causes of voltage sag, voltage sag magnitude, monitoring, theoretical calculation of voltage sag magnitude, voltage sag calculation in non-radial systems, meshed systems, voltage sag duration.

VOLTAGE SAG – CHARACTERIZATION – THREE PHASE

Three phase faults, phase angle jumps, magnitude and phase angle jumps for three phase unbalanced sags, load influence on voltage sags.

Unit IV: PQ CONSIDERATIONS IN INDUSTRIAL POWER SYSTEMS

Voltage sag – equipment behaviour of Power electronic loads, induction motors, synchronous motors, computers, consumer electronics, adjustable speed AC drives and its operation. Mitigation of AC Drives, adjustable speed DC drives and its operation, mitigation methods of DC drives.

Unit V: MITIGATION OF INTERRUPTIONS AND VOLTAGE SAGS

Overview of mitigation methods – from fault to trip, reducing the number of faults, reducing the fault clearing time changing the power system, installing mitigation equipment, improving equipment, immunity, different events and mitigation methods. System equipment interface – voltage source converter, series voltage controller, shunt controller, combined shunt and series controller.

POWER QUALITY AND EMC STANDARDS:

Introduction to standardization, IEC Electromagnetic compatibility standards, European voltage characteristics standards, PQ surveys.

Reference Book:

1. “Understanding Power Quality Problems” by Math H J Bollen. IEEE Press.

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IV Year B.Tech EEE – II sem	**L**	**T/P/D**	**C**
Elective-III	**3**	**0**	**3**

(13EEE027) HVDC TRANSMISSION

Course Objectives:

- To compare EHV AC and HVDC systems
- To analyze Graetz circuit and also explain 6 and 12 pulse converters
- To control HVDC systems with various methods and to perform power flow analysis in AC/DC systems
- To describe various protection methods for HVDC systems and Harmonics

Course Outcomes

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

- Compare EHV AC and HVDC system and to describe various types of DC links
- Analyze Graetz circuit and also explain 6 and 12 pulse converters
- Describe various methods for the control of HVDC systems and to perform power flow analysis in AC/DC systems
- Describe various protection methods for HVDC systems and classify Harmonics and design different types of filters

UNIT – I

BASIC CONCEPTS

Necessity of HVDC systems, Economics and Terminal equipment of HVDC transmission systems, Types of HVDC Links, Apparatus required for HVDC Systems, Comparison of AC and DC Transmission, Application of DC Transmission System, Planning and Modern trends in D.C. Transmission.

ANALYSIS OF HVDC CONVERTERS

Choice of Converter Configuration, Analysis of Graetz circuit, Characteristics of 6 Pulse and 12 Pulse converters, Cases of two 3 phase converters in Y/Y mode – their performance.

UNIT – II

CONVERTER AND HVDC SYSTEM CONTROL

Principle of DC Link Control, Converters Control Characteristics, Firing angle control, Current and extinction angle control, Effect of source inductance on the system, Starting and stopping of DC link, Power Control.

REACTIVE POWER CONTROL IN HVDC

Introduction, Reactive Power Requirements in steady state, sources of reactive power-Static VAR Compensators, Reactive power control during transients.

UNIT –III

POWER FLOW ANALYSIS IN AC/DC SYSTEMS

Modelling of DC Links, DC Network, DC Converter, Controller Equations, Solution of DC load flow, P.U. System for DC quantities, solution of AC-DC Power flow-Simultaneous method-Sequential method.

UNIT-IV

CONVERTER FAULTS AND PROTECTION

Converter faults, protection against over current and over voltage in converter station, surge arresters, smoothing reactors, DC breakers, Audible noise, space charge field, corona effects on DC lines, Radio interference.

UNIT – V

HARMONICS

Generation of Harmonics, Characteristics harmonics, calculation of AC Harmonics, Non- Characteristics harmonics, adverse effects of harmonics, Calculation of voltage and Current harmonics, Effect of Pulse number on harmonics

FILTERS

Types of AC filters, Design of Single tuned filters –Design of High pass filters.

TEXT BOOKS

1. HVDC Power Transmission Systems: Technology and system Interactions by K.R.Padiyar, New Age International (P) Limited, and Publishers.
2. HVDC Transmission by S K Kamakshaiah, V Kamaraju, TMH Publishers.
3. EHVAC and HVDC Transmission Engineering and Practice by S.Rao, Khanna publications.

REFERENCES

1. HVDC Transmission by Jos Arrillaga, The institution of electrical engineers, IEE power & energy series 29, 2nd edition.
2. Direct Current Transmission by E.W.Kimbark, John Wiley and Sons.
3. Power Transmission by Direct Current by E.Uhlmann, B.S.Publications.

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IV Year B.Tech EEE – II sem	**L**	**T/P/D**	**C**
	3	**0**	**3**

Elective-III

(13ECE027) BASICS OF NANO SCIENCE AND TECHNOLOGY

Course Objectives

- To introduce basics in nano science with some of the pre- requisite principles and concepts
- To understand the size dependent physical properties of materials with nano dimensions
- To learn the principles of various preparation methods of nano materials
- To know the different characterization techniques of nano materials,related instruments and the basic electronic devices at nano scale

Learning Outcomes

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

- Appreciate the importance of nano dimensional materials and their applications.
- Realize and explain that the properties of nano materials are size dependent and vary from corresponding bulk materials
- Demonstrate the skills required to prepare some of the nano materials in the laboratory
- Appreciate the applications of nano electronic devices and understand their basic principles.

UNIT-I

Basics of Nano science

Introduction to quantum physics, electron as waves, wave mechanics, Schrödinger equation. and particle in a box, Heisenberg's uncertainty principle, exclusion principle, Free electron theory (qualitative idea) and its features, Idea of band structure, Density of states for zero, one, two and three dimensional materials, Quantum confinement, Quantum wells, wires, dots, Factors affecting by particle size

UNIT II

Properties of Nano materials

Mechanical, Thermal, Electrical, Optical, Magnetic and Structural properties of nano materials.

Electrical and mechanical properties of Carbon nanostructures

UNIT III

Synthesis of Nano materials

Physical methods: Bottom up**-**Ball Milling, Physical vapour deposition, Ionized cluster beam deposition, Laser pyrolysis, Sputter deposition, Gas evaporation.

Chemical methods: Top down Chemical vapor deposition, Synthesis of metal & semiconductor nano particles by colloidal route, Sol-gel method, Combustion method.

UNIT IV

Nano materials characterization

XRD, UV-VIS spectroscopy, X-ray fluorescence, X-ray photon emission spectroscopy, Surface electron microscopy, Transmission electron microscopy, Scanning tunneling microscopy, Atomic force microscopy, Raman spectroscopy

UNIT V

Nano electronics

The p-n-junction and bipolar transistor, Metal semiconductor and metal insulator, semiconductor junction, field effect transistor.

Nano scale MOSFETS, limits to scaling, system integration, interconnects, Nano wire Field Effect Transistors, Single Electron Transistors, Carbon nano tube transistors, Memory Devices

TEXT AND REFERENCE BOOKS

1. Nanotechnology: Principles & Practicals. Sulbha K. Kulkarni, Capital Publishing Co.New Delhi.
2. Carbon nanotechnology-Recent developments in Chemistry, Physics, materials science and device Applications -Elsevier Science
3. Nanostructures & Nanomaterials Synthesis, Properties & Applications**.** Guozhong Cao, Imperials College Press London.
4. Nanomaterials: Synthesis, Properties & Applications**.** Edited by A.S. Edelstein & R.C.Commorata. Institute of Physics Publishing, Bristol & Philadelphia.
5. Introduction to Nanotechnology. C.P. Poole Jr. and F. J.Owens, Wiley Student Edition.
6. Nano: The Essentials. T.Pradeep , McGraw Hill Education.
7. Nanophysics & Nanotechnology: An Introduction to Modern Concepts in Nanoscience Edward L. Wolf (2nd Ed.),WILEY-VCH, 2006
8. Nanoscience and Technology: Novel Structure and Phenomena- Ping and Sheng
9. Hand Book of Nanotechnology, Bhushan
10. Sol-gel science and technology processing, characterization and applications; S. Sakka, Kluwer Acad. Publ.
11. Nanoelectronics & Nanosystems: From Transistor to Molecular & Quantum Devices, Goser et al,
12. Handbook of Semiconductor Nanostructures & Nanodevices, A. A. Balandin and K L. Wang,
13. Hand book of Nanostructure materials and nanotechnology; H.S.Nalwa, (Vol.1-5), Acad. Press, Boston, 2000
14. Nanotechnology; Springer Verrlag, . T.J.Deming, Berlin, 1999
15. Nano CMOS Circuit and Physical Design, Banwong, Anurag Mittal;

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IV Year B.Tech EEE – II Sem	**L**	**T/P/D**	**C**
	3	**0**	**3**

Elective-III

(13EIE077) PROGRAMMABLE LOGIC CONTROLLERS

Course Objectives:

- To provide and ensure a comprehensive understanding of using advanced controllers in measurement and control instrumentation.
- To know about data acquisition - process of collecting information from field instruments.
- To analyze Programmable Logic Controller (PLC), IO Modules and internal features, Programming in Ladder Logic, addressing of IO and PID and its Tuning.

Course Outcomes:

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

- Describe the main functional units in a PLC and be able to explain how they interact.
- Know different bus types used in automation industries.
- Develop ladder logic programming for simple process.

UNIT-I

PLC Basics: PLC system, I/O modules and interfacing, CPU processor, programming Equipment, programming formats, construction of PLC ladder diagrams, Devices connected to I/O modules.

PLC Programming: Input instructions, outputs, operational procedures, programming examples using contacts and coils. Drill press operation.

UNIT-II

Digital logic gates, programming in the Boolean algebra system, conversion examples Ladder Diagrams for process control: Ladder diagrams and sequence listings, ladder diagram construction and flowchart for spray process system.

UNIT-III

PLC Registers: Characteristics of Registers, module addressing, holding registers, Input Registers, Output Registers.PLC Functions: Timer functions and Industrial applications, counters, counter function industrial applications, Arithmetic functions, Number comparison functions, number conversion functions

UNIT-IV

Data Handling functions: SKIP, Master control Relay, Jump, Move, FIFO, FAL, ONS, CLR and Sweep functions and their applications. Bit Pattern and changing a bit shift register, sequence functions and applications, controlling of two-axis and three axis Robots with PLC, Matrix functions.

UNIT-V

Analog PLC operation: Analog modules and systems, Analog signal processing, Multi bit Data Processing, Analog output Application Examples, PID principles, position indicator with PID control, PID Modules, PID tuning, PID functions.

TEXT BOOKS

1. Programmable Logic Controllers- Principles and Applications by John W. Webb and Ronald A. Reiss, Fifth Edition, PHI.
2. Programmable Logic Controllers- Programming Method and Applications by JR.Hackworth and F.D Hackworth Jr., Pearson, 2004.

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IV Year B.Tech EEE – II sem	**L**	**T/P/D**	**C**
	3	**0**	**3**

Elective-III

(13EEE028) RELIABILITY ENGINEERING AND APPLICATIONS TO POWER SYSTEMS

Course Objectives:

- To Describe Rules for combining probabilities of events and Binomial distribution
- To Analyze Series, Parallel, Series-Parallel and Non-series parallel networks
- To Describe Markov models and Frequency and duration concepts
- To apply Reliability concepts for Generation, composite and Distribution systems
- To evaluate basic and performance indices of radial networks.

Course Outcomes

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

- Define Reliability and unreliability and describe Rules for combining probabilities of events
- Define Hazard rate function and derive the expressions for different reliability functions
- Explain Discrete Markov chains and Continuous Markov process
- Apply Reliability concepts for Generation, composite and Distribution systems

UNIT – I

BASICS OF PROBABILITY THEORY AND DISTRIBUTION

Concepts of Reliability, Unreliability, Availability, Unavailability–Rules for combining probabilities of events – Bernoulli's trials – probability density and distribution functions – binomial distribution – expected value and standard deviation of binomial distribution.

UNIT – II

NETWORK MODELLING AND RELIABILITY ANALYSIS

Analysis of Series, Parallel, Series-Parallel networks, complex networks: decomposition method, Path based and Cutset based approaches.

RELIABILITY FUNCTIONS

Reliability functions f(t), F(t), R(t), h(t) and their relationships – Bath tub curve - exponential distribution – Expected value and standard deviation of exponential distribution –reliability analysis of series, parallel networks using exponential distribution – reliability measures: MTTF, MTTR and MTBF.

UNIT – III

MARKOV MODELLING

Discrete Markov chains: General modeling concepts-concept of stochastic transitional probability Matrix, Evaluation of limiting state Probabilities, Continuous Markov processes: one component repairable model – time dependent probability evaluation using Laplace transform approach – evaluation of limiting state probabilities using STPM – two component repairable models.

FREQUENCY AND DURATION TECHNIQUES

Frequency and duration concept – Evaluation of frequency of encountering state, MTTF and MTTR of one , two component repairable models – evaluation of cumulative probability and cumulative frequency of encountering of merged states of two component repairable model.

UNIT – IV

GENERATION SYSTEM RELIABILITY ANALYSIS

Reliability model of a generation system: recursive relation for unit addition and removal, load modeling - Merging of generation load model – evaluation of transition rates for merged state model – cumulative Probability, cumulative frequency of failure evaluation – LOLP, LOLE.

UNIT – V

COMPOSITE SYSTEM RELIABILITY ANALYSIS

Markov model-Weighted average rate model–Reliability Indices– Decomposition method.

DISTRIBUTION SYSTEM AND RELIABILITY ANALYSIS

Basic Concepts – Evaluation of Basic and performance indices of radial networks.

TEXT BOOKS

1. Reliability Evaluation of Engg. System by R. Billinton, R.N.Allan, BS Publications.
2. Reliability Evaluation of Power systems by R. Billinton, R.N.Allan, BS Publications.

REFERENCE BOOKS

1. Reliability Engineering: Theory and Practice by Alessandro Birolini, Springer Publications.
2. An Introduction to Reliability and Maintainability Engineering by Charles Ebeling, TMH Publications.
3. Reliability Engineering by E. Balaguruswamy, TMH Publications.
4. Reliability Engineering by Elsayed A. Elsayed, Prentice Hall Publications.

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IV Year B.Tech EEE –II Sem	**L**	**T/P/D**	**C**
	3	**0**	**3**

Elective-IV

(13EEE029) UTILIZATION OF ELECTRICAL ENERGY

Course Objectives

- To make the student familiar with electrical energy and its use when it is converted into several forms of energy.
- To deal with the fundamentals of illumination and its classification and the electric heating and welding.
- To learn the basic knowledge of electric drives.
- To learn the different types of speed time curves in traction system.

Course Outcomes

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

- Know types of electric drives, choice of motor, starting and running characteristics, speed control, temperature rise, particular applications of electric drives, types of industrial loads.
- Describe advantages and methods of electric heating and Electric welding
- Describe existing electric traction systems in India, special features of traction motor and various operating techniques, Speed-time curves for different services and various calculations regarding traction systems.
- Applications of electric drives in traction systems.

UNIT- I

ILLUMINATION

Illumination: Definitions, types of lighting schemes, Incandescent lamps and fluorescent lamps-polar curves, effect of voltage variation on efficiency and life of lamps, Distribution and control of light, lighting calculations, solid angle, Laws of Illumination-calculations, discharge lamps: Sodium Vapour and Mercury Vapour Lamps, merits of LED Lamps - Illumination Design –Indoor lighting, factory lighting, flood lighting and street lighting-problems.

UNIT- II

HEATING AND WELDING

Electrical heating-advantages, methods and applications, Resistance heating, design of heating element, efficiency calculations. Induction heating: Core type and Core less furnaces and high frequency eddy current heating, dielectric heating: principle and applications - Problems, Arc furnaces: Direct arc and Indirect arc furnaces-Problems. Electric welding- types, merits and demerits.

UNIT - III

ELECTRIC DRIVES

Introduction to Electric vehicle, Types of electric drives, choice of motor, starting and running characteristics, speed control, Methods of Electric Braking: Plugging, Rheostatic and Regenerative Braking. Temperature rise, particular applications of electric drives, types of industrial loads, continuous, intermittent and variable loads, load equalization.

UNIT - IV

ELECTRIC TRACTION (Part – I)

Traction Systems: types, Electric traction. Modern 25 KV A.C. single phase traction systems: advantages, equipment and layout of 25 KV single phase A.C. traction system.

Simplified speed time curves, Average and scheduled speed - Quadrilateral and Trapezoidal speed time curves-Problems.

UNIT - V

ELECTRIC TRACTION (Part – II)

Mechanics of train movement: Adhesive Weight, coefficient of Adhesion, tractive effort and specific energy consumption, factors affecting specific energy consumption-problems.

TEXT BOOKS

1. Utilization of Electric Energy by E. Openshaw Taylor, Orient Longman private limited, 1971.
2. Art & Science of Utilization of electrical Energy by Partab, Dhanpat Rai & Sons.
3. Utilization of Electric Power and Electric Traction by G.C.Garg, Khanna Publishers

REFERENCE BOOKS

1. Utilization of Electrical Power including Electric drives and Electric traction by N.V.Suryanarayana, New Age International (P) Limited, Publishers, 1996.
2. Generation, Distribution and Utilization of electrical Energy by C.L. Wadhwa, New Age International (P) Limited, Publishers, 1997.
3. Utilization of Electrical Power by J.B.Gupta, Kataria publishers.

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IV Year B.Tech EEE –II Sem	L	T/P/D	C
	3	0	3

ELECTIVE-IV

(13EEE030) FLEXIBLE A.C. TRANSMISSION SYSTEMS

Course Objectives:

- To understand the fundamentals of FACTS Controllers,
- To know the importance of controllable parameters and types of FACTS controllers & their benefits
- To understand the objectives of Shunt and Series compensation
- To Control STATCOM and SVC and their comparison and the regulation of STATCOM, Functioning and control of GCSC, TSSC and TCSC

Course Outcomes:

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

- Choose proper controller for the specific application based on system requirements
- Understand various systems thoroughly and their requirements
- Understand the control circuits of Shunt Controllers SVC & STATCOM for various functions viz. Transient stability Enhancement, voltage instability prevention and power oscillation damping
- Understand the Power and control circuits of Series Controllers GCSC, TSSC and TCSC

Unit - I

FACTS CONCEPTS

Transmission interconnections 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.

UNIT - II

VOLTAGE SOURCE CONVERTERS

Single phase, three phase full wave bridge converters transformer connections for 12 pulse operation.

Three level voltage source converter, pulse width modulation converter, basic concept of current source Converters, and comparison of current source converters with voltage source converters.

UNIT - III

STATIC SHUNT COMPENSATION

Objectives of shunt compensation, mid point voltage regulation, voltage instability prevention, improvement of transient stability, Power oscillation damping, Methods of

controllable var generation, variable impedance type static var generators, switching converter type var generators and hybrid var generators.

UNIT - IV

SVC AND STATCOM

SVC : FC-TCR and TSC-TCR

STATCOM: The regulation and slope.

Comparison between SVC and STATCOM

UNIT - V

STATIC SERIES COMPENSATORS

Objectives of Series compensation, concept of series capacitive compensation, GTO thyristor controlled series capacitor (GSC), thyristor switched series capacitor (TSSC), and thyristor controlled series capacitor (TCSC) control schemes for GSC TSSC and TCSC.

TEXT BOOKS

1. Understanding FACTS Devices by N.G. Hingorani and L. Guygi. IEEE Press Publications 2000.
2. Flexible AC Transmission System by Yong- Hua Song, Allan Johns, IEE Press.

REFERENCE BOOKS

1. Introduction to FACTS Controllers by Kalyan K.Sen and meyling sen, John wiley & sons, Inc., Hoboken, New Jersey. Mohamed E.EI – Hawary, Series editor.
2. FACTS controllers in power transmission and distribution by K.R Padiyar, Motilal UK Books of India (2007).

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IV Year B.Tech EEE – II Sem	L	T/P/D	C
	3	0	3

Elective - IV

(13EEE031) ENERGY AUDITING CONSERVATION AND MANAGEMENT

Course Objectives

- To understand the necessity of conservation of Energy.
- To Know the methods of Energy management .
- To identity the factors to increase the efficiency of electrical equipment.
- To know the benefits of carrying out energy Audits.

Course Outcomes:

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

- To conduct Energy Audit of industries.
- To manage energy Systems
- To specify the methods of improving efficiency of electric motor.
- To improve power factor and to design a good illumination system
- To calculate pay back periods for energy saving equipment.

Unit I Basic principles of Energy audit

Energy audit- definitions, concept , types of audit, energy index, cost index ,pie charts, Sankey diagrams, load profiles, Energy conservation schemes- Energy audit of industries- energy saving potential, energy audit of process industry, thermal power station, building energy audit

Unit II Energy management

Principles of energy management, organizing energy management program, initiating, planning, controlling, promoting, monitoring, reporting- Energy manger, Qualities and functions, language, Questionnaire - check list for top management

Unit III Energy efficient Motors

Energy efficient motors, factors affecting efficiency, loss distribution, constructional details, characteristics - variable speed, variable duty cycle systems, RMS hp- voltage variation-voltage unbalance- over motoring- motor energy audit

Unit IV Power Factor Improvement, Lighting and energy instruments

Power factor – methods of improvement, location of capacitors, pf with non-linear loads, effect of harmonics on p.f. , p.f motor controllers - Good lighting system design and practice, lighting control, lighting energy audit - Energy Instruments- watt meter, data loggers, thermocouples, pyrometers,lux meters, tongue testers ,application of PLC's

Unit V Economic aspects and analysis

Economics Analysis-Depreciation Methods, time value of money, rate of return, present worth method, replacement analysis, life cycle costing analysis- Energy efficient motors- calculation of simple payback method, net present worth method- Power factor correction, lighting - Applications of life cycle costing analysis, return on investment.

REFERENCE BOOKS:

1) Energy management by W.R. Murphy & G. Mckay Butter worth, Heinemann publications.
2) Energy management by Paul o' Callaghan, Mc-graw Hill Book company-1st edition, 1998
3) Energy efficient electric motors by John .C. Andreas, Marcel Dekker Inc Ltd-2nd edition, 1995-
4) Energy management handbook by W.C.Turner, John wiley and sons
5) Energy management and good lighting practice: fuel efficiency- booklet12-EEO

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IV Year B.Tech EEE – II Sem	L	T/P/D	C
	3	0	3

Elective - IV

(13ECE023) EMBEDDED REAL TIME OPERATING SYSTEMS

Course Objectives

- To Learn the general embedded system concepts
- To Understand the general embedded system concepts, design of embedded hardware and software development tools
- To Learn the basics of real time operating and embedded systems
- To describe key issues such as CPU scheduling, memory management, task synchronization, and file system in the context of real-time embedded systems.

Course Outcomes:

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

- Understand and design embedded systems and real-time systems
- Define the unique design problems and challenges of real-time systems
- Identify the unique characteristics of real-time operating systems and evaluate the need for real-time operating system
- Explain the general structure of a real-time system, to Understand and use RTOS to build an embedded real-time system
- Gain knowledge and skills necessary to design and develop embedded applications based on real-time operating systems.

UNIT 1

FUNDAMENTALS OF EMBEDDED SYSTEMS

Definition – Classification of Embedded Systems - Processors in the system - Other Hardware units. Software components - Examples for embedded systems, Design issues and trends

UNIT 2

EMBEDDED HARDWARE DEVELOPMENT ENVIRONMENT

Processor Architecture- Structured units of a processor - Processor selection factors. Common memory devices - Memory selection - Memory map - Internal devices & I/O devices, Serial devices - Parallel port devices, Timer and Counting devices - Direct memory access, Communication Interface Standards,.

UNIT 3

EMBEDDED SOFTWARE DEVELOPMENT ENVIRONMENT

Embedded System Development Process, Embedded Operating systems, Types of Embedded Operating systems, Host and Target machines, Linkers/Locators for embedded software, getting embedded software into the target system, Testing on host machine.

UNIT 4

REAL TIME OPERATING SYSTEMS CONCEPTS -I

Typical OS structure - RTOS structure - The context of its use - Schedule management for multiple tasks - Scheduling in real time - RTOS task scheduling models – Round Robin, Round Robin with Interrupts, Priority driven- Preemptive and Non-preemptive scheduling

UNIT 5

REAL TIME OPERATING SYSTEMS CONCEPTS -II

Tasks and Task states, Tasks and Data, Semaphores and shared data, Message queues, Mailboxes and Pipes, Timer functions, events, Memory management, Interrupt routines in an RTOS environment.

Case study of RTOS using MUCOS. Case study for RTOS based programming - Coding for Automatic Chocolate vending machine using MUCOS.

TEXT BOOKS

1. An Embedded Software Primer by David E. Simon, Pearson Ed., 2005.
2. Embedded systems - architecture, programming and design by Raj Kamal, Tata McGraw Hill

REFERENCES

1. Real time Systems by J. W. S. Liu, Pearson
2. The 8051 Microcontroller & Embedded Systems using Assembly and C by Ayala & Gadre, Cengage Publications

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IV Year B.Tech EEE – II sem	**L**	**T/P/D**	**C**
	3	**0**	**3**

Elective-IV

(13CSE076) RELATIONAL DATA BASE MANAGEMENT SYSTEMS

Course Ojectives:

- To present an introduction to database management systems (DBMS) and relational data model.
- To provide an emphasis on how to organize, maintain and retrieve information efficiently and effectively from a DBMS.
- To introduce the concepts of transactions and transaction processing
- To present the issues and techniques relating to concurrency and recovery in multi-user database environments

Course Outcomes:

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

- Understand the fundamental concepts of database management. These concepts include aspects of database design, database languages, and database-system implementation.
- The students will be able to design and query databases, as well as understand the internals of databases.
- Define basic functions of DBMS & RDBMS.
- Describe database development process.
- Apply the Relational Database Model to understand the Logical and Physical aspects of the DBMS architecture.
- Analyze database models & entity relationship models.
- Draw the E-R diagram for the given case study.
- Use Structured Query Language (SQL) with complex queries.

UNIT-I

Introduction to Databases and Database Management System - Database system Applications - Advantages of DBMS over File System - Data Models – Instances and schema - View of Data - Database Languages -DDL-DML - Database Users and Administrator - Database System Structure.

UNIT-II

Database Design and ER diagrams – Attributes and Entity Sets – Relationships and Relationship Sets – Constraints - Keys - Design Issues - Entity-Relationship Diagram- Weak Entity Sets - Extended E-R Features - Database Design with ER model - Database Design for Banking Enterprise

UNIT – III

Introduction to the Relational Model – Structure of RDBMS - Integrity Constraints over Relations – Enforcing Integrity Constraints – Querying Relational Data - Relational Algebra and Calculus.

Introduction to SQL- Data Definition commands, Data Manipulation Commands, Basic Structure, Set operations Aggregate Operations - Join operations - Sub queries and correlated queries, SQL functions , views ,Triggers, Embedded SQL.

UNIT – IV

Functional Dependencies– Introduction , Basic Definitions, Trivial and Non trivial dependencies, closure of a set of dependencies, closure of attributes, irreducible set of dependencies- Schema Refinement in Database Design- Problems Caused by Redundancy – Decompositions – Problem Related to Decomposition — Lossless Join Decomposition – Dependency Preserving Decomposition - FIRST, SECOND, THIRD Normal Forms – BCNF — Multi valued Dependencies – Fourth Normal Form.

UNIT-V

Transaction concept- Transaction state- Implementation of atomicity and Durability- Concurrent executions – Serializability, Recoverability

File Organization – Organization of records in file - Data Dictionary Storage – Indexing and Hashing – Basic Concepts , Ordered Indices,B^+Tree Index files, B- tree index files

EXTBOOKS

1. Database System Concepts, Silberschatz, Korth , Fifth Edition, McGraw hill (1,2,3 and 5 Units)
2. Introduction to Database Systems, C.J.Date, Pearson Education (4^{th} Unit)

REFERENCES

1. Fundamentals of Database Systems, Elmasri Navrate Pearson Education
2. Database Management Systems, Raghu ramakrishnan, Johannes Gehrke, TATA Mc Graw Hill(1,2,3 and 5 Units)
3. Data base Systems design, Implementation, and Management, Peter Rob and Carlos Coronel 7th Edition.
4. Data Base Systems using Oracle : A simplified guide to SQL and PL /SQL, Shah, PHI

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	0	**18**	**12**

(13EEE202) PROJECT WORK

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IV Year B.Tech EEE – II SEM	**L**	**T/P/D**	**C**
	0	**3**	**2**

(13EEE203) TECHNICAL SEMINAR

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IV Year B.Tech EEE – II SEM	**L**	**T/P/D**	**C**
	0	**0**	**2**

(13EEE204) COMPREHENSIVE VIVA