ACADEMIC REGULATIONS

B.TECH. Regular Four Year Degree Programme
(For the Batches admitted from the Academic Year 2014-15)
And
B.Tech. Lateral Entry Scheme
(For the batches admitted from the academic year 2015-16)

The following rules and regulations will be applicable for the batches of 4 year B.Tech degree admitted from the academic year 2014-15 onwards.

1. ADMISSION:

1.1 Admission into first year of Four Year B.Tech. Degree programme of study in Engineering:

As per the existing stipulations of A.P State Council of Higher Education (APSCHE), Government of Andhra Pradesh, admissions are made into the first year of four year B.Tech Degree programme as per the following pattern.

a) Category-A seats will be filled by the Convener, EAMCET.
b) Category-B seats will be filled by the Management as per the norms stipulated by Govt. of Andhra Pradesh.

1.2 Admission into the Second Year of Four year B.Tech. Degree programme (lateral entry).

As per the existing stipulations of A.P State Council of Higher Education (APSCHE), Government of Andhra Pradesh.

2. PROGRAMMES OF STUDY OFFERED BY AITS LEADING TO THE AWARD OF B.TECH DEGREE:

Following are the four year undergraduate Degree Programmes of study offered in various disciplines at Annamacharya Institute of Technology and Sciences, Rajampet (Autonomous) leading to the award of B.Tech (Bachelor of Technology) Degree:

1. B.Tech (Computer Science & Engineering)
2. B.Tech (Electrical & Electronics Engineering)
3. B.Tech (Electronics & Communication Engineering)
4. B.Tech (Information Technology)
5. B.Tech (Mechanical Engineering)
6. B.Tech (Civil Engineering)

and any other programme as approved by the concerned authorities from time to time.

3. ACADEMIC YEAR:

The institute shall follow Year-wise pattern for First year course and Semester pattern for II, III and IV years. An academic year shall consist of a first semester and a second semester from second year onwards.

The first year of four year B.Tech programme shall have duration to accommodate a minimum of 180 instruction days. From second year onwards each semester shall have 90 instruction days.

4. COURSE STRUCTURE:

Each programme of study shall consist of:

4.1 General Courses comprising of the following: (5 to 10%)

i. Language / Communication Skills
ii. Humanities and Social Sciences : Environmental Science
iii. Economics and Accounting
iv. Principles of Management

4.2 Basic Science Courses comprising of the following: (15 to 25%)

i. Computer Literacy with Numerical Analysis
ii. Mathematics
iii. Physics
iv. Chemistry

4.3 Basic Engineering Courses comprising of the following (depending on the branch) :(15 to 25%)

i. Engineering Drawing
ii. Engineering and IT Workshop
iii. Engineering Mechanics
iv. Basic Mechanical Engineering
v. Electrical and Electronics Engineering
vi. Basic civil Engineering
vii. Computer Programming

4.4 Compulsory Discipline Courses :(45 to 55%)

The lists of professional subjects are chosen as per the suggestions of the experts, to impart broad based knowledge needed in the concerned branch of study.

4.5 Elective Courses: (10 to 15%)

Electives will be offered to the students to diversify the spectrum of knowledge, based on the interest of the student to broaden his individual skill and knowledge.

4.6 In the final year first semester a subject like comprehensive Electrical & Electronics Engineering, with 2 hours / week is introduced.

4.7 Every programme of study shall be designed to have 42-44 theory courses and 19-22 laboratory/seminar/comprehensive courses.

4.8 Contact Hours: Depending on the complexity and volume of the course, the number of contact hours per week will be assigned.

5. CREDIT SYSTEM:

Credits are assigned based on the following norms.

	Year Pattern		Semester Pattern	
	Period(s)/ Week	Credits	Period(s)/ Week	Credit(s)
Theory	01	02	01	01
Practical	03	04	03	02
Comprehensive Electrical & Electronics Engineering	--	--	02	02
Seminar	--	--	01	01
Final Year Project	--	-	12	12

6. EXAMINATION SYSTEM: All components in any programme of study will be evaluated continuously through internal evaluation and an external evaluation component conducted as year-end/semester-end examination.

6.1 Distribution of Marks:

S. No		Marks	Examination and Evaluation	Scheme of Evaluation
1.	Theory	70	Year-end / Semester-end examination	The question paper shall be of descriptive type with 5 questions with internal choice are to be answered in 3hours duration of the examination.
		30	Mid - Examination of 120 Min. duration - Internal evaluation-20 marks. The question paper shall be of descriptive type with 4 questions with internal choice are to be answered. Remaining 10 marks for Assignments, 3-5 in number will be given and each assignment will be evaluated for 10 marks and average is considered.	**For I B Tech:** Three (03) mid exams, each for 20 marks are to be conducted. Two best performances to be considered. **Mid-I:** After first spell of instructions (I Unit) . **Mid-II:** After second spell of instructions (II & III Units) **Mid-III:** After third spell of instructions (IV & V Units) **For a Semester**: Two mid-exams 20 marks each are to be conducted. Better one to be considered. **Mid-I:** After first spell of instructions (I & II Units). **Mid-II:**After second spell of instructions (III to V Units).

S. No		Marks	Examination and Evaluation		Scheme of Evaluation
2	Laboratory, Design and / or drawing	70	Year-end / Semester-end Lab Examination		**For laboratory courses:** **3** hours duration – two examiners. For drawing and/ or Design: like for the theory examination.
		30	20	Day to Day evaluation	Performance in laboratory experiments
			10	Internal evaluation	Practical Tests (For first year two best out of three tests and for semester one best out of two tests)
3	Seminar	100	Internal Evaluation 20 Marks for Report 20 Marks for subject content 40 Marks for presentation 20 Marks for Question and Answers		Continuous evaluation during a semester by the Departmental Committee (DC)
4	Comprehensive Electrical & Electronics Engineering	100	The marks can be allotted based on the performance in viva-voce conducted by Head of the department and two senior faculty members in the department.		
5	Project Work	100	70	External evaluation	Semester-end Project Viva-Voce Examination by Committee as detailed under 6.2
			30	Internal evaluation	Continuous evaluation by the DC 15 Marks by DC as detailed under 6.2.1 15 Marks by Supervisor

6.2. Project Work Evaluation:

6.2.1 The Internal Evaluation shall be made by the Departmental Committee, on the basis of average of two seminars presented by each student on the topic of his project, the best one to be considered. The presentations shall be evaluated by the Departmental Committee (DC) consisting of Head of the Department, supervisor and a senior faculty member.

6.2.2 The Semester-End Examination (viva-voce) shall be conducted by a Committee consisting of External examiner nominated by the Chief Controller of Examinations, HOD and Supervisor. The evaluation of project work shall be conducted at the end of the IV year.

6.3. Eligibility to appear for the year-end / Semester-End examination:

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

6.3.2 Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in first year or each semester may be granted by the Institute Academic Committee if the reason for shortage is convincing.

6.3.3 Shortage of Attendance below 65% in aggregate shall in no case be condoned.

6.3.4 A stipulated fee shall be payable towards condonation of shortage of attendance to the Institute as per following slab system

1st Slab : Less than 75% attendance but equal to or greater than 70% a normal condonation fee can be collected from the student.

2nd Slab : Less than 70% but equal to or greater than 65%, double the condonation fee can be collected from the student.

6.3.5 Students whose shortage of attendance is not condoned in First year/any semester are not eligible to take their End examination of that class and their registration for that semester / year shall stand cancelled.

6.3.6 A student will not be promoted to the next semester unless he satisfies the attendance requirements of the current year/semester, as applicable.

6.3.7 A student detained due to shortage of attendance, will have to repeat that year/semester when offered next.

6.4 Revaluation / Recounting:

Students shall be permitted to request for recounting/ revaluation of the end theory examination answer scripts within a stipulated period after payment of prescribed fee.

After recounting or revaluation, records are updated with changes if any and the student will be issued a revised memorandum of marks. If there *are* no changes, the student shall be intimated the same through a letter or a notice.

6.5 Supplementary Examination:

All Regular examinations are understood as Regular/Supplementary examinations. The supplementary students have to appear for the supplementary examinations along with their regular examinations conducted at the end of each semester. However, separate supplementary examinations will be conducted for the II-Semester subjects at the end of I-Semester and vice-versa.

7. ACADEMIC REQUIREMENTS FOR PROMOTION/ COMPLETION OF REGULAR B.TECH PROGRAMME OF STUDY:

The following academic requirements have to be satisfied in addition to the attendance requirements for promotion/ completion of regular B.Tech Programme of study.

7.1 For students admitted into B.Tech. (Regular) programme:

7.1.1 A student shall be deemed to have satisfied the minimum academic requirements for 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. For the seminar he should secure a minimum of 40% marks.

7.1.2 For promotion from I B.Tech to II B.Tech a student must satisfy the attendance requirements in I year.

7.1.3 A Student shall be promoted from II year to III year, if he fulfills the academic requirements of securing a minimum of 56 credits from I year, II year I-Semester and II year II-Semester examinations conducted till that time.

7.1.4 A student shall be promoted from III year to IV year if he fulfills the academic requirements of securing a minimum of 86 credits from I year, II year I and II-Semesters and the III year I and II-Semester examinations conducted till that time.

7.1.5 **A student shall register for all the subjects and earn all the 236 credits**. Marks obtained in all the credits shall be considered for the calculation of the class based on CCPA.

7.1.6 A student who fails to earn all the 236 credits as indicated in the course structure within **eight** academic years from the year of his admission shall forfeit his seat in B.Tech. Programme and his admission stands cancelled.

7.2 For Lateral Entry Students (batches admitted from 2015-2016):

7.2.1 Academic requirements for pass in a subject are the same as in 7.1.1 and attendance requirements as in 6.3.

7.2.2 A student shall be promoted from II year to III year if he fulfills the academic requirements of securing a minimum of 28 credits from II year I and II-Semesters examinations conducted till that time.

7.2.3 A student shall be promoted from III year to IV year if he fulfills the academic requirements of securing a minimum of 58 credits from II year I and II-Semesters and the III year I and II-Semester examinations conducted till that time.

7.2.4 A student shall register for all the subjects and earn all such credits. Marks obtained in all such credits shall be considered for the calculation of the class based on CCPA.

7.2.5 A student who fails to earn all the 180 credits as indicated in the course structure within **six** academic years from the year of his admission shall forfeit his seat in B.Tech. Programme and his admission stands cancelled.

8. TRANSITORY REGULATIONS:

Students who got detained for want of attendance (or) who have 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/year from the date of commencement of class work for the next batch or later batches with the same (or) equivalent subjects as and when subjects are offered and they continue to be in the academic regulations of the batch he is joining later.

9. CREDIT POINT AVERAGE (CPA) AND CUMULATIVE CREDIT POINT AVERAGE (CCPA):

9.1 For a semester/year:

CREDIT POINT AVERAGE [CPA] $=\frac{1}{10}\frac{\sum_i C_i T_i}{\sum_i C_i}$

Where C_i= Credits earned for Course i in any semester/ year,

T_i= Total marks obtained for course i in any semester/year,

9.2 For the entire programme:

CUMULATIVE CREDIT POINT AVERAGE [CCPA]
$=\frac{1}{10}\frac{\sum_n \sum_i C_{ni} T_{ni}}{\sum_n \sum_i C_{ni}}$

n -refers to the semester in which such courses were credited

9.3 Overall Performance:

CCPA	Classification of final result
7.0 and above	First Class with distinction
6.0 and above but below 7.0	First class
5.0 and above but below 6.0	Second class
4.0 and above but below 5.0	Pass class

10. TRANSCRIPTS:

After successful completion of the entire programme of study, a transcript containing performance of all academic years will be issued as a final record. Duplicate transcripts will also be issued, if required, after payment of requisite fee. Partial transcript will also be issued up to any point of study to a student on request.

11. ELIGIBILITY:

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

(i) Registered and successfully completed all the components prescribed in the programme of study to which he is admitted.
(ii) Successfully acquired all **236 credits** as specified in the curriculum corresponding to the branch of study within the stipulated time.
(iii) No disciplinary action is pending against him.

12. AWARD OF B.TECH DEGREE:

The B.Tech Degree will be conferred and awarded by Jawaharlal Nehru Technological University Anantapur, Anantapur on the recommendations of the Principal of Annamacharya Institute of Technology and Sciences (Autonomous).

13. AMENDMENTS TO REGULATIONS:

The chairman, Academic Council of Annamacharya Institute of Technology and Sciences, Rajampet (Autonomous) reserves the right to revise, amend, or change the Regulations, Scheme of Examinations, and / or Syllabi or any other policy relevant to the needs of the society or industrial requirements etc., without prior notice.

14. Any legal issues are to be resolved in Rajampet Jurisdiction.

15. GENERAL:

Where the words "he", "him", "his", "himself" occur in the regulations, they include "she", "her", "herself".

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Curriculum for the Programmes under Autonomous Scheme	
Regulation	R 2014
Department	Department of Electrical and Electronics Engineering
Programme Code & Name	G2, **B.Tech-Electrical & Electronics Engineering**

I Year B.Tech

Subject Code	Subject Name	Hours/ Week			C	Maximum marks		
		L	T	P		Internal	External	Total
4GC11	English	2	0	0	4	30	70	100
4GC12	Engineering Physics	2	0	0	4	30	70	100
4GC13	Engineering Chemistry	2	0	0	4	30	70	100
4GC14	Mathematics - I	3	1	0	6	30	70	100
4G113	Programming In C And Introduction To Data Structures	3	1	0	6	30	70	100
4G311	Electronic Devices and circuits	3	1	0	6	30	70	100
4G513	Engineering Drawing	1	0	3	6	30	70	100
4GC16	Engineering Physics and Chemistry Lab	0	0	3	4	30	70	100
4GC17	English Language and Communication Skills Lab	0	0	3	4	30	70	100
4G114	Programming in C and Introduction to Data Structures Lab	0	0	3	4	30	70	100
4G411	Engineering and IT Workshop	0	0	3	4	30	70	100
4G312	Electronic Devices and circuits lab	0	0	3	4	30	70	100
Total		**16**	**3**	**18**	**56**	**360**	**840**	**1200**

Note: L - Lecture; T-Tutorial; P – Practical; C – Credits

Curriculum for the Programmes under Autonomous Scheme	
Regulation	R 2014
Department	Department of Electrical and Electronics Engineering
Programme Code & Name	G2, **B.Tech-Electrical & Electronics Engineering**

II Year B.Tech I Semester

Subject Code	Subject Name	Hours/ Week			C	Maximum marks		
		L	T	P		Internal	External	Total
4GC32	Engineering Mathematics	4	0	0	4	30	70	100
4G536	Fluid Mechanics and Hydraulic Machines	4	1	0	4	30	70	100
4G231	Switching Theory and Logic Design	4	1	0	4	30	70	100
4G232	Electrical Machines-I	4	1	0	4	30	70	100
4G233	Electrical Circuits-I	4	1	0	4	30	70	100
4G234	Electromagnetic Fields	4	1	0	4	30	70	100
4G537	Fluid Mechanics and Hydraulic Machines Lab	0	0	3	2	30	70	100
4G237	Electrical Machines-I Lab	0	0	3	2	30	70	100
4G239	Seminar - I	0	0	2	2	100	00	100
Total		**24**	**5**	**8**	**30**	**340**	**560**	**900**

Curriculum for the Programmes under Autonomous Scheme	
Regulation	R 2014
Department	Department of Electrical and Electronics Engineering
Programme Code & Name	G2, **B.Tech-Electrical & Electronics Engineering**

II Year B.Tech II Semester

Subject Code	Subject Name	Hours/ Week			C	Maximum marks		
		L	T	P		Internal	External	Total
4GC41	Mathematics – III	4	0	0	4	30	70	100
4G346	Pulse and Digital Circuits	4	1	0	4	30	70	100
4G241	Electrical Machines-II	4	1	0	4	30	70	100
4G242	Electrical Circuits-II	4	1	0	4	30	70	100
4G243	Generation of Electric Power	4	1	0	4	30	70	100
4G244	Linear Control Systems	4	1	0	4	30	70	100
4G246	Electrical Circuits and Simulation Lab	0	0	3	2	30	70	100
4GC44	Aptitude & Reasoning skills	2	0	0	2	30	70	100
4GC45	Advanced English Communication Skills Lab	0	0	3	2	30	70	100
Total		**26**	**5**	**6**	**30**	**270**	**630**	**900**

Curriculum for the Programmes under Autonomous Scheme	
Regulation	R 2014
Department	Department of Electrical and Electronics Engineering
Programme Code & Name	G2, **B.Tech-Electrical & Electronics Engineering**

III Year B.Tech I Semester

Subject Code	Subject Name	Hours/ Week			C	Maximum marks		
		L	T	P		Internal	External	Total
4GC52	Environmental Science	4	0	0	4	30	70	100
4G359	Linear and Digital Integrated Circuits Applications	4	1	0	4	30	70	100
4G251	Electrical Machines-III	4	1	0	4	30	70	100
4G252	Transmission of Electric Power	4	1	0	4	30	70	100
4G253	Power Electronics	4	1	0	4	30	70	100
4G254	Electrical and Electronics Measurements	4	1	0	4	30	70	100
4GC52	Environmental Science	4	0	0	4	30	70	100
4G255	Electrical Machines-II Lab	0	0	3	2	30	70	100
4G256	Control systems Lab	0	0	3	2	30	70	100
4G257	Seminar - II	0	0	2	2	100	00	100
Total		**24**	**5**	**8**	**30**	**340**	**560**	**900**

Curriculum for the Programmes under Autonomous Scheme	
Regulation	R 2014
Department	Department of Electrical and Electronics Engineering
Programme Code & Name	G2, **B.Tech-Electrical & Electronics Engineering**

III Year B.Tech II Semester

Subject Code	Subject Name	Hours/ Week			C	Maximum marks		
		L	T	P		Internal	External	Total
4GA61	Managerial Economics and Financial Analysis	4	0	0	4	30	70	100
4G465	Computer System Architecture	4	1	0	4	30	70	100
4G261	Power System Analysis	4	1	0	4	30	70	100
4G262	Utilization of Electrical Energy	4	1	0	4	30	70	100
4G263	Microprocessors and Microcontrollers	4	1	0	4	30	70	100
4G264	Power System Operation and Control	4	1	0	4	30	70	100
4G265	Electrical Measurements Lab	0	0	3	2	30	70	100
4G266	Power Electronics and Simulation Lab	0	0	3	2	30	70	100
4GC62	English for Competitive Exams	2	0	0	2	30	70	100
Total		**26**	**5**	**6**	**30**	**270**	**630**	**900**

Curriculum for the Programmes under Autonomous Scheme	
Regulation	R 2014
Department	Department of Electrical and Electronics Engineering
Programme Code & Name	G2, **B.Tech-Electrical & Electronics Engineering**

IV Year B.Tech I Semester

Subject Code	Subject Name	Hours/ Week			C	Maximum marks		
		L	T	P		Internal	External	Total
4GA71	Management Science	4	1	0	4	30	70	100
4G271	Fundamentals of HVDC & FACTS Devices	4	1	0	4	30	70	100
4G272	Switch Gear & Protection	4	1	0	4	30	70	100
4G37C	Digital Signal Processing	4	1	0	4	30	70	100
Elective-I								
4G273	Instrumentation	4	1	0	4	30	70	100
4G274	High Voltage Engineering							
4G275	Renewable Energy Sources							
Elective-II								
4G276	Soft Computing Techniques	4	1	0	4	30	70	100
4G277	Reliability Engineering & Applications To Power Systems							
4G278	Optimization Techniques							
4G279	Microprocessors & Microcontrollers Lab	0	0	3	2	30	70	100
4G27A	Power Systems Lab	0	0	3	2	30	70	100
4G27B	Comprehensive Electrical & Electronics Engineering	0	0	2	2	100	00	100
Total		**24**	**6**	**8**	**30**	**340**	**560**	**900**

Curriculum for the Programmes under Autonomous Scheme	
Regulation	R 2014
Department	Department of Electrical and Electronics Engineering
Programme Code & Name	G2, **B.Tech-Electrical & Electronics Engineering**

IV Year B.Tech II Semester

Subject Code	Subject Name	Hours/ Week			C	Maximum marks		
		L	T	P		Internal	External	Total
4G281	Power Semiconductor Drives	4	1	0	4	30	70	100
4G282	Distribution of Electrical Power	4	1	0	4	30	70	100
Elective-III								
4G283	Modern Control Theory	4	1	0	4	30	70	100
4G284	Special Electrical Machines							
4G285	Principles of Power Quality							
Elective-IV								
4G38B	Embedded Systems	4	1	0	4	30	70	100
4G286	Design of Electrical Systems							
4G287	Energy Auditing and Demand side Management							
4G288	Seminar - III	0	0	2	2	100	00	100
4G289	Project work	0	0	12	12	30	70	100
Total		**16**	**4**	**14**	**30**	**250**	**350**	**600**

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

I Year B.Tech. EEE

(4GC11) ENGLISH
(Common to All Branches)

Course Objectives:

- To improve the language proficiency of the students in English with an emphasis on LSRW skills
- To enhance the vocabulary of the students in English through the use of diversified authentic materials
- To equip the students with comprehension skills to study academic subjects with greater felicity
- To develop English communication skills of the students in formal and informal situations
- To enable the students absorb the human values expressed in literature

Textbooks Prescribed:

- The books prescribed serve as students' handbooks. The reader for detailed study comprises essays which are particularly relevant to engineering students. Texts from open sources are also included in the syllabus to make the teaching-learning process more interesting. Also, the literary texts from open sources will allow the student learn language from literature. The book for the non-detailed study allows the student to have an insight into the lives and careers of some legendary personalities.
- The text for non-detailed study is meant for extensive reading 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 etc.
- The teacher should focus on developing LSRW skills of students while using the prescribed text and exercises. The classes should be interactive. The students should be encouraged to participate in the classroom proceedings and also to write short paragraphs and essays. The main aim is to encourage two-way communication in place of one-sided lecture.

Unit I

Detailed Study: a) Technology with a Human Face, b) *Cabuliwallah* by Rabindranath Tagore Non-detailed Study: G. D. Naidu

Grammar: Kinds of Verbs and their Use; Writing: Official Letters; Vocabulary: Synonyms and Antonyms, Prefixes and Suffixes, Idioms and Phrases

Unit II
Detailed Study: a) Climatic Change and Human Strategy, b)*If* by Rudyard Kipling
Non-detailed Study: Sudha Murthy
Grammar: Tenses; Writing: Letters of Application; Vocabulary: One-word Substitutes

Unit III
Detailed Study: a) Emerging Technologies: Solar Energy in Spain, b) *The Gift of Magi* by O. Henry
Non-detailed Study: Vijay Bhatkar
Grammar: Types of Sentences: Simple, Compound and Complex; Declarative, Interrogative, Imperative and Exclamatory; Writing: E-mails; Vocabulary: Commonly Confused Words

Unit IV
Detailed Study: Water: a) The Elixir of Life, b)*Night of the Scorpion* by Nissim Ezekiel
Non-detailed Study: Jagadis Chandra Bose
Grammar: Subject-verb Agreement; Writing: Official Reports, Technical Reports; Vocabulary: English Spelling, Commonly misspelt words

Unit V
Detailed Study: a) The Secret of Work, b) *The Zoo Story*, a One-act Play by Edward Albee
Non-detailed Study: HomiJehangir Baba
Grammar: Active and Passive Voice; Writing: Note-making; Vocabulary: Connotations
For Detailed study:***Sure Outcomes*** published by Orient Black Swan, Texts from Open Sources (Available on Web)
For Non-detailed study:***Trailblazers*** published by Orient Black Swan

Reference Books:

1. Technical Communication, Principles and Practice, Meenakshi Raman and Sangita Sharma, OUP, 2011, 2nd edition
2. Essential Grammar in Use, (with CD), Raymond Murphy, 3/e, Cambridge University Press, 2009
3. Basic Communication Skills for Technology, Andrea J Ruthurford, Pearson Education, Asia.
4. English for Technical Communication, AyshaViswamohan, Tata Mc-Graw Hill
5. English Grammar and Composition, David Green, Mc Millan India Ltd.
6. Murphy's English Grammar, Raymond Murphy, CAMBRIDGE

7. Everyday Dialogues in English by Robert J. Dixson, Prentice-Hall of India Ltd., 2006.
8. Communication Skills for Technical Students, Farhathullah, T.M., Orient Blackswan, 2008
9. Developing Communication Skills, 2/e. by Krishna Mohan &MeeraBanerji , Macmillan, 2009
10. English for Technical Communication, Vol. 1 & 2, by K. R. Lakshmi Narayanan, Sci tech. Publications.
11. Longman Dictionary of Contemporary English with DVD, Pearson Longman

Course Outcomes:

- The student will know the significance of silent reading and comprehension
- The student will demonstrate the ability to guess the contextual meaning of the words and grasp the overall message of the text to draw inferences
- The student develops critical thinking and creative writing skills through exposure to literary texts
- The student will understand the components of different forms of writing
- The student will exhibit effective writing skills through his understanding of English Grammar

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

I Year B.Tech. EEE

(4GC12) ENGINEERING PHYSICS
(Common to All Branches)

Course Objectives:

- The mission of the Engineering Physics course is to prepare students for careers in engineering where physics principles can be applied to the advancement of technology.
- The Engineering Physics course educates the principles of optical science and engineering necessary to understand optical systems.
- The Crystallography, X-ray diffraction of crystals and crystal defects explains how basic structure modulates properties of materials.
- The principles of quantum mechanics and electron theory of metals gives an idea on basic development of energy in metals.
- The main objective of this course to provide basic understanding of different engineering materials (semiconductors, magnetic, superconducting and nano materials).

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 – Ruby laser - He-Ne laser – Semiconductor 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 in communications, sensors and medicine.

UNIT II CRYSTALLOGRAPHY AND ULTRASONICS:

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 – Laue and Powder methods – Defects in solids: point defects, line defects (qualitative) - screw and edge dislocation, burgers vector.

Ultrasonics: Introduction – Properties – Production of ultrasonics by piezoelectric method and detection – Applications in non-destructive testing.

UNIT III QUANTUM MECHANICS AND FREE ELECTRON THEORY:

Quantum Mechanics: Introduction to matter waves – de'Broglie hypothesis - Heisenberg's uncertainty principle - Schrodinger's time independent and time dependent wave equation – Significance of wave function - Particle in a one dimensional infinite potential well - Eigen values and Eigen functions.

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.

UNIT IV SEMICONDUCTORS AND MAGNETIC MATERIALS:

Semiconductors: Introduction – Intrinsic and extrinsic semiconductors – Drift & diffusion currents and Einstein's equation – Hall effect - Direct and indirect band gap semiconductors – Working principle of p-n junction diode, LED and photodiode.

Magnetic materials: Introduction and basic definitions – Origin of magnetic moments – Bohr magneton – Classification of magnetic materials into dia, para, ferro, antiferro and ferri magnetic materials – Hysteresis - Soft and hard magnetic materials and applications.

UNIT V SUPERCONDUCTIVITY AND NANOMATERIALS:

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

***Nanomaterials*:** Introduction - Significance of nanoscale –Basic principles of nano materials (Surface area and quantum confinement) – Physical properties: optical, thermal, mechanical and magnetic properties –Synthesis of nanomaterials: ball mill, chemical vapour deposition, sol-gel, plasma arcing and thermal evaporation methods – Properties of Carbon nanotubes & CNT applications – Applications of nanomaterials.

Text Books:

1. Engineering physics – S. ManiNaidu, Pearson Education, I Edition, 2012.
2. Engineering Physics – V. Rajendran, MacGraw Hill Publishers, I Edition,2008.
3. Engineering physics –P.K.palanisamy,scietech publisher,Edition,2013.

Reference Books:

1. Engineering Physics – V. Rajendran, K.Thyagarajan Tata MacGraw Hill Publishers, III Edition, 2012.
2. Engineering Physics – RV.S.S.N. Ravi Kumar and N.V. Siva Krishna, Maruthi Publications , 2013
3. Engineering Physics – D.K.Battacharya and A.Bhaskaran,OxfordHeigher Education I Edition, 2010.
4. Engineering Physics – D K Pandey, S. Chaturvedi, Cengage Learning, I Edition, 2012
5. Engineering Physics – D.K.Bhattacharya and A.Bhaskaran, Oxford University press
6. Engineering Physics – M. Arumugam, Anuradha Publications II Edition, 1997.
7. Engineering physics – M.N. Avadhanulu and P.G. KrshiSagar, Chand and Co, Revised Edition, 2013.
8. Solid State Physics – A.J. Dekkar, McMillan Publishers, Latest edition, 2012.
9. Engineering Physics – Gaur and Gupta Dhanapati, RaiPublishers , 7th Edition, 1992.
10. Text book of Nanoscience and Nanotechnology: B S Murthy, P.Shankar, Baldev Raj B B Rath, James Murday, University Press, I Edition, 2012.

Course outcomes:

The student is able to

- Understand basic principles of optics, optical engineering materials and incorporation of optics in engineering field.
- Identify different types of crystal structures in materials and x-ray diffraction through crystals.
- Know about importance of ultrasonic's in engineering field.
- Analyse basic concepts of quantum mechanics and electron theory and consequences.
- Know basic mechanism of different types of advanced materials used in engineering field.
- Understand synthesis, properties and applications of nano materials.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

I Year B.Tech. EEE

(4GC13) ENGINEERING CHEMISTRY
(Common to All Branches)

Course Objectives:

- The Engineering 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 course main aim 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 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, analytical methods, engineering materials and water chemistry.

UNIT I WATER TREATMENT

Impurities in water, Hardness of water and its Units, Disadvantages of hard water, Estimation of hardness by EDTA method, Numerical problems on hardness, Estimation of dissolved oxygen, Alkalinity and chlorides in water, Water treatment for domestic purpose Disinfection- Chlorination.

Industrial Use of water: For steam generation, Boiler troubles: Scale & Sludge, Priming and Foaming, Caustic Embrittlement and Boiler Corrosion.

Treatment of Boiler Feed water: Internal Treatment: Colloidal, Phosphate, Carbonate, Calgon and sodium aluminate conditioning. External Treatment: Ion-Exchange process, Desalination of brackish water by Reverse Osmosis.

UNIT II ELECTROCHEMISTRY

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

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

Corrosion: Definition & Types (dry & wet Corrosions) concentration cell, galvanic corrosion, Electrochemical Theory of corrosion, Factors affecting the corrosion, Prevention: Anodic and Catholic protection, Electroplating & Electroless plating

UNIT III POLYMERS

Introduction to polymers, Polymerization process- types, Elastomers (rubbers), Natural Rubber, Compounding of Rubber, Synthetic Rubber: Preparation, properties and engineering applications of Buna-S & Buna-N rubbers. Plastics: Thermosetting and Thermoplastics, Preparation, properties and Engineering applications of PVC, Bakelite, nylons.

Conducting polymers: Mechanism, synthesis and applications of polyacetylene, polyaniline.

Inorganic Polymers: Basic Introduction, Silicones.

UNIT IV FUEL TECHNOLOGY

Classifications of Fuels – Characteristics of Fuels- Calorific Value – Units, its determination using bomb calorimeter, Numerical Problems. Solid Fuels-Coke: Manufacture of Metallurgical Coke by Otto Hoffmann's by product oven processes.

Liquid Fuels: Petroleum: Refining of Petroleum, Gasoline: Octane Number, Synthetic Petrol: Bergius Processes, Fischer Tropsch's synthesis. Power Alcohol: Manufacture, Advantages and Disadvantages of Power Alcohol

Gaseous Fuels: Origin, Production and uses of Natural gas, Producer gas, Water gas, Coal gas and Biogas. Flue Gas analysis by Orsat's apparatus, Solving of problems on Combustion.

UNIT V CHEMISTRY OF ENGINEERING MATERIALS

Cement: Composition & manufacture of Portland cement, Setting and Hardening (Hydration and Hydrolysis), Refractories: Classification, properties and applications

Lubricants: Theory of lubrication, properties of lubricants and applications, Rocket Propellants: Classification, Characteristics of good propellant

Text Books:

1. Engineering Chemistry by K.N.Jayaveera, G.V.Subba Reddy and C. Ramachandraiah, McGraw Hill Higher Education, New Delhi, Fourth Edition, 2012.
2. A Text Book of Enigneering Chemistry, Jain and Jain, DhanapathRai Publishing Company, New Delhi, 15th Edition, 2010.
3. A Text book of Engineering Chemistry by S.S Dhara, S.S.Umare, S. Chand Publications, New Delhi, 12th Edition, 2010.

Reference Books:

1. Engineering Chemistry by K.B.ChandraSekhar, UN.Das and Sujatha Mishra, SCITECH, Publications India Pvt Limited, Chennai, 2nd Edition, 2012.
2. Concepts of Engineering Chemistry- Ashima Srivastava and N.N. Janhavi, Acme Learning Pvt Ltd, First Edition, 2013.
3. Text Book of Engineering Chemistry – C. Parameswara Murthy, C.V.AgarwalandAndra Naidu, BS Publications, Hyderabad, 3rd Edition, 2008.
4. Text Book of Engineering Chemistry, Shashichawla, DhanapathRai Publications, New Delhi, 4th Edition, 2011.
5. Engineering Chemistry, K. SeshaMaheswaramma and MrudulaChugh, Pearson Education, First Edition, 2013.

Course outcomes:

The student is able to:

- Understand the electrochemical sources of energy
- Understand industrially based polymers, various engineering materials.
- Differentiate between hard and soft water.
- Understand the disadvantages of using hard water domestically and industrially.
- Select and apply suitable water treatment methods domestically and industrially.
- Understand the manufacture of synthetic petrol.
- Differentiate between thermoplastics and thermosetting plastics.
- Understand the manufacture, setting and hardening of cement.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

I Year B.Tech. EEE

(4GC14) MATHEMATICS-I
(Common to All Branches)

Course Objectives*:*

The course aims to provide the student with the ability

- To understand the Differential equations of first, second and higher orders with their applications.
- To apply this knowledge to evaluate the multiple integrals in real life situations.
- To apply the knowledge of Laplace transforms and vector calculus for engineering problems

UNIT I

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}, sinax/cosax, polynomials in x, e^{ax} V(x), xV(x), method of variation of parameters.Applications to oscillatory electrical circuits, Deflectionof Beams, whirling of shafts.

UNIT II

Rolle's Theorem – Lagrange's Mean Value Theorem – (excluding proof). Simple examples of Taylor's and McLaurin's Series - Functions of several variables – Jacobian – Maxima and Minima of functions of two variables, Lagrangian method of Multipliers with three variables only.

UNIT III

Curve tracing – Cartesian, polar and parametric curves.

Multiple integral: –Double integral – Evaluation - Change of Variables - Change of order of integration- Area and volumes using double integral. Triple integral - Evaluation.

UNIT IV

Laplace transform of standard functions – Inverse transform – First shifting Theorem, Transforms of derivatives and integrals – Second shifting theorem – Convolution theorem – Laplace transform of Periodic function - Application of Laplace transforms to ordinary differential equations of first and second order.

UNIT V

Vector Calculus: Gradient – Divergence – Curl - Line integral - Area, Surface and volume integrals. **Vector integral theorems**: Green's theorem – Stoke's theorem and Gauss's Divergence Theorem (without proofs) and their applications.

Text Books:

1. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers-42 Edition (2012)

Reference Books:

1. Higher Engineering Mathematics, by Kreyszing
2. A Text Book of Engineering Mathematics, B.V. Ramana, Tata McGraw Hill.
3. A Text Book of Engineering Mathematics, Vol – 1, T.K.V. Iyengar, B. Krishna Gandhi and others, S. Chand & Company.
4. A Text Book of Engineering Mathematics-1,E. Rukmangadachari, E. Keshava Reddy, Pearson Education.

Course Outcomes*:*

Upon completion of the course, students will

CO1: Understand the various types of ordinary differential equations

CO2: Have the knowledge on functions of several variables.

CO3: Understand the concepts of curve tracing, applications of integration.

CO4: Have the knowledge of Laplace transforms and their inverse.

CO5: Learns about vector integral theorems.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

B.Tech. I Year.EEE

(4G113) PROGRAMMING IN C AND INTRODUCTION TO DATA STRUCTURES

(Common to Civil, EEE, ME & ECE)

Course Objectives:

- Introduction to computer peripherals, Software development.
- Describe when and how to use the stand C statement and to Write, Compile and Debug basic C programs using an IDE
- Write and debug programs using an IDE and the principles of designing structured programs when and how to use the appropriate statements available in the C language
- Write basic C programs using , Selection statements, Repetitive statements, Functions, Pointers, Arrays and Strings
- Implementation of C applications for data structures, sorting and searching.

UNIT I: Introduction to Computers: Computer Systems, Computer Environments, Computer Languages, Creating and Running C programs, System Development-Algorithms, Flow Charts. **Introduction to C Language**: Structure of a C Language program, Keywords, Identifiers, Types, typedef, enumerated Types variables, constants, input/output, simple example programs.

UNIT II Operators and Expressions, precedence and associatively, Type Conversions, Bitwise Operators Program Statements, Selection and Decision making Statements-two way selection –if…else statements, multi way selection-switch statements. Loop Control Statements-concept of a loop, pretest and post test loops ,event and Counter Controlled loops, Loops in C-while loop, do…while loop, for loop, Other Related Statements -break, continue, goto, sample programs. **ARRAYS:** Declaring and Referencing Arrays, Array Subscripts, Using for Loops for Sequential Access, Multidimensional Arrays. **Strings**: String Basics, String Library Functions, Array of Strings.

UNIT III Functions: Library Functions in C, User defined Functions,-declaration, definition, calling of function , types of User defined functions, Parameter passing methods-pass by value, pass by reference, Scope, Storage Classes - Auto, Register, Static, Extern, Scope rules, Type Qualifiers, Recursion - Recursive Functions, Preprocessor Commands. Using Array Elements as Function Arguments.**Pointers** - Introduction, Features of Pointers, Pointer Declaration and Definition, Void Pointers, pointers for inter function communication, Pointers to Pointers, Pointer Applications: arrays and pointers, pointer arithmetic, Dynamic Memory Allocation, Pointers to Functions, pointer to void and command line arguments.

UNIT IV Structures – Definition, initialization, accessing structures, nested structures, array of structures, structures and functions. pointer and Structures. Unions. Sample programs.**Files**: Introduction Streams and File, Standard library input/output functions, formatted input/output functions, character input/output functions, Text verses binary Streams, Standard library functions for files. File examples. **Searching And Sorting** - Exchange (Bubble) Sort, Selection Sort, Quick Sort, Insertion Sort, Merge Sort, Searching- Linear and Binary Search Methods.

UNIT V Data Structures: Overview of Data Structure. **Stack:** Representation of a Stack, Operation on a Stack, Implementation of a Stack using Arrays and Pointers, Representation of Arithmetic Expressions, Infix, Prefix, and Postfix Notations, Evaluation of Postfix Expression, Recursion.

Queues: Representation of Queue, Insertion, Deletion, Searching Operations, Circular Queues.

Text Books:

1. C Programming and Data Structures. B.A Forouzan,R. F.Gilberg,Cengage learning, Indian edition.
2. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. Ananda Rao, Pearson Education.
3. C and Data Structures, E.Balaguruswamy, Tata Mc Graw Hill.

Reference books:

1. C and Data Structures, A snapshot oriented treatise with live engineering examples, Dr. N.B.Venkateswarlu, Dr. E.V.Prasad, S. Chand.
2. LET US C, Yeswanth Kanitkar, Ninth Edition, BPB Publication.
3. Data Structures using C – A.M.Tanenbaum, Y.Langsam, and M.J. Augenstein, Pearson Education / PHI, Eighth Edition.

Course Outcomes:

1. Understand the importance of the software development process and System development tools.
2. Understand general principles of C programming language and able to write simple program in C. Able to develop programs based on arrays and functions.
3. Understand the purpose of pointers for parameter passing, referencing and dereferencing and understands the concepts of structures, unions and File management.
4. Understands what and how to design data structure programs using C programming language.
5. Understands how to solve applications like searching and sorting using C Programming language.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

I Year B.Tech. EEE

(4G311) ELECTRONIC DEVICES AND CIRCUITS
(Common to EEE & ECE)

Course Objectives*:*

The course aims to provide the student with the ability

1. To learn the fundamentals of Circuit Laws and Network Theorems.
2. To understand the concepts of semiconductor devices and its applications.
3. To understand the concepts of BJT and FET &their biasing

UNIT-I CIRCUIT LAWS AND THEOREMS:-Introduction-Ohm's law-Kirchoff laws-network reduction techniques-series, parallel, series parallel circuits-source transformations. Thevenin's Theorem-Norton's Theorem-Superposition Theorem-maximum power transfer theorem.

UNIT-II DIODE AND DIODE APPLICATIONS:- Energy Band Diagrams of PN diode, Ideal Diode – Characteristics of PN Junction Diode and Temperature Dependency , Diode Capacitances, Breakdown Mechanisms in semiconductor diodes, Zener diode characteristics.

Rectifier Circuits: Half Wave and Full Wave Rectifiers – General Filter Considerations – Capacitor Filter – RC Filter – Choke Filter - LC Filter – π Filter – Zener diode acts as a regulator.

UNIT-III INTRODUCTION OF BJTs, BIASING & STABILITY: Transistor construction - Transistor operation & its Characteristics - Transistor Amplifying Action – Load Line Analysis of AC & DC – Operating Point. Types of Biasing: Fixed Bias – Emitter Bias – Emitter Feedback Bias - Collector to Base bias – Voltage Divider Bias. Bias Stability: Need for Stabilization – Stabilization Factors (S,S',S'') – Stability Factors for Voltage Divider Bias - Thermal Stability and Thermal Runaway – Heat Sinks**.**

UNIT-IV FIELD EFFECT TRANSISTORS & ITS BIASING: Construction of JFETs – Transfer Characteristics – FET Biasing: Fixed Bias Configuration – Self Bias Configuration – Voltage Divider Biasing – Construction and Characteristics of MOSFETs – Depletion type MOSFETs – Enhancement type MOSFETs – Biasing in MOSFETs.

UNIT-V SPECIAL PURPOSE ELECTRONIC DEVICES:

Varactor Diode, Tunnel Diode, LED, PIN diode, Schottkey Diode, SCR, UJT, Phototransistor.

Text Books:

1. "Electronic Devices and Circuits" David A Bell, Fifth Edition, 2008, Oxford University Press.
2. "Circuits & Network Analysis & Synthesis", Sudhakar A & Shyammohan S Palli, 4th Edition, Tata McGraw Hill, 2010.
3. "Electronic Devices and Circuits" J. Millman and Halkias, 1991 edition, 2008, TMH.

Reference Books:

1. "Electronic Devices and Circuit Theory" Robert L.Boylestad and Louis Nashelsky, 9th edition, PHI.
2. "Integrated Electronics, Analog and Digital Circuits and Systems" J. Millman and Halkias, TMH.
3. "Micro Electronic Circuits" Sedra and Smith, Oxford University Press.

Course outcomes:

CO1: Understand the principles of Electrical circuits and theorems.
CO2: Have the knowledge on the theory of semiconductor devices and its applications.
CO3: Understand the concepts of BJT and FET as well as its Biasing and Stability

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

B.Tech. I Year.EEE

(4G513) ENGINEERING DRAWING

(Common to EEE, ECE, CSE & IT)

Course Objectives:

- By studying the engineering drawing, a student becomes aware of how industry communicates technical information. Engineering drawing teaches the principles of accuracy and clarity in presenting the information necessary about objects.
- This course develops the engineering imagination i,e so essential to a successful design , by learning techniques of engineering drawing changes the way one thing about technical images.
- It is easy to master the fundamentals of engineering drawing first and to later use these fundamentals for a particular application, such as computer aided drafting. Etc.
- Engineering Drawing is the language of engineers, by studying this course engineering and technology students will eventually be able to prepare drawings of various objects being used in technology.

UNIT – I

Introduction to Engineering Drawing – Construction of Ellipse, Parabola and Hyperbola (General method only). Construction of Ellipse using special methods like Concentric Circles method, Oblong method & Arcs of Circles method only. Cycloidal Curves – Cycloid, Epi cycloid, Hypo cycloid.

UNIT – II

Projections of points, Projections of lines - Inclined to one planes and inclined to both the plane

UNIT – III

Projections of Planes –Inclined to one planes and inclined to both the planes

UNIT – IV

Projections of solids:

Cylinder, Cone, Prism, Pyramid and Sphere positions - Axis Inclined to one planes and inclined to both the planes

UNIT – V

Isometric projections of Lines, Planes and Simple Solids.

Conversion of Orthographic views into Isometric views & Isometric views to Orthographic views.

Text Books :

1. Engineering drawings by N.D.Bhatt
2 Engineering graphics by K.L. Narayana & P.Kannayya

Reference Books-

1. Engineering drawing and graphics by Venugopal/ New age
2. Engineering drawing by Johle / TMI

Course Outcomes:

- Student gets knowledge on various drawing instruments and its usage.
- Students capable to draw various curves like conic curves, cycloidal curves.
- Student can understand about orthographic projection and able to draw points, lines, planes and solids according to orthographic projections.
- Student able to draw, when the simple solids.
- Student can convert and draw the given orthographic view to isometric view and vice versa.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

I Year B.Tech. EEE
(4GC16) ENGINEERING PHYSICS AND ENGINEERING CHEMISTRY LAB

ENGINEERING PHYSICS LAB

LIST OF EXPERIMENTS

Any 10 of the following experiments has to be performed

1. Determination of wavelengths of various colors 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. Hall effect : Determination of mobility of charge carriers in semiconductor
13. B-H curve
14. Magnetic field along the axis of a current carrying coil – Stewart and Gee's method.
15. Determination of rigidity modulus –Torsional pendulum

Reference Books:

1. Engineering Physics Practicals – Dr. B. Srinivasa Rao V.K.V. Krishna K.S Rudramamba
2. Engineering Practical Physics – S.L Kakani& Shubra Kakani

Part B: ENGINEERING CHEMISTRY LAB

LIST OF EXPERIMENTS

Any 10 of the following experiments has to be performed

1. Estimation of iron (II) using Diphenylamine indicator (Dichrometry – Internal indicator method)
2. Estimation of Chloride ion using potassium Chromite indicator (Mohr's method)
3. Determination of total hardness of water by EDTA method
4. Conductometric titration of strong acid Vs strong base (Neutralization titration)
5. Determination of Copper by EDTA method
6. Estimation of Dissolved Oxygen by Winkler's method
7. Determination of Alkalinity of Water.
8. Estimation of Iron in Cement by Colorimetry.
9. Determination of Calorific Value of fuel by using Bomb Calorimeter
10. Determination of Viscosity of oils using Redwood Viscometer I
11. Determination of Eutectic temperature of binary system (urea-benzoic acid)
12. Determination of Viscosity of oils using Redwood Viscometer II
13. Determination of Copper by Iodometry
14. Conductometric titration of Barium Chloride vs Sodium Sulphate (Precipitation Titration)
15. Determination of acidity of Water

References Books:

1. Vogel's Text book of Quantitative Chemical Analysis, J. Mendham et al, Pearson Education, Sixth Edition, 2012.
2. Chemistry Practical – Lab Manual by K.B.ChandraSekhar, G.V. Subba Reddy and K.N.Jayaveera, SM Publications, Hyderabad, 3rd Edition, 2012.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

I Year B.Tech. EEE

(4GC17) ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB

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

Course Objectives:

- To train students to use language effectively in everyday conversations
- To enable a learner sharpen his public speaking skills
- To expose the students to a varied blend of self-instructional, learner-friendly modes of language learning
- To enable the student learn better pronunciation through emphasis on word accent, intonation, and rhythm

SYLLABUS:

The following course content is prescribed for the **English Language Laboratory** sessions:

1. **Introduction to the Sounds of English- Vowels, Diphthongs & Consonants**
2. **Introduction to Stress and Intonation**
3. **Situational Dialogues and Role-play**
4. **Telephone Skills**
5. **'Just A Minute' (JAM)**
6. **Oral Presentations**
7. **Describing Objects / Situation / People**
8. **Information Transfer**

Manual cum Record, prepared by the Faculty Members of English of the college will be used by Students.

Minimum Requirement:

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 P.A System, a T. V. an LCD projector, a digital stereo –audio & video system and camcorder etc.

Suggested Software:

Sky Pronunciation Suite

Connected Speech from Clarity

Clarity Pronunciation Power – Part I

Mastering English in Vocabulary, Grammar, Spellings, Composition

English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge

Dorling Kindersley - Series of Grammar, Punctuation, Composition etc.

Language in Use, Foundation Books Pvt Ltd with CD

Learning to Speak English - 4 CDs

Microsoft Encarta with CD

Cambridge Advanced Learners' English Dictionary with CD.

Murphy's English Grammar, Cambridge with CD

Course Outcomes

- The student will be able to express himself fluently in social and professional contexts
- The student will enhance his skills to make a presentation confidently
- The student will learn how to neutralize his accent
- The student will be able to decipher information from graphics and describe it professionally

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

B.Tech. I Year.EEE

(4G114) PROGRAMMING IN C AND INTRODUCTION TO DATA STRUCTURES LAB

Recommended Systems/Software Requirements:

• Intel based desktop PC with ANSI C Compiler and Supporting Editors

Exercise l.

a) Write a C program to calculate Simple Interest by accepting principle amount, rate of interest and time.
b) Write a C program to find the roots of a quadratic equation.
c) Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)

Exercise 2.

a) Write a C program to find the sum of individual digits of a positive integer.
b) 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. Write a C program to generate the first n terms of the sequence.
c) Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

Exercise 3.

a) Write a C program to find the given number is Armstrong number or not.
($153 = 1^3 + 5^3 + 3^3$)
b) Write a C program to find the given number is Strong number or not.
(145 = 1!+4!+5!)
c) Write a C program to generate all the Armstrong numbers between 1 and n, and Strong number between 1 and n where n is a value supplied by the user

Exercise 4.

a) Write a C program to calculate the following Sum:
$$Sum = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \frac{x^8}{8!} - \frac{x^{10}}{10!}$$
b) Write a C program to read in two numbers, x and n, and then compute the sum of the geometric progression:
$$1 + x + x^2 + x^3 + \ldots\ldots\ldots\ldots\ldots + x^n$$
For example: if n is 3 and x is 5, then the program computes 1+5+25+125. Print x, n, the sum Perform error checking. For example, the formula does not make sense for negative exponents – if n is less than 0.
Have your program print an error message if n<0, then go back and read in the next pair of numbers of without computing the sum. Find if any values of x are also illegal? If so, test for them too.

Exercise 5.

a) Write a C program to generate Pascal's triangle.

b) Write a C program to construct a pyramid of numbers.

Exercise 6.

a) 2's complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2's complement of 11100 is 00100. Write a C program to find the 2's complement of a binary number.

b) Write a C program to convert a Roman number to its decimal equivalent.

Exercise 7.

a) Write a C program to find both the largest and smallest number in a list of integers.

b) Write a C program that uses functions to perform the following:

i) Addition of Two Matrices ii) Multiplication of Two Matrices

Exercise 8.

Write C programs that use both recursive and non-recursive functions

i) To find the factorial of a given integer.

ii) To find the GCD (greatest common divisor) of two given integers.

iii) To solve Towers of Hanoi problem.

Exercise 9.

a) Write a C program that uses functions to perform the following operations:

i) To insert a sub-string into a given main string from a given position.

ii) To delete n Characters from a given position in a given string.

b) Write a C program to determine if the given string is a palindrome or not.

Exercise 10.

a) Write a C program that displays the position or index in the string S where the string T begins, or – 1 if S doesn't contain T.

b) Write a C program to count the lines, words and characters in a given text.

Exercise 11.

Write a C program that uses functions to perform the following operations:

i) Reading a complex number ii) Writing a complex number

iii) Addition of two complex numbers iv) Multiplication of two complex numbers

(Note: represent complex number using a structure.)

Exercise 12

a) Write a C program which copies one file to another.

b) Write a C program to reverse the first n characters in a file.

(Note: The file name and n are specified on the command line.)

Exercise 13

a) Write a C programme to display the contents of a file.

b) Write a C programme to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file)

Exercise 14

Write C programs that implement stack (its operations) using

i) Arrays ii) Pointers

Exercise 15

Write C programs that implement Queue (its operations) using

i) Arrays ii) Pointers

Exercise 16

Write C programs that implement Circular Queue (its operations) using

i) Arrays ii) Pointers

Exercise 17

Write a C program that uses Stack operations to perform the following:

i) Converting infix expression into postfix expression

ii) Evaluating the postfix expression

Exercise 18

Write a C program that implements the following sorting methods to sort a given list of integers in ascending order

i) Bubble sort ii) Selection sort iii) Insertion sort

Exercise 19

Write C programs that use both recursive and non recursive functions to perform the following searching operations for a Key value in a given list of integers:

i) Linear search ii) Binary search

Exercise 20

Write C program that implements the Quick sort method to sort a given list of integers in ascending order.

Exercise 21

Write C program that implement the Merge sort method to sort a given list of integers in ascending order.

Reference Books:

1. The Spirit of C, an introduction to modern programming, M.Cooper, Jaico Publishing House.
2. Mastering C, K.R. Venugopal and S.R. Prasad, TMH Publications.
3. Computer Basics and C Programming, V. Rajaraman, PHI Publications.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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I Year B.Tech. EEE

(4G411) ENGINEERING & I.T. WORKSHOP
(Common to all branches)

ENGINEERING WORKSHOP

1. TRADES FOR EXERCISES:

a. Carpentry shop– Two joints (exercises) involving tenon and mortising, groove and tongue: Making middle lap T joint, cross lap joint, mortise and tenon T joint, Bridle T joint from out of 300 x 40 x 25 mm soft wood stock

b. Fitting shop– Two joints (exercises) from: square joint, V joint, half round joint or dove tail joint out of 100 x 50 x 5 mm M.S. stock.

c. Sheet metal shop– Two jobs (exercises) from: Tray, cylinder, hopper or funnel from out of 22 or 20 guage G.I. sheet.

d. House-wiring– Two jobs (exercises) from: wiring for ceiling rose and two lamps (bulbs) with independent switch controls with or without looping, wiring for stair case lamp, wiring for a water pump with single phase starter.

e. Foundry– Preparation of two moulds (exercises): for a single pattern and a double pattern.

f. Welding – Preparation of two welds (exercises): single V butt joint, lap joint, double V butt joint or T fillet joint

2. TRADES FOR DEMONSTRATION:

a. Plumbing
b. Machine Shop
c. Metal Cutting

Apart from the above the shop rooms should display charts, layouts, figures, circuits, hand tools, hand machines, models of jobs, materials with names such as different woods, wood faults, Plastics, steels, meters, gauges, equipment, CD or DVD displays, First aid, shop safety etc. (though they may not be used for the exercises but they give valuable information to the student).
In the class work or in the examination knowledge of all shop practices may be stressed upon rather than skill acquired in making the job.

Reference Books:

1. Engineering Work shop practice for JNTU, V. Ramesh Babu, VRB Publishers Pvt. Ltd., 2009.
2. Work shop Manual / P.Kannaiah/ K.L.Narayana/ SciTech Publishers.
3. Engineering Practices Lab Manual, Jeyapoovan, Saravana Pandian, 4/e Vikas.
4. Dictionary of Mechanical Engineering, GHF Nayler, Jaico Publishing House.

I.T. WORKSHOP

Preparing your Computer (5 weeks)

Task 1: Learn about Computer: Identify the internal parts of a computer, and its peripherals. Represent the same in the form of diagrams including Block diagram of a computer. Write specifications for each part of a computer including peripherals and specification of Desktop computer. Submit it in the form of a report.

Task 2: Assembling a Computer: 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 (eg: beeps). Students should record the process of assembling and trouble shooting a computer.

Task 3: Install Operating system: 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: Operating system features: Students should record the various features that are supported by the operating system(s) installed. They have to submit a report on it. Students should be able to access CD/DVD drives, write CD/DVDs, access pen drives, print files, etc. Students should install new application software and record the installation process.

Networking and Internet (4 weeks)

Task 5: Networking: Students should connect two computers directly using a cable or wireless connectivity and share information. Students should connect two or more computers using switch/hub and share information. Crimpling activity, logical configuration etc should be done by the student. The entire process has to be documented.

Task 6: Browsing Internet: Student should access the Internet for Browsing. Students should search the Internet for required information. Students should be able to create e-mail account and send email. They should get acquaintance with applications like Facebook, skype etc. If Intranet mailing facility is available in the organization, then students should share the information using it. If the operating system supports sending messages to multiple users (LINUX supports it) in the same network, then it should be done by the student. Students are expected to submit the information about different browsers available, their features, search
process using different natural languages, and creating e-mail account. Draft syllabus, R13 regulations (UG)

Task 7: Antivirus: Students should download freely available Antivirus software, install it and use it to check for threats to the computer being used. Students should submit information about the features of the antivirus used, installation process, about virus definitions, virus engine etc.

Productivity tools (6 weeks)

Task 8: Word Processor: Students should be able to create documents using the word processor tool. Some of the tasks that are to be performed are inserting and deleting the characters, words and lines, Alignment of the lines, Inserting header and Footer, changing the font, changing the colour, including images and tables in the word file, making page setup, copy and paste block of text, images, tables, linking the images which are present in other directory, formatting paragraphs, spell checking, etc. Students should be able to prepare project cover pages, content
sheet and chapter pages at the end of the task using the features studied. Students should submit a user manual of the word processor considered.

Task 9: Spreadsheet: Students should be able to create, open, save the application documents and format them as per the requirement. Some of the tasks that may be practiced are Managing the worksheet environment, creating cell data, inserting and deleting cell data, format cells, adjust the cell size, applying formulas and functions, preparing charts, sorting cells. Students should submit a user manual of the Spreadsheet application considered.

Task 10: Presentations: creating, opening, saving and running the presentations, Selecting the style for slides, formatting the slides with different fonts, colours, creating charts and tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyperlinking, running the slide show, setting the timing for slide show. Students should submit a user manual of the Presentation tool considered.

Optional Tasks:

Task 11: Laboratory Equipment: Students may submit a report on specifications of various equipment that may be used by them for the laboratories in their curriculum starting from I B.tech to IV. B.Tech. It can vary from department to department. Students can refer to their syllabus books, consult staff members of the concerned department or refer websites. The following is a sample list. Instructors may make modifications to the list to suit the department concerned.

- Desktop computer
- Server computer
- Switch (computer science related)
- Microprocessor kit
- Micro controller kit
- Lathe machine
- Generators
- Construction material
- Air conditioner
- UPS and Inverter
- RO system
- Electrical Rectifier
- CRO Draft syllabus, R13 regulations (UG)
- Function Generator
- Microwave benches

Task 12: Software: Students may submit a report on specifications of various software that may be used by them for the laboratories in their curriculum starting from I B.tech to IV. B.Tech. The software may be proprietary software or Free and Open source software. It can vary from department to department. Students can refer to their syllabus books, consult staff members of the concerned department or refer websites. The following is a sample list. Instructors may make modifications to the list to suit the department concerned.

- Desktop operating system
- Server operating system
- Antivirus software
- MATLAB
- CAD/CAM software
- AUTOCAD

References:

1. Introduction to Computers, Peter Norton, Mc Graw Hill
2. MOS study guide for word, Excel, Powerpoint & Outlook Exams", Joan Lambert, Joyce Cox, PHI.
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
4. Networking your computers and devices, Rusen, PHI
5. Trouble shooting, Maintaining & Repairing PCs", Bigelows, TMH

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I Year B.Tech. EEE

(4G312) ELECTRONIC DEVICES AND CIRCUITS LAB
(Common to EEE & ECE)

ELECTRONIC WORKSHOP PRACTICE (4 lab sessions):

1. Identification, Specifications, Testing of R, L, C Components (Color Codes), Potentiometers, Switches (SPDT, DPDT, and DIP), Coils, Gang Condensers, Relays, Bread Boards, PCBs.
2. Identification, Specifications and Testing of Active Devices, Diodes, BJTs, Low power JFETs, MOSFETs, Power Transistors, LEDs, LCDs, SCR, and UJT.
3. Study and operation of Multi-meters (Analog and Digital)
   - Function Generator
   - Regulated Power Supplies
   - CRO.

Perform the following experiments

1. Forward and Reverse Bias Characteristics of PN junction Diode.
2. Zener Diode Characteristics and Zener as Voltage Regulator.
3. Input and Output Characteristics of Transistor CB Characteristics.
4. Input and Output Characteristics of Transistor CE Characteristics.
5. Input and Output Characteristics of Transistor CC Characteristics.
6. Half Wave Rectifier with and without filter.
7. Full Wave (Center trapped) Rectifier with and without filter.
8. Full Wave (Bridge) Rectifier with and without filter.
9. JFET Characteristics.
10. Measurement of h-parameters of BJT in CB, CE and CC configurations.
11. Frequency response of CE Amplifier.
12. Frequency response of CC Amplifier.
13. Frequency response of Common Source FET Amplifier.
14. VI Characteristics of LED.
15. UJT Characteristics.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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II Year B.Tech. EEE-I Semester

(4GC32)ENGINEERING MATHEMATICS

(Common to EEE & ECE)

COURSE OBJECTIVES:

1. To understand several important concepts in linear algebra, including systems of linear equations and their solutions; matrices and their properties; determinants and their properties; and Eigen values and Eigen vectors.
2. To improve your ability to think logically, analytically, and abstractly; and
3. The objective of curve fitting is to find the parameters of a mathematical model that describes a set of (usually noisy) data in a way that minimizes the difference between the model and the data.
4. Introduce students to how to solve linear Partial Differential with different methods
5. Know how to derive a Fourier series of a given periodic function by evaluating Fourier coefficients. Understand the nature of the Fourier series that represent even and odd functions and how derivation of a Fourier series can be simplified in this way. Be able to expand an odd or even function as a half-range cosine or sine Fourier series.
6. To equip students with adequate knowledge of mathematics that will enable them in formulating problems and solving problems analytically.

UNIT I

Fourier series: Determination of Fourier coefficients-Fourier series of even and odd functions-Fourier series in an arbitrary interval-half range Fourier sine and cosine expansions.

Fourier transforms: Fourier sine Transforms-Cosine Transforms-Properties-Inverse Transforms-Finite Fourier Transforms.

UNIT II

Matrix algebra -Rank-Echelon form, normal form -solutions of linear system of homogenous and non-homogenous equations- -Gauss elimination method-Eigen values-Eigen vectors-Properties.

UNIT III

Solution of algebraic and Transcendental equations-Bisection method-Method of false position-Newton-Raphson method -Numerical solutions of ordinary differential equations-Taylor's series-Euler's methods–Runge-kutta fourth order method-Milne's predictor-corrector method.(Without proofs)

UNIT IV

Interpolation - Introduction – Forward Differences – Backward Differences – Newton's forward and backward difference interpolation formulae – Lagrange's Interpolation formula.

Numerical Differentiation - Numerical Integration – Trapezoidal rule – Simpson's 1/3 Rule – Simpson's 3/8 Rule.

UNIT V

Curve fitting: Fitting a straight line-second degree parabola-Exponential curve – power curve by the method of least squares.

Partial differential equations: Formationof partial differential equations by eliminating arbitrary constants and arbitrary functions-solutions of linear equation–Charpit's method-Method of separation of variables.

Text Books:

Higher Engineering Mathematics, B. S. Grewal, 42nd edition, Khanna Publishers, New Delhi.

References:

1. Advanced Engineering Mathematics, Erwin Kreyszig, 8th edition, New Age International (Pvt) Limited.
2. A text book of Engineering Mathematics, B. V. Ramana, Tata McGraw Hill.
3. Mathematical Methods, T. K. V. Iyengar, B. Krishna Gandhi and Others, S. Chand & Company.

COURSE OUT COMES:

Upon completing this course students should be able to:

CO.1. Analyze real world scenarios to recognize when matrices, or linear systems are appropriate, formulate problems about the scenarios, creatively model these scenarios (using technology, if appropriate) in order to solve the problems using multiple approaches, judge if the results are reasonable, and then interpret and clearly communicate the results.

CO.2. Understand linear algebra concepts that are encountered in the real world, and be able to communicate the underlying mathematics involved to help another person gain insight into the situation.

CO.3. Apply numerical method to obtain approximate solutions to mathematical problems.

CO.4. Have the knowledge of interpolation, numerical integration, and numerical differentiation; know how to approximate definite integrals and derivatives.

CO.5. Be competent in solving linear PDEs using classical solution methods.

CO.6. Compute the Fourier series representation of a periodic function, in both exponential and sine-cosine forms. Be able to apply Fourier analysis to simple initial condition standing wave Problems and determine the resulting time evolution.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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II Year B.Tech. EEE-I Semester

(4G536) FLUID MECHANICS AND HYDRAULIC MACHINES

Course Objective:

To introduce the study of various fluid properties and their significance in engineering problems and the basic concepts of fluid flow, both kinematics and dynamics, including the derivation of energy equation needed for the analysis of fluid flow problems, different types of flow in pipes, theory of boundary layer, losses in pipes and basics of turbo machinery in essentials of hydro electric power plants.

UNIT I FLUID STATICS: Dimensions and units: physical properties of fluids- specific gravity, viscosity surface tension- vapor pressure and their influence on fluid motion- atmospheric gauge and vacuum pressure – measurement of pressure- Piezometer, U-tube and differential manometers.
FLUID KINEMATICS: Stream line, path line and streak lines and stream tube, classification of flows, equation of continuity for one dimensional flow.

UNIT II FLUID DYNAMICS: Surface and body forces –Euler's and Bernoulli's equations for flow along a stream line, momentum equation and its application on force on pipe bend.
CLOSED CONDUIT FLOW: Reynold's experiment- Darcy Weisbach equation- Minor losses in pipes- pipes in series and pipes in parallel- total energy line-hydraulic gradient line. Measurement of flow: pitot tube, venturimeter, and orifice meter, Flow nozzle, Turbine flow meter.

UNIT III BASICS OF TURBO MACHINERY: Hydrodynamic force of jets on stationary and moving flat, inclined, and curved vanes, jet striking centrally and at tip, velocity diagrams, work done and efficiency, flow over radial vanes.
HYDROELECTRIC POWER STATIONS: Elements of hydro electric power station-types-concept of pumped storage plants-storage requirements, mass curve (explanation only) estimation of power developed from a given catchment area; heads and efficiencies.

UNIT IV HYDRAULIC TURBINES: Classification of turbines, impulse and reaction turbines, Pelton wheel, Francis turbine and Kaplan turbine-working proportions, work done, efficiencies, hydraulic design –draft tube theory-functions and efficiency.

PERFORMANCE OF HYDRAULIC TURBINES: Geometric similarity, Unit and specific quantities, characteristic curves, governing of turbines, selection of type of turbine, cavitation, surge tank, water hammer.

UNIT V CENTRIFUGAL PUMPS: Classification, working, work done – manomertic head- losses and efficiencies specific speed- pumps in series and parallel-performance - characteristic curves, NPSH.
Reciprocating pumps: Working, Discharge, slip, indicator diagrams.

Text Books:
1. Modi and Seth, *Hydraulics, fluid mechanics and Hydraulic machinery*.
2. Rajput, *Fluid Mechanics and Hydraulic Machines*.

Reference Books:
1. D.S. Kumar, *Fluid Mechanics and Fluid Power Engineering.* Kotaria & Sons.
2. D. Rama Durgaiah, *Fluid Mechanics and Machinery*. New Age International.
3. Banga & Sharma, *Hydraulic Machines*. Khanna Publishers.
4. James W. Dally, William E. Riley, *Instrumentation for Engineering Measurements*. John Wiley & Sons Inc. 2004.

Course Outcomes:
1. An ability to understand the fluid properties and their engineering significance and able to differentiate between different pressures and the methods of fluid pressure measurement.
2. The student shall have basic idea about the fundamentals of fluid flow. The student is exposed to the fundamental equations, used in the analysis of fluid flow problems like continuity, energy and momentum equations.
3. An ability to understand the different types of pipe flow and the conditions governing them and understands the working of the different devices used for measurement of fluid flow under different conditions.
4. An ability to understand the fundamentals of turbo machinery, elements of hydro electric power plant.
5. An ability to understand the performance of hydraulic turbines and hydraulic pumps.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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II Year B.Tech. EEE-I Semester

(4G231) SWITCHING THEORY AND LOGIC DESIGN

COURSE OBJECTIVE:

1. To understand the concepts and techniques associated with the number systems and codes.
2. To minimize the logical expressions using Boolean postulates.
3. To design various combinational and sequential circuits.

UNIT I NUMBERSYSTEMS, CODES & BOOLEAN ALGEBRA: Philosophy of number systems – r, (r-1)'s complement, representation of negative numbers, binary arithmetic, binary codes, error detecting & error correcting codes, hamming codes.
Boolean Algebra: Fundamental postulates of Boolean algebra, Basic theorems and properties, digital logic gates, properties of XOR gate, universal gates.

UNIT II SWITCHING FUNCTIONS AND THEIR MINIMIZATION: **Switching Functions**-Canonical and Standard forms, algebraic simplification using Boolean theorems, two level & Multilevel Realization of Boolean Functions using Universal Gates.
Minimization: K-Map methods, Prime implicants, don't care combinations, Minimal SOP and POS forms, Tabular Method, Prime-Implicant chart, simplification rules.

UNIT III COMBINATIONAL LOGIC DESIGN & PROGRAMMABLE LOGIC DEVICES: Design using conventional logic gates-Binary Adders, Subtractors, Ripple Adder, Look Ahead carry adder, Magnitude comparator, Encoder, Decoder, Multiplexer, De-Multiplexer, Code-converters.
PLD's: ROM, PROM, PLA, PAL, and Realization of Switching functions using PLD's. Comparison between PLA, PAL, ROM.

UNIT IV SEQUENTIAL CIRCUITS : Classification of sequential circuits (Synchronous, Asynchronous, Pulse mode, Level mode with examples),Basic flip-flops, Triggering and excitation tables, flip flop conversions, Steps in synchronous sequential circuit design, Design of modulo-N Synchronous counters – up/down counter, ring counter, Johnson counter, Design of modulo-N Asynchronous counter-Sequence detector, Serial binary adder.

UNIT V FSM MINIMIZATION AND ASM CHARTS: Finite state machine-capabilities and limitations, Mealy and Moore models and their conversions, minimization of completely specified and incompletely specified sequential machines, Partition techniques and Merger chart methods, concept of minimal cover table. Salient features of the ASM chart, Simple examples**.**

Text Books:

1. Morris Mano, *Digital Design*. Prentice Hall India, 3rd Ed.
2. Zvi Kohavi and Niraj K.Jha Switching *& Finite Automata theory*. Tata McGraw Hill, 3 rd Ed.

Reference Books:

1. Charles H. Roth, *Fundamentals of Logic Design*. Thomson Publications, 2004, 5th Ed.
2. Fletcher, *an Engineering Approach to Digital Design*. Prentice Hall of India.
3. Anand Kumar, *Switching Theory and Logic Design*. Prentice Hall of India, 2008.

Course outcomes:

By end of this course, students will be able to

1. Analyze the number systems and codes.
2. Simplify the logic expression using Boolean laws and postulates and designs them by using logic gates.
3. Minimize the logic expressions using map method and tabular method.
4. Design of combinational logic circuits using conventional logic gates and various programmable logic devices.
5. Design of sequential logic circuits.
6. Design the FSM for completely specified and incompletely specified sequential circuits.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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II Year B.Tech. EEE-I Semester

(4G232) ELECTRICAL MACHINES-I

COURSE 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 DC GENERATORS –CONSTRUCTION & OPERATION: Basic principle of Electromechanical energy conversion - Energy balance equation - constructional features of dc generators - principle of operation - function of commutator - armature windings - Lap and Wave windings - simplex and multiplex windings - single and multi layer windings - equalizer rings and dummy coils.

UNIT II TYPES & ARMATURE REACTION OF DC GENERATORS: E.M.F equation - methods of excitation - separately excited and self excited generators - Losses - reduction of losses - efficiency - Armature reaction - Cross magnetizing and de-magnetizing AT/pole – compensating winding - commutation - reactance voltage - methods of improving commutation.

UNIT III CHARACTERISTICS & PARALLEL OPERATION OF DC GENERATORS : O.C.C - Internal and External Characteristics - causes of failure of self excitation and remedial measures - Load characteristics. Parallel operation of DC generators - use of equalizer bar and cross connection of field windings - load sharing.

UNIT IV PRINCIPLE & SPEED CONTROL OF DC MOTORS: D.C Motors - Principle of operation - Back E.M.F. - Torque equation - characteristics of shunt, series and compound motors - Speed control of DC Motors - Armature voltage and field flux control methods - Ward-Leonard system - 3 point and 4 point starters, applications.

UNIT V TESTING OF DC MACHINES: Brake test - Swinburne's test - Hopkinson's test - Field's test - Retardation test - separation of stray losses in a DC motor.

TEXT BOOKS:.

1. I.J. Nagrath& D.P. Kothari, *Electrical Machines*. Tata McGraw – Hill Publishers, New Delhi, 2005, 7th Ed.
2. P.S. Bimbhra, *Electrical Machinery*. Khanna Publishers. New Delhi, 2005, 7th Ed.

REFERENCE BOOKS:

1. JB Gupta, *Theory and Performance of Electrical Machines* (DC machines, Poly phase circuits & AC machines) in SI Units. S.K. KATARIA & Sons, New Delhi, 2006, 14th Ed.
2. Albert E Clayton & N N Hancock, *Performance and Design of Direct Current Machines.* CBS Publishers, New Delhi, 2004, 3rd Ed.
3. S.K. Bhattacharya, *Electrical Machines*. Tata McGraw Hill Publishers, New Delhi, 2001.
4. A.E. Fitzgerald, C.Kingsley and S.Umans, *Electric Machinery*. McGraw-Hill Companies, New Delhi, 2008, 6th Ed.

COURSE OUTCOMES:

By the end of this course, students will be able to:

1. Understand the principle of energy conversion.
2. Understand the construction and principle of DC generator.
3. Know different types of DC generators, losses and efficiency.
4. Understand the concept of armature reaction and commutation.
5. Analyze the characteristics and operate DC Generators in parallel.
6. Understand principle, starting and speed control of DC motors.
7. Evaluate the performance of DC machines by conducting various tests.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

II Year B.Tech. EEE-I Semester

(4G233) 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, theorems, locus diagrams and network topology etc

UNIT I BASIC CONCEPTS OF ELECTRICAL CIRCUITS: Electrical Circuits: Circuit Concept–R-L-C Parameters, Voltage-Current Relationship for Passive Elements, Kirchhoff's Laws, Network Reduction Techniques-Series, Parallel, Series Parallel , Star-to-Delta & Delta-to-Star Transformation -Voltage and Current Sources-Independent and Dependent Sources, Source Transformation. Mesh , Super Mesh ,Nodal and super node analysis

UNIT II FUNDAMENTALS OF AC CIRCUITS: Single Phase Circuits: R.M.S, Average Values and Form Factor for Different Periodic Wave Sinusoidal Alternating Quantities – Phase and Phase Difference – Complex and Polar forms Of Representations, J-Notation, Steady State Analysis of R, L And C With Sinusoidal Excitation- Concept of Power Factor-Concept of Reactance, Impedance, Susceptance and Admittance-Real and Reactive Power, Complex Power-Locus Diagrams. Resonance – Definitions and computations of series and parallel resonance, definitions of bandwidth and Q-factor.

UNIT III NETWORK THEOREMS & TWO PORT NETWORKS: Network Theorems: Thevenin's, Norton's, Maximum Power Transfer and Millman's Theorems. Tellegen's, Superposition, Reciprocity and Compensation Theorems for D.C And Sinusoidal Excitations.

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 IV MAGNETICALLY COUPLED CIRCUITS: Coupled circuits – self & mutual inductance- Dot conventions – coefficient of coupling – Analysis of magnetic circuits: Series, Parallel and Composite circuits - comparison of electrical and magnetic circuits

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.

Text Books:

1. A. Sudhakar & Shyam Mohan. *Electric Circuits*. 3rd Edition, Mc Graw Hill Company, 2007.
2. A. Chakrabarthi. *Circuits Theory*. Dhanpat Rai & Co, New Delhi, 2009.

Reference Books:

1. M.E. Van Valkenberg. *Network Analysis*. 3rd edition, Pearson Publications, New Delhi 2006.
2. William H. Hayt & Jack E. Kennedy & Steven M. Durbin. *Engineering Circuit Analysis*. 6th edition, TATA Mc Graw Hill Company, 2009.
3. J.A.Edminister & M.D.Nahvy. *Theory and Problems of Electric Circuits*. 4th Edition Schaums Outline series, New Delhi TATA Mc Graw Hill Company, 2004.
4. G. K. Mittal, Ravi Mittal. *Network Analysis*. 14th Edition, Khanna Publishers, New Delhi, 1997.
5. C. K. Alexander and M. N. O. Sadiku. *Fundamentals of Electric Circuits*. 3rd Edition, Tata Mc Graw hill Publishing Company Limited, New Delhi, 2010.

Course Outcomes :

At the end of this subject, students should be able to:

1. Analyze simple dc circuits using systemic analysis techniques (basic law).
2. Apply thevenin's theorem, norton's theorem and the superposition theorem to aid in circuit analysis.
3. Explain ac steady-state circuit concepts (impedance, reactance, etc) and perform ac steady state analysis.
4. Be able to systematically obtain the equations that characterise the performance of an electric circuit as well as solving both single phase and three-phase circuits in sinusoidal steady state.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

II Year B.Tech. EEE-I Semester

(4G234) ELECTROMAGNETIC FIELDS

Course objective:

To provide the basic skills required to understand, develop, and design various engineering applications involving electromagnetic fields.

Review of Vector Algebra:

Scalar and vector fields - Vector algebra - Cartesian, Circular Cylindrical and Spherical co-ordinate systems-Divergence Theorem - Stoke's Theorem

UNIT I ELECTROSTATICS: Electrostatic fields-Coulomb's law - Electric Field Intensity (EFI) - Various Charge Distributions - EFI due to a Continuous volume charge distribution, line and surface charge Electric Flux density-Gauss's Law - Applications of Gauss law to symmetrical charge distributions and differential volume element - Maxwell's first equation. Energy expended in moving a point charge in an electric field-Potential –Maxwell's second equation - Potential Gradient-Potential for different Charge distributions-energy density in electrostatic fields

UNIT II DIELECTRICS, CONDUCTORS AND CAPACITANCE: Electric Dipole-Dipole moment - potential and EFI due to an electrical Dipole-Torque on an Electric Dipole in an electric field-Current density - conduction and convection current density - Ohm's law in point forms - continuity equation-Conductors and Dielectric materials Polarization , Boundary Conditions Capacitance-capacitance of parallel plate, Spherical and Co-axial capacitors with composite dielectric Laplace's and poison's equations.

UNIT III MAGNETOSTATICS & MAGNETIC POTENTIAL: Static magnetic fields-Biot-Savart's law, Magnetic Field Intensity(MFI) - MFI due to a straight current carrying filament, Circular, Square, Solenoid and Toroid current carrying wire, Relation between magnetic flux, Magnetic flux density and MFI. Ampere's Circuital law - Maxwell's third equation- Applications of Ampere's law to infinite line current, Infinite sheet of current, Infinitely long co-axial transmission line, Scalar magnetic potential and its limitations-Vector magnetic potential , Vector Poisson's equation.

UNIT IV FORCE IN MAGNETIC FIELDS AND INDUCTANCE: Magnetic Forces- Force on moving charges, - Lorentz force equation, Force on a current element -Force on a straight and long current carrying conductor in magnetic field-Force between two straight long and parallel current carrying conductors. Magnetic Dipole and Dipole moment - Torque on a current loop placed in a magnetic field.

Magnetization - Classification of magnetic materials - B-H curve - Magnetic Boundary conditions. Self and Mutual Inductance - Coefficient of coupling(K) - Neumann's formulae - Self-Inductance of a solenoid, Toroid, Co-axial cable, energy stored and density in magnetic field.

UNIT V ELECTRODYNAMIC FIELDS: Time varying fields - Faraday's laws of electromagnetic induction - Maxwell's fourth equation - statically and dynamically induced EMF – simple problems. Modifications of Maxwell's equations for time varying fields(Point forms and Integral forms) - displacement current - poynting theorem and poynting vector

TEXT BOOKS:

1. Sadiku. *Elements of Electromagnetic Fields*. 4th edition, Oxford Publications.
2. U.A.Bakshi ,A.V.Bakshi,*Electromagnetic Fields,*Technical Publications.

REFERENCE BOOKS:

1. William H. Hayt & John A. Buck. *Engineering Electromagnetics*. 7th Edition, Mc. Graw Hill Companies, 2006.
2. J D Kraus. *Electromagnetics*. 4th Edition, Mc Graw Hill, 1992.
3. K.A.Gangadhar & P.M. Ramanathan. *Field Theory*. 5th edition, Khanna publishers, New Delhi, 2003.
4. Ashutosh Pramanik. *Electromagnetics Theory & Applications*. 2nd Edition.PHI

Course Outcomes

1. Define electric and magnetic fields
2. Calculate electric and magnetic fields from stationary and dynamic charge and current distributions
3. Solve simple electrostatic boundary problems
4. Describe simple models for electromagnetic interaction with media
5. Be able to choose adequate models and solution methods for specific problems
6. Solve problems analytically and numerically
7. Have an ability to determine and describe static and dynamic electric and magnetic fields for technologically important structures: the coil, charge distributions, the dipole, the coaxial cable, dielectric and conducting spheres immersed in electric fields
8. Knowledge of, physical interpretation, and ability to apply Maxwell's equations to determine field waves, potential waves, energy and charge conservation conditions.

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II Year B.Tech. EEE-I Semester

(4G537) FLUID MECHANICS AND HYDRAULIC MACHINES LAB

Any **Ten** of the following experiments are to be conducted

1. Impact of jets on Vanes.
2. Performance Test on Pelton Wheel.
3. Performance Test on Francis Turbine.
4. Performance Test on Kaplan Turbine.
5. Performance Test on Single Stage Centrifugal Pump.
6. Performance Test on Multi Stage Centrifugal Pump.
7. Performance Test on Reciprocating Pump.
8. Calibration of Venturimeter.
9. Calibration of Orifice meter.
10. Determination of friction factor for a given pipe line.
11. Determination of loss of head due to sudden contraction in a pipeline.
12. Turbine flow meter.

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II Year B.Tech. EEE-I Semester

(4G237) ELECTRICAL MACHINES-I LAB

Any **Ten** of the following experiments are to be conducted

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. Load test on DC series generator. (Determination of characteristics)
4. Load test on DC compound generator (Cumulative and differential connection). (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. Retardation test on DC shunt motor (Determination of stray losses)
8. Swinburne's test on DC shunt motor. (Predetermination of efficiencies)
9. Speed control of DC shunt motor by
   a. Armature control method
   b. Field flux control method
10. Brake test on DC compound motor. (Determination of performance curves).
11. Brake test on DC shunt motor. (Determination of performance curves).
12. Separation of losses in DC shunt machine.

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II Year B.Tech. EEE-II Semester

(4GC41) MATHEMATICS - III

Course objectives:

The course aims to provide the student with the ability

1. To understand the complex variables and their functions.
2. To apply this knowledge to evaluate the complex integrals in real life situations.

UNIT – I

Beta and Gamma Functions – their properties – Evaluation of improper integrals using Beta and Gamma functions.

Complex variables: Exponential, trigonometric, hyperbolic functions and their properties – General power z^c (c is complex), principal value.

UNIT – II

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.

UNIT – III

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.

UNIT – IV

Singular point – Isolated singular point – Pole of order m – Essential singularity.

Residue – Evaluation of residues – Residue theorem. Evaluation of integrals of the type $\int_{-\infty}^{\infty} f(x)dx \quad and \quad \int_{0}^{2\pi} f(\cos\theta, \sin\theta)d\theta$.

Determination of zeros – Argument principle – Rouche's theorem.

UNIT – V

Conformal mapping: Definition – Translation, rotation, and inversion –- Transformation by e^z, $\ln z$, z^2, z^n, $\sin z$, $\cos z$ .Bilinear transformation -Fixed points – Cross ratio – Determination of bilinear transformation mapping for three given points

Text books:

1. Higher Engineering Mathematics, B. S. Grewal, Khanna Publication.

Reference Books:

1. A Text Book of Engineering Mathematics, B. V. Ramana, Tata McGraw Hill.
2. A Text Book of Engineering Mathematics, Vol – III, T.K. V Iyengar, B. Krishna Gandhi and Others S. Chand & Company.
3. Complex Variables – Chruchile and Brown.
4. Complex Variables – Schaum Series.

Course outcomes:

Upon completion of the course, students will

CO1: Understand the properties of Beta and Gamma functions

CO2: Have the knowledge on functions of a complex variable.

CO3: Understand the concepts of exponential, trigonometric, hyperbolic functions and their properties.

CO4: Have the knowledge of complex integration and apply it solve complex integrals of different type.

CO5: Learn about **c**onformal mapping

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II Year B.Tech. EEE-II Semester

(4G346)PULSE AND DIGITAL CIRCUITS

Course objectives:

The course aims to provide the student with the ability

1. To understand various wave shaping circuits and their applications.
2. To study and acquire knowledge on different circuits that produce non-sinusoidal waveforms
3. To study various voltage time base generators, Logic gates etc.

UNIT I: LINEAR WAVE SHAPING

High pass & low pass RC circuits, their response for sinusoidal, step, pulse, square, ramp and Exponential inputs. High pass RC network as differentiator, Low pass RC network as integrator, attenuators, ringing circuit.

UNIT II: SWITCHING CHARACTERISTICS & NON-LINEAR WAVE SHAPING:

Switching Characteristics of Devices: Diode as a switch, Diode Switching Times, Transistor as a Switch, transistor-switching times

Non-Linear Wave Shaping: Diode clippers, Transistor clippers, clipping at two independent levels, Comparators, clamping operation, clamping circuit taking source and diode resistance into account, Clamping circuit theorem, practical clamping circuits, effect of diode characteristics on clamping voltage.

UNIT III: TIME BASE GENERATORS, SYNCHRONIZATION AND FREQUENCY DIVISION

Voltage time base generators: General features of a time base signal, methods of generating time base waveform, Principle and working of Miller and Bootstrap time base generators.

Current time base generators: Simple current sweep circuit, linearity correction through driving waveform.

Synchronization and Frequency Division: Pulse Synchronization of relaxation devices, Frequency division in sweep circuit, astable relaxation circuits, Monostable relaxation circuits, stability of relaxation devices, Synchronization of a sweep circuit with symmetrical signals.

UNIT IV: MULTIVIBRATORS

Design and analysis of Bistable, Monostable & Astable Multi vibrators with BJT. Schmitt trigger circuit, Symmetrical & Un Symmetrical Triggering of Bistable Multivibrator, Monostable Multivibrators

UNIT V: SAMPLING GATES, LOGIC GATES AND LOGIC FAMILIES

Sampling Gates: Basic operation and principle of Sampling gates, uni-directional diode sampling gate, Bi-Directional diode & Transistor sampling gates, four diode sampling gate and their applications.

Realization of AND,OR,NOT gates using diodes and transistors, Inhibit operation, classification of logic families,DTL,RTL, DCTL,TTL, and CMOS logic families, comparison of logic families.

Text Books:

1. J. Millman and H. Taub, "Pulse, Digital and Switching Waveforms", McGraw-Hill, second edition, 2007.
2. Anand Kumar, " Pulse and Digital Circuits", PHI, 2005.Second Edition.

Reference Books:

1. Fundamentals of pulse and digital circuits-Ronald j.Tocci, third edition, 2008.
2. Solid state pulse circuits-David A.Bell,4th Ediion,2002 PHI.

Course Outcomes

Upon completion of the course, students will

CO1: Understand the response of high pass and low pass circuits for different non-sinusoidal signals and Clippers, Clampers.

CO2: Learn the characteristics of switching devices & operation of different multivibrator circuits.

CO3: Get knowledge about different time base signals to improve the linearity and sampling gates.

CO4: Understand the principles of synchronization and also know how synchronization is established.

CO5: Understand the operation and realization of different logic gates and logic families.

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II Year B.Tech. EEE-II Semester

(4G241) ELECTRICAL MACHINES-II

Course objective:

As an extension of Electrical machines I course this subject facilitates to study of the performance of Transformers and Induction motors which are the major part of industrial drives and agricultural pump sets.

UNIT-I CONSTRUCTION & OPERATION OF SINGLE PHASE TRANSFORMERS: Single phase transformer - types - constructional details - emf equation - operation on no load and on load - phasor diagrams - Losses - minimization of core losses - effect of variations of frequency & supply voltage on core losses

UNIT-II PERFORMANCE OF SINGLE PHASE TRANSFORMERS: Equivalent circuit - Efficiency - regulation - OC and SC tests, Polarity test - Sumpner's test - predetermination of efficiency and regulation - separation of core losses test - Parallel operation - Auto transformers - Equivalent circuit - comparison with two winding transformers - All day efficiency.

UNIT-III THREE - PHASE TRANSFORMERS: Three-Phase transformers - connections - Y/Y, Y/Δ, Δ/Y, Δ/Δ - open Δ and Scott connection, Third harmonics in phase voltages - three winding transformers.

UNIT-IV THREE-PHASE INDUCTION MOTORS: Three-Phase induction motors - construction - production of R.M.F. - principle - Effect of slip on rotor parameters at standstill and during operation - 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 characteristics - double cage and deep bar rotors - equivalent circuit - phasor diagram - crawling and cogging.

UNIT-V CIRCLE DIAGRAM, STARTING & SPEED CONTROL OF THREE-PHASE INDUCTION MOTORS: No - Load and blocked rotor tests - stator resistance test - Circle diagram - predetermination of performance - methods of starting - starting current and torque calculations - speed control - change of frequency, change of poles, methods of consequent poles, cascade connection, Injection of an emf into rotor circuit (qualitative treatment only) - Induction Generator -principle of operation.

Text books:

1. I.J.Nagrath & D.P.Kothari, *Electric Machinery*. Tata McGraw Hill, 2005, 7th Ed.

2. P.S. Bimbhra, *Electrical Machinery*. Khanna Publishers. Delhi, 2005, 7th Ed.

Reference books:

1. JB Gupta, *Theory and performance of Electrical Machines. (DC machines, Poly phase circuits & AC machines) in SI Units*, S.K. KATARIA & Sons, Delhi 2009.
2. A.E. Fitzgerald, C.Kingsley and S.Umans, *Electric Machinery*. McGraw-Hill Companies, New Delhi, 2008, 6th Ed.
3. MG.Say, *Performance and Design of AC Machines*. BPB Publishers.
4. Langsdorf, *Theory of Alternating Current Machinery*. Tata McGraw-Hill Companies, 2nd Ed.
5. B.L. Theraja & A.K. Theraja, *A. text of Electrical Technology in SI units* Vol: 2.

S. Chand, 2010.

Course outcomes:

By the end of this course, students will be able to:

1. Understand the construction and operation of single phase transformer.
2. Evaluate the performance of single phase transformer.
3. Understand the performance of single phase Auto transformer.
4. Know the different three phase transformer connections.
5. Understand the construction and principle of three phase induction motor.
6. Analyze the Torque-Slip characteristics of three phase induction motor.
7. Evaluate the performance of three phase induction motor.
8. Control speed of three phase induction motor

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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II Year B.Tech. EEE-II Semester

(4G242) 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 three phase circuits , transient analysis, applications of Laplace and Fourier transforms and network synthesis techniques etc.

UNIT I THREE PHASE 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 II LAPLACE TRANSFORMS: Definition of Laplace transform – advantages, basic theorems(differentiation and integration) - Laplace transform of important functions – inverse Laplace transform – transform impedance of network elements (R, L & C), application of Laplace transform – series RL, RC, RLC – parallel RLC circuits – initial and final value theorem

UNIT III.TRANSIENT ANALYSIS (AC & DC): Transient response of RL, RC and RLC series circuits –Initial conditions-Solution method using differential equation and Laplace transforms, Response of RL and RC networks to pulse excitation.

Transient response of RL, RC and RLC series circuits –Initial conditions-Solution method using differential equation and Laplace transforms.

UNIT IV FOURIER SERIES: Introduction – trigonometric Fourier series - evaluation of Fourier coefficients – waveforms symmetry, exponential form Fourier series, effective value, Fourier transforms & Properties – relationship with Laplace transform.

UNIT V NETWORK FUNCTIONS AND SYNTHESIS: Introduction-course and terminal pairs-determinants and co factors for determining network functions-network functions – necessary conditions for driving point function-necessary conditions for transfer function-applications of network analysis in deriving network functions-transient response –positive real functions-definitions and properties-synthesis of single port networks (RL, RC and LC networks)

Text books:

1. A. Sudhakar, Shyammohan S Palli. *Circuits and Networks*. (Analysis and Synthesis), 3rd edition, Tata Mc GrawHill Publishing company Ltd.,
2. D. Roy Choudhury. *Networks and Systems*. 1st edition, New Age international publishers.

Reference books:

1. A. Chakrabarthi. *Circuit Theory (Analysis and Synthesis)*. 1st edition, Dhanpat Roi & Co. New Delhi, 2009
2. M.E. Van Valkenburg. *Network analysis*. 3rd edition, PHI.
3. William H Hayt, Jr. Jack E. Kemmerly, Steven M. Durbin. *Engineering Circuit Analysis*. 6th edition, Tata Mcgraw Hill publishing company Ltd.,
4. Umesh Sinha. *Network Analysis and Synthesis*. 5th edition, Satyaprakashan, New Delhi.
5. *Engineering Network Analysis & Filter Design*. Gopal Bhise G, Durgesh Kulshreshtha C, Prem Chadha R.

Course outcomes:

1. Analyze Star and Delta Connections, Phase and Line quantities.
2. Emphasize Power measurement in three phase circuits.
3. Analyze the applications of Laplace transforms and inverse Laplace transforms.
4. Analyze the transient response of electrical circuits for DC and AC excitations.
5. Analyze the applications of Fourier series and Fourier transforms.
6. Analyse the Network functions and Network Synthesis.

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II Year B.Tech. EEE-II Semester

(4G243) GENERATION OF ELECTRIC POWER

Course objective:

Electrical power plays significant role in day-to-day life of entire mankind. To familiarize the students with different types of power generating systems and the economics associated with power generation.

UNIT I: INTRODUCTION & THERMAL POWER STATIONS: Overview of Conventional and Non-Conventional sources of energy - Structure of Electric Power System - Growth of PS in India Layout of thermal plant –use of lignite and coal - showing paths of coal – steam – water – air - ash and flue gases - brief description of TPS components: economizer – boilers - super heaters - turbines and condenser-chimney and cooling towers.

UNIT II: HYDRO ELECTRIC AND GAS POWER STATIONS: Arrangement and location of hydro electric station, principle of working of a hydro – electric plants, components, Advantages and disadvantages
Gas Power Stations: Principle of Operation and Components (Block Diagram Approach Only)

UNIT III: NUCLEAR POWER STATIONS: Nuclear fission - chain reaction - principle of operation of nuclear reactor - nuclear fuel – moderator - control rods - reflectors and coolants - shielding and safety precautions - radiation hazards - nuclear reactors – PWR - BWR and breeder reactor

UNIT IV: ECONOMIC ASPECTS OF POWER GENERATION: Load curve - load duration and integrated load duration curve – load – demand – diversity – capacity - utilization and Plant use factors. Costs of generation – depreciation - methods of calculations

UNIT V: TARIFF METHODS AND POWER FACTOR IMPROVEMENT: Tariffs - flat rate - block rate - two part - three part and power factor tariffs. Causes of low p.f -Methods of Improving p.f -Phase advancing and generation of reactive KVAR using static Capacitors.

Text Books:

1. V.K.Mehta and Rohith Mehta. *Principles of Power Systems*. Schand & Company Ltd, New Delhi 2004
2. M.L.Soni, P.V.Gupta, U.S.Bhatnagar and A.Chakraborti. *A Text Book on Power System Engineering*. Dhanpat Rai & Co. Pvt. Ltd., 1999.

Reference books:

1. C.L.Wadhwa. *Electrical Power Systems*. New Age international (P) limited, 2005
2. M.V.Deshpande. *Elements of Power Station Design And Practice*. Wheeler publishing, 1999
3. *Electrical power Generation, Transmission and Distribution*, S N Singh,PHI,2003.
4. J B Gupta , *A course in Power Systems* , Published by S K Kotaria & Sons

Course outcomes:

1. Learns about generation of electric power from Thermal sources.
2. Demonstrates the working of Hydro and Gas power plants.
3. Understands the importance of Nuclear power generation.
4. Able to know the economic aspects of power generation.
5. To know the different types of tariff ‘s and importance of power factor.

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II Year B.Tech. EEE-II Semester

(4G244) LINEAR CONTROL SYSTEMS

Course objective:

To provide an introduction to the analysis of linear control systems. This will permit an engineer to exploit time domain and frequency domain tools

UNIT I INTRODUCTION: Concepts of Control Systems-Classification-Open Loop and closed loop control systems and their differences-Examples-Feed-Back Characteristics, Effects of feedback-Mathematical models-differential Equations-Transfer function-Mechanical Translational & Rotational systems, electrical analogy — Block Diagram representation of systems considering electrical systems as examples- Block diagram algebra, Signal Flow graph and Mason's gain formula. Transfer function of DC servo motor – AC servo motor -synchro transmitter and receiver

UNIT II TIME RESPONSE ANALYSIS: Types of test signals, Type and Order of a systems, Time Response of first and second order system, Time domain specifications- and– steady state error – static error constants – generalized error coefficients. Effects of proportional, integral, derivative Controllers

UNIT III STABILITY ANALYSIS: Concepts of stability: Characteristic equation, location of roots in s-plane for stability, asymptotic stability and relative stability, Routh-Hurwitz stability criterion- 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.-

UNIT V Design and Compensation Techniques: Compensation techniques – Lag, Lead, Lead-Lag Compensators design using Bode Plot

State Space Analysis

Concepts of state, state variables and state model-derivation of state model for physical systems Diagonalization- State transition Matrix and its properties – Solution of linear state equation – Concepts of controllability and Observability

Text Books:

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

Reference Books:

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

Course Outcomes

1. To Understand the basic components of control systems.
2. To Gain knowledge in various time domain and frequency domain tools for
   analysis and design of linear control systems and compensators.
3. To Understand the methods to analyze the stability of systems from transfer
   function forms
4. To Understand the concept of state variable analysis

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II Year B.Tech. EEE-II Semester

(4G246) ELECTRICAL CIRCUITS AND SIMULATION LAB

Any **EIGHT** experiments to be conducted from the following

1. Verification of KCL & KVL.
2. Verification of Maximum Power Transfer Theorem.
3. Verification of superposition theorem.
4. Verification of Thevenin's and Norton's theorem.
5. Verification of Compensation theorem.
6. Verification of Reciprocity and Millmann's Theorems
7. Determination of Self Inductance, Mutual Inductance and Co-efficient of Coupling of a single phase transformer.
8. Series and Parallel Resonance
9. Determination of Impedance and Admittance Parameters
10. Determination of transmission and Hybrid Parameters
11. Locus diagrams on RL and RC circuits.

Any TWO experiments to be conducted from the following

PSPICE SIMULATION

12. Simulation of DC Circuits
13. DC Transient Response
14. Mesh Analysis
15. Nodal Analysis

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II Year B.Tech. EEE-II Semester

(4GC45) ADVANCED ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

Syllabus:

- **Resume Preparation** – structure, formats and styles – planning - defining career objective - projecting one's strengths and skills - creative self-marketing–sample resumes - cover letter
- **Interview Skills**- concept and process - pre-interview planning – preparation - body language - answering strategies – frequently asked questions
- **Group Discussion** –communicating views and opinions – discussing – intervening – agreeing and disagreeing –asking for and giving clarification - substantiating - providing solution on any given topic across a cross-section of individuals - modulation of voice and clarity - body language – case study
- **Oral Presentations(Individual)** – collection of data from various sources –planning, preparation and practice – attention-gathering strategies -transitions – handling questions from audience
- **Oral Presentations (Team)**- appropriate use of visual aids –PowerPoint presentation.
- **Reading Comprehension**- reading for facts – scanning – skimming - guessing meanings from context– speed reading
- **Listening Comprehension** – listening for understanding - responding relevantly

Minimum Requirements:

Advanced English Language Communication Skills Lab is conducted at two places:

- Computer-aided Language Lab with 60 computer machines, one teacher console, LAN facility and Language Learning software for self-study.
- Communication Skills Lab with movable chairs, a discussion room, Public Address System, a Television, a DVD Player, a camcorder, an LCD Projector and a computer machine.
- Manual cum Record, prepared by Faculty Members of English of the college will be used by students.

Suggested Software:

- It's your Job published by Clarity
- Business Writing published by Clarity
- Active Listening published by Clarity
- Active Reading published by Clarity
- Software published by Globerana
- Cambridge Advanced Learner's Dictionary
- Oxford Advanced Learner's Dictionary

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

II Year B.Tech. EEE-II Semester

(4GC44) APTITUDE AND REASONING SKILLS

QUANTITATIVE APTITUDE:

1. Number Systems
2. Averages
3. Problems on ages
4. Allegations
5. Percentages
6. Profit and loss
7. Simple interest and Compound interest
8. Ratio and Proposition and variation
9. Time and Work
10. Time and Distance
11. Menstruation
12. Permutation and Combinations
13. Progressions
14. Inequalities
15. Logarithms
16. HCF and LCM
17. Decimal Fractions
18. Simplification
19. Square Roots and Cube Roots
20. Pipes and Cisterns
21. Area, Volume and Surface Areas
22. Calendar, Clocks
23. True Discount, Banker's Discounts
24. Data Interpretation, Tabulation, Bar Graphs, Pie charts, Line Graphs

REASONING:

1. Directions
2. Blood Relations
3. Problems on Cubes
4. Series and Sequences
5. Odd man out
6. Coding and Decoding
7. Data sufficiency
8. Logical deductions
9. Arrangements and Combinations
10. Groups and Teams
11. Puzzles to Puzzle you. More puzzles, Brain Teasers, Puzzles and Teasers

Reference Books:

1. Arun Sharma, How to Prepare for Quantitative Aptitude, TMH Publishers, New Delhi, 2003.
2. R.S. Agarwal, Quantitative Aptitude, S. Chand Publishers, New Delhi, 2005.
3. Sharon Weiner-Green, Irn K.Wolf, Barron's GRE, Galgotia Publications, New Delhi, 2006.
4. R.S.Agarwal, Vrebal and Non-Verbal Reasoning, S.Chand Publishers, New Delhi, 1998.
5. Shakuntala Devi, Puzzles to Puzzle you, Orient Paper Backs Publishers(OPB), New Delhi, 2005.
6. Shakuntala Devi, More Puzzles, OPB, New Delhi, 2006.
7. Ravi Narula, Brain Teasers, Jaico Publishing House, New Delhi, 2005.
8. George J Summers, Puzzles and Teasers, Jaico Publishing House, Mumbai, 2005.

Library:

1. Mittal.U, Puzzles to Puzzle you (Book-I & II).
2. Aptitude (Quantitative, Analytical, Logical), By Globarena.
3. Aptitude – Student work book, Part-I &II, By Globarena.

Material for Soft Skills, By Globarena

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(AN AUTONOMOUS INSTITUTION)

III Year B.Tech. EEE-I Semester

(4GC52) ENVIRONMENTAL SCIENCE

Course objectives:

1. Understand & appreciate the importance of Environmental Science.
2. In order to make the students environmentally educated
3. To protect the environment by preventing environmental pollution& degradation.

UNIT - I

Multidisciplinary nature of environmental studies - Scope & Importance of environmental studies - Need for public awareness - Global environmental crisis (over-exploitation of natural resources, decline of ecosystems, loss to biodiversity, environmental pollution, and population growth) – People in environment – Institutions in environment

UNIT - II

Renewable & non-renewable natural resources. Forest resources: Use – deforestation, case studies - dams & their effects on forest & tribal people Water resources: Use - floods, drought- conflicts over water. Mineral resources: Use - environmental effects of extracting mineral resources, case studies. Food resources: Impacts of over grazing, traditional agriculture and modern agriculture, Energy resources: Renewable and non – renewable energy resources - use of alternate energy resources. Land resources: Land as a resource, land degradation, soil erosion. Role of an individual in the conservation of natural resources.

UNIT - III

ECOSYSTEMS: Producers, consumers & decomposers - Food chains, food webs & ecological pyramids - Energy flow in the ecosystem- Cycling of nutrients (Bio geo chemical cycles-water, oxygen, carbon, nitrogen & energy cycles) – Types and characteristic features of the following ecosystems :(a)Forest ecosystems (b) Grass land ecosystems (c) Desert ecosystems (d) Aquatic ecosystems (lakes, rivers, oceans, estuaries)

BIODIVERSITY AND ITS CONSERVATION: Definition - Values of biodiversity: consumptive value, productive value, social value, ethical value, aesthetic value & option values - Hot spots of biodiversity - Threats to biodiversity: habitat loss, poaching of wild life - Conservation of biodiversity: In –situ & Ex-situ conservation

UNIT –IV

ENVIRONMENTAL POLLUTION: Definition, causes, effects & control measures of: Air pollution, Water pollution, Soil pollution, Noise pollution, Thermal pollution, Marine pollution, Nuclear hazards - Solid waste management: Causes, effects and control measures of urban wastes.

UNIT – V

SOCIAL ISSUES AND THE ENVIRONMENT: Rain water harvesting - Environmental ethics: Issues & possible solutions - Global warming - Acid rain - Ozone layer depletion – Wasteland reclamation - Environment protection Act.-Air (Prevention & Control of Pollution) Act.-Water (Prevention & Control of Pollution) Act.-Wildlife Protection Act-Forest Conservation Act.

HUMAN POPULATION & ENVIRONMENT: Population explosion – Family Welfare Program -Environment & human health - Human Rights (in relation to environment) - Value Education (environmental values) - HIV/AIDS.

Text books:

1. Text book of Environmental Studies for Undergraduate Courses by ErachBharucha for University Grants Commission, University press.
2. Environmental Studies by R. Rajagopalan Oxford University Press.
3. Perspectives In Environmental Studies by AnubhaKaushik and C.P.kaushik, New Age International Publishers.

Reference books:

1. Comprehensive Environmental Studies by J.P.Sharma, Laxmi Publications.
2. Environmental Studies by AninditaBasak – Pearson education.
3. Environmental Studies by Benny Joseph, Mc.graHill Publications.

Course outcomes:

Upon completion of the course, students will

CO1: To aware about global environment crisis & to understand the different resources and their problems.

CO2: To make the student know about different types of pollution, their sources, effects & control measures.

CO3: Broad awareness about ecosystems, biodiversity, solid waste & disaster management.

CO4: Understand the main social issues & population issues related to the environment.

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(AN AUTONOMOUS INSTITUTION)

III Year B.Tech. EEE-I Semester

(4G359) LINEAR & DIGITAL IC APPLICATIONS

Course objectives:

The course aims to provide the student with the ability

1. To Understand the Concepts of differential amplifier and OP-Amp.
2. To learn filters, Timer, converters , Analog Multipliers and Logic Design Concepts.

UNIT-I OP-AMPS AND APPLICATIONS

Integrated circuits-types, classification, package types and temperature ranges ,Characteristics of OP-Amps, power supplies, OP-Amp Block diagram, ideal and practical OP-Amp specifications, DC and AC characteristics, 741 OP-Amp and its features, FET input OP-Amps, OP-Amp parameters and measurement, input and output offset voltages and currents, slew rate, CMRR, PSRR, drift, Frequency compensation technique. Inverting and non-inverting amplifier, integrator and differentiator, difference amplifier, instrumentation amplifier, AC amplifier, V-I, I-V converters, Buffers, Non-linear function generation, comparators, Multivibrators, Triangular and square wave generators, Log and antilog amplifiers, precision rectifiers.

UNIT-II TIMERS AND PHASE LOCKED LOOPS

Introduction to 555 Timer, functional diagram, Monostable and Astable operations and applications, Schmitt Trigger, PLL-Introduction, Block schematic, principles and description of individual blocks,565 PLL ,applications of PLL-Frequency multiplication, frequency translation, AM, FM and FSK demodulators

D/A AND A/D CONVERTERS

Introduction, Basic DAC techniques, weighted resistor DAC, R-2R Ladder DAC, Inverted R-2R DAC and IC 1408 DAC, different types of ADCs-parallel comparator type ADC, counter type ADC, successive approximation ADC and Dual slope ADC.DAC and ADC specifications.

UNIT III CMOS LOGIC:

Introduction to logic families, CMOS logic, CMOS steady state electrical behavior, CMOS dynamic electrical behavior, CMOS logic families.

BIPOLAR LOGIC AND INTERFACING:
Bipolar logic, Transistor logic, TTL families, CMOS/TTL interfacing, low voltage CMOS logic and interfacing, Emitter coupled logic, Comparison of logic families, Familiarity with standard 74XX and CMOS 40XX series-ICs – Specifications.

UNIT IV COMBINATIONAL LOGIC DESIGN :
Decoders, encoders, three state devices, multiplexers and demultiplexers, Code Converters, EX-OR gates and parity circuits, comparators, adders & subtractors, ALUs, Combinational multipliers.

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

Text books:

1. Ramakanth A. Gayakwad - Op-Amps & Linear ICs , PHI, 1987.
2. John F. Wakerly - Digital Design Principles & Practices, PHI/ Pearson Education Asia, 3rd Ed., 2005

Reference books:
1. Floyd and Jain - Digital Fundamentals, Pearson Education, 8th Edition, 2005.
2. D. Roy Chowdhury - Linear Integrated Circuits, New Age International (p) Ltd, 2nd Ed., 2003.

Course outcomes:
Upon completion of the course, students will
CO1: Understand the analysis of differential amplifier and characteristics of OP-Amp.
CO2: Design Op-Amp circuits for liner & non linear applications.
CO3: Design different analog filters
CO4: Understand the applications of 555 timer and PLL.
CO5: know the principles of converters and analog multipliers
CO6: Understand Logic Design concepts

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

III Year B.Tech. EEE-I Semester

(4G251) ELECTRICAL MACHINES-III

Course Objective:

This course is an extension of electrical machines-II. At present, majority of the power plants use synchronous machines. It is important to Understand the construction, principle of operation, characteristics and operational issues of such machine. It is equally important to study the principle of operation of special machines which are used in several home appliances and electronic gadgets.

UNIT I CONSTRUCTION AND PRINCIPLE OF OPERATION OF SYNCHRONOUS GENERATOR: Constructional features of round rotor and salient pole machines - armature windings -Integral slot and fractional slot windings, distributed and concentrated windings - distribution, pitch and winding factors - E.M.F equation - Harmonics in generated e.m.f. - suppression of harmonics .

UNIT II CHARACTERISTICS OF SYNCHRONOUS GENERATOR: Armature reaction - leakage reactance - synchronous reactance and impedance - experimental determination - phasor diagram - load characteristics - regulation by synchronous impedance, M.M.F., Z.P.F., and A.S.A. methods - salient pole alternators - two reaction theory - experimental determination of X_d and X_q (slip test)- phasor diagrams - regulation of salient pole alternators.

UNIT III PARALLEL OPERATION OF SYNCHRONOUS GENERATORS:

Synchronizing alternators with infinite bus bars – synchronizing power and torque - parallel operation and load sharing - Effect of change of excitation and mechanical power input.

UNIT IV SYNCHRONOUS MOTORS –PRINCIPLE OF OPERATION: Theory of operation - phasor diagram - variation of current and power factor with excitation - V and inverted V curves - synchronous condenser - mathematical analysis for power developed - excitation and power circles - hunting and its suppression - methods of starting.

UNIT V SINGLE PHASE MOTORS: Single phase induction motor - Constructional features-Double revolving field theory - Elementary idea of cross - field theory - split-phase motors - shaded pole motor - A.C. Series motor - Universal motor - Stepper motor.

Text books:

1. I.J.Nagrath&D.P.Kothari, *Electric Machines*. Tata McGraw-Hill Publishers, 2010, 4th Ed.
2. P.S. Bimbra, *Electrical Machinery*. Khanna Publishers. Delhi, 2005, 7th Ed.

Reference books:

1. JB Gupta, *Theory and performance of Electrical Machines*.S.K. Kataria& Sons, New Delhi, 2006, 14th Ed.
2. M.G. Say, *The Performance and Design of A.C.Machines*. ELBS publishers, New Delhi, 2002, 3rd Ed.
3. A.E. Fitzgerald, C.Kingsley and S.Umans, *Electric Machinery*. McGraw-Hill Companies, New Delhi, 2008, 6th Ed.
4. Langsdorf, *Theory of Alternating Current Machinery*. Tata McGraw-Hill, New Delhi, 2005, 2nd Ed.
5. I.J.Nagrath&D.P.Kothari, *Electric Machines*. Tata McGraw-Hill Publishers, 2010, 4th Ed.

Course outcomes:

By the end of this course, students will be able to:

1. Understand the construction and operation of three phase synchronous generator.
2. Analyze the characteristics of three phase synchronous generator.
3. Evaluate the performance of three phase synchronous generator.
4. Perform parallel operation of the synchronous generators.
5. Understand the construction and operation of three phase synchronous motor.
6. Evaluate the performance of three phase synchronous motor.
7. Understand the construction and operation of single phase motors.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

III Year B.Tech. EEE-I Semester

(4G252) TRANSMISSION OF ELECTRIC POWER

Course objective:

To enrich the students with the fair knowledge of transmission line parameters and their performance analysis, power system transients, cables and insulators and also the recent trends in power transmission systems.

UNIT I: TRANSMISSION LINE PARAMETERS: Types of conductors-calculation of resistance for solid conductors-calculation of inductance for single phase and three phase, single and double circuit lines, concept of GMR and GMD, symmetrical and asymmetrical conductor configuration with and without transposition.Calculation of capacitance for 2 wire and 3 wire systems, effect of ground on capacitance, capacitance calculations for symmetrical and asymmetrical single and double circuit lines. Skin and Proximity effects.

UNIT II: PERFORMANCE OF TRANSMISSION LINES: Classification of transmission lines- short, medium and long lines and their model representations-nominal T, nominal-pie and A, B, C, D constants for transmission lines, numerical problems. Mathematical solutions to estimate regulation and efficiency of all types of lines-Long Transmission Line-Rigorous Solution, evaluation of A, B, C, D Constants, Surge Impedance and SIL of Long Lines, Ferranti effect and charging current

UNIT III: POWER SYSTEM TRANSIENTS: Types of transients- traveling 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.

UNIT IV: INSULATORS, CORONA AND MECHANICAL DESIGN OF TRANSMISSION LINES: Types of insulators, String efficiency, Voltage distribution, calculation of string efficiency, methods for improvement-capacitance grading and static shielding. Corona - Description of the phenomenon, factors affecting corona, critical voltages and power loss. Sag and Tension calculations with equal and unequal heights of towers, effect of wind and ice on weight of conductor, Stringing chart and sag template and their applications.

UNIT V: UNDER GROUND CABLES: Types of cables, construction, types of insulating materials, calculations of insulation resistance and stress in insulation. Capacitance of single and 3-core belted cables. Grading of cables-capacitance grading, description of inter sheath grading.

Text Books:

1. C.L.Wadhwa, *Electrical Power Systems* ,3rd edition, New Age International(P)Limited, publishers, 2005.
2. M.L.Soni, P.V.Gupta, V.S. Bhatnagar, A.Chakravarthy, *A text book on power system engineering* , Dhanpat Rai and Co Private Limited, 2007.

Reference Books :

1. A course in Power Systems, J B Gupta, Published by S K Kotaria & Sons

2. John J Grainger William D Stevenson, Power System Analysis, 4th Edition, TMC Companies, 2003.

3. B.R.Gupta, Power System Analysis and Design, 3rd edition, Wheeler Publishers, 1999.

4. Hadi Saadat, Power System Analysis , 6th reprint, TMH Edition, 2005.I.J.Nagarat and D.P.Kothari, Modern Power System Analysis, 3rd edition, TATA Mc Graw Hill, Sep 2003.

Course outcomes:

1. Able to determine the resistance, inductance and capacitance for different over head transmission lines.
2. Able to evaluate the performance of short, medium and long transmission lines.
3. Understands the behavior of a transmission line for different transients.
4. Knows the importance of different types of insulators.
5. Able to know the significance of mechanical design of transmission lines.
6. Learns different features of underground cables.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

III Year B.Tech. EEE-I Semester

(4G253) POWER ELECTRONICS

Course Objective:

Introduce the basic theory of power semiconductor devices & their practical application in power electronics. It also familiarize the operation principle of AC-DC, DC-DC, DC-AC, AC-AC conversion circuits and their applications.

UNIT I - POWER SEMICONDUCTOR DEVICES

Thyristors – Silicon Controlled Rectifiers (SCR's) – BJT – Power MOSFET – Power IGBT and their characteristics – Basic theory of operation of SCR – Static and Dynamic characteristics of SCR - Turn on methods for SCR- Turn off (Commutation) methods for SCR- Series and parallel connections of SCRs- Numerical problems–Specifications and Ratings of SCRs

UNIT II – FIRING CIRCUITS & PROTECTION CIRCUITS

Two transistor analogy of SCR – R and RC Triggering - UJT firing circuit Protection against dv/dt & over voltages -Design of Snubber circuit- Metal Oxide Varistors-Improving dv/dt rating with the help of Cathode short-di/dt Protection with the help of Inductor-over current Protection-Semi conductor Fuses-Cooling of Semi conductor devices-Types

UNIT III - PHASE CONTROLLED RECTIFIERS

Phase control techniques – Single phase Line commutated converters – Midpoint and Bridge connections – Half & Fully controlled converters with R, RL and RLE loads– Derivation of average load voltage and current -Active and Reactive power inputs to the converters-Effect of Freewheeling Diode - Phase converters – Three pulse and six pulse converters – Midpoint and bridge connections average load voltage With R and RL loads – Effect of Source inductance–Dual converters (Both single phase and three phase)

UNIT IV - CHOPPERS

Principle of step up and step down operation – single quadrant DC chopper with R, RL and RLE loads –Time ratio control & current limit control strategies – Derivation of average load voltage and load current for continuous current operation –Two quadrant and four quadrant DC choppers. Voltage, current and load commutated choppers.

UNIT V - AC TO AC CONVERTERS & INVERTERS

Inverters – Single phase inverter – Basic series inverter – Basic parallel inverter –Voltage Source Inverter & Current Source Inverter- Mc Murray and McMurray-Bedford inverters-Voltage control techniques for inverters- Pulse width modulation techniques.

AC voltage controllers – Single phase two SCRs 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 –Numerical problems -Cyclo converters – Single phase mid point cyclo converters with Resistive and inductive load– Bridge configuration of single phase cyclo converter

Text books:

1. M. D. Singh & K. B. Kanchandhani. *Power Electronics*. Tata Mc Graw Hill Publishing Company, 2nd edition, 2006.
2. P.S.Bimbhra. *Power Electronics*. Khanna Publishers,2012.

Reference books:

1. Vedam Subramanyam. *Power Electronics*. 3rd Edition, New Age International (P) Limited, 2008.
2. M. H. Rashid. *Power Electronics Circuits Devices and Applications*. 3rd Edition, Pearson, 2014.
3. John G. Kassakian, Martin F. Schlecht and George.C.Verghese. *Principles of Power Electronics*. Pearson Edition, 2010
4. P.C. Sen. *Power Electronics*. Tata Mc Graw-Hill Publishing Company, 2009.

Course outcomes

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

1. Analyze the characteristics of different types of semiconductor devices
2. Analyze the Firing circuits & protection circuits of SCR
3. Analyze the operation of controlled rectifiers
4. Analyze the operation of choppers
5. Analyze the operation of AC-AC converters, Inverters
6. Acquainted with the applications of power electronic converters

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

III Year B.Tech E.E.E –I Semester

(4G254) ELECTRICAL & ELECTRONICS MEASUREMENTS

Course Objective:

Electrical measurements course introduces the basic principles of all measuring instruments. It also deals with the measurement of RLC parameters voltage, current, Power factor, power, energy, magnetic measurements and Digital Meters

UNIT I MEASURING INSTRUMENTS: Methods of measurements, Classification of instruments – deflecting, control and damping torques – Ammeters and Voltmeters – PMMC, Dynamometer, moving iron type instruments – expression for the deflecting torque and control torque – Errors and compensations, extension of range using shunts and series resistance.
INSTRUMENT TRANSFORMERS: CT and PT – Ratio and phase angle errors – design considerations.

UNIT II P.F METERS AND FREQUENCY METERS: Types of P.F. Meters – dynamometer and moving iron type – 1-ph and 3-ph meters - frequency meters- resonance type and Weston type
MEASUREMENT OF POWER / ENERGY: Single phase dynamometer wattmeter, LPF and UPF, Double element and three element dynamometer wattmeter, expression for deflecting and control torques. Single phase induction type energy meter – driving and braking torques – errors and compensations. Three phase energy meter.

UNIT –III POTENTIOMETERS: Principle and operation of D.C. Crompton's potentiometer – standardization – Measurement of unknown resistance, current, voltage. A.C. Potentiometers: polar and coordinate types standardization – applications.
D.C BRIDGES: Method of measuring low, medium and high resistance – sensitivity of Wheatstone's bridge – Kelvin's double bridge for measuring low resistance, measurement of high resistance – loss of charge method.

UNIT IV A.C BRIDGES: Measurement of inductance – Maxwell's bridge, Anderson's bridge. Measurement of capacitance and loss angle – Desauty bridge. Wien's bridge , Schering Bridge.

MAGNETIC MEASUREMENTS: Ballistic galvanometer – equation of motion – flux meter – constructional details, comparison with ballistic galvanometer. Determination of B-H Loop methods of reversals – step by step method – A.C. testing – Iron loss of bar samples.

UNIT – V OSCILLOSCOPE: Cathode Ray Oscilloscope- Cathode Ray tube- Time base generator- Horizontal and Vertical amplifiers – application of CRO – Measurement of phase , frequency, current & voltage- Lissajous pattern
DIGITAL METERS: Digital Voltmeter-Successive approximation, ramp and integrating type-Digital frequency meter-Digital multimeter-Digital Tachometer

Text books:

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

Reference books:

1. R. K.Rajput *Electrical & Electronic Measurement & Instrumentation*., 2nd Edition, S. Chand & Co.
2. H. S. Kalsi *Electronic Instrumentation* .Tata Graw Hill Mc, 3rd Edition.
3. Buckingham and Price *Electrical Measurements*, Prentice –Hall
4. Reissland, M.U *Electrical Measurements*: *Fundamentals, Concepts, Applications*-New Age International (P) Limited, Publishers.

Course outcomes:

1. Understands the construction and operation of analog Ammeters and voltmeters, and extension of range.
2. Understands construction and operation of current transformers, potential transformers and power factor meters.
3. Learns the construction and operation of single phase dynamometer type wattmeter and single phase induction type energy meter.
4. Learns measurement of voltage by DC Crompton potentiometer and AC potentiometer, and their applications.
5. Learns the measurement of Resistance , Inductance and Capacitance by using bridge circuits
6. Understands the magnetic measurements by using ballistic galvanometer and flux meter
7. Understands construction and operation of C.R.O and its applications.
8. Understand the principle and working of digital voltmeter ,digital frequency meters, multi meters and tachometer

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

III Year B.Tech. EEE-I Semester

(4G255) ELECTRICAL MACHINES-II LAB

Any **Ten** of the following experiments are to be conducted

1. O.C. & S.C. Tests on Single phase Transformer
2. Sumpner's test on a pair of single phase transformers
3. Scott connection of transformers
4. No-load & Blocked rotor tests on three phase Induction motor
5. Regulation of a three –phase alternator by E.M.F and M.M.F. methods
6. V and Inverted V curves of a three—phase synchronous motor.
7. Equivalent Circuit of a single phase induction motor
8. Determination of X_d and X_q of a salient pole synchronous machine
9. Parallel operation of Single phase Transformers
10. Separation of core losses of a single phase transformer
11. Brake test on three phase Induction Motor
12. Brake test on single phase Induction Motor
13. Regulation of three-phase alternator by Z.P.F. and A.S.A methods
14. Measurement of sequence impedance of a three-phase alternator

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(AN AUTONOMOUS INSTITUTION)

III Year B.Tech. EEE-I Semester

(4G256) CONTROL SYSTEMS LAB

Any **Ten** 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
11. PSPICE simulation of Op-Amp based Integrator and Differentiator circuits.
12. Linear system analysis (Time domain analysis, Error analysis) using MATLAB.
13. Stability analysis (Bode, Root Locus, Nyquist) of Linear Time Invariant system using MATLAB.
14. State space model for classical transfer function using MATLAB – Verification.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

III Year B.Tech. EEE-II Semester

(4GA61) MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Course Objective:

This subject aims to equip the budding engineering student with an understanding of concepts and tools of economic analysis. The focus does not only on understand the concepts but apply them in real life by developing problem solving skills There exists a relationship between Managerial Economics and Accounting and same is dealt in the second part of the course.

Unit I Introduction to Managerial Economics

Managerial Economics: Meaning and Nature, Definition, Scope, relationship with other areas.

Demand Analysis: Definition and types of Demand, Demand Determinants, Law of Demand and its exceptions, Measurement and Significance of Elasticity of Demand, Demand forecasting methods.

Unit II Production and Cost Analysis

Production – Theories of the firm, Production Function, Cobb-Douglas Production function, Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Laws of Returns, Internal and External Economies of Scale.

Cost Analysis: Cost concepts, Determinants of cost, cost-output relationship in short run and Long run.

Break-even Analysis (BEA)- Objectives, Assumptions, Importance, Graphical representation, Limitations, simple numerical problems.

Unit III Market Structure and forms of Business Organizations

Markets: Perfect, Monopoly, Monopolistic and Oligopoly Markets. Price-output determination in perfect competition and monopoly in long run and short run.

Forms of Business Organizations Definition, Forms of Business Organizations-**Private Sector**-sole proprietary ship, Partnership, Joint hindu family business, co-operative societies, joint stock companies.**Public Sector-** Departmental organizations, public corporations, government companies**.** Joint Sector.

Unit IV Capital and Capital Budgeting

Capital: Definition of Capital and its significance, Types of Capital, Sources of Raising Capital.

capital budgeting: Definition**,** Nature and scope of capital budgeting, features of capital budgeting, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value Method (simple problems)

Unit V Introduction to Financial Accounting and Analysis

Financial Accounting : Definition, Book Keeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments).

Financial Analysis, Definition of Financial Analysis, Ratios and its significance- types- liquidity Ratios, turnover Ratios - solvency Ratios and profitability ratios.

Text books:

1. Gupta: Managerial Economics, TMH, 2009.
2. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2003.
3. Mehta P.L., Managerial Economics-Analysis, Problems, Cases, S Chand and Sons,New Delhi, 2001.
4. M.E.Thukaram Rao., Accounting for Managers, New Age International Publishers.
5. T.S, Reddy and Y.Hari Prasad Reddy,Accounting and Financial Management, Margham Publications.

Reference Books:

Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi.

1. H. Craig Peterson & W. Cris Lewis, Managerial Economics, PHI, 4th Ed.
2. Suma Damodaran, Managerial Economics, Oxford University Press.
3. Lipsey & Chrystel, Economics, Oxford University Press.
4. S. A. Siddiqui & A. S. Siddiqui, Managerial Economics & Financial Analysis, New age International Space Publications.
5. Domnick Salvatore: Managerial Economics In a Global Economy, 4th Edition, Thomson.
6. Narayanaswamy: Financial Accounting—A Managerial Perspective, PHI
7. Raghunatha Reddy & Narasimhachary: Managerial Economics& Financial Analysis, Scitech.
8. S.N.Maheswari & S.K. Maheswari, Financial Accounting, Vikas.
9. Truet and Truet: Managerial Economics:Analysis, Problems and Cases, Wiley.
10. Dwivedi:Managerial Economics, 6th Ed., Vikas

Course Outcomes:

CO1. provides a basic insight into seeking solutions for managerial problems.
CO2.The student can familiarized with Accounting Data and Financial Statements that can be useful for interpreting the financial information.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

III Year B.Tech. EEE-II Semester

(4G465) COMPUTER SYSTEM ARCHITECTURE

Course objectives:

The course aims to provide the student with the ability

1. To make the students understand the structure and of various functional modules
2. To understand the techniques that computers use to communicate with I/O devices
3. To study the concepts of pipelining and the basic characteristics of multiprocessors

UNIT I BASIC STRUCTURE OF COMPUTERS: Computer types, Functional units, Basic operational concepts, Bus structures, Software, performance, multiprocessors and multi computers. Data types, Complements, Data representation: Fixed point and floating point representations, Error detection codes.

UNIT II REGISTER TRANSFER LANGUAGE AND MICRO-PERATIONS: Register transfer language, register transfer, Bus and memory transfer, Arithmetic Micro Operations, logic micro operations, shift micro operations, arithmetic logic shift unit, Instruction codes, Computer registers computer instructions-Instruction cycle, memory-reference instructions, input-output and interrupt.

UNIT III CENTRAL PROCESSING UNIT & COMPUTER ARITHMETIC: Stack organization, Instruction formats, Addressing modes, data transfer and manipulation, Program control, reduced instruction set computer.

COMPUTER ARITHMETIC: Addition and subtraction, multiplication algorithms, Division algorithms

MICRO PROGRAMMED CONTROL: Control memory, Address sequencing, micro program example.

UNIT IV: THE MEMORY SYSTEM & INPUT-OUTPUT

ORGANIZATION: Memory hierarchy, Main memory, Auxiliary memory, Associative memory, Cache memory, virtual memory, memory management hardware.

INPUT-OUTPUT ORGANIZATION: Peripheral devices, input-output interface, Priority Interrupt, Direct Memory Access, Input-output processor (IOP).

UNIT V: PIPELINE AND VECTOR PROCESSING: Parallel processing, pipelining, Arithmetic pipeline, Instruction Pipeline, RISC pipeline vector processing, Array Processing.

Multi Processors: Characteristics of multiprocessors, interconnection structures, Inter processor Arbitration.

Text books:

1. M.Moris Mano, *Computer System Architecture*, PHI, III Edition, 2006.
2. Car Hamacher, Zvonko Vranesic, Safwat Zaky, Car Hamacher, Zvonks Vranesic, Safwat Zaky,*Computer Organization* , McGrawHill,V Edition, 2002.

Reference books:

1. William stallings, *Computer Organization and Architecture*, PHI, Seventh Edition, 2006.
2. John P.Hayes, *Computer Architecture and Organization*, Mc Graw Hill International editions, 1998.

Course outcomes:

Upon completion of the course, students will be

CO.1. Able to use memory and I/O devices effectively

CO.2. Able to explore the hardware requirements for cache memory and virtual memory

CO.3. Able to understand pipelining and multiprocessors

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

III Year B.Tech. EEE-II Semester

(4G261) POWER SYSTEM ANALYSIS

Course objectives:

1. To know the formation of Y_{bus} and Z_{bus} for Power flow studies.
2. To calculate Load flows by using various Methods.
3. To model and analyze the power system under abnormal conditions
4. To Model and analyze power system for steady state and transient stability.

UNIT I POWER SYSTEM NETWORK MATRICES-: Representation of Power system elements. Bus Incidence Matrices. Y_{bus} formation by Direct and Singular Transformation Methods.

Formation of Z_{Bus}: Partial network, Algorithm for the Modification of Z_{Bus} Matrix for addition of elements (Type-1 modification to Type 4 Modification) - Derivations and Numerical Problems. Modification of Z_{Bus} for the changes in network (Problems).

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

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

UNIT III SHORT CIRCUIT STUDIES: Per Unit system of representation. Per-unit equivalent reactance network of a three phase power system. Symmetrical fault analysis: Short circuit Current and MVA Calculations, Application of Series Reactors. Symmetrical Component Transformation, positive, negative and zero sequence components: Voltages, Currents and Impedance. Sequence Networks: Positive, Negative and Zero sequence Networks, Numerical Problems. Unsymmetrical Fault Analysis: LG, LL, LLG faults with and without impedance, Numerical Problems.

UNITIV POWER SYSTEM STEADY STATE STABILITY ANALYSIS: Elementary concepts of Steady State, Dynamic and Transient Stabilities. Description of Steady State Stability Power Limit, Transfer Reactance, Synchronizing Power Coefficient, Power Angle Curve and Determination of Steady State Stability and Methods to improve steady state stability.

UNIT V POWER SYSTEM TRANSIENT STATE STABILITY ANALYSIS: Derivation of Swing Equation. Determination of Transient Stability by Equal Area Criterion, Application of Equal Area Criterion, Critical Clearing Angle Calculation - Solution of Swing equation by point by point method - Methods to improve Stability.

Text Books:

1. Stagg & El – Abiad. Computer Methods in Power Systems. McGraw-hill Edition.
2. I.J.Nagrath & D.P.Kothari. Modern Power system Analysis. 4th edition. Tata McGraw-Hill Publishing Company, 2011.

Reference books:

1. K.Umararao .Computer Techniques and Models in power systems, I.K.International Publishing house Pvt.Ltd.2007
2. Grainger and Stevenson. Power System Analysis. Tata McGraw Hill. 2003.
3. M A Pai. Computer Techniques in Power System Analysis. 2nd Edition. Tata McGraw Hill. 2006.
4. Glovar and Sarma. Power System Analysis.4 th Edition Thomson Publishers. 2008.
5. Hadi&Sadath. Power System Analysis. Tata McGraw Hill. 2004.
6. B.R.Gupta.Power System Analysis and Design. 6th Revised Edition. S. Chand & Co. 2010.

Course outcome:

By the end of this course, students will be able to:

1. Formulate the mathematical modeling of power system.
2. Explain the Static state of the system
3. Perform load flow computations and analyze the load flow results.
4. Create computational models for analysis of both symmetrical and unsymmetrical conditions in power systems.
5. Know the Steady state stability status of the power system.
6. Know the Transient state stability status of the power system.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

III Year B.Tech. EEE-II Semester

(4G262) UTILIZATION OF ELECTRICAL ENERGY

Course Objective

The purpose of this course is to enable the students to have fair knowledge about electric heating, welding, illumination, traction and their industrial applications.

UNIT I ELECTRIC DRIVES: Types of electric drives - choice of motor - starting and running characteristics - speed control - Temperature rise – particular applications of electric drives - types of industrial loads - Continuous - intermittent and variable loads - load equalization.

UNIT II ELECTRIC HEATING & WELDING: Advantages and methods of electric heating - resistance heating - induction heating and dielectric heating- Electric welding - resistance and arc welding - electric welding equipment - comparison between A.C. and D.C. Welding.

UNIT III ILLUMINATION: Introduction - terms used in illumination - laws of illumination - polar curves – photometry - integrating sphere - sources of light. -Discharge lamps – mercury vapour and sodium vapour lamps – comparison between tungsten filament lamps and fluorescent tubes – compact fluorescent lamp - Basic principles of light control - Types and design of good lighting system and practice - flood lighting.

UNIT IV ELECTRIC TRACTION-I: System of electric traction and track electrification - Review of existing electric traction systems in India - Special features of traction motor - methods of electric braking-plugging - rheostatic braking - regenerative braking.- Mechanics of train movement - Speed-time curves for different services – trapezoidal and quadrilateral speed time curves.

UNIT V ELECTRIC TRACTION-II: Calculations of tractive effort – power - specific energy consumption for given run effect of varying acceleration and braking retardation - adhesive weight and braking retardation adhesive weight, Coefficient of adhesion**.**

Text books:

1. J.B. Gupta. *Utilization of Electrical Power and Electric Traction*. S.K. Kataria and Sons.2007.
2. B.R. Gupta. *Generation of Electrical Energy*. Eurasia publishing House (P) Ltd ,New Delhi. 2010.

Reference books:

1. N.V. Suryanarayana. *Utilization of Electrical Power including Electric drives and Electric traction*. New Age International (P) Limited Publishers. 1996.
2. C.L. Wadhwa. *Generation, Distribution utilization of Electrical Energy*. New Age International Pvt .Ltd. 2011.
3. E. Openshaw Taylor. *Utilisation of Electric Energy*. Orient Longman, 2009
4. Dr.S. L Uppal."*Electric Power"*, Khanna Publications., 2008

Course Outcomes:

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

1. Analyze the various types of Electrical Drives & its applications
2. Analyze the process of Electrical Heating & welding
3. Analyze the process of Illumination & Lighting schemes
4. Emphasize the various systems of Track Electrification & Speed time curves.
5. Acquainted with calculation of specific energy consumption.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

III Year B.Tech. EEE-II Semester
(4G263) MICROPROCESSORS AND MICROCONTROLLERS

Course Objective:

To understand the hardware and software details of 8086 microprocessor and 8051 micro controller and their interfacing with memory and I/O devices, programming knowledge on the above to implement real time projects.

UNIT I 8086 ARCHITECTUREAND PROGRAMMING: Architecture of 8086 microprocessor, Register organization, Memory organization, Pin diagram, Minimum mode and maximum mode of operation, Timing diagrams. Machine language instruction formats, Addressing modes, instruction set. Assembler directives, Assembly language programs involving logical, branch and call instructions, sorting, string manipulation. Procedure and Macros.

UNIT II MEMORY AND I/O INTERFACING OF 8086: I/O Interfacing methods – I/O mapped I/O, Memory mapped I/O. Basic structure of SRAM and DRAM cell, Memory interfacing to 8086 (static RAM and EPROM).Interfacing I/O ports – latches and buffers.8255 PPI-various modes of operation and interfacing to 8086, Seven segment Displays, stepper motor, D/A, A/D converters. Need for DMA, Architecture of 8257 and interfacing with 8086.

UNIT III PROGRAMMABLE INTERRUPT CONTROLLER: Interrupt structure of 8086, Vector interrupt table. Interrupt service routines. 8259 PIC architecture and interfacing. Simple programs. Architecture of 8253 programmable interval timer/counter, Modes of operation, interfacing with 8086.

UNIT IV COMMUNICATION INTERFACE: Asynchronous and synchronous data transfer schemes. Necessity of communication interfaces, 8251 USART architecture and interfacing. Serial communication standards-, RS-232C, 20mA, 60mA current loop. TTL to RS232C and RS232C to TTL conversion.

UNIT V 8051 MICROCONTROLLER: Architecture of 8051, pin diagram, memory organization, Addressing modes, instruction set, simple programs, Timer/Counters, Serial Communication features, Interrupts. Applications-Relays and optoisolators, DC motor interfacing and PWM. Salient features of advanced microcontrollers (ARM,MCS-96 MC).

Text Books:

1. A.K. Ray and K.M.Bhurchandi. *Advanced microprocessor and peripherals*. 2nd edition. TMH. 2000.
2. Muhammad Ali Mazidi. 8051 *Microcontroller and embedded systems using assembly and c*. Pearson Eduction. 2008

Reference books:

1. Kenneth J Ayala. *The 8051 Microcontroller programming and Interfacing*
2. Douglas V.Hall. *Microprocessors Interfacing*. 2nd edition. 2007.
3. Rajkamal. *Microcontrollers Architecture, programming, interfacing and system design*. Pearson Eduction. 2003.

Course Outcomes:

By the end of this course, students will be able to:

1. Analyze the hardware design of 8086 microprocessor and is able to write assembly language programs.
2. Understand the programmable (8255-PPI) and non programmable (latches and buffers) interfacing methods of 8086.
3. Learn the interrupt programming of 8086 microprocessor.
4. Know the basic communication methods and communication interfacing programming of 8086 microprocessor.
5. Identify the difference between 8086 microprocessor based system design and 8051 microcontroller based system design.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

III Year B.Tech. EEE-II Semester

(4G264) POWER SYTEM OPERATION AND CONTROL

Course Objectives:

- To Learn the basics of Power System Control
- To Study the economic operation of power system
- To gain knowledge about modeling of governor, turbine and generator.
- To acquire knowledge in controlling the power system frequency, voltage and reactive power

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 Without Line Losses and With Line Losses, Loss Coefficients, General transmission line loss formula, Numerical Problems**.**

UNIT – II HYDROTHERMAL SCHEDULING: Optimal scheduling of Hydrothermal System: Hydroelectric power plant models, Scheduling problems-Short term Hydrothermal scheduling problem, Optimal Power Flow**.**

UNIT –III MODELING OF TURBINE, GOVERNOR AND GENERATOR:
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-Modeling of excitation system, IEEE Type-1 excitation system-Block Diagram

UNIT IV LOAD FREQUENCY CONTROL: Necessity of keeping frequency constant, Definitions of Control area – Single area control – Block diagram representation of an isolated power system – Steady state analysis – Dynamic response – Uncontrolled case. Load frequency control of Two 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 V REACTIVE POWER CONTROL: Overview of Reactive Power control – Reactive Power compensation in transmission systems – advantages and disadvantages of different types of compensating equipment for transmission systems; load compensation – Specifications of load compensator, Uncompensated and compensated transmission lines: shunt and Series Compensation.

Text Books:

1. "C.L.Wadhwa, *Electrical Power Systems* , 3rd Edition, New age International.
2. I.J. Nagrath & D.P. Kothari, *Modern Power System Analysis* , 2nd Edition, Tata Mc Graw Hill publishing company ,2011.

Reference books:

1. S.N. Singh, *Electric Power Generation, transmission and Distribution* , 2nd Edition, Prentice Hall India.
2. Chakravarthi and S. Halder, *Power System Analysis Operation and Control* , 3rd Edition, Prentice Hall India.
3. Hadi Saadat, *Power System Analysis* , TMH Edition, 2004.
4. S. Sivanagaru & G. Sreenivasan, *Power System Operation and Control*, Pearson Publications.

Course Outcomes:

- Able to understand the different conditions for economic operation of power systems.
- Able to analyze the load sharing between generators and their scheduling.
- Able to design and analyze the parameters of Various Components present in power systems.
- Able to understand need of frequency control in Power Systems and various control systems.
- Able to understand the need of reactive power requirement, control transmission system.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

III Year B.Tech E.E.E –II Semester

(4G265) ELECTRICAL MEASUREMENTS LAB

Any **Ten** experiments are to be conducted from the following

1. Calibration and Testing of single phase energy Meter.
2. Calibration of dynamometer power factor meter.
3. Crompton D.C. Potentiometer – Calibration of PMMC ammeter and PMMC voltmeter.
4. Kelvin‘s double Bridge – Measurement of resistance – Determination of Tolerance.
5. Measurement of % ratio error and phase angle of given C.T. by Silsbee’s method.
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.
9. Calibration LPF wattmeter – by Phantom testing.
10. Dielectric oil testing using H.T. testing Kit.
11. LVDT and capacitance pickup – characteristics and Calibration.
12. Resistance strain gauge – strain measurements and Calibration.
13. Transformer turns ratio measurement using A.C. bridge.
14. Measurement of iron loss in a bar specimen using a CRO and using a wattmeter.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

III Year B.Tech. EEE-II Semester

(4G266) POWER ELECTRONICS AND SIMULATION LAB

Any **Ten** experiments are to be conducted from the following:

1. Gate firing circuits for SCR's(R, RC Triggering, UJT firing circuit).
2. Single Phase Half controlled bridge converter with R and RL loads.
3. Single Phase fully controlled bridge converter with R and RL loads.
4. Single Phase half-Wave controlled converter with R and RL loads.
5. Single Phase AC Voltage Controller with R and RL Loads.
6. Forced Commutation circuits (Class A, Class B, Class C, & Class D).
7. DC Jones chopper with R and RL Loads.
8. Single Phase Parallel inverter with R and RL loads.
9. Single Phase Cycloconverter with R and RL loads.
10. Single Phase series inverter with R and RL loads.
11. Single Phase dual converter with RL loads.
12. PSPICE simulation of single-phase full converter using RLE loads.
13. PSPICE simulation of single phase Inverter with PWM control.
14. PSPICE simulation of single-phase AC voltage controller using RLE loads.

Reference Books:

1. M.H.Rashid. *Simulation of Electric and Electronic circuits using PSPICE,* 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 – Math works*, USA

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(AN AUTONOMOUS INSTITUTION)

III Year B.Tech. EEE-II Semester

(4GC62) English for Competitive Examinations

Correct English Usage: Articles – Prepositions – Tenses – Voice – Error spotting and correcting – Sentence improvement

Vocabulary: Synonyms – Antonyms – Analogy – Words often confused

English Proficiency: One-word substitutions – Idioms and Phrases – Homonyms – Spellings

Logic-based English Language: Rearrangement of jumbled words and jumbled sentences – word pairs – sentence completion

Comprehension Ability: Reading comprehension – Cloze tests

Note: In each lecture class, one practice paper containing objective questions on the said aspects will be discussed thoroughly by the trainer. At the end of the semester, a minimum of 20 papers will have been practiced by students.

As regular method of external assessment is not found suitable, 100 marks will be awarded for internal examinations (30 marks from the average of two Internal Mid Exams and 70 for Internal End Exam)

Reference Books:

1. R. S. Agarwal, “Objective English”, S. Chand Publishers
2. Hari Prasad, “Objective English for Competitive Exams”, TMH
3. Collins Cobuild, “English Guides: Confusable Words”

Course Outcomes:

- The student will be successful in recruitment drives
- The student will get through competitive examination in public/private sector

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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IV Year B.Tech. EEE-I Semester

(4GA71) MANAGEMENT SCIENCE

Course Objective:

1. The objective of this course is to get basic knowledge of management and organization.
2. To understand the concepts of plant location plant layouts its types& types of productions.
3. To get the concepts of work study & method study.
4. Learn about the materials management and inventory classification techniques.
5. To know the concepts of PERT & CPM.
6. To understand the concepts of inspection, quality control techniques, job description, merit rating, product life cycle.

UNIT I MANAGEMENT AND ORGANISATION STRUCTURE:
Meaning, Nature, Importance Elements Of Management. Planning, Organizing, Staffing, Directing, Coordinating, Reporting, Budgeting.-Systems Approach To Management. Evolution 0f Scientific Management, Modern Management. Principles Need Of Organization Structure -Types Of Organisation Structure Line, Line And Staff, Functional And Matrix Organisations

UNIT II OPERATIONS MANAGEMENT:
Plant Location And Layout - Methods Of Production (Job, Batch And Mass Production) Objectives Of Inventory Management- Need For Inventory Control- Method Of Inventory Management: EOQ, ABC Analysis.

MARKETING MANAGEMENT - Core Concepts Of Marketing. Need, Want, Demand, Product, Value, Satisfaction, Marketing Mix- Product, Price, Place, Promotion, Product Levels -Product Life Cycle, – Channels Of Distribution.

UNIT III. HUMAN RESOURCES MANAGEMENT (HRM):
Significance Of HRM, Basic Functions of hr manager. Hr planning, Job evaluation. Recruitment, and Selection. Placement And Induction. Training. Performance Appraisal. Compensation. Industrial Relations.

UNIT IV FINANCIAL MANAGEMENT: Objectives, Scope, Techniques Of Investment Analysis, Pay Back Period, Accounting Rate Of Return, Working Capital, Cost Of Capital, Sources Of Financing.

PROJECT MANAGEMENT (PERT/CPM): Network Drawing - Programme Evaluation And Review Technique (PERT) - Critical Path Method (CPM) - Probability Of Completing The Project Within Given Time – Project Crashing (Simple Problems).

UNIT V ADVANCES IN MANAGEMENT PRACTICES: Basic Concepts And Overview Of Management Information System (MIS), Enterprise Resource Planning (ERP), Value Analysis, Just –In-Time (JIT), Total Quality Management (TQM) And Supply Chain Management.

Overview Of Ethics-Nature And Objectives Of Ethics - Relationship Between Ethics And An Organization.

Text books:

1. L.M.Prasad, Priciples and Practice of Management, S.Chand & Sons.
2. Shridhara Bhat, Production and operation management, HPH.

Reference books:

1. Harnold Koontz, Cyril 'O' Donnell, Essentials of Management, Tata McGraw Hill, New Delhi, 1979.
2. Human Resource Management, Dessler Gary, 10th Edition, Pearson/Prentice Hall of India 2006.
3. Marketing Management, V.S. Ramaswamy and S. Namakumari, 4/eMcMillan, 2010.
4. Production, Planning and Control Text and Cases, S K Mukhopadhyay, PHI, New Delhi. 2009

Course outcomes :

a) An ability to demonstrate basic knowledge in mathematics, science and engineering.
b) An ability to design and conduct experiments, interprets, analyze and report results
c) An ability to identify, formulate and solve mechanical engineering problems.
d) An ability to understand of their professional and ethical responsibilities.
e) An ability to communicate effectively in both verbal and written forms.
f) Confidence to apply engineering solutions in global and societal contexts.
g) oard scene education and will have an understanding of the impact of engineering on society and
h) demonstrate awareness of contemporary issues.
i) An ability to function on multi-disciplinary teams.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

IVYear B.Tech. EEE-I Semester

(4G271) FUNDAMENTALS OF HVDC & FACTS DEVICES

Course Objective:

To study various aspects of EHV AC and HVDC System and its operation. In addition, emphasize the impact of FACTS devices on transient stability and power oscillation damping.

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 3 phase Bridge circuit with and without overlap, converter Bridge characteristics, and equivalent circuits of Rectifier and inverter configurations, twelve pulse converters.

UNIT II CONVERTER AND HVDC SYSTEM CONTROL:
Principle of DC link control, converter control characteristics, and system control Hierarchy, Firing angle control, current and extinction Angle control, starting and stopping of DC link.

HARMONICS, FILTERS AND REACTIVE POWER CONTROL:
Introduction of Harmonics, generation of Harmonics, AC and DC Filters, Reactive power requirements at steady state, sources of Reactive power static var systems.

UNIT III POWER FLOW ANALYSIS IN AC/DC SYSTEMS: Introduction, Modeling of DC/AC converters, controller equations, solutions of AD/DC load flow- simultaneous approach and sequential approach

FACTS CONCEPTS: Flow of power in AC parallel paths and Meshed systems, Basic types of FACTS controllers, Brief description and Definitions of FACTS controllers

UNIT IV STATIC SHUNT & SERIES COMPENSATORS: Objectives of shunt compensation, Methods of controllable VAR generation, Static VAR compensators, SVC and STATCOM, comparison. Objectives of series compensation, variable impedance type-thyristor switched series capacitors (TSC), and switching converter type series compensators – static series synchronous 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.

Text books:

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

Reference books:

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

Course Outcomes:

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

1. Analyze the Economical & Technical aspects of AC & DC Transmission.
2. Analyze the Converter control & Harmonics elimination.
3. Analyze the Power flow analysis in AC/DC & Basic types of FACTS controllers.
4. Emphasize the objectives of static shunt & series compensators.
5. Analyze the operation of Unified power flow controller.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

IVYear B.Tech. EEE-I Semester

(4G272) SWITCH GEAR AND PROTECTION

Course Objective:

To introduce the students about different types of circuit breakers and protective relays for protecting power system equipments.

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

UNIT-II ELECTROMAGNETIC STATIC AND MICROPROCESSOR BASED 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 GENERATOR AND TRANSFORMER: 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 CTs Ratio, Buchholtz relay Protection.

UNIT -IV PROTECTION OF FEEDERS AND TRANSMISSION LINES: Protection of Feeder (Radial & Ring main) using over current Relays. Protection of Transmission line – 3 Zone protection using Distance Relays, Carrier current protection, Protection of Bus bars.

UNIT-V NEUTRAL GROUNDING AND PROTECTION AGAINST OVER VOLTAGES: Grounded and Ungrounded Systems- Effects of Ungrounded Neutral on system performance. Methods of Neutral Grounding: Solid, Resistance, Reactance and Peterson coil grounding- Arcing Grounds and Grounding Practices, Applications of Reactors-Numerical Problems.

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

Reference Books:

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

Course Outcomes:

At the end of the Course the student would be able to:

1. Design the relevant protection systems for the main elements of a power system.
2. Analyze with over current, differential, and ratio protection devices and their application in a coordinated protection scheme.
3. Do the stability problems and clearing of faults to mitigate these problems

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

IVYear B.Tech. EEE-I Semester

(4G37C) DIGITAL SIGNAL PROCESSING

Course Objectives*:*

The course aims to provide the student with the ability

1. To understand application of Discrete Fourier series and Transforms
2. To learn design techniques and applications of Digital signal processing

UNIT-I

INTRODUCTION AND DISCRETE FOURIER SERIES

Discrete time signals, LTI systems, stability and causality, Solution of linear constant coefficient difference equations. 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, Basics of Z-Transforms.

UNIT-II

FAST FOURIER TRANSFORMS

Fast Fourier transforms (FFT)-Radix2 decimation in time and decimation in frequency FFT algorithms, inverse FFT and FFT for composite N.

UNIT-III

IIR DIGITAL FILTERS

Analog filter approximations-Butterworth and chebyshev, design of digital filters from analog filters, design examples: analog-digital transformations, IIR Structures- Direct form –I , Direct form- II, Transposed Structure, Cascade form.

UNIT-IV

FIR DIGITAL FILTERS

Characteristics of FIR digital filters, frequency response. Design of FIR digital filters using window techniques, frequency sampling technique, comparison of IIR and FIR filters,

UNIT-V

APPLICATIONS OF DIGITAL SIGNAL PROCESSING:

Spectral analysis of nonstationary Signals, Musical Sound processing, signal Compression,Oversampling A/D Converter, Oversampling D/A Converter.

Text books:

1. Digital signal processing, principles, Algorithms and applications: John G. Proakis, Dimitris G. Manolakis, Pearson Education/PHI, 4th ed., 2007.

2. Digital signal processing , A computer base approach- Sanjit K Mitra, Tata Mcgraw Hill, 3rd edition, 2009.

Reference books:

1. Digital signal processing: Andreas Antoniou, TATA McGraw Hill, 2006.

2. Discrete Time Signal Processing-A.V. Oppenheim and R.W. Schaffer, 2nd ed., PHI.

3. Digital Signal Processing- P.Ramesh Babu, 4th Ed. Scitech Publications.

Course outcomes:

Upon completion of the course, students will

CO1: understand the types of discrete time signals & systems and analyze using Fourier series and Fourier transforms.

CO2: know the basics of digital filters and design using different techniques**.**

CO3: know the applications in Real life

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

IV YEAR B.Tech EEE-I-semester

(4G273)INSTRUMENTATION

(ELECTIVE-I)

Course Objective:

- To study about functioning of different meters associated with measurements of signal characteristics
- To study about methods of data transmission and acquisition system
- To study working of advanced measuring instruments such as logic analyzers and spectrum Analyzers
- To provide basic knowledge about transducers
- To study working of non electrical quantities such as displacement ,velocity , acceleration, force, torque etc

UNIT I CHARACTERISTICS OF 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, a periodic, modulated signal, sampled data, pulse modulation and pulse code modulation.

UNIT II DATA TRANSMISSION AND TELEMETRY: Methods of Data Transmission – General Telemetry System – Land line Telemetry System – Voltage, Current and position. Land line with feedback system. Frequency Modulation System (FM), Pulse Modulation (PM), Pulse Amplitude Modulation (PAM), Pulse Code Modulation (PCM) Telemetry. Comparison of FM, PM, PAM and PCM.

UNIT III DATA ACQUISITION SYSTEM (DAS) AND SIGNAL ANALYZERS: Analog and Digital Acquisition systems – Components of Analog DAS – Types of Multiplexing Systems: Time division and Frequency division multiplexing – Digital DAS – Block Diagram – Use of Recorders in Digital DAS – Digital Recording using Analog Recorder – Complete data logging System - Block diagram and its working – Modern Digital DAS (Block Diagram).

Signal analyzers: Wave Analyzers, spectrum analyzers, 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, gauge 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, Vacuum, Flow, Liquid level.

Text books:

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

REFERENCE BOOKS:

1. D O Doeblin, *Measurements Systems, Applications and Design*. Mc Graw
2. A.S Morris, *Principles of Measurement and Instrumentation*. Pearson /Prentice Hall of India.
3. H.S.Kalsi, *Electronic Instrumentation*. Tata McGraw-Hill , 3/e.
4. A.D Helfrick and W.D.Cooper, *Modern Electronic Instrumentation and Measurement techniques*. Pearson/Prentice Hall of India.
5. T. R. Padmanabhan, *Industrial Instrumentation – Principles and Design*. Springer.

Course Outcomes:

After the completion of the course the students will be able to

1) Understand basic principles involved in the meters for measuring voltage, current, resistance ,frequency and so on.

2) Understand principles of data transmission system and data acquisition system

3) Get complete knowledge regarding working of advanced instruments such as logic analyzers and spectrum analyzers.

4) understand the principles of transducers and signal conditioning circuits used in Process control industry, manufacturing industry and Automation plants

5)Get complete knowledge regarding working of non electrical quantities.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

IV Year B.Tech. EEE-I Semester

(4G274)HIGH VOLTAGE ENGINEERING
(ELECTIVE-I)

Objective:

To study the generation, measurements of high voltages and currents, testing of high voltage apparatus

UNIT I OVER VOLTAGES IN ELECTRICAL POWER SYSTEMS: Causes of over voltages and their effects on power system – Lightning, switching and temporary over voltages – protection against over voltages – Insulation coordination

UNIT II ELECTRICAL BREAKDOWN IN GASES, SOLIDS & LIQUIDS :

Gaseous breakdown in uniform and non-uniform fields – corona discharges – Vacuum breakdown – conduction and breakdown in pure and commercial liquids – breakdown mechanisms in solid and composite dielectrics.

UNIT III GENERATION OF HIGH VOLTAGE AND CURRENTS: Generation of high DC voltages - multiplier circuits –Van de Graff generator – high alternating voltage generation using cascade transformers-production of high frequency AC high voltages-standard impulse wave shapes-Marx circuit-generation of switching surges - impulse current generation-tripping and control of impulse generators.

UNIT IV MEASUREMENT OF HIGH VOLTAGES AND CURRENTS: HVDC measurement techniques – measurement of power frequency A.C voltages- sphere gap measurement technique-potential divider for impulse voltage measurements – measurement of high D.C, A.C and impulse currents

UNIT V HIGH VOLTAGE TESTING: Tests on insulators-testing of bushings-testing of isolators and circuit breakers- cable testing- testing of transformers-surge diverter testing -radio interference-Measurement-use of I.S for testing.

TEXT BOOKS:

1 .Naidu.M.S, and Kamaraju, "*High Voltage Engineering*", Tata McGraw Hill, 2009.
2. Wadhwa.C.L, "*High Voltage Engineering*", Wiley Eastern Limited, 2007.

REFERENCE BOOKS:

1. Kuffel.E and Abdullah. M, "*High Voltage Engineering*", Pergamon Press, 2000.
2. Dieter Kind, "*An Introduction to High Voltage Experimental Technique*", Wiley Eastern Limited, 1978.Ravindra Arora, Wolfgang Mosh, "*High Voltage and Electrical Insulation Engineering*", Wiley-VCH Publishers, 2011.

Course outcomes

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

1. Analyze the causes of over voltages & protection.
2. Analyze the Electrical Breakdown In Gases, Solids & Liquids.
3. Analyze the generation of high voltage and currents.
4. Emphasize the measurement of high voltages and currents.
5. Analyze the testing methods of high voltage.

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IV Year B.Tech. EEE-I Semester

(4G275)RENEWABLE ENERGY SOURCES
(ELECTIVE-I)

Course objective:

To create awareness among the students about the different types of Renewable Energy sources and emphasize its importance.

UNIT I: PRINCIPLES OF SOLAR RADIATION: Role and potential of new and renewable source, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation geometry, solar radiation on tilted surface, instruments for measuring solar radiation and sun shine, solar radiation data.

UNIT II: SOLAR ENERGY COLLECTION AND ITS APPLICATIONS: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.
Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications- solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion.

UNIT III: WIND AND OCEAN ENERGIES: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria.
OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles Tidal and wave energy -Potential and conversion techniques, mini-hydel power plants, and their economics.

UNIT IV: BIO-MASS AND GEOTHERMAL ENERGY: Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C.Engine operation and economic aspects.
Resources, types of wells, methods of harnessing the energy, potential in India.

UNIT V: DIRECT ENERGY CONVERSION: Need for DEC, Carnot cycle, limitations, principles of DEC. Thermo-electric generators, Seebeck, Peltier, Joul and Thomson effects. MHD generators – Principle, Fuel cells, principles, faraday's laws, thermodynamic aspects, selection of fuel and operation conditions.

Text Books:

1. G.D. Rai. *Non-Conventional Energy Sources*. Khanna Publishers, Delhi, 2007.
2. Khan B.H., *Non-Conventional Energy Resources*, Tata McGraw Hill, New Delhi,2006

Reference books:

1. Twidell & Wier, *Renewable Energy Resources* , CRC Press(Taylor & Francis)
2. Ramesh & Kumar, *Renewable Energy Technologies* , Narosa.
3. K Mittal, Non-*Conventional Energy Systems* , Wheeler
4. D.P.Kothari,K.C.Singhal, *Renewable energy sources and emerging technologies* ,Prentice Hall Iindia.
5. G.D. Rai, *Solar Energy Utilization* , Khanna Publishers, Delhi, 2001.
6. G.N.Tiwari and M.K. Ghosal. *Fundamentals of Renewable energy resources*. Narosa, New Delhi, 2007.

Course outcomes:

1. Able to know the solar radiation at different conditions.
2. Gains knowledge on solar energy collecting and storage techniques.
3. Gains knowledge on different types of wind mills.
4. Acquires knowledge on principle of operation of OTEC and economics of mini hydal plants.
5. Acquires knowledge on different types of digesters and their operation.
6. Able to identify the harnessing methods of geothermal energy.
7. Able to apply Carnot cycle for DEC systems.

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IV Year B.Tech. EEE-I Semester

(4G276) SOFT COMPUTING TECHNIQUES
(ELECTIVE-II)

Course Objectives:

- To understand the fundamental concepts of ANN and Different architectures, Learning/Training algorithms and methodologies.
- To understand the concepts of Fuzzy sets and Fuzzy logic controllers
- To understand the basics in Genetic algorithm
- To gain knowledge in neuro- fuzzy control and its applications in power systems and power electronics.

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UNIT I INTRODUCTION TO ARTIFICIAL NEURAL NETWORKS Introduction, Biological Neuron, Model of Artificial Neuron, Neural network architectures , Characteristics of neural networks , McCulloch-Pitts Model, Types of neuron activation functions, Learning methods(supervised, unsupervised, Reinforcement), Historical Developments, Applications of Neural Networks.

UNIT II SUPERVISED LEARNING NETWORKS: Introduction, Perceptron Models: Discrete, Continuous, Training Algorithms: Discrete and Continuous Perceptron Networks, Perceptron Convergence theorem, Limitations of the Perceptron Model, Applications.
ADALINE, MADALINE, Back Propagation Network, BP Learning Rule, Input Layer, Hidden Layer and output Layer computations, Radial Basis Function.

UNIT III FUZZY SETS & FUZZY LOGIC SYSTEMS: Introduction to classical sets, Fuzzy sets – Properties, Operations and Relations, Membership, Uncertainty, Fuzzy Relations, Cardinalities and Membership Functions.

Fuzzification, Membership Value assignment, Development of Rule Base and Decision Making Systems, Defuzzification to crisp sets, Defuzzification methods.

UNIT IV GENETIC ALGORITHMS: Introduction, Basic operators and Terminologies in GA, Traditional Vs Genetic Algorithm, Encoding, Fitness Function, Reproduction, Crossover, and Mutation Operators.

UNIT V APPLICATIONS TO ELECTRICAL SYSTEMS: ANN Based Short Term Load Forecasting, Load Flow Studies, Fuzzy Logic based Unit Commitment and Genetic Algorithms Based Economic Load Dispatch.

Text books:

1. S.N.Sivanadam, S.N.Deepa *Principles of Soft Computing Techniques* , Wiley India publication.
2. JacekM.Zurada *Introduction to Artificial Neural Systems*, Jaico Publishing House, 1997.

Reference books:

1. N. Yadaiah and S. BapiRaju, *Neural and Fuzzy Systems*: *Foundation, Architectures and Applications*, Pearson Education
2. James A Freeman and Davis S kapura, *Neural Networks* ,Pearson, 2002
3. Brok Kosko, *Neural Networks and Fuzzy Logic System* , , PHI Publications
4. Rajasekharan and Rai, *Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications* - PHI Publication.

Course Outcomes:

- Able to analyze and form Neural Networks For Different Problems
- Able to Get the knowledge of Different Types of Neural Networks
- Able to apply Neural Networks for Electrical Systems.
- Able to form Fuzzy Logic Systems for Different Problems
- Able to apply Fuzzy Logic for Electrical Systems
- Able to understand the concept of Genetic Algorithm and analyze it for Electrical systems

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IV B.TECH EEE I SEM
(4G277) RELIABILITY ENGINEERING & APPLICATIONS TO POWER SYSTEMS
(ELECTIVE-II)

Course objective:

The course is aimed to you that want to perform reliability assessment for electrical power systems.and as a tool for decision support for planning and operation of the electric power system The goal for the course is to give the participants knowledge on how to use reliability analysis as a tool for decision support during design, operation and maintenance of electric power systems. The application studies are focused on electrical distribution systems.

UNIT I Elements of probability theory: Probability distributions: Random variables, density and distribution functions, Mathematical expectation- Mean and Variance, Binominal distribution, Poisson distribution, Normal distribution, Exponential distribution, Weibull distribution.

UNIT II Definition **of Reliability**: Component reliability, Hazard rate, derivation of the reliability functions in terms of the hazard rate. Causes of failures, types of failures.Bath tub curve, MTTR, MTBF. Reliability logic diagrams for series, parallel, series-parallel, non-series- parallel I configurations. Minimal cut-set and decomposition methods.

UNIT III Discrete Markov Chains: General modeling concepts, stochastic transitional probability matrix, time dependent probability evaluation and limiting state probability evaluation. Absorbing states. Continuous Markov Processes: Modeling concepts, State space diagrams, Stochastic Transitional Probability Matrix, Evaluating limiting state Probabilities. Reliability evaluation of repairable systems.

UNIT IV Generating System Reliability Analysis: Generation system model-capacity outage probability tables -Recursive relation for capacitive model building sequential addition method -unit removal- Evaluation of loss of load and energy indices. Frequency and Duration methods- Evaluation of equivalent transitional rates of identical and non- identical units -Evaluation of cumulative probability and cumulative frequency of non- identical generating units -2'-level daily load representation - merging generation and load models

UNIT V Distribution System Reliability Analysis: Radial networks – Evaluation of Basic reliability indices, performance indices -load point and system reliability indices - customer oriented, loss and energy oriented indices. Parallel networks- inclusion of bus bar failures, scheduled maintenance - temporary and transient failures -weather effects - common mode failures- Evaluation of various indices.

Text books :

1. Roy Billinton and Ronald N Allan, "*Reliability Evaluation of Engineering Systems* ", Plenum Press.
2. Roy Billinton and Ronald N. Allan, "*Reliability Evaluation of Power Systems*" Plenum Press, New York and London (Second Edition), 1996.
3. J.Endrenyi, "*ReliabilityModelinginElectricPowerSystems*", John Wiley and Sons, 1978. (First Edition)

Reference books:

1. Charles E. Ebeling. *An Introduction to Reliability and Maintainability Engineering*. TATA McGraw -Hill Edition, 2000.
2. LS Sainath. *Reliability Engineering*. 3rd Edition, Affiliated East West Pvt. Ltd., 1991.
3. BalaguruSwamy. *Reliability Engineering.* TATA McGrawHill Edition. 1984.

Course outcomes:

The course give's knowledge in using reliability assessment as a tool for decision support for planning and operation of the electric power system After completed course the participants shall achieved knowledge to:

1. Describe the fundamental definitions end concepts for reliability assessment
2. Analyze a system using the following techniques for reliability assessment:
3. Network modelling
4. Component importance techniques
5. Markov modelling
6. Lifetime models

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IV B.TECH EEE I SEM

(4G278) OPTIMIZATION TECHNIQUES

(ELECTIVE-II)

Course Objective: On completion of these course student is able to know the formulation of optimization problems in engineering, designing and solving linear, non linear and dynamic programming problems.

UNIT I INTRODUCTION TO OPTIMIZATION TECHNIQUES: Statement of an Optimization problem, design vector, design constraints, constraint surface, objective function, objective function surfaces, classification of Optimization problems- 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 INTRODUCTION TO 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, big M-method.

UNIT III TRANSPORTATION PROBLEM AND CONVEX PROGRAMMING: Finding initial basic feasible solution by North–West corner rule, least cost method and Vogel's approximation method, Convex functions, Concave functions –Testing of Convex & Concave Functions - Convex programming, Applications of Convex Programming.

UNIT IV UNCONSTRAINED NONLINEAR PROGRAMMING & OPTIMIZATION TECHNIQUES: One– dimensional minimization methods: Classification, Fibonacci method, Problems and Quadratic interpolation method, Problems-Univariate method, Problems, Powell's Method, Conjugate directions, Algorithms, Problems, Steepest Descent (Cauchy) Method, Problems.

UNIT V CONSTRAINED NONLINEAR PROGRAMMING& PROGRAMMING:: Characteristics of a constrained problem, Classification, Basic approach of Penalty Function method; Basic approaches of Interior and Exterior penalty function methods-Dynamic programming multistage decision processes, types, concept of sub optimization and the principle of optimality.

Text books:

1. S. S. Rao. Engineering optimization: Theory and practice. 3rd edition, New Age International (P) Limited, 1998.

2. Dr. S.D. Sharma, Kedarnath Ram. Operations Research. Nath and Co. Publications, Meerut.

Reference books:

1. H.A. Taha.Operations Research: An Introduction. 6th edition, PHI Pvt. Ltd.,

2. Kanthi Swaroop. Introduction to Operations Research. Gupta and Mohan.

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IV Year B.Tech. EEE-I Semester

(4G279) MICRO PROCESSORS AND MICROCONTROLLERS LAB

1. Arithmetic operations
   a) Series of n bytes/words addition
   b) Multi byte Addition and Subtraction
   c) 8/ 16 bit Multiplication and Division
   d) Signed Arithmetic operations
   e) ASCII – arithmetic operation.
   f) Addition of two, 4 digit BCD numbers
2. Logical Operations
   a) Code conversion – BCD ⇔ ASCII, BCD ⇔HEX.
   b) Number of 1's and 0's in a given word.
   c) Packed BCD to unpacked BCD using shift instructions
3. String Operations
   a) Relocate a string of N words/bytes.
   b) Reverse String.
   c) Bubble Sort
   d) Length of the String
   e) String Insertion
   f) String Deletion
   g) String comparison
   h) Scanning a byte/ word.
4. Write near procedure for
   a) Factorial of a given number
   b) Largest/smallest number in an N number of given words.
5. Interfacing with 8255 PPI

a) DAC Interfacing: Sawtooth, Triangular, Staircase, sinusoidal and square wave generation in BSR mode.

b) Stepper Motor Interfacing: Rotation in Clock wise and Anti-clock wise direction.

6. 8259 – Interrupt Controller
7. 8279 – Keyboard /Display controller.
8. 8251 - USART Interfacing

Microcontroller 8051:

9. Arithmetic operations – Addition, Subtraction, Multiplication and Division.
10. Reading and writing a port.
11. Serial communication implementation.
12. Square wave generation using Timer.

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IV Year B.Tech. EEE-I Semester

(4G27A) POWER SYSTEMS LAB

Any Ten experiments are to be conducted from the following:

1. Performance of Short/Medium Transmission Line

a) For R, L and C line Parameters

b) For A,B,C, D Parameters

2. Modeling of Long Transmission Line
3. Formation of $\mathbf{Y_{bus}}$ using MATLAB program
4. Formation of $\mathbf{Z_{bus}}$ using MATLAB program
5. **Gauss-Seidel** method load flow analysis using MATLAB program
6. **Newton Raphson** method load flow analysis using MATLAB program
7. Short Circuit Analysis For SLG and LL Faults using MATLAB program
8. Short Circuit Analysis For DLG and 3-ϕ Faults using MATLAB program
9. Transient Stability Analysis of single machine System using MATLAB program
10. Development of Matlab Simulink model for a Single Area Load Frequency Control system
11. Development of Matlab Simulink model for a synchronous machine with and Without **AVR.**
12. Analysis of Linear System using MATLAB

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IV B.TECH EEE II SEM

(4G281) POWER SEMICONDUCTOR DRIVES

Course Objective:

To study Power Electronics applications to AC and DC drives. It also deals control of DC motor drives with single phase and three phase converters and choppers. The control of AC motor drives with variable frequency converters and variable voltage are also emphasized.

UNIT I CONTROL OF DC MOTORS BY SINGLE PHASE CONVERTERS & THREE PHASE CONVERTERS: Introduction to Thyristor controlled Drives, Single Phase semi and fully controlled converters connected to d.c separately excited and d.c series motors – continuous current operation – output voltage and current waveforms – Speed and Torque expressions – Speed – Torque Characteristics- Problems on Converter fed d.c motors-Three phase semi and fully controlled converters connected to d.c separately excited and d.c series motors – output voltage and current waveforms – Speed and Torque expressions – Speed – Torque characteristics – Problems.

UNIT II FOUR QUADRANT OPERATION OF DC DRIVES: Introduction to Four quadrant operation – Motoring operations, Electric Braking – Plugging, Dynamic and Regenerative Braking operations. Four quadrant operation of D.C motors by dual converters – Closed loop operation of DC motor (Block Diagram Only)

UNIT III CONTROL OF DC MOTORS BY CHOPPERS: Single quadrant, Two –quadrant and four quadrant chopper fed dc separately excited and series excited motors – Continuous current operation – Output voltage and current wave forms – Speed torque expressions – speed torque characteristics – Problems on Chopper fed d.c Motors – Closed Loop operation (Block Diagram Only)

UNIT IV CONTROL OF INDUCTION MOTOR THROUGH STATOR VOLTAGE & FREQUENCY: Variable voltage characteristics-Control of Induction Motor by Ac Voltage Controllers – Waveforms – speed torque characteristics.- Variable frequency characteristics-Variable frequency control of induction motor by Voltage source and current source inverter and cyclo converters- PWM control – Comparison of VSI and CSI operations – Speed torque characteristics – numerical problems on induction motor drives – Closed loop operation of induction motor drives (Block Diagram Only)

UNIT V CONTROL OF INDUCTION MOTOR FROM ROTOR SIDE & CONTROL OF SYNCHRONOUS MOTORS: Static rotor resistance control – Slip power recovery – Static Scherbius drive – Static Kramer Drive – their performance and speed torque characteristics – advantages - applications – problems- Separate control &self control of synchronous motors – Operation of self controlled synchronous motors by VSI and CSI cycloconverters. Load commutated CSI fed Synchronous Motor – Operation – Waveforms – speed torque characteristics – Applications – Advantages and Numerical Problems – Closed Loop control operation of synchronous motor drives (Block Diagram Only).

Text books:

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

Reference books:

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

Course outcomes:

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

1. Analyze the control of DC motors by single phase converters.
2. Analyze the control of DC motors by three phase converters.
2. Analyze the Four quadrant operation of converters.
3. Analyze the control of DC motors by choppers.
4. Analyze the control of AC motors by single phase AC voltage controllers.
5. Analyze the control of AC motors by single phase AC voltage controllers.

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IV Year B.Tech. EEE-II Semester

(4G282) DISTRIBUTION OF ELECTRICAL POWER

Course Objectives:

- To learn the basics of Distribution system, different types of loads and their characteristics
- To understand the DC & AC distribution of power in terms of Voltage drops and power losses.
- To know the fundamental components of Substation and bus bar arrangements.
- To understand the need of Power Factor and Voltage Control in Distribution systems.
- To understand the need of protection of Distribution systems and Protecting devices.

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, Numerical Problems

UNIT II D.C. & A.C. DISTRIBUTION SYSTEMS: Classification of Distribution Systems - Requirements and Design features of Distribution Systems. Voltage Drop Calculations in D.C Distributors for the following cases: Radial D.C Distributor fed at one end and fed at both ends (equal/unequal Voltages) and Ring Main Distributor, Numerical Problems.
Design Considerations of Distribution Feeders: Radial and loop types of primary feeders, voltage levels, feeder loading; Basic Design Practice of the Secondary Distribution System. Voltage Drop Calculations in A.C. Distributors for the following cases: Power Factors referred to receiving end voltage and with respect to respective load voltages, Numerical Problems.

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

UNIT IV POWER FACTOR AND VOLTAGE CONTROL: Causes of low p.f -Methods of Improving p.f -Phase advancing and generation of reactive KVAR using static Capacitors-Most economical p.f. for constant KW load and constant KVA type loads, Numerical Problems. Effect of shunt capacitors (Fixed and switched), Power factor correction- Economic justification - Procedure to determine the best capacitor location Dependency 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 sectionalizers and circuit breakers, Coordination of Protective Devices, General coordination procedure.

Text books:

1. Turan Gonen. *Electric Power Distribution System Engineering*. McGraw-Hill Book Company, 1986.
2. A.S.Pabla, *Electric Power Distribution*. 4th edition, Tata Mc Graw-Hill Publishing Company, 1997.

Reference books:

1. Kamalesh Das *Electrical Power Systems for Industrial Plants*, JAICO Publishing House.
2. V.Kamaraju. *Electrical Power Distribution Systems*. Right Publishers, 2001.
3. G. Ramamurthy, *Hand Book of Electric Power Distribution*, 2nd Edition, Universities Press.

Course Outcomes:

- Able to analyze the distribution of power to various loads and load conditions.
- Able to analyze the distribution systems performance for various load models.
- Able to calculate the voltage drops and power losses for different type of Distribution systems.
- Able to understand the structures of different substations and analyze the locations of substations.
- Able to calculate the compensating device ratings for power factor improvement and voltage control in distribution system.
- Able to select and place proper protective devices in distribution systems.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

IV Year B.Tech. EEE-II Semester

(4G283) MODERN CONTROL THEORY
(ELECTIVE-III)

Course Objective:

To enable the students to have a fair knowledge about the use of mathematical techniques in control system

UNIT I MATHEMATICAL PRELIMINARIES: Fields, Vectors and Vector Spaces – Linear combinations and Bases – Linear Transformations and Matrices – Scalar Product and Norms –Eigen values, Eigen Vectors and a Canonical form representation of Linear operators – The concept of state – State Equations for Dynamic systems – Time invariance and Linearity –Non uniqueness of state model – State diagrams for Continuous – Time state models .

UNIT II STATE VARIABLE ANALYSIS: Linear Continuous time models for Physical systems–Solutions of Linear Time Invariant Continuous-Time State Equations – State transition matrix and its properties. General concept of controllability – General concept of Observability – Controllability tests for Continuous-Time Invariant Systems –Observability tests for Continuous-Time Invariant Systems – Controllability and Observability of State Model in Jordan Canonical form

UNIT III: Controllable and Observable Canonical forms of State model- State feedback controller design through Pole Assignment – State observers: Full order and Reduced order.

NON LINEAR SYSTEMS-I Introduction – Non Linear Systems - Types of Non-Linearities – Saturation – Dead-Zone -Backlash – Jump Phenomenon etc;– Singular Points – Introduction to Linearization of nonlinear systems, Properties of Non-Linear systems – Describing function–describing function analysis of nonlinear systems – Stability analysis of Non-Linear systems through describing functions.

UNIT IV: NON LINEAR SYSTEMS-II: Introduction to phase-plane analysis, Method of Isoclines for Constructing Trajectories, singular points, phase-plane analysis of nonlinear control systems.

UNIT V: STABILITY ANALYSIS: Stability in the sense of Lyapunov, Lyapunov's stability and Lypanov's instability theorems -Stability Analysis of the Linear continuous time invariant systems by Lyapunov second method – Generation of Lyapunov functions – Variable gradient & Krasooviski's method.

OPTIMAL CONTROL-Introduction to optimal control - Formulation of optimal control problems – calculus of variations – fundamental theorem of Calculus of variations — Linear Quadratic regulator

Text Books:

1. M.Gopal , *Modern Control System Theory* New Age International -1995
2. Ogata.K ,*Modern Control Engineering*, Prentice Hall of India,Fifth edition,2010

Reference books:

1. Donald E Kirck *Optimal control Theory*–Dover Publications,2004
2. Astrom.K.J, and Wittenmark.B, "*Adaptive control*", Addison-Wesley Longman Publishing Co, Second Edition,1994.
3. Brian.D, Anderson.O, John Barratt Moore, "*Optimal Control*" Prentice Hall,1990.

Course outcomes

1. Understand the concepts of state, assigning of state variables, controllability & Observability
2. Able to design the feedback controllers to make system stable
3. Understand the concepts of non linear systems and stability concepts.
4. Gain knowledge in the basics of optimal and adaptive controls

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(AN AUTONOMOUS INSTITUTION)

IV Year B.Tech. EEE-II Semester

(4G284) SPECIAL ELECTRICAL MACHINES (ELECTIVE-III)

Course Objective:

This course is an extension of electrical machines-III. It is important to study the principle of operation of special machines which are used in several home appliances and electronic gadgets.

UNIT I SPECIAL TYPES OF DC MACHINES: Series booster-Shunt booster - Non-reversible booster-Reversible booster - Armature excited machines-Rosenberg generator - The Amplidyne and Metadyne - Rototrol and Regulex -Third brush generator-Three wire generator-Dynamometer.

UNIT II SYNCHRONOUS RELUCTANCE MOTORS & SWITCHED RELUCTANCE MOTORS: Constructional features of Synchronous Reluctance motor - Types - Axial and radial air gap motors - Operating principle - Reluctance - Phasor diagram – Characteristics - Vernier motor - Constructional features of Switched Reluctance motor - Principle of operation - Torque prediction - Power controllers - Non-linear analysis - Microprocessor based control - Characteristics - Computer control.

UNIT III STEPPING MOTORS: Constructional features - Principle of operation -Variable reluctance motor - Hybrid motor - Single and multi stack configurations - Theory of torque predictions - Linear and non-linear analysis - Characteristics - Drive circuits.

UNIT IV P.M.B.L.D.C. & P.M.S.M. MOTORS: Principle of operation of PMBLDC - Types - Magnetic circuit analysis - EMF and torque equations - Power controllers - Motor characteristics and control - Principle of operation of PMSM - EMF and torque equations - Reactance - Phasor diagram - Power controllers - Converter - Volt-ampere requirements - Torque speed characteristics - Microprocessor based control.

UNIT V LINEAR INDUCTION MOTOR: Development of a Double Sided LIM from Rotary type IM - a Schematic of LIM Drive for Electric Traction - Development of one sided LIM with back Iron - Field Analysis of DSLIM, Fundamental Assumptions.

Text books:

1. T.J.E. Miller. *Brushless Permanent Magnet and Reluctance Motor Drives*. Clarendon Press, Oxford, 1989.
2. P.P. Aearnley. *Stepping Motors – A Guide to Motor Theory and Practice*. Peter Perengrinus. London, 1982.

Reference Books*:*

1. K.Venkatarathnam. *Special Electrical Machines*. University press.
2. R.K.Rajput. *Electrical Machines*. 4th Edition. Laxmi publications.
3. M.G.Say & E.O.Taylor, *DC Machines*, 2nd Edition, EBLS.
4. T. Kenjo. *Stepping Motors and Their Microprocessor Controls*. Clarendon Press London, 1984.
5. T. Kenjo and S. Nagamori, *Permanent Magnet and Brushless DC Motors*, Clarendon Press, London, 1988.

Course outcomes:

By the end of this course, students will be able to:

1. Design special types of DC machines.
2. Understand the construction and operation of synchronous reluctance motors & Switched reluctance motors.
3. Design stepping motors.
4. Design P.M.B.L.D.C. & P.M.S.M. motors.
5. Understand the construction and operation of Linear Induction motor.

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IV Year B.Tech. EEE-II Semester

(4G285) PRINCIPLES OF POWER QUALITY
(ELECTIVE-III)

Course Objective

To study the various issues affecting Power Quality, their production, monitoring and suppression.

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 INTERRUPTIONS: Sources of sags and interruptions, estimating voltage sag performance, fundamental principles of protection, solutions at the end-use level, motor-starting sags, utility system fault-clearing issues.

UNIT III 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 SHORT AND LONG-DURATION VOLTAGE VARIATIONS: Sources of over voltages, principles of over voltage protection, devices for over voltage protection, utility capacitor-switching transients, utility system lighting protection-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, harmonic indices, power quality contracts-Monitoring considerations, power quality measurement equipment, power quality monitoring standards

Text Books:

1. Roger C.Dugan, Mark F.McGranaghan, Surya santoso, H.Wayne Beaty *Electrical power systems quality*, 2nd edition, TMH Education Pvt. Ltd.
2. C.Sankaran, *Power quality*, 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.

Course Outcomes:

1. Understands the definition of power quality and learns different terms and definitions used in power quality.
2. Understands sources of voltage sags and interruptions ,estimating and solutions.
3. Understands sources of transient over voltages and devices for over voltage protection.
4. Understands Harmonic distortion ,Harmonic sources and principles of controlling Harmonics.
5. Understands devices used for regulating long duration voltage variations.
6. Understands the benchmarking process and power quality monitoring conditions.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

IV Year B.Tech. EEE-II Semester

(4G38B)EMBEDDED SYSTEMS
(ELECTIVE-IV)

Course objectives:

The course aims to provide the student with the ability

1. To understand concepts of embedded systems.
2. To apply the knowledge acquired on the design considerations

UNIT – I : MICROCONTROLLER & INTERFACING

8051: Introduction, Architecture, Register Organization, Internal and External Memory, Pin diagram, I/O port structure, Addressing modes, Instruction Set, simple programs. On-Chip Peripherals-8051 Interrupt Structure, Timer/Counter features, modes and programming. MSP 430 Low power Micro Controller (A Quantitative study only).Applications- Interfacing with switches, display – LED, seven segment display, LCD. Keyboard interfacing, D/A and A/D interfacing, Stepper motor interfacing, Handling External Interrupts.

UNIT – II: INTRODUCTION TO EMBEDDED SYSTEMS

Embedded System – Definition, Application Areas, and Categories. Overview of embedded system architecture, specialities: reliability, performance, power consumption cost, size, user interface, software upgradation capability, recent trends: processor, power, memory, operating system, communication interface, programming languages, development tools, programmable hardware.

UNIT – III: ARCHITECTURE OF EMBEDDED SYSTEMS

Hardware Architecture – CPU, Memory, Clock Circuitry, Watch dog Timer/Reset Circuitry, chip select, I/O devices, Debug Port, Communication Interfaces, Power supply Unit. Software Architecture – Services provided by an operating System, Architecture and categories of Embedded Operating Systems, Application Software, Communication software, Process of generating Executable image, Development/Testing tools.

UNIT – IV: COMMUNICATION INTERFACES

Need for Communication interface, RS232/UART, RS 422/RS 485, USB, Infrared, IEEE 1394 fire wire, IEEE 802.11, Blue tooth, I2C and CAN Bus.

UNIT – V: REAL TIME OPERATING SYSTEM

Architecture of Kernel, Tasks and Task Scheduler, Interrupt Service Routines, Inter process Communication– Semaphores, mutex, message queues, mailboxes, pipes, signals, event registers and timers. Priority Inversion Problem.Off the Shelf Operating Systems, Embedded Operating Systems, Real Time Operating Systems, And Handheld Operating Systems

Text Books:

1. Embedded/ Real Time Systems, K.V.K.K. Prasad, Dreamtech press.
2. The 8051 Microcontroller, Kenneth J Ayala, 3rd edition, Thomson Press.

Reference Books:

1. Computers and Components, Wyene Wolf, Elseveir.
2. Embedded Systems, Raj Kamal, TMH.2nd edition.2008.

Course outcomes:

Upon completion of the course, students will

CO1: Understand basic concepts to design embedded applications.

CO2: Understand different programming models and their suitable application areas.

CO3: Analyze the operation of I/O ports and different communication protocols.

CO4: Design different embedded applications.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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IV Year B.Tech. EEE-II Semester

(4G286) DESIGN OF ELECTRICAL SYSTEMS (ELECTIVE-IV)

Course Objective

To enable the students gain fair knowledge on design of electrical systems

UNIT I DESIGN ASPECTS OF ELECTRICAL SYSTEMS & INSTALLATIONS IN DOMESTIC BUILDINGS: Role of Statutes in Electrical system design, classification of building services, design aspects of lighting, design aspects of ventilation, design aspects of climate control, design aspects of vertical transportation, design aspects of minor building services-Classification , estimation of load requirements, selection of type of wiring, special features applicable for high-rise apartment buildings, pre-commissioning tests.

UNIT II INDUSTRIAL INSTALLATIONS-I: Classification of industrial installation ,general characteristics, selection of distribution architecture, selection of transformers and sub stations.

INDUSTRIAL INSTALLATIONS –II: Short circuit studies, fault current calculations, earthing design, selection of switch gears: electrical protection , protection of circuit elements, persons & life stack, Equipment, Electrical isolation, switch gear control, switching devices, uses, selective Co-ordination, circuit breakers and their selection.

UNIT III POWER FACTOR IMPROVEMENT: Nature of reactive energy, power factor, how to improve power factor?, economics of power factor improvement ,location of capacitors, installation features, optimal compensation, PF correction of induction motors, protection and control ,voltage transients, switching considerations.

UNIT IV POWER SYSTEM EARTHING: Introduction, earthing, types of system earthing,reasons for grounding/earthing, TN system, TT system, IT system, protective measures and protective devices in IT system, main characteristics of earthing systems, selection criteria for earthing, design considerations of earthing, measurement of earth resistance, earth leakage protection ,neutral earthing for generators and transformers.

UNIT V POWER QUALITY ISSUES AND RESONANCE PROBLEMS IN SYSTEMS DESIGN: Power quality issues, harmonics, sources of harmonics, disturbances caused by harmonics, methods to reduce the impact of harmonics, design the detuned capacitor bank, IEEE standard519-1992 and limits. **ENERGY**

ECONOMICS IN SYSTEM DESIGN: Introduction, time value of money, single payment compound amount model(SPCA),uniform series compound amount model(USCA),uniform series present worth model(USPW),depreciation, tax considerations, after tax analysis.

Text books:

1. M.K.Giridharan. *Electrical Systems design*. I.K.International Publishing house Pvt.Ltd.
2. Er.V.K.Jain and Er.Amitabh Bajaj. *Design of electrical Installations*. University Science press.

Course Outcomes:

1. Able to estimate and design of electrical installation for industries and Building
2. Know the importance of Power factor improvement and Earthing
3. Able to understand the power quality.
4. Know the Economic Aspects of electrical system design

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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IV Year B.Tech. EEE-II Semester

(4G287) ENERGY AUDITING AND DEMAND SIDE MANAGEMENT (ELECTIVE-IV)

Course objective:

Familiarizing with management, especially with management in energy sector engineering. Fundamentals of product strategy management. Studying methods of energy accounting and energy auditing in energy sector, industry and final consumption. Finding opportunities to increase the rational use of energy

UNIT I ENERGY AUDITING: 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, codes, standards & Legislation

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 INSTRUMENTS: Good lighting system design and practice, lighting control ,lighting energy audit - Energy Instrumentswatt 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 books:

1. W.R. Murphy & G. Mckay Butter worth. *Energy management.* Heinemann publications.
2. Arry C. White, Philip S. Schmidt, David R. Brown. *Industrial Energy Management Systems*. Hemisphere Publishing Corporation, New York.
3. Albert Thumann. *Fundamentals of Energy Engineering*. Prentice Hall Inc, Englewood Cliffs, New Jersey.
4. A S. Pabla, *Electrical Power distribution*, TMH, 5th edition, 2004
5. Jyothi Prakash. *Demand Side Management*. TMH Publishers.

Reference books:

1. Paul o Callaghan. *Energy management*. Mc-graw Hill Book company-1st edition, 1998
2. John .C. Andreas, Marcel Dekker. *Energy efficient electric motors*. Inc Ltd-2nd edition, 1995-
3. W.C.Turner, *Energy management hand book,* John wiley and sons.
4. *Energy management and good lighting practice : fuel efficiency- booklet12-* EEO.
5. D.P.Sen, K.R.Padiyar, Indrane Sen. *Recent Advances in Control and Management of Energy Systems*. M.A.Pai, Interline Publisher, Bangalore, 1993.
6. Ashok V. Desai, Wiley. *Energy Demand – Analysis, Management and Conservation. Eastern*, 2005.
7. *Hand book on energy auditing. TERI (Tata Energy Research Institute).*

Course outcomes:

- Understanding basics of demand side management and mechanisms (technical, legal or financial) that influence energy consumption.
- Recognizing opportunities for increasing rational use of energy. Learning the basics of energy auditing with application on different sectors.