JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING (Autonomous)
ANANTHAPURAMU – 515 002 (A.P) INDIA

Academic Regulations 2013 (R13) for B. Tech (Regular Full time)

(Effective for the students admitted into I year from the Academic Year 2013-2014 onwards)

1. Award of B.Tech. Degree

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

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

ii. Register for 180 credits and secure all 180 credits.

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

3. Courses of study

The following courses of study are offered at present as specializations for the B. Tech. course for non-autonomous, constituent & affiliated colleges from 2013-14

S.No.	Name of the Branch	Branch Code
1.	Civil Engineering	01
2.	Electrical and Electronics Engineering	02
3.	Mechanical Engineering	03
4.	Electronics and Communication Engineering	04
5.	Computer Science and Engineering	05
6.	Chemical Engineering	08
7.	Electronics and Instrumentation Engineering	10
8.	Information Technology	12
9.	Electronics and Control Engineering	13
10.	Mechanical (Mechatronics) Engineering	14
11.	Computer Science & Systems Engineering	15
12.	Electronics and Computer Engineering	19
13.	Aeronautical Engineering	21

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

4. Credits

	I Year		Semester	
	Periods / Week	Credits	Periods / Week	Credits
Theory	02	03	04	03
	03+01	05	--	--
Practical	03	04	03	02
Drawing	01+05	05	01+03	03
Seminar & Comprehensive viva-voce	--	--	--	03
Project	--	--	15	10

5. Distribution and Weightage of Marks

5.1 The performance of a student in each semester / I year shall be evaluated subject – wise with a maximum of 100 marks for theory and 75 marks for practical subject. In addition, 'Seminar & Comprehensive Viva-Voce' and Project work shall be evaluated for 75 and 200 marks respectively whereas audit courses shall be evaluated for a maximum of 30 internal marks.

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

5.2 Internal Examinations:

i. For theory subjects, during the semester, there shall be two midterm examinations and for first year there shall be three midterm examinations. Each midterm examination consists of objective paper for 10 marks and subjective paper for 20 marks with duration of 1hour 50 minutes (20 minutes for objective and 90 minutes for subjective paper).

Objective paper shall be for 10 marks. Subjective paper shall contain 5 questions of which student has to answer 3 questions evaluated* for 20 marks.

***Note 1:** The subjective paper shall contain 5 questions of equal weightage of 10 marks and the marks obtained for 3 questions shall be condensed to 20 marks, any fraction(0.5 & above) shall be rounded off to the next higher mark.

***Note 2:** The midterm examination shall be conducted first by distribution of the Objective paper simultaneously marking the attendance, after 20 minutes the answered objective paper is collected back. The student is not allowed to leave the examination hall. Then the descriptive question paper and the answer booklet shall be distributed. After 90minutes the answered booklets are collected back.

If the student is absent for the internal examination, no re-exam shall be conducted and internal marks for that examination shall be considered as zero.

In semester pattern, first midterm examination shall be conducted for I,II units of syllabus and second midterm examination shall be conducted for III,IV & V units.

Final Internal marks shall be arrived at by considering the marks secured by the student in both the mid examinations with 80% weightage to the better mid exam and 20% to the other. For Ex:

Marks obtained in first mid: 25 Marks
obtained in Second mid: 20
Final Internal Marks: (25x0.8) + (20x0.2) = 24

If the student is absent for any one midterm examination, the final internal marks shall be arrived at by considering 80% weightage to the marks secured by the student in the appeared examination and zero to the other. For Ex:

Marks obtained in first mid: Absent
Marks obtained in Second mid: 25
Final Internal Marks: (25x0.8)+ (0x0.2) =20

v. For first year, first midterm examination, shall be from unit – I, second midterm examination shall be from II & III units, and third midterm examination shall be from IV & V units.

Final Internal marks shall be arrived at by considering the marks secured by the student in all the three mid examinations with 80% weightage to the average marks of the best two midterm examinations and 20% to the other. For Ex:

Marks obtained in First mid : 25
Marks obtained in Second mid: 20
Marks obtained in Third mid: 15
Average of Better mid exams: (25+20)/2 = 22.5 Final
Internal Marks: (22.5x0.8) + (15x0.2) = 21

If the student is absent for any one mid examination, final internal marks shall be arrived at by considering 80% weightage to the average marks secured by the student in the appeared midterm examinations and zero to the other. For Ex:

Marks obtained in First mid: Absent
Marks obtained in Second mid: 25
Marks obtained in Third mid: 20
Average of Better mid exams: (25+20)/2 = 22.5 Final
Internal Marks: (22.5x0.8) + (0x0.2) = 18

If the student is absent for two mid examinations, final internal marks shall be arrived as below:
Marks obtained in First mid: Absent Marks obtained in Second mid: Absent Marks obtained in Third mid: 25

Average of Better mid exams: (25+0.0)/2 = 12.5 Final
Internal Marks: (12.5x0.8) + (0x0.2) = 10

5.3 End Examinations:

i. End examination of theory subjects shall have the following pattern:
   a. There shall be 6 questions and all questions are compulsory.
   b. Question I shall contain 10 compulsory short answer questions for a total of 20 marks such that each question carries 2 marks. There shall be 2 short answer questions from each unit.
   c. In each of the questions from 2 to 6, there shall be either-or type questions of 10 marks each. Student shall answer any one of them.
   d. Each of these questions from 2 to 6 shall cover one unit of the syllabus.

ii. End examination of theory subjects consisting of two parts of different subjects, for ex: Electrical & Mechanical Technology, shall have the following pattern:
   a. Question paper shall be in two parts viz., Part A and Part B with equal weightage.
   b. In each part, there shall be 3 either-or type questions for 12, 12 and 11 marks.

Note: The answers for Part A & Part B shall be written in two separate answer books.

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

In a practical subject consisting of two parts (ex: Electrical & Mechanical Lab), the end examination shall be conducted for 25 marks in each part.

5.5 There shall be an audit pass course in Human values & Professional ethics and Advanced Communication skills lab with no credits. There shall be no external examination. However, attendance in the audit course shall be considered while calculating aggregate attendance and student shall be declared pass in the audit course only when he/she secures 40% or more in the internal examinations.

5.6 For the subject having design and/or drawing, such as Engineering Drawing, Machine Drawing and Estimation, the distribution shall be 30 marks for internal evaluation and 70 marks for end examination. Day-to-day work shall be evaluated for 15 marks by the concerned subject teacher based on the reports/submissions prepared in the class. And there shall be two midterm examinations in a semester for duration of 2hrs each for 15 marks with weightage of 80% to better mid marks and 20% for the other. However, when offered in the I year as 5 credit course, there shall be three midterm exams with weightage of 80% to average marks of the best two midterm examinations and 20% for the other. The sum of day to day evaluation and the internal test marks will be final sessional marks for the subject.

5.7 There shall be a seminar presentation in IV year II Semester. For the seminar, the student shall collect the information on a specialized topic and prepare a technical report, showing his/her understanding over the topic, and submit to the department before presentation. The report and the presentation shall be evaluated by the departmental committee consisting of Head of the Department, seminar supervisor and a senior faculty member. The seminar shall be evaluated for 25 marks. The seminar shall be conducted throughout the semester as per the convenience of the department committee and students. There shall be no external examination for seminar.

There shall be a Comprehensive Viva – Voce in IV year II Semester. The Comprehensive viva- voce will be conducted by the committee consisting of Head of the Department and two senior faculty members of the department. The Comprehensive Viva – voce is aimed to assess the students' understanding in various subjects he/she studies during the B.Tech. course of study. The Comprehensive Viva- Voce shall be evaluated for 50 marks by the committee. There are no internal marks for the Comprehensive Viva-Voce.

A student shall acquire 3 credits assigned to the seminar & comprehensive viva-voce only when he/she secures 40% or more marks for the combined total of 75 marks.

5.8 Out of a total of 200 marks for the project work, 60 marks shall be for Internal Evaluation and 140 marks for the End Semester Examination (Viva-voce). The Viva-Voce shall be conducted by a committee consisting of HOD, Project Supervisor and an External Examiner nominated by the University**.** Project work shall start in IV- I and shall continue in the semester break. The evaluation of project work shall be conducted at the end of the IV year – II semester. The Internal Evaluation shall be made by the departmental committee, on the basis of two seminars given by each student on the topic of his/her project.

5.9 Laboratory marks and the sessional marks awarded by the college are not final. They are subject to scrutiny and scaling by the University wherever necessary. In such cases, the sessional and laboratory marks awarded by the college will be referred to a committee. The committee will arrive at a scaling factor and the marks will be scaled as per the scaling factor. The recommendations of the Committee are final and binding.

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

6 Attendance Requirements:

i. A student shall be eligible to appear for University examinations if he acquires a minimum of 75% of attendance in aggregate of all the subjects in a semester/ I year.

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

iii. Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester or I year may be granted by the College Academic Committee.

iv. Students whose shortage of attendance is not condoned in any semester / I year are not eligible to take their end examination of that class and their registration shall stand cancelled.

v. A student will not be promoted to the next semester unless he satisfies the attendance requirements of the present semester / I year, as applicable. They may seek readmission for that semester / I year when offered next.

vi. A stipulated fee shall be payable towards condonation of shortage of attendance to the University.

7 Minimum Academic Requirements:

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item no.**6**

i. A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory, practical, design, drawing subject or project if he secures not less than 35% of marks in the end examination and a minimum of 40% of marks in the sum total of the internal evaluation and end examination taken together. In case of audit courses and the seminar & comprehensive viva – voce he/she should secure 40% of the total marks.

ii. A student shall be promoted from II to III year only if he/she fulfils the academic requirement of securing 26 credits of the subjects that have been studied up to II year I semester from the following examinations, irrespective of whether the candidate takes the end examination or not as per the normal course of study.

   a. One regular and one supplementary examinations of I year.
   b. One regular examination of II year I semester

iii. A student shall be promoted from third year to fourth year only if he/she fulfils the academic requirements of securing 44 credits of the subjects that have been studied upto III year I semester from the following examinations, irrespective of whether the candidate takes the end examination or not as per the normal course of study.

   a. Two regular and two supplementary examinations of I year.
   b. Two regular and one supplementary examinations of II year I semester.
   c. One regular and one supplementary examinations of II year II semester.
   d. One regular examination of III year I semester.

And in case if student is detained for want of credits for particular academic year by sections 7.2 and 7.3 above, the student may make up the credits through supplementary exams of the above exams before the commencement of third or fourth year I semester class work respectively of next year.

iv. A student shall register and put up minimum attendance in all 180 credits and earn all the 180 credits. Marks obtained in all 180 credits and audit courses shall be considered for the calculation of aggregate percentage of marks obtained.

v. Students who fail to earn 180 credits as indicated in the course structure within eight academic years from the year of their admission shall forfeit their seat in B.Tech. course and their admission shall stand cancelled.

8. Course pattern:

i. The entire course of study is for four academic years. The first year shall be on yearly pattern and the second, third and fourth years shall be on semester pattern.

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

iii. When a student is detained due to lack of credits/shortage of attendance he may be re-admitted when the semester is offered after fulfilment of academic regulations. In such case, he/she shall be in the academic regulations into which the student is presently readmitted.

9. Transitory Regulations:

Discontinued, detained, or failed candidates are eligible for readmission as and when the semester is offered after fulfilment of academic regulations. Candidates who have been detained for want of attendance or not fulfilled academic requirements or who have failed after having undergone the course in earlier regulations or have discontinued and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work with the same or equivalent subjects as and when subjects are offered, subject to Section 2 and they will be in the academic regulations into which the candidate is presently readmitted.

10. With–holding of results:

If the candidate has any dues not paid to the university or if any case of indiscipline or malpractice is pending against him, the result of the candidate shall be withheld and he will not be allowed / promoted into the next higher semester. The issue of awarding degree is liable to be withheld in such cases.

11. Award of Class:

After a student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of B. Tech. Degree he shall be placed in one of the following four classes:

Class Awarded	% of marks to be secured	
First Class with Distinction	70% and above	From the aggregate marks secured from 180 credits and audit courses.
First Class	Below 70% but not less than 60%	
Second Class	Below 60% but not less than 50%	
Pass Class	Below 50% but not less than 40%	

(The marks in internal evaluation and end examination shall be shown separately in the marks memorandum)

However while awarding the degree, rounding of percentages is permitted to the extent of 0.5% to effect change of class from pass class to Second class, Second class to First class, First class to First class with Distinction for all the courses being offered or to be offered by the University without adding any marks to the original marks secured by the students.

12. Minimum Instruction Days:

The minimum instruction days including exams for each semester / I year shall be 90/180 days respectively.

13. Student transfers shall be as per the guidelines issued by the Government of Andhra Pradesh from time to time.

14. General:

i. The academic regulations should be read as a whole for purpose of any interpretation.
ii. Malpractices rules- nature and punishments is appended.
iii. Where the words “he”, “him”, “his”, occur in the regulations, they include “she”, “her”, “hers”.
iv. In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor is final.
v. The University may change or amend the academic regulations or syllabi at any time and the changes or amendments shall be made applicable to all the students on rolls with effect from the dates notified by the University.

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
ANANTAPUR COLLEGE OF ENGINEERING (Autonomous),
ANANTAPURAMU

Course Structure for B. Tech (Electrical and Electronics Engineering) (2013-14)

I YEAR - I SEMESTER

Sl.No.	Course Code	Subject	L	T	P	Credits
1	HS	English-I	3	1	0	3
2	BS	Mathematics- I	3	1	0	3
3	BS	Applied Physics	3	1	0	3
4	ES	Engineering Graphics	2	0	2	3
5	HS	Environmental Studies	3	1	0	3
6	HS	English Language Communication Skills Lab	0	0	3	2
7	BS	Applied Physics Lab	0	0	3	2
8	ES	Engineering & IT Workshop	0	0	3	2
		NSS / NCC				
		Total	**14**	**4**	**11**	**21**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
ANANTAPUR COLLEGE OF ENGINEERING (Autonomous),
ANANTAPURAMU

Course Structure for B. Tech (Electrical and Electronics Engineering) (2013-14)

I YEAR - II SEMESTER

Sl.No.	Course Code	Subject	L	T	P	Credits
1	HS	English-II	3	1	0	3
2	BS	Mathematics – II	3	1	0	3
3	BS	Engineering Chemistry	3	1	0	3
4	ES	Electrical Circuits – I	3	1	0	3
5	PC	Electronic Devices & Circuits	3	1	0	3
6	ES	Computer Programming	3	1	0	3
7	BS	Engineering Chemistry Lab	0	0	3	2
8	ES	Computer Programming Lab	0	0	3	2
		NSS/NCC				
		Total	**18**	**6**	**6**	**22**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
ANANTAPUR COLLEGE OF ENGINEERING (Autonomous),
ANANTAPURAMU

Course Structure for B. Tech (Electrical and Electronics Engineering) (2013-14)

II B. Tech (EEE) – I Sem

Sl.No	Course Code	Subject	L	T	P	Credits
1	BS	Mathematics - III	**3**	**1**	**0**	3
2	PC	Electrical Circuits - II	3	1	0	3
3	PC	Electrical Machines - I	3	1	0	3
4	PC	Control Systems Engineering	3	1	0	3
5	HS	Managerial Economics and Financial Analysis	3	1	0	3
6	ES	Applied Engineering	3	1	0	3
7	PC	Electric Circuits and Simulation Lab	0	0	3	2
8	ES	Electronic Devices & Circuits Lab	0	0	3	2
		Total	18	6	6	22

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
ANANTAPUR COLLEGE OF ENGINEERING (Autonomous),
ANANTAPURAMU

Course Structure for B. Tech (Electrical and Electronics Engineering) (2013-14)

II B. Tech (EEE) – II Sem

Sl.No.	Course Code	Subject	L	T	P	Credits
1	BS	Complex Variables and Special Functions	3	1	0	3
2	PC	Electrical Machines - II	3	1	0	3
3	PC	Electric Power Generating Systems	3	1	0	3
4	PC	Electromagnetic Fields	3	1	0	3
5	PC	Switching Theory and Logic Design	3	1	0	3
6	PC	Analog Electronic Circuits	3	1	0	3
7		Human Values and Professional Ethics (Audit Course)	2	-	-	-
8	PC	Electrical Machines Lab – I	0	0	3	2
9	PC	Control Systems & Simulation Lab	0	0	3	2
		Total	20	6	6	22

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
ANANTAPUR COLLEGE OF ENGINEERING (Autonomous),
ANANTAPURAMU

Course Structure for B. Tech (Electrical and Electronics Engineering) (2013-14)

III B. Tech (EEE) – I Sem

Sl.No.	Course Code	Subject	L	T	P	Credits
1	PC	Transmission of Electric Power	3	1	0	3
2	PC	Electrical Machines – III	3	1	0	3
3	PC	Power Electronics	3	1	0	3
4	PC	Electrical and Electronic Measurements	3	1	0	3
5	ES	Linear & Digital Integrated Circuits	3	1	0	3
6	HS	Management Science	3	1	0	3
7	PC	Electrical Machines Lab – II	0	0	3	2
8	PC	Electrical and Electronic Measurements Lab	0	0	3	2
		Total	20	6	6	22

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
ANANTAPUR COLLEGE OF ENGINEERING (Autonomous),
ANANTAPURAMU

Course Structure for B. Tech (Electrical and Electronics Engineering) (2013-14)

III B. Tech (EEE) – II Sem

Sl.No.	Course Code	Subject	L	T	P	Credits
1	PC	Switch Gear & Protection	3	1	0	3
2	PC	Digital Signal Processing	3	1	0	3
3	PC	Computer Aided Power System Analysis	3	1	0	3
4	PC	Microprocessors & Microcontrollers	3	1	0	3
5	PC	Power Semiconductor Controlled Drives	3	1	0	3
6	PC	Neural Networks & Fuzzy Logic Applications	3	1	0	3
7		Advanced English Communication Skills Lab (Audit Course)	2	-	-	-
8	PC	Microprocessors & Microcontrollers Lab	0	0	3	2
9	PC	Power Electronics & Simulation Lab	0	0	3	2
		Total	20	6	6	22

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
ANANTAPUR COLLEGE OF ENGINEERING (Autonomous),
ANANTAPURAMU

Course Structure for B. Tech (Electrical and Electronics Engineering) (2013-14)

IV B. Tech (EEE) – I Sem

Sl.No.	Course Code	Subject	L	T	P	Credits
1	PC	Electric Power Distribution Systems	3	1	0	3
2	PC	Instrumentation	3	1	0	3
3	PC	Introduction to HVDC Transmission & FACTS	3	1	0	3
4	PC	Power System Operation and Control	3	1	0	3
5	OE	Open Elective 1) PLC & Its Applications 2) Renewable Energy Sources 3) Linear & Nonlinear Optimization Techniques 4) Reliability and Safety Engineering	3	1	0	3
6		**MOOC (Elective – I)**	3	1	0	3
7	PC	Digital Signal Processing Lab	0	0	3	2
8	PC	Power Systems & Simulation Lab	0	0	3	2
9		Project Part-A - Seminar	-	-	-	4
		Total	18	6	6	26

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
ANANTAPUR COLLEGE OF ENGINEERING (Autonomous),
ANANTAPURAMU

Course Structure for B. Tech (Electrical and Electronics Engineering) (2013-14)

IV B. Tech (EEE)– II Sem

Sl.No	Course Code	Subject	L	T	P	Credits
1	PC	Introduction to Power Quality	**3**	**1**	**0**	3
2	HS	Utilization of Electrical Energy	3	1	0	3
3	PE	Elective-II 1) Modern Control Theory 2) Reliability Engineering and its Application to Power Systems 3) Power System Deregulation 4) Switched Mode Power Converters	3	1	0	3
4	PE	Elective-III 1) Electricity Act and Costing of Electrical Systems 2) High Voltage Engineering 3) Introduction to Distributed Generation & Smart Grid 4) Energy Auditing & Demand Side Management	3	1	0	3
5		Seminar - Comprehensive Viva-Voce	-	-	-	3
6		Project Part-B	-	-	-	10
		Total	12	4	0	25

*BS – Basic Sciences
*ES – Engineering Science
*HS – Humanities and Social Science
*PC – Professional Subject -Core
*PE – Professional Subject –Elective
*MC- Mandatory Course
*OE- Open Elective

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
ANANTAPUR COLLEGE OF ENGINEERING (Autonomous),
ANANTAPURAMU

Course Structure for B. Tech (Electrical and Electronics Engineering) (2013-14)

I YEAR - I SEMESTER

Sl.No.	Course Code	Subject	L	T	P	Credits
1	HS	English-I	3	1	0	3
2	BS	Mathematics- I	3	1	0	3
3	BS	Applied Physics	3	1	0	3
4	ES	Engineering Graphics	2	0	2	3
5	HS	Environmental Studies	3	1	0	3
6	HS	English Language Communication Skills Lab	0	0	3	2
7	BS	Applied Physics Lab	0	0	3	2
8	ES	Engineering & IT Workshop	0	0	3	2
		NSS / NCC				
		Total	**14**	**4**	**11**	**21**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY

COLLEGE OF ENGINEERING: ANANTAPUR

I Year B.Tech (Common to all Branches) - I Semester	**T**	**L**	**C**
	3+1*	**0**	**3**

ENGLISH

1. INTRODUCTION:

English is an international language as well as a living and vibrant one. People have found that knowledge of English is a passport for better career, better pay, advanced knowledge and for communication with the entire world. As it is a language of opportunities in this global age, English is bound to expand its domain of use everywhere. The syllabus has been designed to enhance communication skills of the students of engineering and technology. The prescribed books serve the purpose of preparing them for everyday communication and to face the global competitions in future.

The first text prescribed for detailed study focuses on LSRW skills and vocabulary development. The teachers should encourage the students to use the target language. The classes should be interactive and student-centered. They should be encouraged to participate in the classroom activities keenly.

The text for non-detailed study is meant for extensive reading/reading for pleasure by the students. They may be encouraged to read some select topics on their own, which could lead into a classroom discussion. In addition to the exercises from the texts done in the class, the teacher can bring variety by using authentic materials such as newspaper articles, advertisements, promotional material etc.

2. OBJECTIVES:

1. To enable the students to communicate in English for academic and social purpose
2. To enable the students to acquire structure and written expressions required for their profession.
3. To develop the listening skills of the students
4. To inculcate the habit of reading for pleasure
5. To enhance the study skills of the students with emphasis on LSRW skills

3. SYLLABUS:

UNIT –I

Chapter entitled *Humour* from "Using English"
Chapter entitled '*Homi Jehangir Bhabha'* from "New Horizons"

L- Listening -Techniques - Importance of phonetics
L- Meet & Greet and Leave taking, Introducing Oneself and Others (Formal and Informal situations)
R- -Reading Strategies -Skimming and Scanning
W- Writing strategies- sentence structures
G-Parts of Speech –Noun-number, pronoun-personal pronoun, verb- analysis
V-Affixes-prefix and suffix, root words, derivatives

UNIT –II

Chapter entitled *Inspiration* from "Using English"
Chapter entitled 'My Struggle for an Education' from "New Horizons"

L- Listening to details
S- Apologizing, Interrupting, Requesting and Making polite conversations
R-note making strategies
W- Paragraph-types- topic sentences, unity, coherence, length , linking devices
G-Auxiliary verbs and question tags
V- synonyms-antonyms, homonyms , homophones, homographs, words often confused

UNIT –III

Chapter entitled *Sustainable Development* from "Using English"
Chapter entitled 'The Autobiography of Abraham Lincoln' from "New Horizons"

L- Listening to themes and note taking
S- Giving instructions and Directions, making suggestions, Accepting ideas, fixing a time and Advising
R- Reading for details -1
W- Resume and cover letter
G- Tenses – Present tense, Past tense and Future tense
V-Word formation and One-Word Substitutes

UNIT –IV

Chapter entitled *Relationships* from "Using English"
Chapter entitled ' T*he Happy Prince* from "New Horizons"

L- Listening to news
S- Narrating stories, Expressing ideas and opinions and telephone skills
R- Reading for specific details and Information

W- Technical Report writing-strategies, formats-types-technical report writing
G- Voice and Subject – Verb Agreement
V- Idioms and prepositional Phrases

UNIT –V

Chapter entitled Science and Humanism from "Using English"
Chapter entitled 'If'from "New Horizons"
L- Listening to speeches
S- Making Presentations and Group Discussions
R- Reading for Information
W- E-mail drafting
G- Conditional clauses and conjunctions
V- Collocations and Technical Vocabulary and using words appropriately

4.EXPECTED OUTCOME:

The students will get the required training in LSRW skills through the prescribed texts and develop communicative competence

Prescribed Books:

1. **Using English (for detailed study)** published by Orient Black Swan, 2013
2. **New Horizons** published by Pearson, 2013

Suggested Reading:

1. **Raymond Murphy's English Grammar with CD,** Murphy, Cambridge University Press, 2012.
2. **English Conversation Practice –**Grant Taylor, Tata McGraw Hill, 2009.
3. **Communication Skills, Sanjay Kumar & Pushpalatha** Oxford University Press, 2012.
4. **A Course in Communication Skills**- Kiranmai Dutt & co. Foundation Books, 2012.
5. **Current English grammar and usage-**S M Guptha, PHI, 2013.
6. **Modern English Grammar-**Krishna SWAMI .McMillan, 2009.
7. **Powerful Vocabulary Builder**- Anjana Agarwal New Age International Publishers, 2011.
8. **Writing with a Purpose, Tickoo and Sasi Kumar, OUP, 2011**
9. **Strengthen Your Writing, Orient Blackswan**

2013-2014

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR,
College of Engineering (Autonomous) Anantapur.

I Year B.Tech-I semester	**T**	**P**	**C**
	3+1	**0**	**3**

MATHEMATICS – I

(Common to All Branches)

Objectives

- To train the students thoroughly in Mathematical concepts of ordinary differential equations and their applications in electrical circuits, deflection of beams, whirling of shafts.
- To prepare students for lifelong learning and successful careers using mathematical concepts of differential and Integral calculus, ordinary and partial differential equations.
- To develop the skill pertinent to the practice of the mathematical concepts including the students abilities to formulate the problems, to think creatively and to synthesize information.

UNIT – I

Exact, linear and Bernoulli equations. Applications to Newton's law of cooling, law of natural growth and decay, orthogonal trajectories.

Non-homogeneous linear differential equations of second and higher order with constant coefficients with RHS term of the type e^{ax}, sin ax, cos ax, polynomials in x, e^{ax} V(x), xV(x), method of variation of parameters. Applications to oscillatory electrical circuits, Deflection of Beams, whirling of shafts.

UNIT – II

Taylor's and Maclaurin's Series - Functions of several variables – Jacobian – Maxima and Minima of functions of two variables, Lagrange's method of undetermined Multipliers with three variables only. Radius of curvature, center of curvature, Involutes, evolutes and envelopes..

UNIT – III

Curve tracing – Cartesian, polar and parametric curves. Length of curves.

UNIT – IV

Multiple integral – Double and triple integrals – Change of Variables – Change of order of integration. Applications to areas and volumes, surface area of solid of revolution in Cartesian and polar coordinates using double integral.

UNIT – V

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Method of separation of variables – Solutions of one dimensional wave equation, heat equation and two-dimensional Laplace's equation under initial and boundary conditions.

TEXT BOOKS:

1. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers.
2. Engineering Mathematics, Volume - I, E. Rukmangadachari & E. Keshava Reddy, Pearson Publisher.

REFERENCES:

1. Engineering Mathematics Volume-I, by T.K.V. Iyengar, B.Krishna Gandhi, S.Ranganatham and M.V.S.S.N.Prasad, S.Chand publication.
2. Engineering Mathematics, Volume - I, by G.S.S.Raju, CENGAGE publisher.
3. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India.
4. Higher Engineering Mathematics, by B.V.Ramana, Mc Graw Hill publishers.
5. Advanced Engineering Mathematics, by Alan Jeffrey, Elsevier.

Outcomes:

- The students become familiar with the application of differential and integral calculus, ordinary and partial differential equations to engineering problems.
- The students attain the abilities to use mathematical knowledge to analyze and solve problems in engineering applications.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
COLLEGE OF ENGINEERING: ANANTAPUR

I Year B.Tech (Common to all Branches) I Semester	**T**	**L**	**C**
	3+1*	**0**	**3**

ENVIRONMENTAL STUDIES

OBJECTIVE: To make the students to get awareness on environment, to understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day to day activities of human life to save earth from the inventions by the engineers.

UNIT – I

MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES: – Definition, Scope and Importance – Need for Public Awareness.

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

UNIT – II

ECOSYSTEMS : Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological sucession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem:

a. Forest ecosystem.
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

BIODIVERSITY AND ITS CONSERVATION : Introduction 0 Definition: genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-soports of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT – III

ENVIRONMENTAL POLLUTION : Definition, Cause, effects and control measures of :

a. Air Pollution.
b. Water pollution

c. Soil pollution
d. Marine pollution
e. Noise pollution
f. Thermal pollution
g. Nuclear hazards

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

UNIT – IV

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

UNIT – V

HUMAN POPULATION AND THE ENVIRONMENT : Population growth, variation among nations. Population explosion – Family Welfare Proggramme. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

FIELD WORK : Visit to a local area to document environmental assets River/forest grassland/hill/mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, birds – river, hill slopes, etc..

TEXT BOOKS :

(1) Text book of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission, Universities Press.
(2) Environmental Studies by Palaniswamy – Pearson education
(3) Environmental Studies by R.Rajagopalan, Oxford University Press.

REFERENCES :

(1) Textbook of Environmental Science by Deeksha Dave and E.Sai Baba Reddy, Cengage Pubilications.
(2) Text book of Environmental Sciences and Technology by M.Anji Reddy, BS Publication.
(3) Comprehensive Environmental studies by J.P.Sharma, Laxmi publications.
(4) Environmental sciences and engineering – J. Glynn Henry and Gary W. Heinke – Printice hall of India Private limited.
(5) Introduction to Environmental engineering and science by Gilbert M. Masters and Wendell P. Ela - Printice hall of India Private limited.

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COLLEGE OF ENGINEERING: ANANTAPUR

I Year B.Tech I Semester	**T**	**L**	**C**
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APPLIED PHYSICS

(Common to EEE, ECE, CSE)

UNIT 1: PHYSICAL OPTICS, LASERS AND FIBRE OPTICS

Physical Optics: Introduction - Interference in thin films by reflection – Newton's Rings – Fraunhofer diffraction due to single slit, double slit and diffraction grating.

Lasers: Introduction - Characteristics of laser – Spontaneous and stimulated emission of radiation –- Einstein's coefficients — Population inversion – Pumping mechanisms - Ruby laser - He-Ne laser – Applications of lasers.

Fibre optics: Introduction– Construction and working principle of optical fiber –Numerical aperture and acceptance angle – Types of optical fibers –Optical fiber communication system – Applications of optical fibers.

UNIT 2: CRYSTALLOGRAPHY AND QUANTUM MECHANICS

Crystallography: Introduction – Space lattice –Unit cell – Lattice parameters –Bravias lattice – Crystal systems – Packing fractions of SC, BCC and FCC -Directions and planes in crystals – Miller indices – Interplanar spacing in cubic crystals – X-ray diffraction - Bragg's law –Bragg's Spectrometer.

Quantum Mechanics: Introduction to matter waves – de'Broglie hypothesis - Schrodinger's time independent wave equation – Significance of wave function - Particle in a one dimensional infinite potential well.

UNIT 3: FREE ELECTRON THEORY AND SEMICONDUCTORS

Free electron theory: Classical free electron theory –- Sources of electrical resistance - Equation for electrical conductivity - Quantum free electron theory – Fermi-Dirac distribution –Kronig-Penny model(qualitative) – Origin of bands in solids – Classification of solids into conductors, semiconductors and insulators.

Semiconductor physics: Introduction – Intrinsic and extrinsic semiconductors – Drift & diffusion currents and Einstein's equation – Continuity equation -Hall Effect.

UNIT 4: DIELECTRICS AND MAGNETIC MATERIALS

Dielectrics: Introduction – Dielectric Polarization – Types of Polarization – Lorentz field – Clausius-
Mosotti equation – Dielectric strength, loss, breakdown.
Magnetic materials: Introduction and basic definitions – Origin of magnetic moment – Classification of magnetic materials into dia, para, ferro, antiferro and ferri magnetic materials – Hysteresis - Soft and hard magnetic materials – Applications of magnetic materials.

UNIT 5: **SUPERCONDUCTIVITY AND PHYSICS OF NANOMATERIALS**

Superconductivity: Introduction - Properties of superconductors – Meissner effect– Type I and type II superconductors – Flux quantization – London penetration depth – ac and dc Josephson effects – BCS theory(qualitative) - Applications of superconductors.

Physics of Nanomaterials: Introduction - Significance of nanoscale - Surface area and quantum confinement – Physical properties, optical, thermal, mechanical and magnetic properties – Synthesis of nanomaterials: ball milling, chemical vapour deposition, sol-gel – Carbon nanotubes & its properties.

Prescribed Text books:

1. Engineering physics – S. ManiNaidu, Pearson Education
2. Engineering Physics – P.K.Palanisamy, Scitech Publications

Reference Books:

1. Engineering Physics – V. Rajendran, K.Thyagarajan Tata MacGraw Hill Publishers
2. Engineering Physics – D K Pandey, S. Chaturvedi, Cengage Learning
3. Engineering Physics - Sanjay D. Jain, D. Sahasrambudhe and Girish University Press
4. Engineering Physics – M. Arumugam, Anuradha Publications
5. Engineering physics – M.N. Avadhanulu and P.G. KrshiSagar, Chand and Co
6. Nanomaterials – A.K.Bandopadhyaya, New Age Publishers
7. Carbon nanotubes and Graphene Device Physics – H.S. Philip Wong, Deji Akinwande, Cambridge University Press

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COLLEGE OF ENGINEERING: ANANTAPUR

I- Year B.Tech. I-Sem

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ENGINEERING GRAPHICS
(CIVIL, EEE, ECE, CSE & CHEMICAL)

Unit-I

Introduction to Engineering Drawing: Principles of Engineering Graphics and their significance Drawing Instruments and their Use – BIS Conventions in drawing and Lettering.

Curves used in practice:

a) Conic sections including the Rectangular Hyperbola
b) Cycloid, Epicycloid and Hypocycloid –Normals and Tangents
c) Involute of a circle –Normals and Tangents

Principles of orthographic projection, I and III angle projections –Conventions –Projections of points.

Unit –II

Projection of lines inclined to both planes –traces, Projection of plane figures inclined to both planes.

Unit –III

Projection of simple solids inclined to both planes.

Unit –IV

Sections and Developments: Sections and Sectional views of Regular solids –Prism, Cylinder, Pyramid, Cone – True shapes.

Unit –V

Isometric projections: Principles of pictorial representations-Isometric projection- Isometric scale-Isometric views- conventions- Isometric views of plane figures, solids-Isometric projection of objects with non isometric lines-Isometric projection of spherical parts.

TEXT BOOKS:

1. Engineering Drawing, N.D. Bhat, Charotar Publishers
2. Engineering Drawing, K.L. Narayana& P. Kannaih, Scitech Publishers, Chennai.

REFERENCES:

1. Engineering Drawing, Johle, Tata McGraw-Hill Publishers.
2. Engineering Drawing, Shah and Rana,2/e, Pearson Education
3. Engineering Drawing and Graphics, Venugopal/New age Publishers
4. Engineering Graphics, John&john.

Suggestions:

Student is expected to buy a book mentioned under 'Text books' for better understanding.
Student should prepare rough sketches for all the problems given at the end of each chapter to improve his / her imaginations. Student should also practice Auto CAD or any other drawing software to help understanding better.

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I- Year B.Tech. I-Sem	**T**	**P**	**C**
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APPLIED PHYSICS LABORATORY

Any EIGHT of the following experiments has to be performed during the SEMESTER

1. Determination of wavelengths of various colours of mercury spectrum using diffraction grating in normal incidence method.
2. Determination of dispersive power of the prism
3. Determination of thickness of thin object by wedge method.
4. Determination of radius of curvature of lens by Newton's rings.
5. Laser : Diffraction due to single slit
6. Laser : Diffraction due to double slit
7. Laser: Determination of wavelength using diffraction grating
8. Determination of Numerical aperture of an optical fiber.
9. Meldes experiment: Determination of the frequency of tuning fork
10. Sonometer: Verification of the three laws of stretched strings
11. Energy gap of a material using p-n junction diode
12. Electrical conductivity by four probe method
13. Determination of thermistor coefficients (α, β)
14. Hall effect : Determination of mobility of charge carriers in semiconductor
15. B-H curve
16. Magnetic field along the axis of a current carrying coil – Stewart and Gee's method.
17. Determination of lattice constant using X-ray spectrum.

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COLLEGE OF ENGINEERING:: ANANTAPUR

I Year B.Tech - I Semester

T	L	C
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ENGLISH LANGUAGE COMMUNICATION SKILLS (ELCS) LAB

The **Language Lab** focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations and contexts.

OBJECTIVES:

- To train students to use language effectively in everyday conversations, to participate in group discussions, to help them face interviews, and sharpen public speaking skills
- To expose the students to a varied blend of self-instructional learner-friendly modes of language learning through computer-aided multi-media instruction.
- To enable them to learn better pronunciation through stress on word accent, intonation, and rhythm.
- To help the second language learners to acquire fluency in spoken English and neutralize mother tongue influence
- To train students to use language appropriately for interviews, group discussion and public speaking

SYLLABUS:

UNIT- I

Phonetics – Introduction to Sounds of Speech – Vowels – Consonants – Phonetic Transcription & Orthographic Transcription

UNIT – II

Syllabification – Word Stress – Rules of word stress – Intonation – Falling tone and Rising tone

UNIT – III

Situational Dialogues – Role-play – Expressions in various situations – Self Introduction – Introducing others – Greetings – Apologies – Requests – Social and Professional etiquettes – Telephone Etiquettes

UNIT – IV

JAM – Describing object/person/place/situation – Giving directions

UNIT – V

Debates and Group Discussions

EXPECTED OUTCOMES :

- Becoming active participants in the learning process and acquiring proficiency in spoken English of the students
- Speaking with clarity and confidence thereby enhancing employability skills of the students

MINIMUM REQUIREMENT FOR ELCS LAB:

The English Language Lab shall have two parts:

1. Computer Assisted Language Learning (CALL) Lab:
   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.
2. The Communication Skills Lab with movable chairs and audio-visual aids with a P.A. system, Projector, a digital stereo-audio & video system and camcorder etc.

System Requirement (Hardware component):

Computer network with LAN with minimum 60 multimedia systems with the following specifications:

i) P – IV Processor
   a) Speed – 2.8 GHZ
   b) RAM – 512 MB Minimum
   c) Hard Disk – 80 GB
ii) Headphones of High quality

SUGGESTED SOFTWARE:

1. Clarity Pronunciation Power – Part I (Sky Pronunciation)
2. Clarity Pronunciation Power – part II
3. K-Van Advanced Communication Skills
4. TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
5. *DELTA's key to the Next Generation TOEFL Test: Advanced Skills Practice.*
6. Lingua TOEFL CBT Insider, by Dreamtech
7. English Pronunciation in Use (Elementary, Intermediate, Advanced) CUP
8. Cambridge Advanced Learners' English Dictionary with CD.

REFERENCE BOOKS:

1. **A Textbook of English Phonetics for Indian Students** 2nd Ed T. Balasubramanian. (Macmillian),2012.
2. **A Course in Phonetics and Spoken English**, Dhamija Sethi, Prentice-Hall of India Pvt.Ltd
3. **Speaking English Effectively**, 2nd Edition Krishna Mohan & NP Singh, 2011. (Mcmillan).
4. **A Hand book for English Laboratories**, E.Suresh kumar, P.Sreehari, Foundation Books,2011
5. **English Pronunciation in Use. Intermediate & Advanced** ,Hancock, M. 2009. CUP
6. **Basics of Communication in English** ,Soundararaj, Francis. 2012.. *New Delhi: Macmillan*
7. **Spoken English** (CIEFL) in 3 volumes with 6 cassettes, OUP.
8. **English Pronouncing Dictionary**, Daniel Jones Current Edition with CD.Cambridge, 17th edition, 2011

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COLLEGE OF ENGINEERING:: ANANTAPUR

I Year B.Tech - I Semester

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Engineering & IT Workshop
(Common to All Branches)

Part – A: Engineering Workshop Lab

1. TRADES FOR EXERCISES:

At least 2 exercises In each:

1. Carpentry
2. Fitting
3. House-wiring
4. Black Smithy
5. Tin smithy
6. Power Tools Demonstration

TEXT BOOK:

1. Work shop Manual / P.Kannaiah/ K.L.Narayana/ Scitech Publishers.

Objective : The objective of this subject is to provide the basic concepts about different manufacturing processes and use of various workshop tools the exposer to the Power tools used in the inclusion

Question Paper pattern : Test in any two out of 6 trades.

PART – B: IT Workshop

Course Objectives

- To provide Technical training to the students on Productivity tools like Word processors, Spreadsheets, Presentations
- To make the students know about the internal parts of a computer, assembling a computer from the parts, preparing a computer for use by installing the operating system
- Disassemble and Assemble a Personal Computer and prepare the computer ready to use
- Prepare the Documents using Word processors
- Prepare Slide presentations using the presentation tool
- Install single or dual operating systems on computer

Preparing your Computer (4 weeks)

Task 1: Identify the internal parts of a computer of a computer, and its peripherals. Represent the same in the form of diagrams including Block diagram.

Task 2: Disassemble and assemble the PC back to working condition. Students should be able to trouble shoot the computer and identify working and non-working parts. Student should identify the problem correctly by various methods available. Students should record the process of assembling and trouble shooting a computer.

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

Task 4: Students should record the various features that are supported by the operating system installed and submit it.

Productivity tools (3 weeks)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
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ANANTAPURAMU

Course Structure for B. Tech (Electrical and Electronics Engineering) (2013-14)

I YEAR - II SEMESTER

Sl.No.	Course Code	Subject	L	T	P	Credits
1	HS	English-II	3	1	0	3
2	BS	Mathematics – II	3	1	0	3
3	BS	Engineering Chemistry	3	1	0	3
4	ES	Electrical Circuits – I	3	1	0	3
5	PC	Electronic Devices & Circuits	3	1	0	3
6	ES	Computer Programming	3	1	0	3
7	BS	Engineering Chemistry Lab	0	0	3	2
8	ES	Computer Programming Lab	0	0	3	2
		NSS/NCC				
		Total	**18**	**6**	**6**	**22**

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I- Year B.Tech. II-Sem	**T**	**P**	**C**
	3	**0**	**3**

TECHNICAL COMMUNICATION & PRESENTATION SKILLS (Theory)

PREAMBLE:

In the increasingly globalized world, technical communication and presentation skills are assuming great importance. Industries and employers constantly complain that young engineers have adequate technical knowledge, but no communication and presentation skills. Success is defined these days in terms of possessing these skills. The syllabus has been designed to develop communicative competencies of the students.

OBJECTIVES:

1. To develop awareness in students of the relevance and importance of technical communication and presentation skills.
2. To prepare the students for placements
3. To provide students with interactive practice sessions to make them internalize these skills

OUTCOME

Turning out the students with a clear concept of communication and presentation skills, getting them ready for placements and equipping them with readiness to implement them at work place.

UNIT 1:

Basics of Technical Communication – Introduction – Objectives & Characteristics of Technical Communication – Importance and need for Technical communication - LSRW Skills – Barriers to effective communication

UNIT II

Informal and Formal Conversation - Verbal and Non-verbal communication –Kinesics, Proxemics, Chronemics, Haptics, Paralanguage

UNIT III

Written communication – Differences between spoken and written communication – Features of effective writing –Advantages and disadvantages of spoken and written communication

UNIT IV

Presentation Skills – Nature and importance of oral presentation – Defining the purpose – Analyzing the audience - Planning and preparing the presentation, organizing and rehearsing the presentation – Individual and group presentations - Handling stage fright

UNIT V

Interview Skills – The Interview process –Characteristics of the job interview – Pre-interview preparation techniques – Projecting the positive image – Answering Strategies

Prescribed Books

1. **Effective Technical Communication,** Ashrif Rizvi, TataMcGrahill, 2011
2. **Technical Communication** by Meenakshi Raman & Sangeeta Sharma, O U Press 2009

Reference Books

1. Communication Skills by Pushpalatha & Sanjay Kumar, Oxford Univsesity Press

2. Books on **TOEFL/GRE/GMAT/CAT/ IELTS** by Barron's/DELTA/Cambridge University Press.2012.

3. **Soft Skills for Everyone,** Butterfield Jeff, Cengage Publications, 2011.

4. **Management Shapers Series** by Universities Press (India) Pvt Ltd., Himayatnagar, Hyderabad 2008.

5. **Handbook for Technical Writing** by David A McMurrey & Joanne Buckely CENGAGE Learning 2008.

6.**English for Technical Communication for Engineering Students, Aysha Vishwamohan, Tata Mc Graw-Hill 2009.**

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COLLEGE OF ENGINEERING:: ANANTAPUR

I- Year B.Tech. II-Sem	**T**	**P**	**C**
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MATHEMATICS - II
(Common to All Branches)

Objectives:

- Our emphasis will be more on conceptual understanding and application of Fourier series, Fourier, Z and Laplace transforms and vector calculus.

UNIT – I

Fourier Series: Determination of Fourier coefficients – Fourier series – Even and odd functions – Fourier series in an arbitrary interval – Even and odd periodic continuation – Half-range Fourier sine and cosine expansions.

UNIT – II

Fourier integral theorem (only statement) – Fourier sine and cosine integrals. Fourier transform – Fourier sine and cosine transforms – Properties – Inverse transforms – Finite Fourier transforms.

UNIT – III

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

UNIT – IV

Laplace transform of standard functions – Inverse transform – First shifting Theorem, Transforms of derivatives and integrals – Unit step function – Second shifting theorem – Dirac's delta function – Convolution theorem – Laplace transform of Periodic function.

Differentiation and integration of transform – Application of Laplace transforms to ordinary differential equations of first and second order.

UNIT – V

Vector Calculus: Gradient – Divergence – Curl and their properties; Vector integration – Line integral - Potential function – Area – Surface and volume integrals. Vector integral theorems: Green's theorem – Stoke's and Gauss's Divergence Theorem (Without proof). Application of Green's, Stoke's and Gauss's Theorems.

TEXT BOOKS:

1. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers.
2. Engineering Mathematics, Volume - II, E. Rukmangadachari & E. Keshava Reddy, Pearson Publisher.

REFERENCES:

1. Engineering Mathematics, Volume - II, by G.S.S.Raju, CENGAGE publisher.
2. Mathematical Methods by T.K.V. Iyengar, B.Krishna Gandhi, S.Ranganatham and M.V.S.S.N.Prasad S. Chand publication.
3. Higher Engineering Mathematics, by B.V.Ramana, Mc Graw Hill publishers.
4. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India.

Outcomes:

- The student gains the knowledge to tackle the engineering problems using the concepts of Fourier series, various transforms and vector calculus.

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COLLEGE OF ENGINEERING ANANTAPUR

I Year B.Tech - II Semester **L T P C**
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APPLIED CHEMISTRY

(Common to EEE,ECE,CSE)

Knowledge in chemistry serves as basic nutrient for the understanding and thereby design of materials of importance in life. Thus the advancement in Engineering depends on the outcome of basic sciences. Many advances in engineering either produce a new chemical demand as in the case of polymers or wait upon chemical developments for their applications as in the case of implants and alloys. Currently the electronics and computer engineers are looking forward for suitable biopolymers and nano materials for use in miniature super computers, the electrical materials engineers are in search of proper conducting polymers, the mechanical engineers are on lookout for micro fluids and the civil engineers are looking for materials that are environmental friendly, economical but long lasting.

COURSE OBJECTIVES (CO):

- The Applied Chemistry course for undergraduate students is framed to strengthen the fundamentals of chemistry and then build an interface of theoretical concepts with their industrial/engineering applications.
- The main aim of the course is to impart in-depth knowledge of the subject and highlight the role of chemistry in the field of engineering.
- The lucid explanation of the topics will help students to understand the fundamental concepts and apply them to design engineering materials and solve problems related to them. An attempt has been made to logically correlate the topic with its application.
- The extension of fundamentals of electrochemistry to energy storage devices such as commercial batteries and fuel cells is one such example.
- After the completion of the course, the student would understand about the concepts of chemistry in respect of Electrochemical cells, fuel cells, mechanism of corrosion and factors to influence, polymers with their applications and engineering materials.

UNIT.1: ELECTROCHEMISTRY

i).Review of electrochemical cells, Numerical calculations, Batteries: Rechargeable batteries (Lead acid, Ni-Cd, Lithium Ion Batteries),Fuels cells: (Hydrogen-Oxygen and Methanol-Oxygen)

ii).Electrochemical sensors: Potentiometric Sensors and voltammetric sensors. Examples : analysis of Glucose and urea

iii).Corrosion: Electrochemical Theory of corrosion, Factors affecting the corrosion. Prevention: Anodic and cathodic protection and electro and electroless plating

UNIT.2: POLYMERS

i).Introduction to polymers, Polymerisation process, mechanism: cationic, anionic, free radical and coordination covalent.

Elastomers (rubbers), Natural Rubber; Compounding of Rubber

Synthetic Rubber: Preparation, properties and engineering applications of Buna-S, buna-N, Polyurethene, Polysulfide (Thiokol) rubbers

Plastomers: Thermosetting and Thermoplatics, Preparation, properties and Engineering applications , PVC, Bakelite, nylons.

ii).Conducting polymers: Mechanism, synthesis and applications of polyacetyline, polyaniline.

iii).Liquid Crystals: Introduction, classification and applications

iii).Inorganic Polymers: Basic Introduction, Silicones, Polyphospazins (-(R)2-P=N-) applications

UNIT.3: FUEL TECHNOLOGY

i).Classifications of Fuels – Characteristics of Fuels- Calorific Value – Units, Numerical Problems.

Solid Fuels–Coal, Coke : Manufacture of Metallurgical Coke by Otto Hoffmann's by product oven processes.

ii).Liquid Fuels:

Petroleum: Refining of Petroleum, Gasoline: Octane Number, Synthetic Petrol: Bergius Processes, Fischer Troph's synthesis

Power Alcohol: Manufacture, Advantages and Disadvantages of Power Alcohol

iii). Gaseous Fuels: Origin, Production and uses of Natural gas, Producer gas, Water gas, Coal gas and Biogas.

iv). Nuclear Fuels: Controlled and uncontrolled reactions. Breeder reactor and Power reactors.

UNIT.4: CHEMISTRY OF ENGINEERING MATERIALS

i).Electrical Insulators or Dielectric materials: Definition and classification, Characteristics of electrical insulators. Applications of electrical insulating materials (Gaseous, liquid and solid insulators)

iii).Semiconducting and Super Conducting materials-Principles and some examples

iii).Magnetic materials – Principles and some examples

UNIT.5: PHOTOCHEMISTRY & COMPOSITE MATERIALS

i). Photochemical Reactions, Difference between Photochemical reactions and thermo chemical reactions. Absorption of light: Beer-Lambert's law . Photo-physical Processes: a) Fluorescence, (b) Phosphorescence and (c) Chemi-luminiscence and their applications

ii). Composite Materials: Classification of Composites materials, Constituents of Composite materials. Disperse Phase composite materials Ex. a) Glass fibre reinforced polymer composite and b) Carbon fibre reinforced polymer composite materials. Advantages and applications of Composites.

EXPECTED OUTCOMES (EO): The student is expected to:

- Understand the electrochemical sources of energy
- Understand industrially based polymers, various engineering materials.
- Differentiation and uses of different kinds of Photochemical reactions.

Text Books:

1. Engineering Chemistry by KNJayaveera, GVSubba Reddy and C. Ramachandraiah, McGraw Hill Higher Education, Foruth Edition, New Delhi
2. A Text book of Engineering Chemistry by SS Dhara, S. Chand Publications, New Delhi

References:

1. A Text Book of Enigneering Chemistry, Jain and Jain, Dhanapathi Rai Publications, New Delhi
2. Engineering Chemistry by K.B.Chandra Sekhar, UN.Das and Sujatha Mishra, SCITECH Pubblications India Pvt Limited.
3. Concepts of Engineering Chemistry- Ashima Srivastavaf and N.N. Janhavi
4. Text Book of Engineering Chemistry – C. Parameswara Murthy, C.V.Agarwal and Andra Naidu
5. Chemistry of Engineering Materials, C.V.Agarwal, C.Parameswaramurthy and Andranaidu
6. Text Book of Engineering Chemistry, Shashichawla, Dhanapathirai Publications.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, ANANTAPUR
COLLEGE OF ENGINEERING (AUTONOMOUS):: ANANTAPURAMU

I YEAR B. Tech EEE II SEM	**T**	**P**	**C**
	3+1	**0**	**3**

ELECTRICAL CIRCUITS - I

Course objective:
This course introduces the basic concepts of circuit analysis which is the foundation for all subjects of the Electrical Engineering discipline. The emphasis of this course is laid on the basic analysis of circuits which includes Circuit concepts, magnetic circuits, Single and Three Phase Circuits etc.

UNIT- 1 INTRODUCTION TO ELECTRICAL & MAGNETIC CIRCUITS

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. Examples

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, MMF Calculations

UNIT- II SINGLE PHASE A.C CIRCUITS

R.M.S, Average Values and Form Factor for Different Periodic Wave Forms – Sinusoidal Alternating Quantities – Phase and Phase Difference – Complex and Polar Forms Of Representations, J-Notation, Steady State Analysis of R, L And C (In Series, Parallel and Series Parallel Combinations) With Sinusoidal Excitation- Concept of Power Factor-Concept of Reactance, Impedance, Susceptance and Admittance-Real and Reactive Power, Complex Power. Examples.

UNIT- III THREE PHASE A.C CIRCUITS

Phase Sequence- Star and Delta Connection-Relation Between Line and Phase Voltages and Currents in Balanced Systems-Analysis of Balanced Three Phase Circuits- Measurement of Active and Reactive Power in Balanced and Unbalanced Three Phase Systems. Analysis of Three Phase Unbalanced Circuits-Loop Method- Application of Millman's Theorem- Star Delta Transformation Technique – Two Wattmeter Method of Measurement of Three Phase Power.

UNIT- IV LOCUS DIAGRAMS & NETWORK TOPOLOGY

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

Definitions – Graph – Tree, Basic Cutset and Basic Tieset Matrices for Planar Networks – Loop and Nodal Methods of Analysis of Networks with Dependent & Independent Voltage and Current Sources – Duality & Dual Networks. Nodal Analysis, Mesh Analysis, Super Node and Super Mesh for D.C Excitations.

OUTCOME:

After going through this course the student gets a thorough knowledge on basics of circuit concepts, electrical parameters, single phase AC circuits, magnetic circuits , resonance, locus diagrams, network topology with which he/she can able to apply the above conceptual things to real-world problems and applications.

TEXT BOOKS:

1. Network Analysis by M.E Van Valkenberg, Prentice Hall (India), 3rd Edition.
2. Circuit Theory (Analysis & Synthesis) by A. Chakrabarti, Dhanpat Rai & Sons
3. Electric Circuits- Schuam Series

REFERENCE BOOKS:

1. Circuits & Networks by A. Sudhakar and Shyammohan S Palli, Tata McGraw- Hill
2. Electric Circuits by N.Sreenivasulu, REEM Publications
3. Engineering circuit analysis by William Hayt and Jack E. Kemmerly, Mc Graw Hill Company, 6th edition.
4. Electrical Circuit Theory and Technology by John Bird, Routledge, Taylor & Fransis

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I YEAR B. Tech EEE II SEM	**T**	**P**	**C**
	3+1	**0**	**3**

ELECTRONIC DEVICES AND CIRCUITS

Course Objectives:
To give understanding on semiconductor physics of the intrinsic, p and n materials, characteristics of the p-n junction diode, diode's application in electronic circuits, Characteristics of BJT,FET,MOSFET, characteristics of special purpose electronic devices. To familiarize students with dc biasing circuits of BJT, FET and analyzing basic transistor amplifier circuits.

Course Outcomes:
Upon completion of the course, students will:

- Analyze the operating principles of major electronic devices, its characteristics and applications.
- Design and analyze the DC bias circuitry of BJT and FET.
- Design and analyze basic transistor amplifier circuits using BJT and FET.

UNIT- I

Junction Diode Characteristics : Open circuited p-n junction, Biased p-n junction, p-n junction diode, current components in PN junction Diode, diode equation, V-I Characteristics, temperature dependence on V-I characteristics, Diode resistance, Diode capacitance, energy band diagram of PN junction Diode.

Special Semiconductor Diodes: Zener Diode, Breakdown mechanisms, Zener diode applications, LED, LCD, Photo diode, Varactor diode, Tunnel Diode, DIAC, TRIAC, SCR, UJT. Construction, operation and characteristics of all the diodes is required to be considered.

UNIT- II

Rectifiers and Filters: Basic Rectifier setup**,** half wave rectifier, full wave rectifier, bridge rectifier, derivations of characteristics of rectifiers, rectifier circuits-operation, input and output waveforms, Filters, Inductor filter, Capacitor filter, L- section filter, Π- section filter, Multiple L-section and Multiple Π section filter ,comparison of various filter circuits in terms of ripple factors.

UNIT- III

Transistor Characteristics:

BJT: Junction transistor, transistor current components, transistor equation, transistor configurations, transistor as an amplifier, characteristics of transistor in Common Base, Common Emitter and Common Collector configurations, Ebers-Moll model of a transistor, punch through/ reach through, Photo transistor, typical transistor junction voltage values.

FET: FET types, construction, operation, characteristics, parameters, MOSFET-types, construction, operation, characteristics, comparison between JFET and MOSFET.

UNIT- IV

Transistor Biasing and Thermal Stabilization : Need for biasing, operating point, load line analysis, BJT biasing- methods, basic stability, fixed bias, collector to base bias, self bias, Stabilization against variations in V_{BE}, Ic, and β, Stability factors, (S, $S^{'}$, $S^{''}$), Bias compensation, Thermal runaway, Thermal stability.

FET Biasing- methods and stabilization.

UNIT- V

Small Signal Low Frequency Transistor Amplifier Models:

BJT: Two port network, Transistor hybrid model, determination of h-parameters, conversion of h-parameters, generalized analysis of transistor amplifier model using h-parameters, Analysis of CB, CE and CC amplifiers using exact and approximate analysis, Comparison of transistor amplifiers.

FET: Generalized analysis of small signal model, Analysis of CG, CS and CD amplifiers, comparison of FET amplifiers.

TEXT BOOKS:

J. Millman, C. Halkias, "Electronic Devices and Circuits", Tata Mc-Graw Hill, Second Edition,2010.

1. David A.Bell, "Electronic Devices and Circuits", Fifth Edition, Oxford University Press, 2009.
2. Salivahanan, Kumar, Vallavaraj, "Electronic Devices and Circuits", Tata Mc-Graw Hill, Second Edition

REFERENCES:

1. Jacob Millman, C. Halkies, C.D.Parikh, "Integrated Electronics", Tata Mc-Graw Hill, 2009.
2. R.L. Boylestad and Louis Nashelsky, "Electronic Devices and Circuits", Pearson Publications,,9thEdition,2006.
3. BV Rao, KBR Murty, K Raja Rajeswari, PCR Pantulu, "Electronic Devices and Circuits", Pearson, 2nd edition.

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COLLEGE OF ENGINEERING:: ANANTAPUR

I- Year B.Tech. II-Sem	**T**	**P**	**C**
	4	**0**	**3**

COMPUTER PROGRAMMING
(Common to All Branches)

Course Objective

- To understand the core aspects of computer problem solving techniques
- To understand the programming language constructs
- To understand the programming paradigms
- To understand the compound data types
- To understand dynamic memory allocation concepts

Course Outcomes

- Able to design the flowchart and algorithm for real world problems
- Able to learn and understand new programming languages
- Able to construct modular and readable programs
- Able to write C programs for real world problems using simple and compound data types
- Adapt programming experience and language knowledge to other programming language contexts
- Employee good programming style, standards and practices during program development

Unit - I :

Introduction to Computers: Computer Systems, Computing Environment, Computer Languages, Creating and Running Programs, System Developments.

Introduction to the C Language: Introduction, C programs, Identifiers, Types, Variables, Constants, Input and Output, Programming Examples.

Introduction to Computer Problem Solving: Introduction , The Problem-Solving Aspect, Top-down Design, Bottom - up Approach, Flowcharts, Implementation of Algorithms, Program Verification, The Efficiency of Algorithms, The Analysis of Algorithms.

Unit – II:

Structure of C program: Expressions, Precedence and Associatively, Evaluating Expressions, Type Conversion, Statements, Sample Programs.

Selections and Making Decisions: Logical Data and Operators, Two way Selection, Multiway Selection.

Repetition: Concept of Loop, Pretest and Posttest Loops, Initialization and Updation, Event and Counter Controller Loop, Loops in C, Looping Applications.

Fundamental Algorithms: Exchanging the values between two variables, Counting, Summation of a set numbers, Factorial Computation, Sine Function Computation, Generation of the Fibonacci Sequence, Reversing the digits of a integer, Basic conversions, Character to Number Conversion

Unit – III :

Factoring Methods: Finding Square root of a Number, The Smallest Deviser of an Integer, The GCD of two Integers, Generating Prime Numbers, Computing Prime Factor of an Integer, Computing the prime factors of an Integer, Generation of Pseudo Random Number, Raising the number to Large Power, Computing the n^{th} Fibonacci.

Functions: Introduction, User Defined Functions, Inter Function Communication, Standard Functions, Scope, Programming Examples.

Array Techniques: Array Order Reversal, Array Counting, Finding the Maximum Number Set, Removal Duplicates from an Ordered Array, Partitioning an Array, Finding k^{th} smallest Element, Longest Monotone Subsequence.

Arrays: Introduction, Two Dimensional Arrays, Multi Dimensional Arrays, Inter Function Communication, Array Applications, Exchange Sort, Binary Search, Linear Search.

Unit – IV :

Strings: String Concepts, C Strings, Sting Input/Output Functions, Arrays of Strings, String Manipulation Functions, String/Data Conversion.

Enumerated, Structure, and Union Types: The Type Definition, Enumerated Types, Structure, Unions, Programming Applications.

Bitwise Operators: Exact Size Integer Types, Logical Bitwise Operators, Shift Operators, Mask.

Unit – V :

Pointers: Introduction, Pointers for Inter Function Communication, Pointers to Pointers, Compatibility, Lvalue and Rvalue.

Pointer Applications: Array and Pointers, Pointer Arithmetic and Arrays, Passing an Array to a Function, Memory Allocation Functions, Array of Pointers, Programming Applications.

Binary Input/output: Text Versus Binary Streams, Standard Library Functions for Files, Converting File Type.

Text Books :

1. How to Solve it by Computer by R.G. Dromey, Pearson
2. Computer Science, A Structured Programming Approach Using C by Behrouz A. Forouzan & Richard F. Gilberg, Third Edition, Cengage Learning

Reference Books :

1. Programming in C: A Practical Approach, Ajay Mittal, Pearson.
2. The C programming Language, B. W. Kernighan and Dennis M. Ritchi, Pearson Education.
3. Problem Solving and Programming Designs in C, J. R. Hanly and E.B. Koffman.,
4. Programming with C Rema Theraja, Oxford
5. Problem Solving with C, M.T.Somashekara, PHI
6. C Programming with problem solving, J.A. Jones & K. Harrow,Dreamtech Press

Programming with C, R.S.Bickar, Universities Press.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
COLLEGE OF ENGINEERING: ANANTAPUR

I Year B.Tech II Semester	**T**	**P**	**C**
	0	**3**	**2**

COMPUTER PROGRAMMING LAB
(Common to Civil, EEE, ME, CSE, Chemical)

Week-1

1) Write an algorithm and draw a flowchart to make the following exchange between the variables a-> b -> c->d - > a
2) Write an algorithm and draw a flowchart to generate the first n terms of the sequence.
   A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence.
3) Write a algorithm and draw a flowchart to carry out the arithmetic operations addition, subtraction, multiplication, and division between two variables
4) Write a algorithm and draw a flowchart for printing prime numbers between 1 and n.

Week-2

1) Write a C program to construct a multiplication table for a given number.
2) Write a program to reverse the digit of a given integer.
1) Write a C program to calculate the factorial of a given number

Week-3

Write a program to calculate tax, given the following conditions:

a) If income is less than 1,50,000 then no tax.
b) If taxable income is in the range 1,50,001 – 300,000 then charge 10% tax
c) If taxable income is in the range 3,00,001 – 500,000 then charge 20% tax
d) If taxable income is above 5,00,001 then charge 30% tax

Week-4

1) Write a program to print the calendar for a month given the first Week- day of the month.

   Input the first day of the month (Sun=0,Mon=1,Tue=2,Wed=3,.....) :: 3

   Total number of days in the month : 31

   Expected output

Sun	*Mon*	*Tue*	*Wed*	*Thu*	*Fri*	*Sat*
-	*-*	*-*	*1*	*2*	*3*	*4*
5	*6*	*7*	*8*	*9*	*10*	*11*
12	*13*	*14*	*15*	*16*	*17*	*18*
19	*20*	*21*	*22*	*23*	*24*	*25*
25	*26*	*27*	*28*	*29*	*30*	*31*

Week-5

1) Write a program to print the Pascal triangle for a given number
2) Write a program to calculate the following expression for given x value

$$f(x) = a_0 + \sum_{n=1}^{\infty} \left(a_n \cos \frac{n\pi x}{L} + b_n \sin \frac{n\pi x}{L} \right)$$

Week-6

1) Write C code to define a function cash_dispense, which takes an amount as its input, and returns the number of 1000, 500, 100, 50, 20, 10, 5, 2, 1 rupee denomination that make up the given amount.
2) Write C code to reverse the contents of the array. For example, [1,2,3,4,5] should become [5,4,3,2,1]
3) Write a program that will search and find out the position where the given key element exist in a user chosen array and print it as output.

Week-7

1) Write C code to compute the frequency table of survey responses given by 20 users. The survey responses range from 1 to 5 and are stored in an array. For example, 10 responses are stored in the array [1,1,5,2,3,3,5,5,2,2]. The frequency table will be as shown below:
    a. 1 = 2
    b. 2 = 3
    c. 3 = 2
    d. 4 = 0
    e. 5 = 3
2) Write a program to define a function to sort an array of integers in ascending order by using exchange sort.

Week-8

1) Write a C program to check whether a given string is a palindrome or not, without using any built-in functions
2) Write a function that accepts a string and delete the first character.
3) Write a function that accepts a string and delete all the leading spaces.

Week-9

Write a program to accept a string from user and display number of vowels, consonants, digits and special characters present in each of the words of the given string.

Week-10

1) Write a C program to define a union and structure both having exactly the same numbers using the sizeof operators print the sizeof structure variables as well as union variable
2) Declare a structure *time* that has three fields *hr, min, secs.* Create two variables, *start_time* and *end_time.* Input there values from the user. Then while *start_time* is not equal to *end_time* display GOOD DAY on screen.

Week-11

1) Write a program to read in an array of names and to sort them in alphabetical order. Use sort function that receives pointers to the functions strcmp, and swap, sort in turn should call these functions via the pointers.
2) Write a program to read and display values of an integer array. Allocate space dynamically for the array using the *malloc().*
3) Write a program to calculate area of a triangle using function that has the input parameters as pointers as sides of the triangle.

Week-12

1) Two text files are given with the names text1 and text2. These files have several lines of text. Write a program to merge (first line of text1 followed by first line of text2 and so on

until both the files reach the end of the file) the lines of text1 and text2 and write the merged text to a new file text3.

2) Write a program to split a given text file into n parts. Name each part as the name of the original file followed by .part<**n**> where n is the sequence number of the part file.

Reference Books:

1. Computer Science, A Structured Programming Approach Using C by Behrouz A. Forouzan & Richard F. Gilberg, Third Edition, Cengage Learning
2. C Programming A Problem-Solving Approach, Behrouz A. Forouzan & E.V. Prasad, F. Gilberg, Third Edition, Cengage Learning
3. Programming with C Rema Theraja, Oxford
4. "C Test Your Skills", Kamthane, Pearson Education
5. Programming in C: A Practical Approach, Ajay Mittal, Pearson
6. Problem solving with C, M.T.Somasekhara, PHI
7. C Programming with problem solving, J.A. Jones & K. Harrow,Dreamtech Press

Programming withc, Byron S Gottfried, Jitender Kumar Chhabra, TMH, 2011

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
COLLEGE OF ENGINEERING: ANANTAPUR

I- Year B.Tech. I-Sem

T	P	C
3	0	3

ENGINEERING CHEMISTRY LAB

The experiments are designed in a manner that the students can validate their own theory understanding in chemistry by self involvement and practical execution. Thus the execution of these experiments by the student will reinforce his/her understanding of the subject and also provide opportunity to refine their understanding of conceptual aspects. As a result, the student gets an opportunity to have feel good factor at the laboratory bench about the chemical principles that he/she learned in the classroom.

Programme Objective:

- Will learn practical understanding of the redox reaction
- Will able to understand the function of fuel cells, batteries and extend the knowledge to the processes of corrosion and its prevention
- Will learn the preparation and properties of synthetic polymers and other material that would provide sufficient impetus to engineer these to suit diverse applications
- Will also learn the hygiene aspects of water would be in a position to design methods to produce potable water using modern technology

LIST OF EXPERIMENTS

1. Determination of total hardness of water by EDTA method.
2. Determination of Copper by EDTA method.
3. Estimation of Dissolved Oxygen by Winkler's method
4. Determination of Copper by Iodometry
5. Estimation of iron (II) using diphenylamine indicator (Dichrometry – Internal indicator method).
6. Determination of Alkalinity of Water
7. Determination of acidity of Water
8. Preparation of Phenol-Formaldehyde (Bakelite)
9. Determination of Viscosity of oils using Redwood Viscometer I
10. Determination of Viscosity of oils using Redwood Viscometer II
11. Conductometric titration of strong acid Vs strong base (Neutralization titration).
12. Conductometric titration of Barium Chloride vs Sodium Sulphate (Precipitation Titration)

13. Determination of Corrosion rate and inhibition efficiency of an inhibitor for mild steel in hydrochloric acid medium.
14. Estimation of Chloride ion using potassium Chromite indicator (Mohrs method)

(Any 10 experiments from the above list)

Course Outcomes:

- Would be confident in handling energy storage systems and would be able combat chemical corrosion
- Would have acquired the practical skill to handle the analytical methods with confidence.
- Would feel comfortable to think of design materials with the requisite properties
- Would be in a postion to technically address the water related problems.

TEXT BOOKS:

1. Vogel's Text book of Quantitative Chemical Analysis, Sixth Edition – J. Mendham et al, Pearson Education.
2. Chemistry Practical – Lab Manual by Chandra Sekhar, GV Subba Reddy and Jayaveera.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
ANANTAPUR COLLEGE OF ENGINEERING (Autonomous),
ANANTAPURAMU

Course Structure for B. Tech (Electrical and Electronics Engineering) (2013-14)

II B. Tech (EEE) – I Sem

Sl.No	Course Code	Subject	L	T	P	Credits
1	BS	Mathematics - III	**3**	**1**	**0**	3
2	PC	Electrical Circuits - II	3	1	0	3
3	PC	Electrical Machines - I	3	1	0	3
4	PC	Control Systems Engineering	3	1	0	3
5	HS	Managerial Economics and Financial Analysis	3	1	0	3
6	ES	Applied Engineering	3	1	0	3
7	PC	Electric Circuits and Simulation Lab	0	0	3	2
8	ES	Electronic Devices & Circuits Lab	0	0	3	2
		Total	18	6	6	22

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
COLLEGE OF ENGINEERING: ANANTAPUR

II Year B.Tech. I-Sem	**T**	**P**	**C**
3	**0**	**3**

MATHEMATICAL METHODS
(Common to All Branches)

Objectives:

- This course aims at providing the student with the concepts of Matrices, Numerical Techniques and Curve fitting.

UNIT – I

Elementary row transformations-Rank – Echelon form, normal form – Consistency of System of Linear equations. Linear transformations. Hermitian, Skew-Hermitian and Unitary matrices and their properties. Eigen Values, Eigen vectors for both real and complex matrices. Cayley – Hamilton Theorem and its applications – Diagonolization of matrix. Calculation of powers of matrix. Quadratic forms – Reduction of quadratic form to canonical form and their nature.

UNIT – II

Solution of Algebraic and Transcendental Equations: The Bisection Method – The Method of False Position– Newton-Raphson Method.

UNIT – III

Interpolation: Newton's forward and backward interpolation formulae – Lagrange's formulae. Gauss forward and backward formula, Stirling's formula, Bessel's formula,

UNIT – IV

Curve fitting: Fitting of a straight line – Second degree curve – Exponentional curve-Power curve by method of least squares. Numerical Differentiation and Integration – Trapezoidal rule – Simpson's 1/3 Rule – Simpson's 3/8 Rule.

UNIT – V

Numerical solution of Ordinary Differential equations: Solution by Taylor's series-Picard's Method of successive Approximations-Euler's Method-Runge-Kutta Methods – Predictor-Corrector Method – Milne's Method. Numerical solutions of Laplace equation using finite difference approximation.

TEXT BOOKS:

3. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers.
4. Introductory Methods of Numerical Analysis, S.S. Sastry, PHI publisher.
5.

REFERENCES:

3. Engineering Mathematics, Volume - II, E. Rukmangadachari & E. Keshava Reddy, Pearson Publisher.
4. Engineering Mathematics, Volume - II, by G.S.S.Raju, CENGAGE publisher.
5. Mathematical Methods by T.K.V. Iyengar, B.Krishna Gandhi, S.Ranganatham and M.V.S.S.N.Prasad, S. Chand publication.
4. Higher Engineering Mathematics, by B.V.Ramana, Mc Graw Hill publishers.
5. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India.

Outcomes:

The student will be able to analyze engineering problems using the concepts of Matrices and Numerical methods.

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II YEAR B. Tech EEE I SEM	**T**	**P**	**C**
	3+1	**0**	**3**

ELECTRICAL CIRCUITS- II

Course objective:
This course introduces the basic concepts of circuit analysis which is the foundation for all subjects of the Electrical Engineering discipline. The emphasis of this course is laid on the basic analysis of circuits which includes theorems, Transient analysis and Fourier analysis etc.

UNIT- I NETWORK THEOREMS
Thevenin's, Norton's, Maximum Power Transfer and Millman's Theorems for D.C and Sinusoidal Excitations. Tellegen's, Superposition, Reciprocity and Compensation Theorems for D.C And Sinusoidal Excitations.

UNIT- II TWO PORT NETWORKS
Two Port Network Parameters – Impedance, Admittance, Transmission and Hybrid Parameters and Their Relations. Concept of Transformed Network - Two Port Network Parameters Using Transformed Variables.

UNIT- III TRANSIENT ANALYSIS
D.C Transient Analysis: Transient Response of R-L, R-C, R-L-C Series Circuits for D.C Excitation-Initial Conditions-Solution Method Using Differential Equation and Laplace Transforms, Response of R-L & R-C Networks to Pulse Excitation.
A.C Transient Analysis: Transient Response of R-L, R-C, R-L-C Series Circuits for Sinusoidal Excitations-Initial Conditions-Solution Method Using Differential Equations and Laplace Transforms

UNIT- IV FOURIER TRANSFORMS

Fourier Theorem- Trigonometric Form and Exponential Form of Fourier Series – Conditions of Symmetry- Line Spectra and Phase Angle Spectra- Analysis of Electrical Circuits to Non Sinusoidal Periodic Waveforms. Fourier Integrals and Fourier Transforms – Properties of Fourier Transforms and Application to Electrical Circuits.

UNIT V: FILTERS & PSPICE FOR CIRCUITS

Filters – Low Pass – High Pass and Band Pass – RC, RL filters – Constant K and M – derived filters and composite filters design – Attenuators – Principle of Equalizers – Series and Shunt Equalizers – L Type, T type and Bridged – T and Lattice Equalizers.
SPICE for Circuit Analysis – Description of Circuit elements, nodes and sources, Input and Output variables – Modelling of the above elements – Types of DC analysis.

OUTCOME:

After going through this course the student gets a thorough knowledge on basics of Network theorems, Two port networks, Transient analysis, Fourier transforms and Filters with which he/she can able to apply the above conceptual things to real-world problems and applications.

TEXT BOOKS:

1. Network Analysis by M.E Van Valkenberg, Prentice Hall (India), 3rd Edition.
2. Circuit Theory (Analysis & Synthesis) by A. Chakrabarti, Dhanpat Rai & Sons
3. Electric Circuits- Schuam Series

REFERENCE BOOKS:

1. Circuits & Networks by A. Sudhakar and Shyammohan S Palli, Tata McGraw- Hill
2. Electric Circuits by N.Sreenivasulu, REEM Publications
3. Engineering circuit analysis by William Hayt and Jack E. Kemmerly, Mc Graw Hill Company, 6th edition.
4. Electrical Circuit Theory and Technology by John Bird, Routledge, Taylor & Fransis

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COLLEGE OF ENGINEERING (AUTONOMOUS):: ANANTAPURAMU

II YEAR I SEM B. Tech EEE	**T**	**P**	**C**
	3+1	**0**	**3**

ELECTRICAL MACHINES - I

Objective:
Electrical machines course is one of the important courses of the Electrical discipline. In this course the different types of DC generators and Motors which are widely used in industry are covered and their performance aspects will be studied.

UNIT – I PRINCIPLES OF ELECTROMECHANICAL ENERGY CONVERSION

Electromechanical Energy Conversion – Forces and Torque In Magnetic Field Systems – Energy Balance – Energy and Force in A Singly Excited Magnetic Field System, Determination of Magnetic Force - Co-Energy – Multi Excited Magnetic Field Systems.

UNIT – II D.C. GENERATORS -I

D.C. Generators – Principle of Operation – Constructional Features – Armature Windings – Lap and Wave Windings – Simplex and Multiplex Windings – Use of Laminated Armature – E. M.F Equation– Numerical Problems – Parallel Paths-Armature Reaction – Cross Magnetizing and De-Magnetizing AT/Pole – Compensating Winding – Commutation – Reactance Voltage – Methods of Improving Commutation.

UNIT–III D.C GENERATORS – II

Methods of Excitation – Separately Excited and Self Excited Generators – Build-Up of E.M.F - Critical Field Resistance and Critical Speed - Causes for Failure to Self Excite and Remedial Measures-Load Characteristics of Shunt, Series and Compound Generators – Parallel Operation of D.C Series Generators – Use of Equalizer Bar and Cross Connection of Field Windings – Load Sharing.

UNIT – IV D.C. MOTORS

D.C Motors – Principle of Operation – Back E.M.F. – Circuit Model – Torque Equation – Characteristics and Application of Shunt, Series and Compound Motors – Armature Reaction and Commutation.
Speed Control of D.C. Motors: Armature Voltage and Field Flux Control Methods. Ward-Leonard System–Braking of D.C Motors – Permanent Magnet D.C Motor (PMDC).
Motor Starters (3 Point and 4 Point Starters) – Protective Devices-Calculation of Starters Steps for D.C Shunt Motors.

UNIT – V TESTING OF DC MACHINES

Losses – Constant & Variable Losses – Calculation of Efficiency – Condition for Maximum Efficiency.

Methods of Testing – Direct, Indirect – Brake Test – Swinburne's Test – Hopkinson's Test – Field's Test – Retardation Test in a D.C. Motor Test

OUTCOME:

After going through this course the student gets a thorough knowledge on electromechanical energy conversion, construction operation characteristics, construction and operation of different types of DC Generators and motors, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

TEXT BOOKS:

1. Electric Machines by I.J. Nagrath & D.P. Kothari, Tata Mc Graw – Hill Publishers, 3rd Edition, 2004.
2. Electrical Machinery Fundamentals by Stephen J Chapman, Mc Graw Hills, 2005.

REFERENCE BOOKS:

1. Performance and Design of D.C Machines – by Clayton & Hancock, BPB Publishers, 2004.
2. Electrical Machines -S.K. Battacharya, TMH Edn Pvt. Ltd., 3rd Edition, 2009.
3. Electric Machinary – A. E. Fritzgerald, C. Kingsley and S. Umans, Mc Graw-Hill Companies, 5th Editon, 2003.
4. Electrical Machines – M.V Deshpande, Wheeler Publishing, 2004.
5. Electrical Machines – P.S. Bimbhra., Khanna Publishers, 2011.
6. Electromechanics – I - Kamakshaiah S., Overseas Publishers Pvt. Ltd, 3rd Edition, 2004.

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II YEAR I SEM B. Tech EEE	**T**	**P**	**C**
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CONTROL SYSTEMS ENGINEERING

Objective:

In this course it is aimed to introduce to the students the principles and applications of control systems in everyday life. The basic concepts of block diagram reduction, time domain analysis solutions to time invariant systems and also deals with the different aspects of stability analysis of systems in frequency domain and time domain.

UNIT – I CONTROL SYSTEMS CONCEPTS

Open Loop and closed loop control systems and their differences- Examples of control systems- Classification of control systems, Feedback Characteristics, Effects of positive and negative feedback. Mathematical models – Differential equations of Translational and Rotational mechanical systems, and Electrical Systems, Block diagram reduction methods – Signal flow graph - Reduction using Mason's gain formula. Transfer Function of DC Servo motor - AC Servo motor - Synchro transmitter and Receiver

UNIT-II TIME RESPONSE ANALYSIS

Step Response - Impulse Response - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants – Effects of proportional, integral, derivative Controllers, Design of P, PD, PI, PID Controllers.

UNIT – III STABILITY ANALYSIS IN FREQUENCY DOMAIN

The concept of stability – Routh's stability criterion – Stability and conditional stability – limitations of Routh's stability. The root locus concept - construction of root loci-effects of adding poles and zeros to G(s)H(s) on the root loci.

UNIT – IV FREQUENCY RESPONSE ANALYSIS

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

Compensation techniques – Lag, Lead, Lead-Lag Compensators design in frequency Domain.

UNIT – V STATE SPACE ANALYSIS OF CONTINUOUS SYSTEMS

Concepts of state, state variables and state model, derivation of state models from Schematic models, differential equations, Transfer function, block diagrams, Diagonalization- Solving the Time invariant state Equations- State Transition Matrix and it's Properties. System response through State Space models.

OUTCOME:

After going through this course the student gets a thorough knowledge on open loop and closed loop control systems , concept of feedback in control systems, mathematical modeling and transfer function derivations of translational and rotational systems, Transfer functions of Synchros, AC and DC servo motors, Transfer function representation through block diagram algebra and signal flow graphs, time response analysis of different ordered systems through their characteristic equation and time-domain specifications , stability analysis of control systems in S-domain through R-H criteria and root-locus techniques, frequency response analysis through bode diagrams and State space analysis with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

TEXT BOOKS:

1. Modern Control Engineering – by Katsuhiko Ogata – Prentice Hall of India Pvt. Ltd., 5th edition, 2010.
2. Control Systems Engineering – by I. J. Nagrath and M. Gopal, New Age International (P) Limited, Publishers, 5th edition, 2007.

REFERENCE BOOKS:

1. Control Systems Engineering - by NISE 5th Edition – John wiley & sons, 2010.
2. Control Systems – by – A. Nagoor Kani- First Edition RBA Publications, 2006.
3. Automatic Control Systems– by B. C. Kuo and Farid Golnaraghi – John wiley and son's, 8th edition, 2003.

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MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS

Course Objective: The objectives of this course are to equip the student with the basic inputs of Managerial Economics and Economic Environment of business and to enrich analytical skills in helping them take sound financial decisions for achieving higher productivity.

Unit I: INTRODUCTION TO MANAGERIAL ECONOMICS

Managerial Economics - Definition, nature and scope – contemporary importance of Managerial Economics - Demand Analysis: Determinants- Law of Demand - Elasticity of Demand. Significance – types – measurement of elasticity of demand - Demand forecasting- factors governing demand forecasting- methods of demand forecasting –Relationship of Managerial Economics with Financial Accounting and Management.

UNIT II :THEORY OF PRODUCTION AND COST ANALYSIS

Production Function – Short-run and long- run production - Isoquants and Isocosts, MRTS, least cost combination of inputs - Cobb-Douglas production function - laws of returns - Internal and External economies of scale - **Cost Analysis**: Cost concepts - Break-Even Analysis (BEA) - Managerial significance and limitations of BEA - Determination of Break Even Point (Simple Problems)

UNIT III: INTRODUCTION TO MARKETS AND NEW ECONOMIC ENVIRONMENT

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

UNIT IV INTRODUCTION TO FINANCIAL ACCOUNTING AND ANALYSIS

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

UNIT V: CAPITAL AND CAPITAL BUDGETING

Concept of Capital - Over and Under capitalization – Remedial measures - Sources of Shot term and Long term capital - Estimating Working Capital requirement – Capital budgeting – Features of Capital budgeting proposals – Methods and Evaluation of Capital budgeting – Pay Back Method – Accounting Rate of Return (ARR) – Net Present Value (NPV) – Internal Rate Return (IRR) Method (simple problems).

Learning Outcome: The thorough understanding of Managerial Economics and Analysis of Financial Statements facilitates the Technocrats – cum – Entrepreneurs to take-up decisions effectively and efficiently in the challenging Business Environment.

TEXT BOOKS:

1. VijayaKumar.P. and Apparao. N. Managerial Economics and Financial Analysis,Cengage,2012
2. Aryasri: Managerial Economics and Financial Analysis, 4/e, TMH, 2009.

REFERENCES

1. Subhash Sharma & Vithal .M.P.Financial Accounting for Management, Macmillan,2010.
2. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2009.
3. S.A. Siddiqui and A.S. Siddiqui: Managerial Economics and Financial Analysis, New Age International, 2009.
4. Domnick Salvatore: Managerial Economics in a Global Economy, Cengage, 2009.
5. Shailaja & Usha: Managerial Economics and Financial Analysis, University Press, 2012.

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II YEAR I SEM B. Tech EEE	**T**	**P**	**C**
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ELECTRIC CIRCUITS AND SIMULATION LAB

PART-A: ELECTRICAL CIRCUITS

1) Verification of Thevenin's and Norton's Theorems
2) Verification of Superposition Theorem and Maximum Power Transfer Theorem
3) Verification of Compensation Theorem
4) Verification of Reciprocity , 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) Z and Y Parameters
9) 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

PART-B: PSPICE SIMULATION

1) Simulation of DC Circuits
2) DC Transient Response
3) Mesh Analysis
4) Nodal Analysis

NOTE:

- PSPICE Software Package is Necessary.
- Eight Experiments are to be Conducted from PART-A and any two from PART-B

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ELECTRONIC DEVICES AND CIRCUITS LABORATORY

OBJECTIVES:

- This Lab provides the students to get an electrical model for various semiconducter devices. Students can find and plot V_I characteristics of all semiconductor devices. Student learns the practical applications of the devices. They can learn and implement the concept of the feedback and frequency response of the small signal amplifier

OUTCOMES:

- Students able to learn electrical model for various semiconductor devices and learns the practical applications of the semiconductor devices

PART A: Electronic Workshop Practice

1. Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers, Coils, Gang Condensers, Relays, Bread Boards.
2. Identification, Specifications and Testing of active devices, Diodes, BJTs, JFETs, LEDs, LCDs, SCR, UJT.
3. Soldering Practice- Simple circuits using active and passive components.
4. Study and operation of Ammeters, Voltmeters, Transformers, Analog and Digital Multimeter, Function Generator, Regulated Power Supply and CRO.

.

PART B: List of Experiments
(For Laboratory Examination-Minimum of Ten Experiments)

1. P-N Junction Diode Characteristics

Part A: Germanium Diode (Forward bias& Reverse bias)

Part B: Silicon Diode (Forward bias only)

2. Zener Diode Characteristics

Part A: V-I Characteristics

Part B: Zener Diode act as a Voltage Regulator

3. Rectifiers (without and with c-filter)

Part A: Half-wave Rectifier

Part B: Full-wave Rectifier

4. BJT Characteristics(CE Configuration)

Part A: Input Characteristics

Part B: Output Characteristics

5. FET Characteristics(CS Configuration)

Part A: Drain (Output) Characteristics

Part B: Transfer Characteristics

6. SCR Characteristics
7. UJT Characteristics
8. Transistor Biasing
9. CRO Operation and its Measurements
10. BJT-CE Amplifier
11. Emitter Follower-CC Amplifier
12. FET-CS Amplifier

PART C: Equipment required for Laboratory

1. Regulated Power supplies
2. Analog/Digital Storage Oscilloscopes
3. Analog/Digital Function Generators
4. Digital Multimeters
5. Decade Résistance Boxes/Rheostats
6. Decade Capacitance Boxes
7. Ammeters (Analog or Digital)
8. Voltmeters (Analog or Digital)
9. Active & Passive Electronic Components
10. Bread Boards
11. Connecting Wires
12. CRO Probes etc.

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Course Structure for B. Tech (Electrical and Electronics Engineering) (2013-14)

II B. Tech (EEE) – II Sem

Sl.No.	Course Code	Subject	L	T	P	Credits
1	BS	Complex Variables and Special Functions	3	1	0	3
2	PC	Electrical Machines - II	3	1	0	3
3	PC	Electric Power Generating Systems	3	1	0	3
4	PC	Electromagnetic Fields	3	1	0	3
5	PC	Switching Theory and Logic Design	3	1	0	3
6	PC	Analog Electronic Circuits	3	1	0	3
7		Human Values and Professional Ethics (Audit Course)	2	-	-	-
8	PC	Electrical Machines Lab – I	0	0	3	2
9	PC	Control Systems & Simulation Lab	0	0	3	2
		Total	20	6	6	22

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II YEAR II SEM **T P C**
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COMPLEX VARIABLES AND SPECIAL FUNCTIONS
(Common for ECE, EEE)

Objectives: To enable the students to understand the mathematical concepts of special functions & complex variables and their applications in science and engineering.

UNIT – I

Special Functions: Gamma and Beta Functions – their properties – Evaluation of improper integrals. Series Solutions of ordinary differential equations (Power series and Frobenius Method).

UNIT – II

Bessel functions – Properties – Recurrence relations – Orthogonality. Legendre polynomials – Properties – Rodrigue's formula – Recurrence relations – Orthogonality.

UNIT – III

Functions of a complex variable – Continuity – Differentiability – Analyticity – Properties – Cauchy-Riemann equations in Cartesian and polar coordinates. Harmonic and conjugate harmonic functions – Milne – Thompson method.

Conformal mapping: Transformation of e^z, Inz, z^2, Sin z, cos z, Bilinear transformation - Translation, rotation, magnification and inversion – Fixed point – Cross ratio – Determination of bilinear transformation.

UNIT – IV

Complex integration: Line integral – Evaluation along a path and by indefinite integration – Cauchy's integral theorem – Cauchy's integral formula – Generalized integral formula.

Complex power series: Radius of convergence – Expansion in Taylor's series, Maclaurin's series and Laurent series. Singular point – Isolated singular point – Pole of order m – Essential singularity.

UNIT – V

Residue – Evaluation of residue by formula and by Laurent series – Residue theorem.

Evaluation of integrals of the type

(a) Improper real integrals $\int_{-\infty}^{\infty} f(x)dx$ (b) $\int_{c}^{c+2\pi} f(\cos\theta,\sin\theta)d\theta$

(c) $\int_{-\infty}^{\infty} e^{imx} f(x)dx$

TEXT BOOKS:

1. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers.
2. Advanced Engineering Mathematics, Peter V.O'Neil, CENGAGE publisher.

REFERENCES:

1. Mathematics III by T.K.V. Iyengar, B.Krishna Gandhi, S.Ranganatham and M.V.S.S.N.Prasad, S.Chand publications.
2. Engineering Mathematics, Volume - III, E. Rukmangadachari & E. Keshava Reddy, Pearson Publisher.
3. Complex variables by Raisinghania
4. Advanced Engineering Mathematics by M.C. Potter, J.L. Goldberg, Edward F.Aboufadel, Oxford.

Outcomes:

The student achieves the knowledge to analyse the problems using the methods of special functions and complex variables.

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ELECTRICAL MACHINES – II

Objective:
As an extension of Electrical machines I course this subject facilitates to study of the performance of different types of Transformers, Induction Motors and its characteristics which are the major part of industrial drives and agricultural pump sets.

UNIT-I SINGLE PHASE TRANSFORMERS

Single Phase Transformers- Constructional Details- Hystersis and Eddy Current Losses-Emf Equation - Operation on No Load and on Load - Phasor Diagrams
Equivalent Circuit - Losses and Efficiency-Regulation. All Day Efficiency - Effect of Variations of Frequency & Supply Voltage on Iron Losses.

UNIT-II PERFORMANCE OF SINGLE PHASE TRANSFORMERS

OC and SC Tests - Sumpner's Test - Predetermination of Efficiency and Regulation-Separation of Losses Test-Parallel Operation with Equal and Unequal Voltage Ratios - Auto Transformers-Equivalent Circuit - Comparison with Two Winding Transformers.

UNIT-III THREE PHASE TRANSFORMERS AND INDUCTION MOTORS

Three Phase Transformers - Connections - Y/Y, Y/Δ, Δ/Y, Δ/Δ and Open Δ, Third Harmonics in Phase Voltages-Three Winding Transformers-Tertiary Windings- Scott Connection.

Polyphase Induction Motors-Construction Details of Cage and Wound Rotor Machines-Production of a Rotating Magnetic Field - Principle of Operation - Rotor Emf and Rotor Frequency - Rotor Reactance, Rotor Current and Pf at Standstill and During Operation.

UNIT-IV 3-PHASE INDUCTION MOTOR CHARACTERISTICS

Rotor Power Input, Rotor Copper Loss and Mechanical Power Developed and Their Inter Relation-Torque Equation-Deduction From Torque Equation - Expressions for Maximum Torque and Starting Torque - Torque Slip Characteristic –Generator Operation - Double Cage and Deep Bar Rotors - Equivalent Circuit - Phasor Diagram - Crawling and Cogging -Circle Diagram-No Load and Blocked Rotor Tests-Predetermination of Performance

UNIT-V STARTING AND SPEED CONTROL OF INDUCTION MOTORS

Starting Methods and Starting Current and Torque Calculations, Speed Control-Change of Frequency; Pole Changing and Methods of Consequent Poles; Cascade Connection. Injection of an Emf.

OUTCOME:

After going through this course the student gets a thorough knowledge on construction operation characteristics and testing of different types of Transformers and Induction Motors with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

TEXT BOOKS:

1. Electrical Machinery & Transformers by Irving Kosow –Pearson Publishers, Second Edition, 2012
2. Electric Machines –by I.J.Nagrath & D.P.Kothari,Tata Mc Graw Hill, 7th Edition.,2005

REFERENCE BOOKS:

1. Performance and Design of AC Machines by MG.Say, BPB Publishers, 2002.
2. Theory of Alternating Current Machinery- by Langsdorf, Tata McGraw-Hill Companies, 2nd edition, 2008.
3. Electromechanics-II (transformers and induction motors) S. Kamakshaiah, Hitech publishers, 2005.
4. Electric Machinery - A.E. Fitzgerald, C.Kingsley and S.Humans, Mcgraw Hill Companies, 6th edition, 2003.

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ELECTRICAL POWER GENERATING SYSTEMS

OBJECTIVE :

Electrical Power plays significant role in day-to-day life of entire mankind. This course concerns the generation of conventional and non-conventional sources of energy along with the economic aspects.

UNIT-I THERMAL POWER GENERATING SYSTEMS

Block Diagram of Thermal Power Station (TPS) showing paths of Coal, Steam, Water, Air, Ash and Flue Gasses - Brief Description of TPS Components: Economizers, Boilers, Super Heaters, Turbines, Condensers, Chimney and Cooling Towers.

UNIT-II HYDRO & NUCLEAR POWER GENERATING SYSTEMS

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

Nuclear Power: Nuclear Fission and Chain Reaction.- Nuclear Fuels.- Principle of Operation of Nuclear Reactor.-Reactor Components: Moderators, Control Rods, Reflectors and Coolants.- Radiation Hazards: Shielding and Safety Precautions.- Types of Nuclear Reactors and Brief Description of PWR, BWR and FBR.

UNIT -III SOLAR & WIND POWER GENERATING SYSTEMS

Solar Power Generation: Role and Potential of Solar Energy Options, Principles of Solar Radiation, Flat Plate and Concentrating Solar Energy Collectors, Different Methods of Energy Storage – PV Cell- V-I Characteristics.

Wind Power Generation: Role and potential of Wind Energy Option, Horizontal and Vertical Axis Wind Mills- Performance Characteristics- Power- Speed & Torque- Speed Characteristics- Pitch & Yaw Controls – Power Electronics Application – Economic Aspects.

UNIT-IV BIOGAS & GEOTHERMAL POWER GENERATING SYSTEMS

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

Geothermal and Ocean Power Generation: Principle of Geothermal Energy Methods of Harnessing-Principle of Ocean Energy-Tidal and Wave Energy- Mini Hydel Plants- Economic Aspects.

UNIT-V ECONOMIC ASPECTS OF POWER GENERATION

Load Curve, Load Duration and Integrated Load Duration Curves-Load Demand, Diversity, Capacity, Utilization and Plant Use Factors- Numerical Problems. Costs Of Generation and their Division Into Fixed, Semi-Fixed and Running Costs. Tariff Methods: Desirable Characteristics of a Tariff Method.- Flat Rate, Block-Rate, Two-Part, Three –Part, and Power Factor Tariff Methods and Numerical Problems.

OUTCOME:

After going through this course the student gets a thorough knowledge on thermal gas and nuclear power plants operation, AC and DC distribution systems operation, AIR insulated and GAS insulated indoor/outdoor substations operation, voltage control and power factor improvement techniques, economic aspects of power generation and different types of TARIFF methods with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

TEXT BOOKS:

1. A Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, U.S.Bhatnagar and A.Chakraborti, Dhanpat Rai & Co. Pvt. Ltd., 1999.
2. Electric Power Generation Distribution and Utilization by C.L Wadhwa, New Age International (P) Ltd., 2005.
3. Non Conventional Energy Sources by G.D. Rai, Khanna Publishers, 2000.

REFERENCE BOOKS:

1. Renewable Energy Resources – John Twidell and Tony Weir, Second Edition, Taylor and Francis Group, 2006.
2. Electrical Power Generation, Transmission and Distribution by S.N.Singh., PHI, 2003.
3. Principles of Power Systems by V.K Mehta and Rohit Mehta S.CHAND& COMPANY LTD., New Delhi 2004.
4. Wind Electrical Systems by S. N. Bhadra, D. Kastha & S. Banerjee – Oxford University Press, 2013.

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ELECTROMAGNETIC FIELDS

Course objective:

The objective of this course is to introduce the concepts of electric field and magnetic fields and their applications which will be utilized in the development of the theory for power transmission lines and electrical machines.

UNIT-I ELECTROSTATICS

Electrostatic Fields - Coulomb's Law - Electric Field Intensity(EFI) due to Line, Surface and Volume charges- Work Done in Moving a Point Charge in Electrostatic Field-Electric Potential due to point charges, line charges and Volume Charges - Properties of Potential Functions-Potential Gradient - Gauss's Law-Application of Gauss's Law-Maxwell's First Law, Laplace's Equation and Poisson's Equations - Solution of Laplace's Equation in one Variable.

Electric Dipole - Dipole Moment - Potential and EFI due to Electric Dipole - Torque on an Electric Dipole in an Electric Field - Capacitance-Capacitance of Parallel Plate and Spherical Capacitors**.**

UNIT- II CONDUCTORS AND DIELECTRICS

Behavior of Conductors in an Electric Field-Conductors and Insulators – Electric Field Inside a Dielectric Material – Polarization – Dielectric Conductors and Dielectric Boundary Conditions – 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 Law – Magnetic Field Intensity(MFI) due to a Straight Current Carrying Filament – MFI due to Circular, Square Filament – Solenoid Current Carrying Wire – Relation Between Magnetic Flux ,Magnetic Flux Density and MFI – Maxwell's Second Equation.

Ampere's Circuital Law and Its Applications Viz., MFI Due to an Infinite Sheet of Current and a Long Current Carrying Filament – Point Form of Ampere's Circuital Law – Maxwell's Third Equation.

Magnetic Force – Moving Charges in Magnetic Fields – Lorentz Force Equation – Force on Current Element in a Magnetic Field - Force on a Straight and Long Current Carrying Conductor in a Magnetic Field - Force Between two Straight and Parallel Current Carrying Conductor in a Magnetic Field – Magnetic Dipole and Dipole moment – A Differential Current Loop as a Magnetic Dipole – Torque on a Current Loop Placed in a Magnetic Field.

UNIT – IV MAGNETIC POTENTIAL

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

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

UNIT-V TIME VARYING FIELDS

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

Wave Equations – Uniform Plane Wave Motion in Free Space, Conductors and Dielectrics – Velocity, Wave Length, Intrinsic Impedence and Skin Depth – Poynting Theorem – Poynting Vector and its Significance**.**

OUTCOME:

After going through this course the student gets a thorough knowledge on vector algebra, 3-dimensional co-ordinate systems, electrostatics, behavior of conductors insulators semiconductors dielectrics and capacitance, magneto statics, time-varying fields, interaction between electricity and magnetism, different laws, Maxwell's equations, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

TEXT BOOKS:

1. Engineering Electromagnetics by William.H.Hayt, Mc.Graw – Hill, 2010.
2. Electromagnetics by J.D.Kraus,Mc.Graw – Hill Inc,5th edition,1999.
3. Field Theory – Gangadhar, Khanna Publications, 2003.

REFERENCE BOOKS:

1. Electrodynamics by Griffith, PHI, 3rd Edition, 1999.
2. Electromagnetic Fields by Sadiku – Oxford University Press, 5th Edition, 2010.
3. Electromagnetics by Joseph Edminister, Tata Mc Graw Hill, 2006.

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SWITCHING THEORY AND LOGIC DESIGN

Course Objectives:

- To provide fundamental concepts used in the design of digital systems and learn the methods for the design of digital circuits.

Course Outcomes:

- To introduce basic postulates of Boolean algebra and the methods for simplifying Boolean expressions
- To illustrate the concepts and study the procedures for the analysis and design of combinational circuits and sequential circuits
- To introduce the concepts of programmable logic devices.

UNIT I

Number System & Boolean Algebra:

Digital Systems, Binary Numbers, Number base conversions, Complements of numbers, Signed binary numbers, Binary codes.

Boolean Algebra-Basic definition, Basic theorems and properties, Boolean Functions, Canonical & Standard forms, other logic operations & Logic gates.

UNIT II

Gate Level Minimization:

The map method, four variable & Five variable K-map, POS & SOP Simplification, Don't care conditions, NAND & NOR Implementation, Other two level Implementation, Ex-or Function, Tabular Method- Simplification of Boolean function using tabulation Method.

UNIT III

Combinational Logic Circuits:

Combinational circuits, Analysis & Design procedure, Binary Adder-Subtractor, Decimal Adder, Binary Multiplier, Magnitude comparator, Decoder, Encoders, Multiplexers.

UNIT IV

Sequential Logic Circuits:

Sequential Circuits, Latches, Flips-Flops - RS, JK, Master-Slave JK, D & T flip flops, Analysis of Clocked sequential circuits, State Reduction & Assignment, Design procedure, Registers & Counters – Registers, Shift Registers, Ripple Counters, Synchronous counters, asynchronous counters.

Asynchronous sequential circuits - Introduction, Analysis Procedure, Design Procedure, Reduction of State flow tables, Race-free State Assignment, Hazards.

UNIT V

Programmable Memories:

Memory organization, classification of semi conductor memories, ROM, PROM, DROM, EPROM, EEPROM, RAM, expansion of memory, CCD memories, content addressable memory, programmable logic devices, PROM at PLD, programmable logic array (PLA) programmable array logic (PAL), field programmable gate array (FPGA).

Text Books:

1. M.Morris Mano & Michel D. Ciletti, "Digital Design", 5th Edition Pearson.
2. Zvi KOhavi and Nirah K.Jha, "Switching theory and Finite Automata Theory", 3rd Edition Cambridge.

References:

1. Subratha Goshal, "Digital Electronics", Cambridge
2. Comer, "Digital & State Machine Design", Third Indian edition, OXFORD

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ELECTRICAL MACHINES LAB – I

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

1. Magnetization Characteristics of DC Shunt Generator. Determination of Critical Field Resistance and Critical Speed.
2. Load Test on DC Shunt Generator. Determination of Characteristics.
3. Brake Test on DC Shunt Motor. Determination of Performance Curves.
4. Load Test on DC Compound Generator. Determination of Characteristics.
5. Hopkinson's Test on DC Shunt Machines. Predetermination of Efficiency.
6. Fields Test on DC Series Machines. Determination of Efficiency.
7. Swinburne's Test and Speed Control of DC Shunt Motor. Predetermination of Efficiencies.
8. Brake Test on DC Compound Motor. Determination of Performance Curves.

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

9. Load Test on DC Series Generator. Determination of Characteristics.
10. Retardation Test on DC Shunt Motor. Determination of Losses at Rated Speed.
11. Separation of Losses In DC Shunt Motor.

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CONTROL SYSTEMS AND SIMULATION LAB

Any Eight of the following experiments are to be conducted:

1. Time Response of Second Order System
2. Characteristics of Synchros
3. Programmable Logic Controller – Study and Verification of Truth Tables of Logic Gates, Simple Boolean Expressions and Application of Speed Control of Motor.
4. Effect of Feedback on DC Servo Motor
5. Transfer Function of DC Machine
6. Effect of P, PD, PI, PID Controller on a Second Order Systems
7. Lag and Lead Compensation – Magnitude and Phase Plot
8. Temperature Controller Using PID
9. Characteristics of Magnetic Amplifiers
10. Characteristics of AC Servo Motor

Any two simulation experiments are to be conducted:

1. PSPICE Simulation of Op-Amp Based Integrator and Differentiator Circuits.
2. Linear System Analysis (Time Domain Analysis, Error Analysis) Using MATLAB.
3. Stability Analysis (Bode, Root Locus, Nyquist) of Linear Time Invariant System Using MATLAB
4. State Space Model for Classical Transfer Function Using MATLAB – Verification.

REFERENCE BOOKS:

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

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Course Structure for B. Tech (Electrical and Electronics Engineering) (2013-14)

III B. Tech (EEE) – I Sem

Sl.No.	Course Code	Subject	L	T	P	Credits
1	PC	Transmission of Electric Power	3	1	0	3
2	PC	Electrical Machines – III	3	1	0	3
3	PC	Power Electronics	3	1	0	3
4	PC	Electrical and Electronic Measurements	3	1	0	3
5	ES	Linear & Digital Integrated Circuits	3	1	0	3
6	HS	Management Science	3	1	0	3
7	PC	Electrical Machines Lab – II	0	0	3	2
8	PC	Electrical and Electronic Measurements Lab	0	0	3	2
		Total	20	6	6	22

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TRANSMISSION OF ELECTRIC POWER

Objective:

The student should learn:

- How to compute the parameters of a Transmission line
- How to represent a Transmission line using Interconnecting circuit parameters
- About the various factors that affect the performance of Transmission lines
- About the study of Travelling waves
- Design of Underground cables

UNIT-I Transmission Line Parameters

Types of conductors - calculation of resistance for solid conductors - Calculation of inductance for single phase and three phase, single and double circuit lines, concept of GMR & GMD, symmetrical and asymmetrical conductor configuration with and without transposition. 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 Modeling of Transmission Lines

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

UNIT-III Performance of Transmission Lines

Types of Insulators, String efficiency and Methods for improvement, Numerical Problems – Voltage Distribution, Calculation of string efficiency, Capacitance grading and Static shielding. Corona - Description of the phenomenon, factors affecting corona, critical voltages and power loss, Radio Interference. Sag and Tension Calculations with equal and unequal heights of towers, Effect of Wind and Ice on weight of Conductor, Numerical Problems - Stringing chart and sag template and its applications.

UNIT – IV Power System Transients

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

UNIT-V Underground Cables

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

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Power system Analysis-by John J Grainger William D Stevenson, TMC Companies, 4th edition
2. Power System Analysis and Design by B.R.Gupta, Wheeler Publishing.
3. Power System Analysis by Hadi Saadat – TMH Edition..
4. Modern Power System Analysis by I.J.Nagaraj and D.P.Kothari, Tata McGraw Hill, 2nd Edition.
5. Transmission of Electric Power by S. Sivanagaraju.

Course Outcomes:

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

- Compute the transmission line parameters.
- Model a given transmission line.
- Understand the design of transmission line and Insulators.
- Estimate the performance of a given transmission line.
- Analyze the effect of over voltage on transmission line.
- Design underground cables and analyze cable performance.

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ELECTRICAL MACHINES - III

Objective:

This subject should enable the students to

i. Deals with the detailed analysis of synchronous machines and motors
ii. Understand the construction and principle of working of synchronous machines
iii. Understand different methods of predetermining the regulation of alternators
iv. Understands the concepts of load sharing among alternators
v. Study the performance characteristics of synchronous motors and their use as synchronous condensers.
vi. Also, it deals with different types of single phase & special motors which have significant applications in house hold appliances and control systems.

UNIT – I SYNCHRONOUS MACHINES & CHARACTERISTICS 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 – experimental determination - phasor diagram – load characteristics.

UNIT – II REGULATION OF ALTERNATORS

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

UNIT – III PARALLEL OPERATION OF ALTERNATORS

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

UNIT – IV SYNCHRONOUS MOTORS

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

UNIT – V SINGLE PHASE MOTORS AND SPECIAL MOTORS

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

Special Motors: Construction, working principle, performance of- Stepper Motors, Reluctance motors, A.C. Series motors, Universal motors, BLDC motor.

TEXT BOOKS

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

REFERENCE BOOKS:

1. The Performance and Design of A.C.Machines – by M.G.Say, ELBS and Ptiman & Sons.
2. Electric Machinery – by A.E. Fitzgerald, C.Kingsley and S.Umans, Mc Graw-Hill Companies, 5th edition, 1990.
3. Theory of Alternating Current Machinery by Langsdorf, Tata Mc Graw-Hill, 2nd edition.
4. Electromachanics-III (Synchronous and single phase machines), S.Kamakashiah, Overseas publishers Pvt Ltd.
5. Electric Machines - by M. S. Sarma and M. K. Pathak, CENGAGE Learning.
6. Special Electrical Machines by K. Venkataratnam, Universities Press, 2013.

Outcomes:

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

i. Understand the basic construction and working principle of synchronous machines
ii. Estimate the regulation of synchronous generator using different methods
iii. Determine the load sharing among alternators
iv. Analyze the performance characteristics of synchronous motors and their ability to operate at various power factors
v. Use specific 1-phase motor and special motors to a given application.

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POWER ELECTRONICS

Course objectives:

- The objective of this course is to study the high efficient and high reliable Power conversion systems.
- To study the basic power semiconductor switching devices and their principles of operation.
- To study the various power conversion methods, controlling and designing of power converters.
- To study the applications of Power electronic conversion to domestic, industrial, aerospace, commercial and utility systems etc.

UNIT – I POWER SEMI CONDUCTOR DEVICES AND COMMUTATION CIRCUITS

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

UNIT – II PHASE CONTROLLED RECTIFIERS

Phase control technique – Single phase Line commutated converters – Midpoint and Bridge connections – Half controlled converters with Resistive, RL and Fully controlled converters with Resistive, RL and RLE load– Derivation of average load voltage & current -Active & Reactive power inputs to the converters without and with Freewheeling Diode, Effect of source inductance –Numerical problems

Three phase converters – Three pulse and six pulse converters – Midpoint and bridge connections average load voltage with R, RL and RLE loads – Effect of Source inductance–Dual converters (both single phase and three phase) - Waveforms –Numerical Problems.

UNIT – III CHOPPERS

Principle of chopper operation– Time ratio and Current limit control strategies – Derivation of load voltage and currents with R, RL and RLE loads- Step up Chopper – load voltage expression, Types of chopper circuits (A, B, C, D & E) – Basic principle operation – waveforms, Morgan's chopper – Jones chopper and Oscillation chopper (Principle of operation only) Waveforms —– AC Chopper – Numerical Problems.

UNIT – IV INVERTERS

Single phase Voltage Source inverters – operating principle - steady state analysis, Simple forced commutation circuits for bridge inverters – Mc Murray and Mc Murray Bedford inverters, Voltage control techniques for inverters and Pulse width modulation techniques, single phase current source inverter with ideal switches, basic series inverter, single phase parallel inverter – basic principle of operation only, Three phase bridge inverters (VSI) – 180 degree mode – 120 degree mode of operation - Numerical problems.

UNIT – V AC VOLTAGE CONTROLLERS & CYCLO CONVERTERS

AC voltage controllers – Principle of phase control – Principle of integral cycle control - Single phase two SCR's in anti parallel – With R and RL loads – modes of operation of Triac – Triac with R and RL loads – Derivation of RMS load voltage, current and power factor - wave forms – Numerical problems.

Cyclo converters - Midpoint and Bridge connections - Single phase to single phase step-up and step-down cyclo converters with Resistive and inductive load, Principle of operation, Waveforms, output voltage equation.

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Power Electronics – by Vedam Subramanyam, New Age International (P) Limited, Publishers
2. Power Electronics - by V.R.Murthy , 1st edition -2005, OXFORD University Press
3. Power Electronics-by P.C.Sen,Tata Mc Graw-Hill Publishing.

Outcome: The student can be able to:

- After going through this course the student gets knowledge about basic operating principles of various power semiconductor switching devices.
- Also he/she can understand high efficient and high reliable power conversion methods.
- Understand the operation of various power electronic converters and their control.
- Apply the above principles and methods to practical applications.

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ELECTRICAL & ELECTRONIC MEASUREMENTS

OBJECTIVE:

- This course introduces the basic principles of different types of electrical instruments for the Measurement of voltage, current, power factor, power and energy.
- It also explains the measurements of RLC parameters using bridge principles.
- The principles of magnetic measurements are also explained.
- The principle of working of CRO and its applications are explained.
- Digital meters are also introduced.

UNIT- I MEASURING INSTRUMENTS

Classification – Ammeters and Voltmeters – PMMC, Dynamometer, Moving Iron Types – Expression for the Deflecting Torque and Control Torque – Errors and their Compensation, Extension of range.

UNIT – II MEASUREMENT OF POWER, POWER FACTOR AND ENERGY

Single Phase Dynamometer Wattmeter, LPF and UPF, Double Element and Three Elements, Expression for Deflecting and Control Torques; P.F. Meters: Dynamometer and Moving Iron Type – 1-ph and 3-ph Power factor Meters. Single Phase Induction Type Energy Meter – Driving and Braking Torques – Errors and their Compensation, Three Phase Energy Meter.

UNIT – III INSTRUMENT TRANSFORMERS, POTENTIOMETERS, AND MAGNETIC MEASUREMENTS

Current Transformers and Potential Transformers – Ratio and Phase Angle Errors – Methods for Reduction of Errors-Design Considerations.

DC Potentiometers: Principle and Operation of D.C. Crompton's Potentiometer –Standardization – Measurement of unknown Resistance, Currents and Voltages.

A.C. Potentiometers: Polar and Coordinate types- Standardization – Applications.

Determination of B-H Loop Methods of Reversals - Six Point magnetic measurement Method – A.C. Testing – Iron Loss of Bar Samples.

UNIT – IV D.C & A.C BRIDGES

Method of Measuring Low, Medium and High Resistances – Sensitivity of Wheatstone's Bridge – Kelvin's Double Bridge for Measuring Low Resistance, Measurement of High Resistance – Loss of Charge Method. Measurement of Inductance - Maxwell's Bridge, Anderson's Bridge. Measurement of Capacitance and Loss Angle – DeSauty Bridge. Wien's Bridge – Schering Bridge.

UNIT – V CRO AND DIGITAL METERS

Cathode Ray Oscilloscope- Cathode Ray Tube-Time Base Generator-Horizontal and Vertical Amplifiers – Applications of CRO – Measurement of Phase , Frequency, Current and Voltage-Lissajous Patterns

Digital Voltmeters-Successive Approximation, Ramp, and Integrating Type-Digital Frequency Meter-Digital Multimeter-Digital Tachometer

TEXT BOOKS:

1. Electrical & Electronic Measurement & Instruments by A.K.Sawhney Dhanpat Rai & Co. Publications, 2007.
2. Electrical Measurements and measuring Instruments – by E.W. Golding and F.C. Widdis, 5th Edition, Reem Publications, 2011.

REFERENCE BOOKS:

1. Electronic Instrumentation by H. S. Kalsi, Tata Mcgrawhill, 3rd Edition, 2011.
2. Electrical Measurements – by Buckingham and Price, Prentice – Hall, 3rd Edition, 1970.
3. Electrical Measurements: Fundamentals, Concepts, Applications – by Reissland, M.U, New Age International (P) Limited, 2010.
4. Electrical & Electronic Measurement & Instrumentation by R. K. Rajput, 2nd Edition, S. Chand & Co., 2nd Edition, 2013.

OUTCOMES:

The student should have learnt how to

- Use wattmeters, pf meters, and energy meters in a given circuit.
- Extend the range of ammeters and voltmeters
- Measure active power, reactive power , reactive power , power factor, and energy in both 1-phase and 3-phase circuits
- Determine the resistance values of various ranges, L and C values using appropriate a.c bridges
- Measure the different characteristics of periodic and aperiodic signals using CRO.

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LINEAR & DIGITAL IC APPLICATIONS

Learning Outcomes:

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

- Understand the basic building blocks of linear integrated circuits and its characteristics.
- Analyze the linear, non-linear and specialized applications of operational amplifiers.
- Understand the theory of ADC and DAC.
- Able to use computer-aided design tools for development of complex digital logic circuits.
- Able to model, simulate, verify, analyze, and synthesize with hardware description languages.
- Able to design and prototype with standard cell technology and programmable logic.
- Able to design tests for digital logic circuits, and design for testability.

UNIT-I OP-AMP CHARECTERISTICS:
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. Basic applications of Op-amp, instrumentation amplifier, AC amplifier, V to I and I to V converters, sample & Hold circuits, multiplier and divider, Differentiator and Integrator, Comparators, Schmitt trigger, Multivibrators, Introduction to voltage regulators, features of 723 General purpose regulator.

UNIT-II TIMERS, PHASE LOCKED LOOPS&D-A AND A-D CONVERTERS:
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.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-III ACTIVE FILTERS & OSCILLATORS:
Introduction, 1st order LPF, HPF filters, Band pass, Band reject and all pass filters. Oscillator types and principle of operation- RC, Wien, and quadraturetype, waveform generators-triangular, sawtooth, square wave and VCO.

UNIT – IV INTIGRATED CIRCUITS:

Classification, Chip size and circuit complexity,Classification of integrated circuits, comparison of various logic families, standard TTL NAND Gate-Analysis & characteristics, TTL open collector o/ps, Tristate TTL, MOS & CMOS open drain and tri-state outputs, CMOS transmission gate, IC interfacing-TTL driving CMOS & CMOS driving TTL.

UNIT – V COMBINATIONAL & SEQUENTIAL CIRCUITS

COMBINATIONAL: Code converters, Decoders, Demultiplexers, decoders & drives for LED & LCD display. Encoder, priority Encoder, Multiplexers & their applications, priority generators/checker circuits. Digital arithmetic circuits-parallel binary adder/subtractor circuits using 2's Complement system. Digital comparator circuits.

SEQUENTIAL: Latches, Flip-flops & their conversions. Design of synchronous counters, Decade counter, shift registers & applications, familiarities with commonly available 74XX and CMOS 40XX series of IC counters.

TEXT BOOKS:

1. Linear Integrated Circuits – D.RoyChowdhury, New Age International (p) Ltd, 2nd Edition., 2003.
2. Digital Design Principles & Practices – John F. Wakerly, PHI/ Pearson Education Asia, 3rd Ed., 2005.

REFERENCES:

1. Operational Amplifiers & Linear Integrated Circuits – R.F.Coughlin& Fredric F.Driscoll, PHI.
2. Operational Amplifiers & Linear Integrated Circuits: Theory & Applications –Denton J.Daibey, TMH.
3. Design with Operational amplifiers & Analog Integrated circuits-Sergio Franco, Mc Graw Hill, 3rd Edition , 2002.
4. Digital Fundamentals – Floyd and Jain, Pearson Education, 8th Edition 2005.
5. A VHDL Primer – J. Bhasker, Pearson Education/ PHI, 3rd Edition.
6. Op-amps & Linear ICs – RamakanthA.Gayakwad, PHI, 1987.

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MANAGEMENT SCIENCE

Course Objective: The objective of the course, is to equip the student the fundamental knowledge of management science and its application for effective management of human resource, materials and operation of an organization. It also aims to expose the students about the latest and contemporary developments in the field of management**.**

UNIT I INTRODUCTION TO MANAGEMENT

Management-Concept and meaning-Nature-Functions-Management as a science and art and both. Schools of management thought-Taylor's scientific theory-Henry Fayol's principles-Weber's Ideal Bureaucracy-Eltan Mayo's Human relations-Systems theory- Situational or Contingency theory-Social responsibilities of management.**Organizational structure and design**: Features of organizational structure-work specialization-Departmentation-Span of control-Centralization and Decentralization. **Organisational designs**-Line organization-Line & Staff Organization-Functional Organization-Matrix Organization-Project Organization-Committee form of organization.

UNIT II OPERATIONS MANAGEMENT

Principles and Types of Plant Layout-Methods of production (Job, batch and Mass Production), Work Study- Statistical Quality Control**:** *C* chart, *P* chart, (simple Problems) Deming's contribution to quality. **Material Management:** Objectives-Inventory-Functions,types, inventory classification techniques-EOQ-ABC Analysis-Purchase Procedure and Stores Management. **Marketing Management:** Concept- Meaning - Nature- Functions of Marketing-Marketing Mix- Channels of distribution -Advertisement and sales promotion- Marketing Strategies based on Product Life Cycle.

UNIT III HUMAN RESOURCES MANAGEMENT (HRM)

HRM- Definition and meaning – nature-Managerial and Operative functions-Evolution of HRM-Human Resource Planning(HRP)-Employee Recruitment-sources of recruitment-employee selection- process and tests in employee selection- Employee training and development-On- the-job and Off- the- job training methods-Performance Appraisal systems-Concept-Methods of Performance Appraisal-Placement-Employee Induction-Wage and Salary Administration-Objectives-Essentials of Wage and Salary Administration-Job Analysis-Process -Job Evaluation-Employee Grievances-techniques of handling Grievances.

UNIT IV STRATEGIC MANAGEMENT

Definition& meaning-Setting of Vision- Mission- Goals- Corporate Planning Process- Environmental Scanning-Steps in Strategy Formulation and Implementation-SWOT Analysis. **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).

UNIT V CONTEMPORARY ISSUES IN MANAGEMENT

The concept of MIS- Materials Requirement Planning (MRP)- Just-In-Time (JIT) System- Total Quality Management (TQM)- Six Sigma Concept- Supply Chain Management- Enterprise Resource Planning (ERP)- Performance Management- Business Process Outsourcing (BPO), Business Process Re-engineering and Bench Marking -Balanced Score Card-Knowledge Management.

The students are required to submit any one of the following- two assignments/ a mini project/submission of any two case studies in the subject.

TEXT BOOKS:

1. A.R Aryasri: Management Science, TMH, 2013
2. Stoner, Freeman, Gilbert, Management, Pearson Education,New Delhi, 2012.

REFERENCE BOOKS:

1. Kotler Philip & Keller Kevin Lane: Marketing Mangement , PHI,2013.
2. Koontz & Weihrich: Essentials of Management, 6/e, TMH, 2005.
3. Thomas N.Duening & John M.Ivancevich ManagementPrinciples and Guidelines,Biztantra.
4. Kanishka Bedi, Production and Operations Management, Oxford University Press, 2004.
5. Memoria & S.V.Gauker, Personnel Management, Himalaya, 25/e, 2005
6. Samuel C.Certo: Modern Management, 9/e, PHI, 2005
7. Schermerhorn, Capling, Poole & Wiesner: Management, Wiley, 2002.
8. Parnell: Strategic Management, Biztantra, 2003.
9. Lawrence R Jauch, R.Gupta &William F.Glueck: Business Policy and Strategic Management, Frank Bros., 2005.
10. L.S.Srinath: PERT/CPM,Affiliated East-West Press, 2005.

Learning Outcome:

After completion of this course, the prospective engineering technocrats will be able to understand various fundamentals of functional areas such general management, plant and materials management, marketing management, human resource management, statistical quality control techniques, strategic management and also aware of the latest and contemporary issues of management science.

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ELECTRICAL MACHINES LAB - II

Objective:

- Transformers, Induction Motors, Alternators and synchronous motors are experimented in detail and their performance characteristics are evaluated.

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

1. O.C. & S.C. Tests for predetermination of regulation and efficiency of single phase transformers.
2. Sumpner's test on a pair of single phase transformers.
3. Scott connection of transformers.
4. No-load & Blocked-rotor tests for construction of circle diagram and predetermination of performance characteristics of three-phase Induction motor.
5. Regulation of a three phase alternator by synchronous impedance & m.m.f methods.
6. V and inverted V curves of a 3-phase synchronous motor.
7. Determination of Equivalent circuit of a single phase induction motor.
8. Determination of X_d and X_q of a salient pole synchronous machine.

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

9. Parallel operation of single phase transformers.
10. Separation of core losses of a single phase transformer.
11. Load test on three phase Induction motor.
12. Regulation of three-phase alternator by Z.P.F. and A.S.A. methods.

OUTCOME:

- After going through this laboratory course, the student acquires sufficiently good practical knowledge about the operation, testing, and characteristics of important A.C equipment like transformers, Induction Motors, Alternators and synchronous motors.
- The student should also have acquired the knowledge about the fixation of the rating of transformers, induction motors and synchronous machines.

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ELECTRICAL AND ELECTRONIC MEASUREMENT LAB

Objective: This laboratory deals with the practical exercises for

- Calibration of various electrical measuring instruments.
- Accurate determination of inductance and capacitance using D.C and A.C Bridges.
- Measurement of coefficient of coupling between two coupled coils.

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

1. Calibration and Testing of single phase energy Meter
2. Calibration of dynamometer power factor meter
3. Crompton D.C. Potentiometer – Calibration of PMMC ammeter and PMMC voltmeter
4. Kelvin's double Bridge – Measurement of low resistance – Determination of Tolerance.
5. Determination of Coefficient of coupling between two mutually coupled coils.
6. Schering Bridge & Anderson bridge.
7. Measurement of 3-phase reactive power with single-phase wattmeter.
8. Measurement of parameters of a choke coil using 3-voltmeter and 3-ammeter methods.

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

9. Maxwell's bridge and DeSauty bridge.
10. Calibration of LPF wattmeter – by Phantom loading.
11. Measurement of 3-phase power with Two-watt meter method (Balanced & Un balanced).
12. Wheatstone bridge – measurement of medium resistances.
13. LVDT and capacitance pickup – characteristics and Calibration
14. Resistance strain gauge – strain measurement and Calibration
15. Transformer turns ratio measurement using A.C Bridge.
16. A.C. Potentiometer – Calibration of AC Voltmeter, Parameters of Choke coil.

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

- Calibrate various electrical measuring instruments.
- Accurately determine the values of inductance and capacitance using a.c bridges
- Compute the coefficient of coupling between two coupled coils.
- Accurately determine the values of very low resistances.

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Course Structure for B. Tech (Electrical and Electronics Engineering) (2013-14)

III B. Tech (EEE) – II Sem

S.No	Course Code	Subject	L	T	P	Credits
1	PC	Switch Gear & Protection	3	1	0	3
2	PC	Digital Signal Processing	3	1	0	3
3	PC	Computer Aided Power System Analysis	3	1	0	3
4	PC	Microprocessors & Microcontrollers	3	1	0	3
5	PC	Power Semiconductor Controlled Drives	3	1	0	3
6	PC	Neural Networks & Fuzzy Logic Applications	3	1	0	3
7		Advanced English Communication Skills Lab (Audit Course)	2	-	-	-
8	PC	Microprocessors & Microcontrollers Lab	0	0	3	2
9	PC	Power Electronics & Simulation Lab	0	0	3	2
		Total	20	6	6	22

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ELECTRICAL AND ELECTRONICS ENGINEERING

III Year B. Tech EEE II-Sem	**L**	**T**	**C**
	3	**1**	**3**

SWITCH GEAR AND PROTECTION

Objective: the student can be able to learn about

- The study of different Circuit Breakers and Relays
- The protection of Generators and Transformers
- The protection of various feeder bus bars from abnormal conditions and over voltages
- It importance on Neutral grounding for overall protection.

UNIT – I Circuit Breakers

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

UNIT – II Electromagnetic and static relays

Basic Requirements of Relays – Primary and Backup protection - Construction details of – Attracted armature, balanced beam, inductor type and differential relays – Universal Torque equation – Characteristics of over current, Direction and distance relays. Static Relays – Advantages and Disadvantages – Definite time, Inverse and IDMT static relays – Comparators – Amplitude and Phase comparators. Microprocessor based relays – Advantages and Disadvantages – Block diagram for over current (Definite, Inverse and IDMT) and Distance Relays and their Flow Charts.

UNIT – III Protection of Generators and Transformers

Protection of generators: Protection of generators against Stator faults, Rotor faults, and Abnormal Conditions. Restricted Earth fault and Inter-turn fault Protection. Numerical Problems on % Winding Unprotected.

Protection of transformers: Percentage Differential Protection, Numerical Problem on Design of CT s Ratio, Buchholtz relay Protection.

UNIT –IV Protection of Feeders and Transmission Lines

Protection of Feeders (Radial & Ring main) using over current Relays. Protection of Transmission lines – 3 Zone protection using Distance Relays. Carrier current protection. Protection of Bus bars.

UNIT – V Protection against over voltages

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

TEXT BOOKS:

1. Switchgear and Protection – by Sunil S Rao, Khanna Publlishers
2. Power System Protection and Switchgear by Badari Ram , D.N Viswakarma, TMH Publications
3. Principles of power systems - by V.K. Mehta, Rohit Mehta. S.Chand publications.

REFERENCE BOOKS:

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

OUTCOME:

After completing this course the candidate will be able to:

- Understand the operation of different circuit breakers.
- Get thorough knowledge on different relays which are used in real time power system operation.
- Understand the protection of different power system components such as generators, transformers, lines and feeders against over voltages.
- Apply the above conceptual things in practical applications of power system operation and planning.

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III B. Tech -II Sem. (E.E.E)	**L**	**T**	**C**
	3	**1**	**3**

DIGITAL SIGNAL PROCESSING

Objective:

The student will be able to learn about:

- Basic concepts of signal processing and representation of discrete time signals and systems
- Realization of FIR and IIR digital filters
- Processing of signals in different engineering fields

UNIT-I INTRODUCTION TO DIGITAL SIGNAL PROCESSING

Discrete Time Signals and Sequences, Linear Shift Invariant Systems, Stability and Causality, Linear Constant Coefficient Difference Equations. Frequency Domain Representation of Discrete Time Signals and Systems.

UNIT-II DISCRETE FOURIER SERIES AND FAST FOURIER TRANSFORMS

Properties of Discrete Fourier Series, DFS Representation of Periodic Sequences, Discrete Fourier Transforms: Properties of DFT, Linear Convolution of Sequences Using DFT, Computation of DFT. Relation between Z-Transform and DFS, Fast Fourier Transforms (FFT)-Radix2 Decimation in Time and Decimation in Frequency FFT Algorithms, Inverse FFT and FFT for Composite N.

UNIT-III REALIZATION OF DIGITAL FILTERS

Z-Transforms: Concept, Properties, Region of Convergence, and Applications; Solution of Difference Equations of Digital Filters, Block Diagram Representation of Linear Constant-Coefficient Difference Equations, Basic Structures of IIR Systems, Transposed Forms, Basic Structures of FIR Systems, System Function.

UNIT-IV IIR AND FIR DIGITAL FILTERS

Analog Filter Approximations-Butterworth and Chebyshev, Design of IIR Digital Filters from Analog Filters, Design Examples: Analog-Digital Transformations, Characteristics of FIR Digital Filters, Frequency Response. Design of FIR Digital Filters Using Window Techniques, Frequency Sampling Technique, Comparison of IIR and FIR Filters, Illustrative Problems.

UNIT-V MULTIRATE DIGITAL SIGNAL PROCESSING

Basic Sample Rate Alteration Devices, Multirate Structures for Sampling Rate Converters, Multistage Design of Decimator and Interpolator, Polyphase Decomposition, Nyquist Filters. Spectral Analysis of Nonstationary Signals, Musical Sound Processing, Signal Compression, Transmultiplexers, Discrete Multitone Transmission of Digital Data.

TEXT BOOKS:

1. Digital signal processing, principles, Algorithms and applications: John G. Proakis, Dimitris G. Manolakis, Pearson Education/PHI, 2007.
2. Digital signal processing , A computer base approach- Sanjit K Mitra, Tata McGraw Hill, 3rd edition, 2009.

REFERENCES:

1. Digital signal processing: Andreas Antoniou, TATA McGraw Hill, 2006.
2. A Text book on Digital Signal processing – R S Kaler, M Kulkarni, Umesh Gupta, I K International Publishing House Pvt. Ltd., 2009.
3. Digital signal processing: M H Hayes, Schaum's outlines, TATA Mc-Graw Hill, 2007.

OUTCOMES:

The student can be able to

- Design signal processer
- Realize various filters and finding solution for various filter designs
- Apply design procedures in various processing applications
- Understanding of different transformation techniques

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

III Year B.Tech II-Sem (EEE)	**L**	**T**	**C**
	3	**1**	**3**

COMPUTER AIDED POWER SYSTEM ANALYSIS

Objective:

The student will be able to

- Study about the Y bus and Z bus of a Power System, power flow studies by various methods.
- It also deals with short circuit analysis and analysis of power system for steady state and transient stability.

UNIT -I Power System Network Matrices-I

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

UNIT -II Power System Network Matrices-II

Formation of Z_{Bus}: Partial network, Algorithm for the Modification of Z_{Bus} Matrix for addition element for the following cases: Addition of element from a new bus to reference, Addition of element from a new bus to an old bus, Addition of element between an old bus to reference and Addition of element between two old busses - Modification of Z_{Bus} for the changes in network (Problems)

UNIT –III Power flow Studies

Derivation of Static load flow equations – Load flow solutions using Gauss Seidel Method: Algorithm and Flowchart. Acceleration Factor, Load flow Solution for Simple Power Systems (Max. 3-Buses): Newton Raphson Method in Rectangular and Polar Co-Ordinates Form: Load Flow Solution- Derivation of Jacobian Elements, Algorithm and Flowchart. Decoupled and Fast Decoupled Methods.- Comparison of Different Methods .

UNIT – IV Short Circuit Analysis

Symmetrical fault Analysis: Short Circuit Current and MVA Calculations, Fault levels, Application of Series Reactors. Symmetrical Component Theory:, Positive, Negative and Zero sequence components: Positive, Negative and Zero sequence Networks. Unsymmetrical Fault Analysis: LG, LL, LLG faults with and without fault impedance, Numerical Problems

UNIT –V Power System Stability Analysis

Elementary concepts of Steady State, Dynamic and Transient Stabilities. Derivation of Swing Equation, Power Angle Curve and Determination of Steady State Stability. Determination of Transient Stability by Equal Area Criterion, Application of Equal Area Criterion, Critical Clearing Angle Calculation. Numerical methods for solution of swing equation - Methods to improve Stability - Application of Auto Reclosing and Fast Operating Circuit Breakers.

TEXT BOOKS:

1. Computer Methods in Power Systems, Stagg El – Abiad & Stags.
2. Modern Power system Analysis – by I.J.Nagrath & D.P.Kothari: Tata McGraw-Hill Publishing Company, 2nd edition.

REFERENCE BOOKS:

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.

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

- Understand the mathematical models of power system components.
- Analyze and pick the best algorithm for a selected power system problem.
- Generate input data suitable for load flow.
- Understand the methods for load flow studies.
- Understand the fault calculations for various types of faults.
- Understand the power system stability concepts.

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III B. Tech -II Sem. (E.E.E)	**L**	**T**	**C**
	3	**1**	**3**

MICROPROCESSORS AND MICROCONTROLLERS

Objectives: The student can be able to learn about

- Architecture and designing of 8086 Microprocessor with Assembling language programming and interfacing with various modules
- Understands the 8051 Microcontroller concepts, architecture, programming, and various applications.

UNIT-I: INTRODUCTIO 8086 ARCHITECTURE

Historical background- 8-Bit Microprocessor - 8085 architecture and memory interfacing (RAM& ROM - Evolution of microprocessors. Architecture of 8086 microprocessor - special function of general purpose registers - 8086 flag registers and functions of 8086 flags.

UNIT-II: 8086 HARDWARE

Architecture of 8086 microprocessor, special function of general purpose registers. 8086 flag registers and functions of 8086 flags – Addressing modes of 8086 – Instruction set of 8086 – Assembler directives - Pin diagram 8086 – Minimum mode and maximum mode of operation. Timing diagrams.

UNIT III: ASSEMBLY LANGUAGE PROGRAMMING & I/O INTERFACE

Assembler directives – macros – simple programs involving logical – branch instructions – sorting – evaluating arithmetic expressions - string manipulations – 8255 PPI - various modes of operation and interfacing to 8086 - interfacing keyboard - display - stepper motor interfacing - A/D - D/A converter interfacing.

UNIT-IV: INTERFACING WITH ADVANCED DEVICES AND COMMUNICATION INTERFACE

Memory interfacing to 8086 – interrupt structure of 8086 – vector interrupt table – interrupt service routine – introduction to DOS and BIOS interrupts – interfacing interrupt controller 8259 - Need of DMA – DMA controller 8257 to 8086 – serial communication standards – serial data transfer schemes.

UNIT V: 8051 MICRO CONTROLLER PROGRAMMING AND APPLICATIONS

Introduction to micro controllers, Functional block diagram, Instruction sets and addressing modes, interrupt structure – Timer – I/O ports – serial communication. Data transfer, manipulation, Control and I/O instructions – simple programming exercises skey board and display interface – Closed loop control of servo motor – stepper motor control.

OUTCOMES:

The student should have learnt about:

- Understand the basic architecture & pin diagram of 8086 microprocessor.
- Assembly language programming to perform a given task.
- Interrupt service routines for all interrupt types.
- Microcontroller and its applications
- Microprocessor and Microcontroller designing in various applications.

TEXT BOOKS

1. Advanced Microprocessor and Peripherals – A. K. Ray and K. M. Bhurchandi- TMH,2000
2. The 8051 Micro Controller Architecture, Programming and Applications – Kenneth J Ayala, Pearson International publishing (India).

REFERENCE BOOKS

1. Microprocessor and Interfacing - Douglas V Hall 2nd Edition , Tata McGrawhill-1992
2. Microprocessor – NILESH B BAHADURE – PHI, 2010.

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	3	**1**	**3**

POWER SEMICONDUCTOR CONTROLLED DRIVES

Objective: The student should learn about

- Operation of electric motor drives those are controlled from power electronic converters.
- Analyze the stable steady-state operation and transient dynamics of a motor-load system
- Analyze the operation of the chopper fed DC drive
- Gives the differences between synchronous motor drives and induction motor drives.

UNIT-I: Introduction

Electrical Drives, Parts of electrical Drives –Electrical motors, Power modulators, sources and control unit -dynamics of electrical drives -torque equation -equivalent values of drive parameters-components of load torques, types of load Torques–steady state stability –Load equalization.

UNIT-II: Control of Electrical Drives

Modes of operation- speed control and drive classifications- Closed loop control of Drives-current limit control, closed loop torque control, closed loop speed control, closed loop speed control of multi-motor drives- speed sensing-current sensing.

UNIT-III: DC motor drives

DC motors & their performance (shunt, series, compound, permanent magnet motor, universal motor, dc servomotor) –Braking –regenerative braking, dynamic braking, plugging –Transient analysis of separately excited motor –converter control of dc motors –analysis of separately excited & series motor with 1-phase and 3-phase converters –dual converter –analysis of chopper controlled dc drives –converter ratings and closed loop control.

UNIT-IV: Induction motor drives

Three-phase Induction Motors- Analysis and Performance- stator voltage control of induction motor –torque-slip characteristics –control by ac voltage controllers and soft start–stator frequency control –variable frequency operation –V/F control- Voltage Source Inverter Control-Current Source Inverter Control - Cycloconverter Control- rotor resistance control –slip torque characteristic- slip power recovery – Static scherbius drive- Static Kramer drive.

UNIT-V: Synchronous motor drives

Separate and self control of synchronous motors- operation of self controlled By VSI, CSI and Cycloconverters. Load commutated CSI fed synchronous motors- operation- waveforms- speed torque characteristics- Applications- Advantages and Numerical problems- Closed loop control operation of Synchronous motor drives.

Outcomes: The student should have learned about

- The choice of their electric drives system based on their applications.
- The operation of single and multi quadrant operation of electric drives.
- The type of an electric drive whether it is 1-Φ or 3-Φ rectifiers fed to DC motors as well as chopper fed to DC motors.
- The speed control methods for AC-AC & DC-AC converters fed to Induction motors and synchronous motors with their closed loop, and open loop operations.

Text Books:

1. Fundamentals of Electric Drives –by G K Dubey, alpha science Publications-2001.
2. Power Electronics –MD Singh and K B K hanchandani, Tata –McGraw-Hill Publishing Company, 1998.
3. Power Electronics- by Dr. P.S.Bhimbhra, kanna publications, 5th Edition.

Reference Books:

1. Modern Power Electronics and AC Drives by B.K.Bose, PHI Publications. Prentice Hall PTR- 2002.
2. Thyristor Control of Electric drives –Vedam Subramanyam Tata McGraw Hill Publilcations-2008.

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	3	**1**	**3**

NEURAL NETWORKS & FUZZY LOGIC APPLICATIONS

Objective:

The student will be able to understand:

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

UNIT – I: INTRODUCTION TO ARTIFICIAL INTILLEGENCE

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

UNIT – II: ARTIFICIAL NEURAL NETWORKS

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

UNIT – III: ANN APPLICATIONS TO ELECTRICAL SYSTEMS

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

UNIT – IV: FUZZY LOGIC

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

UNIT – V: FUZZY LOGIC APPLICATIONS TO ELECTRICAL SYSTEMS

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

Text Books:

1. S. N. Sivanandam, S. Sumathi and S. N. Deepa, “Introduction to Neural Networks using MATLAB”, McGraw Hill Edition, 2006.
2. Timothy J. Ross, “Fuzzy Logic with Engineering Applications”, Third Edition, WILEY India Edition, 2012.

References:

1. S. N. Sivanandam, S. Sumathi and S. N. Deepa, “Introduction to Fuzzy Logic using MATLAB”, Springer International Edition, 2013.
2. Yung C. Shin and Chengying Xu, “Intelligent System – Modeling, Optimization & Control, CRC Press, 2009.

Outcomes: The students acquire knowledge about:

- Artificial Intelligence techniques
- ANN Techniques and their concepts
- Role of ANN in various Applications
- Fuzzy Logic concepts and its role in various applications

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III B. Tech -II Sem. (E.E.E)	**L**	**P**	**C**
	0	**2**	**0**

ADVANCED ENGLISH LANGUAGE COMMUNICATION SKILLS LAB
(Audit Course)

1. Introduction:

In the past engineering education has focused only on imparting "hard" or technical skills. With the entry of multinational companies in India there is a revolutionary change in the employment opportunities and recruitment process as well. Globalization demands universities to produce engineers who are equipped with effective interpersonal skills to meet global demands.

In this scenario the **Advanced English Language Communication skills lab** introduced at the 3rd B. Tech. level plays a key role to learn the foreign language in a happy atmosphere and in a successful way. Breaking through the traditional method of teaching, this course motivates student's learning attitude by providing an interactive learning environment.

This course is developed on the methodology of LSRW skills along with soft skills. This course focuses on the practical aspects of listening, speaking, reading and writing that enable the students to expose to various activities like group discussions, Oral Presentations, Mock interview sessions etc., Personality development, etiquettes and to provide corporate knowledge to help the students in facing interviews in a formal organizational set up.

2. Objectives:

This lab focuses on using computer-aided multimedia instruction for language development to meet the following targets:

- To expose the students to a variety of self instructional, learner-friendly modes of language learning.
- To enable the students to learn better pronunciation and accent through listening and reading exercises.
- To train students to use language appropriately for interviews, group discussion and public speaking.
- To initiate them to greater use of the computer in resume preparation, format-making etc.
- To help the students to cultivate the habit of reading passages from the computer monitor, thus providing them with the required facility to face computer based competitive exams such as GRE, TOFEL, and GMAT etc.

- To enable the students to acquire good communication skills as well as soft skills to meet global demands.

3. Syllabus:

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

Unit I:

Reading &Listening Comprehension: Skimming –scanning- Extensive and Intensive reading. Reading for making inferences. Active VS passive listening. Listening and Note taking, - Listening for making inferences.

. **Unit II:**

Writing Skills: Formal and informal writing- Resume Writing-E-Correspondence.

. **Unit III:**

Technical Presentations (Oral) : Planning-Preparation-Presentation . Art of Persuasion- Audience analysis- Handling questions.

.

Unit IV:

Interview Skills: Types of Interviews - pre-interview planning- answering strategies. Analysis of One to one –interviews – group interviews - Mock interviews.

Unit V:

Soft Skills: Inter Personal Skills- Goal setting – Etiquettes and good manners – Team Working – Work Ethics--Time management – Problem Solving.

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Minimum Requirements

The English Language Lab shall have two parts:

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.

The Communication Skills Lab with movable chairs and audio-visual aids with a PA System, a TV, a digital stereo-audio and video system, a Camcorder, etc

System Requirement (Hardware Component):

Computer network with LAN with a minimum of 60 multimedia systems with the following specifications:

P-IV Processor
Speed-2.8 GHZ
RAM_512 MB minimum
Hard Disk-80 GB
Headphones

Prescribed Software:

9. K-Van Advanced Communication Skills

10. Walden Infotech Advanced Communication Skills.

Books Suggested for English Language Lab Library (to be located within the lab in addition to the CDs of the text book which are loaded on the systems):

1. **Technical Writing and Professional Communication, Huckin and Olsen** Tata Mc Graw-Hil 2009.

2. **Technical Communication** by Meenakshi Raman & Sangeeta Sharma, Oxford University Press 2009.

3. **Cambridge English for Job-Hunting** by Colm Downes, Cambridge University Press, 2008

4. **Resume's and Interviews** by M.Ashraf Rizvi, Tata Mc Graw-Hill, 2008

5.. **English Language Communication : A Reader cum Lab Manual** Dr A Ramakrishna Rao, Dr G Natanam & Prof SA Sankaranarayanan, Anuradha Publications, Chennai 2008.

6. **Managing Soft Skills** by K R Lakshminarayan and T.Muruguvel, Sci-Tech Publications, 2010

7. **The ACE of Soft Skills** by Gopal Ramesh and Mahadevan Ramesh, Pearson Education, 2010

8. **Soft Skills** by Dr. K. Alex, S.Chand

9. **Study Skills for Professional Students in Higher Education** by Dr. M. Adithan, S.Chand.

10. **Personality Development and Soft Skills by Barun** K. Mitra, Oxford Higher Education.

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III B. Tech -II Sem. (E.E.E)	**L**	**P**	**C**
	0	**3**	**2**

MICROPROCESSORS AND MICROCONTROLLERS LAB

Objectives: The student will perform:

- Assembly language programming on 8086 Microprocessors
- Interfacing of various devices with 8086
- MASAM Programming
- Interfacing 8051 Microcontroller with its peripheral devices

I . Microprocessor 8086:

Introduction to MASM/TASM.

Arithmetic operation – Multi byte addition and subtraction, Multiplication and Division – Signed and unsigned Arithmetic operation, ASCII – arithmetic operation.

Logic operations – Shift and rotate – Converting packed BCD to unpacked BCD, BCD to ASCII conversion.

By using string operation and Instruction prefix: Move Block, Reverse string, Sorting, Inserting, Deleting, Length of the string, String comparison.

Modular Program: Procedure, Near and Far implementation, Recursion.

Dos/BIOS programming: Reading keyboard (Buffered with and without echo) – Display characters, Strings.

II. Interfacing

8259 – Interrrupt Controller.

8279 – Keyboard Disply.

8255 – PPI.

8251 – USART.

III. Mcrocontroller 8051:

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

Outcomes: The student able to perform:

- Assembly language programming on 8086 Microprocessors
- Interfacing of various devices with 8086
- MASAM Programming
- Interfacing 8051 Microcontroller with its peripheral devices

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III B. Tech -II Sem. (E.E.E)	**T**	**P**	**C**
	0	**3**	**2**

POWER ELECTRONICS AND SIMULATION LAB

Objectives: The student will understand about

- Various characteristics of power electronic devices with gate firing circuits
- Various forced commutation techniques
- The operation of single-phase half & fully-controlled converters, and inverters with different types of loads
- The operation of single-phase AC Voltage controllers with different loads
- Experimentation and also by the PSPICE/PSIM

Any Eight of the Experiments in Power Electronics Lab

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

Any two simulation experiments with PSPICE/PSIM

PSPICE simulation of single-phase full converter using RLE loads and single-phase AC voltage controller using RLE loads.

PSPICE simulation of resonant pulse commutation circuit and Buck chopper.

PSPICE simulation of single phase Inverter with PWM control.

Outcomes:

The student should have learned about

- The study of various power electronic devices and their commutation circuits
- The voltage and current characteristics of various converters and inverters at different firing angles
- The study of different types converters and inverters with different types of loads
- The PSPICE/PSIM programming for various power electronic devices.

REFERENCE BOOKS:

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 Books user's manual and – Mathworks, USA.

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Course Structure for B. Tech (Electrical and Electronics Engineering) (2013-14)

IV B. Tech (EEE) – I Sem

S.No	Course Code	Subject	L	T	P	Credits
1	PC	Electric Power Distribution Systems	3	1	0	3
2	PC	Instrumentation	3	1	0	3
3	PC	Introduction to HVDC Transmission & FACTS	3	1	0	3
4	PC	Power System Operation and Control	3	1	0	3
5	OE	Open Elective 1) PLC & Its Applications 2) Renewable Energy Sources 3) Linear & Nonlinear Optimization Techniques 4) Reliability and Safety Engineering	3	1	0	3
6		**MOOC (Elective – I)**	3	1	0	3
7	PC	Digital Signal Processing Lab	0	0	3	2
8	PC	Power Systems & Simulation Lab	0	0	3	2
9		Project Part-A - Seminar	-	-	-	4
		Total	18	6	6	26

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ELECTRICAL AND ELECTRONICS ENGINEERING

IV - B.Tech -I-Sem (EEE)	**L**	**T**	**C**
	3	**1**	**3**

ELECTRIC POWER DISTRIBUTION SYSTEMS

Objectives: The student acquires knowledge about:

- The classification of distribution systems
- The technical aspects and design considerations in DC and AC distribution systems and their comparison
- Technical issues of substations such as, location, ratings and bus bar arrangements
- The causes of low power factor and methods to improve dependence of voltage on reactor power flow and methods of voltage control

UNIT – I GENERAL CONCEPTS

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

UNIT – II GENERAL ASPECTS OF D.C. DISTRIBUTION SYSTEMS

Classification of Distribution Systems - Comparison of DC vs AC and Under-Ground vs Over - Head Distribution Systems- Requirements and Design features of Distribution Systems.

Voltage Drop and power loss derivations in D.C Distributors for the following cases: Radial D.C Distributors fed at one end and at both ends (equal/unequal Voltages) and Ring Main Distributor, LVDC Distribution Network

A.C. DISTRIBUTION SYSTEMS

Design Considerations of Distribution Feeders: Radial and loop types of primary feeders, voltage levels, feeder loading; basic design practice of secondary distribution systems.

Voltage Drop and power loss derivations in A.C. Distributors for the following cases: Power Factors referred to receiving end voltage and with respect to respective load voltages.

UNIT – III SUBSTATIONS

Location of Substations: Rating of distribution substations, service area within primary feeders. Benefits derived through optimal location of substations.

Classification of substations: Air insulated substations - Indoor & Outdoor substations: Substation layout showing the location of all the substation equipment.

Bus bar arrangements in Sub-Stations: Simple arrangements like single bus bar, sectionalized single bus bar, main and transfer bus bar, Double breaker – One and half breaker system with relevant diagrams, Lightening arrestors, Grounding practices

UNIT – IV POWER FACTOR IMPROVEMENT and VOLTAGE CONTROL

Causes of low P.F -Methods of Improving P.F -Phase advancing and generation of reactive KVAR using static Capacitors-Most economical P.F. for constant KW load and constant KVA type loads- Capacitive compensation for power-factor control - effect of shunt capacitors (Fixed and switched) and other compensating devices, Power factor correction- Economic justification - Procedure to determine the best capacitor location-Numerical Problems.

Dependence of Voltage on Reactive Power flow.- Methods of Voltage Control: Shunt Capacitors, Series Capacitors, Synchronous Capacitors, Tap changing and Booster Transformers

UNIT – V PROTECTION AND COORDINATION OF DISTRIBUTION SYSTEMS

Objectives of distribution system protection, types of common faults and procedure for fault calculations. Protective Devices: Principle of operation of Fuses, Circuit Reclosures, line sectionalizer, and circuit breakers. Coordination of Protective Devices: General coordination procedure.

Outcomes: Student should have learnt about:

- Design aspects and computational procedures for DC and AC Distribution systems
- Important phenomena regarding substations such as, ratings, optimal location, layout of equipment, various types of busbar arrangements
- Dependence of voltage on reactive power flow and methods of voltage control

TEXT BOOK:

1."Electric Power Distribution system, Engineering" – by Turan Gonen, Mc Graw-hill Book Company.

2. Electric Power Distribution – by A.S. Pabla, Tata Mc Graw-hill Publishing company, 4th edition, 1997.

REFERENCE BOOK:

1. Electrical Power Distribution and Automation by S.Sivanagaraju, V.Sankar, Dhanpat Rai & Co, 2006

2. Electrical Power Distribution Systems by V.Kamaraju, Right Publishers.

3.Principles of Power Systems by V.K.Mehta

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IV B.Tech -I Sem. (E.E.E)	**L**	**T**	**C**
	3	**1**	**3**

INSTRUMENTATION

Objectives: The student able to learn about:

- Measuring system, Common errors, test signals and modulation phenomenon
- Data acquisition system
- Measuring meters and analyzers
- Basic transducers and their usage in various measurements

UNIT-I: INSTRUMENT ERRORS, SIGNALS AND THEIR REPRESENTATION

Measuring Systems, Performance Characteristics, - Static Characteristics, Dynamic Characteristics; Errors in Measurement – Gross Errors, Systematic Errors, Statistical Analysis of Random Errors. Signal and Their Representation: Standard Test, Periodic, Aperiodic, Modulated Signal, Sampled Data, Pulse Modulation and Pulse Code Modulation.

UNIT-II: DATA TRANSMISSION, TELEMETRY AND DAS

Methods of Data Transmission – General Telemetry System . Frequency Modulation System (FM), Pulse Modulation (PM), Pulse Amplitude Modulation (PAM), Pulse Code Modulation (PCM) Telemetry. Comparison of FM, PM, PAM and PCM. Analog and Digital Acquisition Systems – Components of Analog DAS – Types of Multiplexing Systems: Time Division and Frequency Division Multiplexing – Digital DAS – Block Diagram — Modern Digital DAS (Block Diagram)

UNIT-III: SIGNAL ANALYZERS

Wave Analysers- Frequency Selective Analyzers, Heterodyne, Application of Wave Analyzers- Harmonic Analyzers, Total Harmonic Distortion, Spectrum Analyzers, Basic Spectrum Analyzers, Spectral Displays, Vector Impedance Meter, Q Meter. Peak Reading and RMS Voltmeters.

UNIT-IV: TRANSDUCERS

Definition of Transducers, Classification of Transducers, Advantages of Electrical Transducers, Characteristics and Choice of Transducers; Principle Operation of Resistor, Inductor, LVDT and Capacitor Transducers; LVDT Applications, Strain Gauge and Its Principle of Operation, Guage Factor, Thermistors, Thermocouples, Synchros, Piezo Electric Transducers, Photovoltaic, Photo Conductive Cells, Photo Diodes.

UNIT-V: MEASUREMENT OF NON-ELECTRICAL QUANTITIES

Measurement of strain, Gauge Sensitivity, Displacement, Velocity, Angular Velocity, Acceleration, Force, Torque, Temperature, Pressure, Flow, Liquid level.

TEXT BOOKS:

1. Transducers and Instrumentation by D.V.S Murthy, Prentice Hall of India, 2004.
2. A course in Electrical and Electronic Measurements and Instrumentation, A.K. Sawhney, Dhanpat Rai & Co., 2012.

REFERENCE BOOKS:

1. Electronic Instrumentation-by H.S.Kalsi Tata MCGraw-Hill Edition, 3/e., 2010.
2. Modern Electronic Instrumentation and Measurement techniques – by A.D Helfrick and W.D.Cooper, Pearson/Prentice Hall of India., 1990.
3. Industrial Instrumentation – Principles and Design by T. R. Padmanabhan, Springer, 3rd re print, 2009.

Outcomes: The student should have learnt about:

- Measuring systems, error measurements, test signals, different types of data transmission and modulation techniques
- Basic operation of DAS
- Various measuring meters and signal analyzers
- Transducers and their measurements

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IV Year B. Tech EEE I-Sem	**L**	**T**	**C**
	3	**1**	**3**

INTRODUCTION TO HVDC TRANSMISSION & FACTS

Objectives:

The objectives of this course include:

- To learn about the comparison of AC and DC transmission systems and operation of different HVDC converters.
- To know about harmonics and filters.
- To know about sources of reactive power and its control.
- To learn about operation of different FACTS devices and their applications.
-

UNIT-I INTRODUCTION

Comparison of AC and DC Transmission systems, Application of D.C. Transmission, Types of DC links, Typical layout of a HVDC converter station. HVDC converters, pulse number, Analysis of 6 - pulse Bridge circuit with and without overlap, converter Bridge characteristics, equivalent circuits of Rectifier and inverter configurations 12- pulse converters, Principles of DC links control, converter control characteristics, system control Hierarchy, Firing angle control, current and extinction Angle control starting and stopping of DC link.

UNIT -II HARMONICS, FILTERS AND REACTIVE POWER CONTROL

Introduction, generation of Harmonics, AC and DC Filters, Reactive power requirements at steady state, sources of Reactive power, static Var systems.

UNIT - III TYPES OF FACT DEVICES

Objectives of shunt compensation, Methods of controllable VAR generation, Static VAR compensators, SVC and STATCOM, Comparison

UNIT - IV STATIC SERIES COMPENSATORS

Objectives of series compensation, variable impedance type-thyristor switched series capacitors (TCSC), switching converter type series compensators – static synchronous series compensator (SSSC) – power angle characteristics – Basic operating control Schemes.

UNIT - V COMBINED COMPENSATORS

Introduction, unified power flow controller (UPFC), Basic operating principle, Independent real and reactive power flow controller, control structure.

Outcomes:

After completion of the course the student will able to;

- Understand the operation of HVDC converters.
- Know the effect of harmonics and filters as a remedy.
- Understand about FACTS devices and their applications.

TEXT BOOKS:

1. HVDC power Transmission systems by K.R. Padiyar, Wiley Eastern Limited
2. Understanding of FACTS by N.G. Hingorani & L. Gyugyi, IEEE Press.
3. Flexible AC Transmission Systems (FACTS) Young Huasong & Alian T. hons, The Institution of Electrical Engineers, IEE Power and Energy Series 30.
4. An Introduction to: Reactive Power Control and Voltage Stability in Power Transmission Systems by Abhijit Chakrabarti, D. P. Kothari, A. K. Mukhopadhyay and Abhinandan De, Eastern Economy Edition, 2010.

REFERENCE BOOKS:

1. **EHVAC, HVDC Transmission & Distribution Engineering,** S.Rao,Khanna publishers, 3rd edition 2003.
2. **Power Electronic Control in Electrical Systems-** E Acha. VG Agelidis & O Anaya-Lara. THE Miller – Elsevier, 2009.

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IV B. Tech -I Sem. (E.E.E)	**L**	**T**	**C**
	3	**1**	**3**

POWER SYSTEM OPERATION AND CONTROL

Objectives:

The objectives of this course include:

- To learn about economic operations of Power Systems.
- To know about hydrothermal scheduling and modeling of turbines, generators and automatic controllers.
- To know about single area and two area load frequency control and reactive power control.
- To learn about introduction and key issues of power system deregulation.

UNIT – I Economic Operation of Power Systems

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

UNIT – II Hydrothermal Scheduling and Governing

Optimal scheduling of Hydrothermal System: Hydroelectric power plant models, Scheduling problems-Short term Hydrothermal scheduling problem, Modeling of Turbine: First order Turbine model, Block Diagram representation of Steam Turbines and Approximate Linear Models. Modeling of Governor: Mathematical Modeling of Speed Governing System – Derivation of small signal transfer function – Block Diagram.

UNIT – III Load Frequency Control

Definitions of Control area – Single area control – Block diagram representation of an isolated power system – Steady state analysis – Dynamic response – Uncontrolled case. Load frequency control of 2-area system – uncontrolled case and controlled case, tie-line bias control, Proportional plus Integral control of single area and its block diagram representation, steady state response – Load Frequency Control and Economic dispatch control.

UNIT – IV 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.

UNIT – V Power System Restructuring

Introduction – Need for Regulation – Motivation for Power System Restructuring – Structure of Deregulated system.

Outcomes:

After completion of the course, the student will able to;

- Understand the economic operations of Power Systems.
- Get the knowledge on hydrothermal scheduling and modeling of turbines, generators and automatic controllers.
- Understand single area and two area load frequency control and reactive power control.
- Get knowledge on introduction and key issues of power system deregulation.

TEXT BOOKS:

1. Power Systems Operation and Control – Chakravarthi, Halder
2. Modern Power System Analysis – by I.J.Nagrath & D.P.Kothari Tata M Graw – Hill Publishing Company Ltd, 2nd edition.
3. Electric Energy Systems by O I Elgerd.

REFERENCE BOOKS:

1. Power System Analysis and Design by J.Duncan Glover and M.S.Sarma., THOMPSON, 3rd Edition.
2. Electric Power Generation, Transmission and Distribution, S N Sing, PHI, 2008.

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	3	**1**	**3**

PLC & ITS APPLICATIONS
(OPEN ELECTIVE)

Objectives: The student will be able to learn about:

- PLC and its basics, architecture, connecting devices and programming
- Implementation of Ladder logic for various Industrial applications
- Designing of control circuits for various applications
- PLC logical and arithmetic operations

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 & 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 & Industrial Applications, 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 & Sweep Functions and Their Applications. Bit Pattern and Changing a Bit Shift Register, Sequence Functions and Applications, Controlling of Two-Axis & Three Axis Robots With PLC, Matrix Functions.

UNIT-V

Analog PLC Operation, Types of PLC Analog Modules and Systems, PLC Analog Signal Processing, BCD or Multibit data Processing, Analog output application examples, PID Modules, PID Tuning, Typical PID Functions, PLC Installation, Troubleshooting and Maintanance.

Text Books:

1. Programmable Logic Controllers- Principles and Applications by John W. Webb & Ronald A. Reiss, Fifth Edition, PHI, 2011.

Outcomes: The student should have learnt about:

- PLC and its basics, architecture, connecting devices and programming
- Implementation of Ladder logic for various Industrial applications
- Designing of control circuits for various applications
- PLC logical and arithmetic operations

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IV B. Tech -I Sem. (E.E.E)	**L**	**T**	**C**
	3	**1**	**3**

RENEWABLE ENERGY SOURCES
(OPEN ELECTIVE)

OBJECTIVES: The student will be able to learn about:

- Basic renewable energy sources.
- The development of solar energy by solar radiation.
- The development of wind energy
- The applications of solar & wind energy systems
- The study of bio-mass, geothermal and ocean energy technology.

UNIT - I:
Introduction, problems associated with fossil fuel based energy options, need for alternate sources of energy, present energy scenario, Role and potential of new and renewable energy sources.

UNIT - II:
Basic characteristics of sunlight – Solar energy resource - Flat plate and concentrating collectors – advanced collectors - Photovoltaic cell - characteristics – Equivalent circuit – Photo voltaic for battery charging - Solar Applications- solar heating/cooling technique, solar distillation and drying.

UNIT - III:
Wind source – Wind statistics - Energy in the wind – Aerodynamics - Rotor types – Forces developed by blades - Aerodynamic models – Braking systems – Tower - Control and monitoring system – Power performance. Horizontal and vertical axis windmills, performance characteristics Wind driven induction generators - Power circle diagram - Steady state performance – Modeling - Integration issues – Impact on central generation - Transmission and distribution systems – Wind farm electrical design.

UNIT - IV:
Wind - Diesel systems - Fuel savings - Permanent magnet alternators – Modeling – Steady state equivalent circuit - Self-excited induction generators – Integrated wind - Solar systems.

UNIT - V:
Micro-hydel electric systems – Power potential – Scheme layout – Generation efficiency and turbine part flow - Isolated and parallel operation of generators – Geothermal - tidal and OTEC systems - Hydrogen energy concept, production and storage of hydrogen, utilization of hydrogen, safety measures - Introduction to sources of energy from nuclear power biomass, ocean and geothermal energy.

TEXT BOOKS:

1. S.P. Sukhatme, Solar Energy – Thermal Collection and Storage, Tata-Mc Graw Hill New Delhi, 1984.
2. G.D.Rai, Non-conventional Energy Sources, Khanna Publishers, New Delhi, 1999.
3. El Wakil, Power Plant Technology, Tata Mc Graw Hill, New York, 1999.

REFERENCE BOOKS:

1. Arora and S.Domkundwar, A Course in Power Plant Engineering, Dhanpat Rai and Sons, New Delhi 1998.
2. Ed Nejat Vezirog, Alternate Energy Sources, Mc Graw Hill, New York.
3. John F.Walker & Jenkins. N , Wind Energy Technology, John Wiley and sons, Chichester , U.K , 1997.
4. Van Overstraeton and Mertens R.P, Physics, Technology and Use of Photovoltaics, Adam Hilger, Bristol,1996.
5. Freries LL , Wind Energy Conversion Systems, Prentice Hall, U.K., 1990.

OUTCOMES: The student should have learned about:

- Understands the principles of wind power and solar photovoltaic power generation, fuel cells.
- Evaluate the cost of generation for conventional and renewable energy plants.
- Design suitable power controllers for wind and solar applications.
- Study of Ocean & Geo-thermal power plants

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IV B. Tech -I Sem. (E.E.E)	**L**	**T**	**C**
	3	**1**	**3**

LINEAR AND NONLINEAR OPTIMIZATION TECHNIQUES
(OPEN ELECTIVE)

Objectives:
The student will be able to learn:

- The basic concepts of Optimization
- The emphasis of this course is laid different classical Optimization techniques, linear programming, Constrained and unconstrained Nonlinear programming.

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

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

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

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

UNIT – V Constrained Nonlinear & Dynamic Programming:

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

OUTCOMES:

The student gets thorough knowledge on:

- Basic theoretical principles in optimization, formulation of optimization models, solution methods in optimization
- Methods of linear and non-linear (constrained and unconstrained) programming
- Applications to a wide range of engineering problems.

TEXT BOOKS:

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

REFERENCE BOOKS:

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

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IV B. Tech -I Sem. (E.E.E)	**L**	**T**	**C**
	3	**1**	**3**

RELIABILITY AND SAFETY ENGINEERING
(OPEN ELECTIVE)

Objectives:
The objectives of this course include:

- To introduce the concepts of system reliability and safety.
- To learn about reliability block diagram, markov models, fault tree analysis, monte carlo simulation and dynamic reliability analysis.
- To know about probabilistic safety assessment procedure, identification of hazards and initiating events.
- To learn about event tree analysis, importance measures, common-cause failure analysis and human reliability analysis.
- To learn about various applications of probabilistic safety analysis.
- To learn about uncertainty management in reliability assessment.

UNIT I: BASIC RELIABILITY CONCEPTS

Introduction, Need for Reliability and Safety Engineering, Definitions and Terms, Basic Reliability Mathematics - Classical Set Theory and Boolean Algebra, Concepts of Probability Theory, Reliability and Hazard Functions, Distributions Used in Reliability and Safety Studies, Failure Data Analysis, Numerical Problems.

UNIT II: SYSTEM RELIABILITY MODELING

Reliability Block Diagram, Markov Models, Fault Tree Analysis, Monte Carlo Simulation, Dynamic Reliability Analysis, Numerical Problems.

UNIT III: PROBABILISTIC SAFETY ASSESSMENT

Introduction, Concept of Risk and Safety, Probabilistic Safety Assessment Procedure, Identification of Hazards and Initiating Events, Event Tree Analysis, Importance Measures, Common-cause Failure Analysis, Human Reliability Analysis.

UNIT IV: APPLICATIONS OF PROBABILISTIC SAFETY ASSESSMENT

Objectives of Probabilistic Safety Assessment, Probabilistic Safety Assessment of Nuclear Power Plants, Technical Specification Optimization, Risk Monitor, Risk-informed In-service Inspection.

UNIT V: UNCERTAINTY MANAGEMENT IN RELIABILITY/SAFETY ASSESSMENT

Mathematical Models and Uncertainties, Uncertainty Analysis: an Important Task of Probabilistic Risk/Safety Assessment, Methods of Characterizing Uncertainties, Uncertainty Propagation, Uncertainty Importance Measures, Treatment of Aleatory and Epistemic Uncertainties, Dempster – Shafer Theory, Probability Bounds Approach, Bayesian Approach, Expert Elicitation Methods, Case Study to Compare Uncertainty Analysis Methods, Numerical Problems.

TEXT BOOK:

1. Reliability and Safety Engineering – by Ajit Kumar Verma, Srividya Ajit, Durga Rao Karanki, Springer Publications, 2010.

REFERENCE BOOKS:

1. Roy Billinton and Ronald N. Allan, Reliability Evaluation of Engineering Systems, Pitman Advanced Publishing Program, 2nd Edition 1998.
2. Charles E. Ebeling , Reliability and Maintainability Engineering, Tata McGraw Hill, 2000
3. E. Balagurusamy, Reliability Engineering, Tata McGraw Hill, 2003.
4. A. K. Gupta, Reliability, Maintenance & Safety Engineering, University Science Press, 2013.

Outcomes:

After completion of the course the student will able to;

- Understand the concepts of system reliability and safety.
- Get knowledge on reliability block diagram, markov models, fault tree analysis, monte carlo simulation and dynamic reliability analysis.
- Understand the probabilistic safety assessment procedure, identification of hazards and initiating events.
- Familiar with event tree analysis, importance measures, common-cause failure analysis and human reliability analysis.
- Get knowledge on various applications of probabilistic safety analysis.
- Understand about uncertainty management in reliability assessment.

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	0	**3**	**2**

DIGITAL SIGNAL PROCESSING LAB

OBJECTIVES:

- To implement the processing techniques using the instructions of DSP Processor
- To implement various filters using MATLAB Programming.

SIMULATION IN MATLAB

1. Generation of Signals
2. Linear and circular convolution of two sequences
3. Sampling and effect of aliasing
4. Design of FIR filters
5. Design of IIR filters
6. Calculation of FFT of a signal
7. Decimation by polyphase decomposition.

USING PROCESSOR

8. Study of various addressing modes of DSP using simple programming examples.
9. Implementation of Linear and Circular Convolution.
10. Sampling of input signal and display.
11. Waveform generation.
12. Implementation of FIR filter

OUTCOMES: The student can be able to perform:

- Programming concepts to implement various digital filters
- Generation of signals and their processing
- Interfacing of DSP processor with other peripherals

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	0	**3**	**2**

POWER SYSTEMS & SIMULATION LAB

Objectives:

The objectives of this course include:

- To do the experiments (in machines lab) on various power system concepts like determination of sequence impedance, fault analysis, finding of subtransient reactances.
- To draw the equivalent circuit of three winding transformer by conducting a suitable experiment.
- To develop the MATLAB program for formation of Y and Z buses.
- To develop the MATLAB programs for gauss-seidel and fast decouples load flow studies.
- To develop the SIMULINK model for single area load frequency problem.

1. Determination of Sequence Impedances of Cylindrical Rotor Synchronous Machine.
2. Fault Analysis – I
   LG Fault
   LL Fault
3. Fault Analysis – II
   LLG Fault
   LLLG Fault
4. Determination of Sub transient reactances of salient pole synchronous machine.
5. Equivalent circuit of three winding transformer.
6. Y bus formation using MATLAB
7. Z Bus formation using MATLAB
8. Gauss-Seidel load flow analysis using MATLAB
9. Fast decoupled load flow analysis using MATLAB
10. Develop a Simulink model for a single area load frequency problem and Simulate the same.

Outcomes:

After completion of the course the student will able to;

- Get the practical knowledge on calculation of sequence impedance, fault currents, voltages and sub transient reactances.
- Get the practical knowledge on how to draw the equivalent circuit of three winding transformer.
- Get the practical knowledge on development of MATLAB program for formation of Y and Z buses.
- Get the practical knowledge on development of MATLAB programs for gauss-seidel and fast decouples load flow studies.

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Course Structure for B. Tech (Electrical and Electronics Engineering) (2013-14)

IV B. Tech (EEE)– II Sem

S.No	Course Code	Subject	L	T	P	Credits
1	PC	Introduction to Power Quality	**3**	**1**	**0**	3
2	HS	Utilization of Electrical Energy	3	1	0	3
3	PE	Elective-II 1) Modern Control Theory 2) Reliability Engineering and its Application to Power Systems 3) Power System Deregulation 4) Switched Mode Power Converters	3	1	0	3
4	PE	Elective-III 1) Electricity Act and Costing of Electrical Systems 2) High Voltage Engineering 3) Introduction to Distributed Generation & Smart Grid 4) Energy Auditing & Demand Side Management	3	1	0	3
5		Seminar - Comprehensive Viva-Voce	-	-	-	3
6		Project Part-B	-	-	-	10
		Total	12	4	0	25

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IV B. Tech -II Sem. (E.E.E)	**L**	**T**	**C**
	3	**1**	**3**

INTRODUCTION TO POWER QUALITY

Objectives

The objectives of this course include:

- To know about introduction on power quality issues.
- To learn about voltage disturbances and power transients that are occurring in power systems.
- To know the concept of harmonics in the system and their effect on different power system equipment.
- To know about different power quality measuring and monitoring concepts.

UNIT-I INTRODUCTION

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

UNIT-II VOLTAGE SAGS AND TRANSIENT OVER VOLTAGES

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

UNIT-III FUNDAMENTALS OF HARMONICS

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

UNIT-IV LONG-DURATION VOLTAGE VARIATIONS

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

UNIT-V POWER QUALITY BENCH MARKING AND MONITORING

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

Outcomes:

After completion of the course the student will able to;

- Understand the different power quality problems in the power system.
- Know about voltage variations and over voltage transients in the system and also know about the protection of over voltages.
- Understand the effect of harmonics in the system and about the equipment that are effected from the harmonics.
- Know the concepts on measuring and monitoring issues of power quality.

TEXT BOOKS:

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

2. Power quality by C. Sankaran, CRC Press

REFERENCE BOOKS:

1. Electrical systems quality Assessment by J. Arrillaga, N.R. Watson, S. Chen, John Wiley & Sons

2. Understanding Power quality problems by Math H. J. Bollen IEEE Press

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IV B. Tech –II Sem. (E.E.E)	**L**	**T**	**C**
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UTILIZATION OF ELECTRICAL ENERGY

Objectives:

- To make the students aware about the importance of maximizing the energy efficiency by optimum utilization of electrical energy.
- To ensure that the knowledge acquired can be applied in various fields such as electric heating, illumination, chemical processes and electric traction.
- To develop ability amongst the students to analyze the performance of arc furnaces, electric traction, different sources of light, illumination schemes, electric traction
- To provide knowledge about above processes and applications of these in practical world.

UNIT – I ILLUMINATION

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

UNIT – II ELECTRICAL HEATING & ELECTRIC WELDING

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

UNIT – III ELECTROLYTIC PROCESS

Basic principle of Electrolysis, Faradays laws of Electrolysis – **Numerical problems**, Applications of Electrolysis – **Electro deposition-manufacturing of chemicals – anodizing – electro polishing – electro cleaning – electro parting – electro metallurgy**, Power supply for Electrolysis.

UNIT – IV ELECTRIC TRACTION

Introduction –Traction Systems, Systems of Electric Traction- Advantages of Electric Traction, **Systems of Track Electrification**, Desirable features of Traction Motors – **Suitability of D.C. series motor, A.C. series motor, 3 phase induction motor and linear induction motor for traction**. Electric Braking in traction– Plugging, Rheostatic and Regenarative types – Suitability of different motors for braking, Temperature Rise and Load Equalization.

UNIT – V TRACTION MECHANICS

Types of services – urban – sub-urban and main line services, Speed-time curves of different services – trapezoidal and quadrilateral speed-time curves – Numerical Problems, Tractive effort, Power, Specific Energy Consumption- factors affecting Specific Energy Consumption, Mechanics of train movement - Adhesive weight and coefficient of adhesion – Problems.

Outcomes:

- Students will be able to understand the importance of maximizing the energy efficiency by its optimum utilization and mould their practical work in professional world accordingly.
- Students will be able to understand the performance of simple resistance furnaces, modern welding techniques, illumination schemes and electric traction.
- Students will get technical knowledge of various control devices and their use, in practical world.
- Students will be able to design above systems and apply them to real world usage.

TEXT BOOKS:

1. Utilization of Electrical Energy' by E. O. Taylor – Revised in S.I. Units by V.V.L.Rao, Orient Longman
2. Generation, Distribution and Utilization of Electrical Energy' by C. L. Wadhwa, Eastern Wiley Ltd.
3. 'Utilization of Electric Power and Electric Traction' by J.B. Gupta, S.K. Kataria and sons,Delhi.

REFERENCE BOOKS:

1. Art & Science of Utilization of electrical Energy – by H. Partab, Dhanpat Rai & Sons.
2. A text book on Power System Engineering' by A. Chakraborti, M. L. Soni, P. V. Gupta, U.S.Bhatnagar, Dhanpat Rai and Co.(P) Ltd – Delhi
3. Utilization of Electrical Power including Electric drives and Electric traction – by N.V.Suryanarayana, New Age International (P) Limited Publishers, 1996.
4. Utilization of Electrical Power – by R.K. Rajput, Laxmi publications.

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MODERN CONTROL THEORY

(ELECTIVE – II)

Objective: This course introduces

- To give an overview of system analysis and design based on state space.
- Stability analysis for linear and nonlinear systems.
- Design of state feedback control and observer.
- Design of adaptive control and optimal control problem.

UNIT – I STATE VARIABLE DISCRIPTION

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

UNIT – II POLE PLACEMENT OBSERVER

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

UNIT – III DESCRIBING FUNCTION AND PHASE-PLANE ANALYSIS

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

UNIT-IV STABILITY ANALYSIS

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

UNIT –V OPTIMAL AND ADAPTIVE CONTROL

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

Course Outcomes: At the end of the course the student will be able to

- Obtain the transfer functions for linear and non-linear systems.
- Obtain the State Space Modeling for linear time-invariant systems.
- Solve system state equations.
- Analyze the system stability.
- Apply optimal control to statement of the optimal control problems.
- Design an adaptive control

TEXT BOOKS:

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

REFERENCE BOOKS:

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

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RELIABILITY ENGINEERING AND APPLICATIONS TO POWER SYSTEMS
(ELECTIVE-II)

Objectives:
The objectives of this course include:

- To learn about the basic reliability concepts like probability theory, distribution function and network modelling.
- To know about different reliability functions and time dependent reliability evaluation of different networks.
- To know about Markov modelling and component repairable models for frequency and duration.
- To study about the reliability applications to power systems.

UNIT–I BASICS OF PROBABILITY THEORY, DISTRIBUTION & NETWORK MODELLING

Basic Probability Theory – Rules for Combining Probabilities of Events – Bernoulli's Trials – Probability Density and Distribution Functions – Binomial Distribution – Expected Value and Standard Deviation of Binomial Distribution. Analysis of Series, Parallel, Series-Parallel Networks – Complex Networks – Decomposition Method.

UNIT–II RELIABILITY FUNCTIONS

Reliability Functions F(T), F(T), R(T), H(T) and Their Relationships – Exponential Distribution – Expected Value and Standard Deviation of Exponential Distribution – Bath Tub Curve – Reliability Analysis of Series Parallel Networks Using Exponential Distribution – Reliability Measures MTTF, MTTR, MTBF.

UNIT–III MARKOV MODELLING AND FREQUENCY & DURATION TECHNIQUES

Markov Chains – Concept of Stochastic Transitional Probability Matrix, Evaluation of Limiting State Probabilities – Markov Processes One Component Repairable System – Time Dependent Probability Evaluation Using Laplace Transform Approach – Evaluation of Limiting State Probabilities Using Stpm – Two Component Repairable Models.

Frequency and Duration Concept – Evaluation of Frequency of Encountering State, Mean Cycletime, For One , Two Component Repairable Models – Evaluation of Cumulative Probability and Cumulative Frequency of Encountering of Merged States.

UNIT–IV APPLICATIONS TO GENERATING SYSTEMS

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, LOEE.

UNIT–V APPLICATIONS TO NETWORK

Transmission & Distribution System Reliability Analysis: System and Load Point Reliability Indices – Weather Effects on Transmission Lines, Weighted Average Rate and Markov Model. Basic Techniques - Radial Networks – Evaluation of Basic Reliability Indices, Performance Indices – Load Point and System Reliability Indices – Customer Oriented, Loss and Energy Oriented Indices -Examples.

Outcomes:

After completion of the course the student will able to;

- Understand the basic reliability concepts like probability theory, distribution function and network modeling.
- Know about different reliability functions and time dependent reliability evaluation of different networks.
- Understand concept of Markov modeling and component repairable models for frequency and duration.
- Know about the reliability applications to power systems.

TEXT BOOKS:

1. System Reliability Concepts by V. Sankar, Himalaya Publishing House, 2015.
2. Reliability Evaluation of Engg. System – R. Billinton, R.N.Allan, Plenum Press, New York, reprinted in India by B.S.Publications, 2007.
3. Reliability Evaluation of Power systems – R. Billinton, R.N.Allan, Pitman Advance Publishing Program, New York, reprinted in India by B.S.Publications, 2007.

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POWER SYSTEM DEREGULATION
(ELECTIVE – II)

Objectives:

The objectives of this course include:

- To learn about key issues of restructured power systems and its financial matters.
- To get knowledge on cost analysis, information on system operator and its duties.
- To know about ATC, TTC and different ancillary services.
- To learn about different cost allocation method in the power systems.

UNIT-I: KEY ISSUES IN ELECTRIC UTILITIES

Introduction – Restructuring models – Independent System Operator (ISO) – Power Exchange - Market operations – Market Power – Standard cost – Transmission Pricing – Management of Inter zonal/Intra zonal Congestion.

UNIT-II: OPEN ACCESS SAME-TIME INFORMATION SYSTEM (OASIS) & MARKET POWER

Structure of OASIS - Posting of Information – Transfer capability on OASIS. Market Power: Introduction - Different types of market Power – exercising of Market Power - Examples.

UNIT-III: AVAILABLE TRANSFER CAPABILITY (ATC) & ELECTRICITY PRICING

Transfer Capability Issues – ATC – TTC – TRM – CBM Calculations – Calculation of ATC based on power flow. Electricity Pricing: Introduction – Electricity Price Volatility Electricity Price Indexes – Challenges to Electricity Pricing – Construction of Forward Price Curves – Short-time Price Forecasting.

UNIT-IV: POWER SYSTEM OPERATION IN COMPETITIVE ENVIRONMENT

Introduction – Operational Planning Activities of ISO- The ISO in Pool Markets – The ISO in Bilateral Markets – Operational Planning Activities of a GENCO.

UNIT-V: TRANSMISSION COST ALLOCATION METHODS & ANCILLARY SERVICES MANAGEMENT

Introduction - Transmission Cost Allocation Methods : Postage Stamp Rate Method - Contract Path Method - MW-Mile Method – Unused Transmission Capacity Method - MVA-Mile method – Comparison of cost allocation methods. Ancillary Services Management: Introduction – Reactive Power as an Ancillary Service – a Review – Synchronous Generators as Ancillary Service Providers.

Outcomes:

After completion of the course the student will able to;

- Understand the key issues of restructured power systems and its financial matters.
- Know about cost analysis, information on system operator and its duties.
- Know about ATC, TTC and different ancillary services.
- Understand about different cost allocation method in the power systems.

TEXT BOOKS :

1. Kankar Bhattacharya, Math H.J. Boller and Jaap E.Daalder, Operation of Restructured Power System, Kulwer Academic Publishers, 2001.
2. Mohammad Shahidehpour and Muwaffaq alomoush, Restructured Electrical Power Systems, Marcel Dekker, Inc., 2001.

REFERENCE BOOKS:

1. Loi Lei Lai, Power System Restructuring and Deregulation, John Wiley & Sons Ltd., England.

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SWITCHED MODE POWER CONVERTERS
(ELECTIVE – II)

Objectives:

- To provide conceptual knowledge in modern power electronic converters and its applications in electric power utility.
- To make the student to analyze and control the various power converter circuits

UNIT I DC-DC CONVERTERS
Principles of stepdown and stepup converters – Analysis and state space modeling of Buck, Boost, Buck- Boost and Cuk converters.

UNIT II SWITCHING MODE POWER CONVERTERS
Analysis and state space modeling of flyback, Forward, Luo, Half bridge and full bridge converters- control circuits and PWM techniques.

UNIT III RESONANT CONVERTERS
Introduction- classification- basic concepts- Resonant switch- Load Resonant converters- ZVS, Clamped voltage topologies- DC link inverters with Zero Voltage Switching- Series and parallel Resonant inverters- Voltage control .

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

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

Text Book:

1. M.H. Rashid – Power Electronics handbook, Elsevier Publication, 2001.
2. Kjeld Thorborg, "Power Electronics – In theory and Practice", Overseas Press, First Indian Edition
2005.

REFERENCES:

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

Outcomes:

Upon completion of this course,

- The student learns the fundamental concepts of DC - DC Converters
- The student can analyze and control the various power converter circuits.

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ELECTICITY ACT AND COSTING OF ELECTRICAL SYSTEMS
(ELECTIVE – III)

Objective:

The student will be able to learn about:

- Domestic and Industrial wiring estimation
- Coasting and Contracting types
- Estimate the Transmission line, Overhead distribution and underground distribution based on IE Rules.

Unit-I Electrical Wiring

Types of wires Different types of wiring system and wiring procedure Merits, demerits and comparison of different types of wiring, Different types and specifications of wiring materials, Accessories and wiring tools Domestic and industrial panel wiring I.E. rules for wiring, including Electricity supply act-1948 Different types of wiring circuits.

Unit– II Estimating, Costing and Contracting

Estimation and estimation tools. Electrical Schedule of rates, catalogues, Survey and source selection, Recording estimates, Quantity and cost of material required. Purchase system, Purchase enquiry and selection of appropriate purchase mode, Comparative statement, Purchase orders, Payment of bills, Types of contract system. Tendering procedure and preparation of simple tender, Earnest Money Deposit, Security Deposit Schedule of rates (S.O.R.)

Unit– III Estimating and Costing of Domestic and Industrial wiring

Layout for domestic Wiring, Load calculation , Cable selection Earthing Selection of switchgear. Overall Estimating and costing, Layout for industrial Wiring, Load calculation, Cable selection, Earthing Selection of switchgear. Overall Estimating and costing.

Unit-IV Estimation of Overhead Transmission line

Transmission lines, Line supports, Factors governing height of pole, Conductor materials, size of conductor for overhead, Transmission line: cross arms, pole brackets and clamps, guys and stays, conductors configuration spacing and clearances, span lengths, overhead line insulators, insulator materials lightning arrestors, erection of supports, setting of stays, Earthling of lines, Guarding of overhead lines, Clearances of conductor from ground, Spacing between supports conductors, I.E. rules pertaining to LV transmission line

Unit- V Estimation of Distribution line Underground Distribution System

Describe Method of installation of service connection (1-phase and 3-phase), observing I.E. rules, Overhead distribution system. Materials and accessories required for the overhead distribution system. Estimate for 440 V, 3-phase, 4 wires or 3 wires overhead distribution system. Types of service connections, Method of installation of service connection(1-phase and 3-phase), I.E. rules pertaining to overhead lines and service connection

Underground distribution system. Materials and accessories required for underground distribution system. Estimate for 440 V, 3-phase, 4 wires or 3 wires underground distribution system. I.E. rules pertaining to underground system and service

Outcomes:

The student should able to:

1. Prepare an estimate of quantity and cost of the material for a electrical project
2. Prepare detail estimate and costing of Residential and commercial Electrical Installations
3. Test Residential, commercial and Industrial Electrical Installation
4. Prepare detail estimate and costing of a transmission line/Overhead and underground distribution project
5. Prepare estimates for repairs and maintenance of electrical devices and equipment.

TEXT BOOKS:

1. Electrical Design, estimating & Costing aina, K. B. and Bhattacharya,S.K New Age International (p) Limited, New Delhi
2. Electrical Estimating & costing Uppal, S L New Age International (p) New Delhi

REFERENCE BOOKS:

1. Electrical Installation Estimating & Costing Gupta, J.B. S. K. Kataria & Sons, New Delhi
2. Relevant IS Code for-service line connection, laying of cable, wiring installation NBC National Building Code- Vol-IV
3. E. rules for wiring, Electricity supply act-1948. Bureau of Indian Standards Electricity supply act-1948

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HIGH VOLTAGE ENGINEERING
(ELECTIVE – III)

Objectives:
The objectives of this course include:

- To learn about detailed analysis of breakdown occur in gaseous, liquids and solid dielectrics.
- To study about generation and measurement of high voltage and current.
- In addition to learn about high voltage testing methods.

UNIT-I BREAK DOWN IN GASEOUS, LIQUID & SOLID DIELECTRICS

Introduction to HV Technology, Need for Generating High Voltages in Laboratory. Industrial Applications of High Voltage, Electrostatic Precipitation, Separation.

Gases As Insulating Media, Collision Process, Ionization Process, Townsend's Criteria Of Breakdown in Gases, Paschen's Law, Liquid As Insulator, Pure and Commercial Liquids, Breakdown in Pure and Commercial Liquids.

Intrinsic Breakdown, Electromechanical Breakdown, Thermal Breakdown, Breakdown of Solid Dielectrics in Practice, Breakdown in Composite Dielectrics, Solid Dielectrics Used in Practice.

UNIT–II GENERATION OF HV AC AND DC VOLTAGES

HV AC-HV Transformer: Need for Cascade Connection and Working of Transformers Units Connected in Cascade. Series Resonant Circuit- Principle of Operation and Advantages - Tesla Coil - HV DC- Voltage Doubler Circuit, Cockroft- Walton Type High Voltage DC Set - Calculation of High Voltage Regulation, Ripple and Optimum Number of Stages for Minimum Voltage Drop.

UNIT–III GENERATION OF IMPULSE VOLTAGES

Introduction to Standard Lightning and Switching Impulse Voltages - Analysis of Single Stage Impulse Generator-Expression for Output Impulse Voltage - Multistage Impulse Generator Working of Marx Impulse Generator, Rating of Impulse Generator - Components of Multistage Impulse Generator - Triggering of Impulse Generator By Three Electrode Gap Arrangement - Trigatron Gap and Oscillograph Time Sweep Circuits, Generation of Switching Impulse Voltage - Generation of High Impulse Current.

UNIT–IV MEASUREMENT OF HIGH VOLTAGES:

Electrostatic Voltmeter-Principle, Construction and Limitation - Chubb and Fortescue Method for HV AC Measurement - Generating Voltmeter- Principle, Construction - Series Resistance Micro Ammeter for HV DC Measurements - Standard Sphere Gap Measurements of HVAC, HVDC And Impulse Voltages - Factors Affecting The Measurements - Potential Dividers-Resistance Dividers Capacitance Dividers Mixed RC Potential Dividers. Measurement of High Impulse Currents-Rogowsky Coil.

UNIT–V HIGH VOLTAGE TESTING TECHNIQUES

Dielectric Loss and Loss Angle Measurements Using Schering Bridge - Transformer Ratio Arms Bridge. Need for Discharge Detection and PD Measurements Aspects - Factors Affecting The Discharge Detection, Discharge Detection Methods-Straight and Balanced Methods. Tests on Isolators, Circuit Breakers, Cables, Insulators and Transformers.

TEXT BOOKS:

1. High Voltage Engineering by M.S.Naidu and V. Kamaraju – TMH Publications, 4th Edition, 2004.
2. High Voltage Engineering by C.L.Wadhwa, New Age Internationals (P) Limited, 1997.

REFERENCE BOOKS:

1. High Voltage Engineering: Fundamentals by E.Kuffel, W.S.Zaengl, J.Kuffel by Elsevier, 2nd Edition, 2000.
2. High Voltage Insulation Engineering by Ravindra Arora, Wolfgang Mosch, New Age International (P) Limited, 1995.
3. High Voltage Technology by L. L. Alston, OXFORD University Press, Second Edition, 2009.
4. High Voltage Engineering Problems & Solutions, R. D. Begamudre, New Age International Publishers, First Edt., 2010

Outcomes:

After completion of the course, the student will able to;

- Understand the detailed analysis of breakdown occur in gaseous, liquids and solid dielectrics.
- Know about generation and measurement of high voltage and current.
- Understand about high voltage testing methods.

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INTRODUCTION TO DISTRIBUTED GENERATION AND SMART GRID
(ELECTIVE – III)

Objectives:

The objectives of this course include:

- To study about various types of power generation resources to be connected in distributed generation system.
- To know the architecture of smart grid with integrated distribution generation with various plants.
- To get the knowledge on smart grid and how will gain the efficient power to the distributed end.

UNIT-I Introduction to Distributed Generation and Smart Grid

The development of the electrical power system - Value of distributed generation and network pricing – Smart Grids - Reasons for distributed generation - The future development of distributed generation - Distributed generation and the distribution system - Technical impacts of generation on the distribution system - Economic impact of distributed generation on the distribution system - Impact of distributed generation on the transmission system - Impact of distributed generation on central generation.

UNIT-II Distributed generation plant

Combined heat and power plants - Renewable energy generation - Small-scale hydro generation - Wind power plants - Offshore wind energy - Solar photovoltaic generation

UNIT-III Distributed generators and their connection to the system

Distributed generators - Synchronous generators - Induction generators - Doubly fed induction generator - Full power converter (FPC) connected generators - System studies - Load flow studies in a simple radial system - Load flow studies in meshed systems - Symmetrical fault studies - Unbalanced (asymmetrical) fault studies - Case studies - Steady-state voltages under peak and minimum loading - Electromagnetic transient studies

INTELLIGRID ARCHITECTURE FOR THE SMARTGRID:
Introduction- Launching intelligrid - Intelligrid today- Smart grid vision based on the intelligrid architecture-Barriers and enabling technologies.

UNIT-IV DC DISTRIBUTION
AC vs DC sources-Benefits of and drives of DC power delivery systems-Powering equipment and appliances with DC-Data centers and information technology loads-Future neighborhood-Potential future work and research.

UNIT-V SMART GRID TO EVOLVE A PERFECT POWER SYSTEM

Electricity network-Local energy networks- Electric transportation- Low carbon central generation-Attributes of the smart grid- Alternate views of a smart grid.
Overview of the perfect power system configurations- Device level power system- Building integrated power systems- Distributed power systems- Fully integrated power system-Nodes of innovation.

Outcomes: After completion of the course the student will able to;

- Understand about the distribution generation system connected with various power generation plants.
- Gain the knowledge on smart grid by various techniques for better efficiency in transmitting the power.
- Know about the integration of distribution generation with various plants to the smart grid.

TEXT BOOKS:

1. "Distributed Generation" by N.Jenkins, J.B. Ekanayake & G. Strbac
2. Clark W Gellings, "The Smart Grid, Enabling Energy Efficiency and Demand Side Response"- CRC Press, 2009.
3. Janaka Ekanayake, Kithsiri Liyanage,Jianzhong.Wu, Akihik Yokoyama, Nick Jenkins, "Smart Grid: Technology and Applications"- Wiley, 2012.

REFERENCES:

1. IEEE 1547. IEEE Standard for Interconnecting Distributed Resources with Electric Power Systems; 2003.
2. James Momoh, "Smart Grid :Fundamentals of Design and Analysis"- Wiley, IEEE Press, 2012.
3. Horlock J.H. Cogeneration: Combined Heat and Power Thermodynamics and Economics. Oxford: Pergamon Press; 1987.

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ENERGY AUDITING & DEMAND SIDE MANAGEMENT
(ELECTIVE – III)

Objectives:

The objectives of this course include:

- To learn about energy consumption and situation in India
- To learn about Energy Auditing.
- To aware of Energy Measuring Instruments.
- To understand the Demand Side Management.

UNIT - I INTRODUCTION TO ENERGY AUDITING

Energy situation – world and India, energy consumption, conservation, Codes, standards and Legislation. Energy audit- definitions, concept, types of audit, energy index, cost index, pie charts, Sankey diagrams, load profiles, Energy conservation schemes. Measurements in energy audits, presentation of energy audit results.

UNIT - II ENERGY EFFICIENT MOTORS & POWER FACTOR IMPROVEMENT

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. Power factor – methods of improvement, location of capacitors, Pf with non linear loads, effect of harmonics on p.f. , p.f motor controllers.

UNIT – III LIGHTING AND ENERGY MEASURING INSTRUMENTS

Good lighting system design and practice, lighting control ,lighting energy audit - Energy Measuring Instruments- watt meter, data loggers, thermocouples, pyrometers, lux meters, tongue testers ,application of PLC's

UNIT – IV ENERGY ECONOMIC ANALYSIS

The time value of money concept, developing cash flow models, payback analysis, depreciation, taxes and tax credit – numerical problems.

UNIT – V DEMAND SIDE MANAGEMENT

Introduction to DSM, concept of DSM, benefits of DSM, different techniques of DSM – time of day pricing, multi-utility power exchange model, time of day models for planning. Load management, load priority technique, peak clipping, peak shifting, valley filling, strategic conservation, energy efficient equipment. Management and Organization of Energy Conservation awareness Programs.

TEXT BOOK:

1. **Industrial Energy Management Systems,** Arry C. White, Philip S. Schmidt, David R. Brown, Hemisphere Publishing Corporation, New York.
1. **Fundamentals of Energy Engineering -** Albert Thumann, Prentice Hall Inc, Englewood Cliffs, New Jersey.
2. **Electrical Power distribution**, A S. Pabla, TMH, 5th edition, 2004
3. **Demand Side Management,** Jyothi Prakash, TMH Publishers.

REFERENCES:

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 hand book by W.C.Turner, John wiley and sons
5. Energy management and good lighting practice : fuel efficiency- booklet12-EEO
6. **Recent Advances in Control and Management of Energy Systems**, D.P.Sen, K.R.Padiyar, Indrane Sen, M.A.Pai, Interline Publisher, Bangalore, 1993.
7. **Energy Demand – Analysis, Management and Conservation,** Ashok V. Desai, Wiley Eastern, 2005.
8. **Hand book on energy auditing** - TERI (Tata Energy Research Institute)

Outcomes:

After completion of the course the student will able to;

- Understand the concepts of energy auditing
- Analyze efficiency of motors.
- Understand the concept of Demand side management