ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES:: RAJAMPET

(AN AUTONOMOUS INSTITUTION)

www.aitsrajampet.ac.in

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

ACADEMIC REGULATIONS (R15)

AND

COURSE STRUCTURE & SYLLABI

For the students admitted to

B. Tech., Regular Four Year Degree Programme in CBCS from the Academic Year 2015-16

and

B. Tech., Lateral Entry Scheme from the Academic Year 2016-17

B. Tech., ELECTRICAL AND ELECTRONICS ENGINEERING

VISION AND MISSION OF THE INSTITUTION

Vision

We impart futuristic technical education and instill high patterns of discipline through our dedicated staff who set global standards, making our students technologically superior and ethically strong, who in turn shall improve the quality of life of the human race.

Mission

Our mission is to educate students from the local and rural areas, and from other states so that they become enlightened individuals, improving the living standards of their families, industry and society. We provide individual attention, world-class quality of Technical education and take care of character building.

VISION AND MISSION OF THE DEPARTMENT

Vision

We envision the Department as one of the best in the region with a stimulating environment to make an impact on, and lead in the field through its Education and Research.

Mission

The mission of the Department is to provide an excellent and comprehensive education in the field of **Electrical And Electronics Engineering** which in turn mould students for a wide range of careers and to exhibit a high level of professionalism, ethical behavior and social responsibility.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

Program Educational Objective 1

To experience success in electrical engineering areas or other diverse fields that requires analytical and professional skills.

Program Educational Objective 2

To prepare students to contribute to their fields or professions and to excel them in professional ethics and leadership qualities

Program Educational Objective 3

To inculcate in students professional attitude, effective communication skills and an ability to succeed in multi-disciplinary and diverse fields.

Program Educational Objective 4

To promote students to continue to pursue professional development, including continuing or advanced education relevant to their career path and to create enthusiasm for life-long learning Acceptance by and satisfactory progress in a graduate degree program.

PROGRAMME OUTCOMES (POs)

a. An ability to apply knowledge of Mathematics, Science, Computer Science, Electronics and Electrical Engineering.

b. An ability to design Electrical and Electronics circuits and conduct experiments with Electrical Engineering as well as to analyze and interpret data.

c. An ability to design digital and analog system pertaining to electrical systems.

d. An ability to visualize and work on multi-disciplinary tasks.

e. An ability to identify, formulate and solve engineering problems.

f. An understanding of professional and ethical responsibility

g. An ability to communicate effectively in both verbal and written form.

h. An ability to develop confidence for self-education and to understand the value of life-long learning.

i. An ability to recognize the impact of engineering on society.

j. An ability to acquire new knowledge to use modern engineering tools, software and equipment’s to analyze problems necessary for engineering practice.

k. A knowledge of contemporary issues to undertake innovative projects.

l. An ability to use the techniques and skills to face and succeed in competitive examinations like GATE, GRE, TOEFL, GMAT etc.

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ACADEMIC REGULATIONS
B.Tech, Four Year Degree Programme with CBCS
(For the batches admitted from the academic year 2015-16)
and
B.Tech. Lateral Entry Scheme
(For the batches admitted from the academic year 2016-17)

The following rules and regulations will be applicable for the batches of Four year B.Tech. Degree admitted from the academic year 2015-16 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 Andhra Pradesh 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, AP-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 Andhra Pradesh State Council of Higher Education (APSCHE), Government of Andhra Pradesh seats will be filled by the Convener, AP-ECET.

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 leading to the award of B.Tech. (Bachelor of Technology) Degree:

1. B. Tech. (Computer Science and Engineering)
2. B. Tech. (Electrical and Electronics Engineering)
3. B. Tech. (Electronics and 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 entire course of study is of four academic years and each year will have **TWO** Semesters (Total **EIGHT** Semesters). The minimum instruction days for each semester shall be 90.

4. COURSE STRUCTURE:

Each programme of study shall consist of:

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

a) Language / Communication Skills
b) Humanities and Social Sciences : Environmental Science
c) Economics and Accounting
d) Principles of Management

4.2 Basic Science Courses comprising of the following: (15 to 20%)

a) Computer Literacy with Numerical Analysis
b) Mathematics
c) Physics
d) Chemistry

4.3 Basic Engineering Courses comprising of the following (depending on the branch): (15 to 20%)

a) Engineering Drawing
b) Engineering and IT Workshop
c) Engineering Mechanics
d) Basic Mechanical Engineering
e) Electrical and Electronics Engineering
f) Basic Civil Engineering
g) Computer Programming

4.4 Compulsory Discipline Courses: (30 to 40%)

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 Professional subjects - Electives: (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 Open Electives: (5 to 10%)

Open subjects will be offered from other technical and / or emerging subject areas

4.7 Project work, seminar and /or internship: (10-15%)

Project work, Seminar and / or Internship in industry or elsewhere.

4.8 Mandatory Courses:

Environmental studies, Technical English and Technical Communication & Soft Skills are included as subjects under mandatory courses but with credit weightage.

4.9 There shall be a subject like comprehensive Electrical and Electronics Engineering with 2 hours per week introduced in final year first semester.

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

4.11 Every programme has included foundation courses to the extent of 30%, programme core and programme elective subjects to the extent of 60%, open electives and mandatory courses to the tune of 10% approximately of the total credits.

4.12 Audit Courses (to be included in III B.Tech. I Sem & II Sem)

Interested students who want to supplement their knowledge can opt for audit courses namely Professional Ethics/Stress Management & Advanced English Communication Skills lab and can appear/Pass in Continuous Internal Evaluation and Semester End Examination of these courses, will be included in marks memo only when they pass.

4.13 Open Elective

IV Year I Semester student has to necessarily select a subject from the list of open electives.

4.14 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.

	Semester Pattern	
	Period(s) / Week	Credit(s)
Theory	01	01
Practical	03	02
Comprehensive Course	02	02
Seminar	–	02
Final Year Project	12	08

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

6.1 Distribution of Marks:

S. No.	Description	Marks	Examination and Evaluation	Scheme of Evaluation
1	Theory	70	Semester-End Examination.	The question paper shall be of subjective type with **Five** questions with internal choice to be answered in 180 Minutes duration.
		30	Mid-Examinations of 120 Minutes duration to be evaluated for 20 marks. The question paper shall be of subjective type in which four questions with an internal choice are to be answered. Remaining 10 marks is for continuous evaluation which includes weekly/fortnightly class tests, homework assignments, problem solving, group discussions, quiz, seminar, mini-project and other means. The method of allotting these marks will be decided by the teacher dealing that subject in consultation with the Head of the Department. Teacher has to announce the evaluation method in the beginning of the semester.	**Two** MID - Examinations are to be conducted for 20 marks each in a semester. 80% weightage for better performance and 20% for other shall be considered. **MID-I:** after first spell of instructions(I & II-Units). **MID-II:** after second spell of instructions (III, IV & V-Units). The student who has missed both the Mid examinations will be permitted to appear for a substitute examination covering the total syllabus. This substitute examination will be given a weightage of 80%. This is to be conducted before the commencement of end semester exams, can be even outside the working hours, can be even two mid exams a day also.

S. No.	Description	Marks	Examination and Evaluation	Scheme of Evaluation
2	Laboratory or Drawing	70	Semester - End Lab Examination	**For laboratory courses: 180 minutes** duration – two examiners. For Drawing and / or Design: like for the theory examination.
		30	**20 Marks** for Day to Day evaluation	Performance in laboratory experiments
			10 Marks for Internal evaluation	Performance of one best out of two tests to be considered.
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) consisting of two/three faculty members allotted by Head of the Department.
4	Comprehensive Course	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 Marks for External evaluation	Semester-end Project Viva-Voce Examination by Committee as detailed under 6.2
			30 Marks for Internal evaluation	Continuous evaluation by the DC 15 Marks by DC as detailed under 6.2.1 and 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 II Semester.

6.3 Eligibility to appear for the 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 semester.

6.3.2 Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the 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 any semester are not eligible to take their End examination of that class and their registration for that semester 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 semester, as applicable.

6.3.7 A student detained due to shortage of attendance, will have to repeat that 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 areno changes, the student shall be intimated the same through a letter or a notice.

6.5 Improvement of marks:

Students are permitted for improvement examinations once for a maximum of four subjects after completion of the study course but before applying for provisional certificate and consolidated marks memo after payment of prescribed fee.

6.6 Readmission of Students:

A student who has satisfied the minimum attendance requirement in any semester may repeat that semester, after obtaining written permission from the Principal and cancelling the previous record of attendance and academic performance (viz ; internal evaluation and external evaluation marks) of the semester or year. This facility may be availed by any student at the maximum twice for a 4 year B.Tech, and only once by Lateral Entry student & PG student during the entire course of study.

6.7 Supplementary Examination:

a) 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.

b) In case of Seminars and Comprehensive Viva-Voce examinations, supplementary seminar / comprehensive Viva-Voce will be conducted along with the next batch of students if available. If the next batch of students is not available, a separate supplementary examination will be conducted.

6.8 Internship Programme:

The weightage of two credits given for an internship of three weeks duration and more, when a student undergoes Internship / Industrial Training from the specified Industries / Research Organizations / Universities. In such a case, the student has to submit a report on that internship which will be evaluated by a team of three faculty members (decided by the HOD) of the department for those two credits. Student is given a chance to drop one seminar in place of a successful internship / industrial training.

6.9 Massive Open Online Course (MOOC):

MOOC is one of the courses introduced in IV year II semester. The list of subjects under MOOC will be intimated before commencement of class work.

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

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

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

7.1.1 A student shall be deemed to have satisfied the minimum academic requirements for each theory, practical, drawing subject 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.

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

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 **50** credits from I year I and II-Semesters, II year I and II -Semesters Examinations conducted till that time.

7.1.4 A student shall be promoted from III year to IV year if he / she fulfills the academic requirements of securing a minimum of **74** credits from I year I and II-Semesters, 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 **195** 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 **195** credits as indicated in the course structure within **eight** academic years from the year of admission shall forfeit his seat in B.Tech.Programme and his admission stands cancelled.

7.2 For Lateral Entry Students (batches admitted from 2016-2017):

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 **22** 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 **46** 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 **139** 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 **139** 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 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:

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,

T_i = Total marks obtained for course i in any semester

9.2 For the entire programme:

Cumulative Credit Point Average [CCPA] $= \frac{1}{10} \frac{\sum_n \sum_i c_{ni} T_{ni}}{\sum_n \sum_i c_{ni}}$

Where *n*= the semester in which such courses were credited

9.3 Overall Performance:

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

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 **195/139 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:

12.1 A student is permitted to select one of the extracurricular / extension activities like NSS / Sports / Games / Cultural activities. A certificate in one of these activities is a must for the student to become eligible for the award of Provisional Certificate or Degree.

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

13.AMENDMENTS TO REGULATIONS:

The Chairman, Academic Council of Annamacharya Institute of Technology and Sciences, Rajampet 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, there include "she", "her", "herself".

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CURRICULUM STRUCTURE

Opportunity does not knock, it presents itself when you beat down the door

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Regulations:**R15** Programme Code: **G2**

I Year B. Tech. I Semester

Subject Code	Subject Name	Hours / Week			C
		L	T	P	
5GC11	English through Literature	2	1	0	2
5GC13	Engineering Physics	4	1	0	4
5GC14	Engineering Mathematics-I	3	1	0	3
5G111	Problem Solving Techniques And Introduction To C Programming	3	1	0	3
5G311	Electronic Devices and Circuits -I	3	1	0	3
5G513	Engineering Drawing- I	1	--	3	3
5GC16	English Language Communication Skills Lab-I	--	--	3	2
5GC18	Engineering Physics Lab	--	--	3	2
5G113	Problem Solving Through C Lab	--	--	3	2
5G312	Electronic Devices and Circuits Lab -I	--	--	3	2
5G114	IT Workshop	--	--	3	2
	Total	**16**	**5**	**18**	**28**

I Year B. Tech. II Semester

Subject Code	Subject Name	Hours / Week			C
		L	T	P	
5GC21	Technical English	2	1	0	2
5GC22	Engineering Chemistry	4	1	0	4
5GC24	Engineering Mathematics-II	3	1	0	3
5G121	C programming and Data Structures	3	1	0	3
5G321	Electronic Devices and Circuits -II	3	1	0	3
5G523	Engineering Drawing –II	1	--	3	3
5GC26	English Language Communication Skills Lab-II	--	--	3	2
5GC27	Engineering Chemistry Lab	--	--	3	2
5G123	Programming in C and Data Structures Lab	--	--	3	2
5G322	Electronic Devices and Circuits Lab-II	--	--	3	2
5G524	Engineering workshop	--	--	3	2
	Total	**16**	**5**	**18**	**28**

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

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II Year B. Tech. I Semester

Subject Code	Subject Name	Hours / Week			C
		L	T	P	
5GC32	Mathematical Methods-III	3	1	0	3
5G231	Switching Theory and Logic Design	3	1	0	3
5G232	Electrical Machines-I	3	1	0	3
5G233	Electrical Circuits-I	3	1	0	3
5G539	Fluid Mechanics and Hydraulic Machines	3	1	0	3
5G234	Electro Magnetic Fields	3	1	0	3
5G53A	Fluid Mechanics and Hydraulic Machines Lab	--	--	3	2
5G237	Electrical Machines-I Lab	--	--	3	2
5G238	Seminar - I	--	--	2	2
	Sports & Extension Activities	--	--	1	0
	Total	**18**	**6**	**09**	**24**

II Year B. Tech. II Semester

Subject Code	Subject Name	Hours / Week			C
		L	T	P	
5G241	Electrical Machines-II	3	1	0	3
5G242	Electrical Circuits-II	3	1	0	3
5G345	Electronic Circuit Theory	3	1	0	3
5G243	Generation of Electric Power	3	1	0	3
5G244	Linear Control Systems	3	1	0	3
5GC41	Complex Variables & Special Functions	3	1	0	3
5G247	Electrical Circuits and Simulation Lab	--	--	3	2
5G248	Control systems and Simulation Lab	--	--	3	2
5GC44	Aptitude & Reasoning Skills	2	--	--	2
	Total	**20**	**6**	**06**	**24**

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Regulations: **R15** Programme Code: **G2**

III Year B. Tech. I Semester

Subject Code	Subject Name	Hours / Week			C
		L	T	P	
5G359	Linear and Digital Integrated Circuits Applications	3	1	0	3
5G251	Electrical Machines-III	3	1	0	3
5G252	Transmission of Electric Power	3	1	0	3
5G253	Power Electronics	3	1	0	3
5G254	Electrical and Electronics Measurements	3	1	0	3
5GC52	Environmental Science	3	1	0	3
5G255	Electrical Machines-II Lab	--	--	3	2
5G256	Electrical Measurements Lab	--	--	3	2
5G257	Seminar - II	--	--	2	2
AUDIT COURSE	Advanced English Communications skills Laboratory	--	--	3	0
		18	**6**	**11**	**24**

III Year B. Tech. II Semester

Subject Code	Subject Name	Hours / Week			C
		L	T	P	
5GA61	Management Science	3	1	0	3
5G261	Power System Analysis	3	1	0	3
5G262	Microprocessors and Microcontrollers	3	1	0	3
5G263	Power System Operation and Control	3	1	0	3
5G466	Object oriented Programming Concepts	3	1	0	3
5G264	Switch Gear and Protection	3	1	0	3
5G46C	Object oriented Programming Concepts Lab	--	--	3	2
5G265	Power Electronics and Simulation Lab	--	--	3	2
5GC62	English for Competitive Examinations	2	--	--	2
AUDIT COURSE	Professional Ethics / Stress Management	2	--	--	0
	Total	**22**	**6**	**06**	**24**

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Regulations: **R15** Programme Code: **G2**

IV Year B. Tech. I Semester

Subject Code	Subject Name	Hours / Week			C
		L	T	P	
5G271	Power Semiconductor Drives	3	1	0	3
5G272	Distribution of Electrical Power	3	1	0	3
5G379	Digital Signal Processing	3	1	0	3
OPEN ELECTIVE		3	1	0	3
PROFESSIONAL ELECTIVE-I					
5G273	Instrumentation	3	1	0	3
5G274	High Voltage Engineering				
5G275	Renewable Energy Sources				
PROFESSIONAL ELECTIVE-II					
5G276	Principles of Power Quality	3	1	0	3
5G277	Reliability Engineering and Applications To Power Systems				
5G278	Special Electrical Machines				
5G279	Microprocessors and Microcontrollers Lab	--	--	3	2
5G27A	Power Systems Lab	--	--	3	2
5G27B	Comprehensive Electrical and Electronics Engineering	--	--	2	2
		18	**6**	**8**	**24**

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LIST OF OPEN ELECTIVES SUBJECTS		Offered By Department of
5G679	Disaster Management	CE
5G27C	System Modelling and Simulation	EEE
5G57D	Total Quality Management	ME
5G57E	Integrated Product Development	ME
5G377	Nano Technology and Applications	ECE
5G379	Medical Instrumentation	ECE
5G178	.NET Technologies	CSE
5G473	Cyber Laws	IT
5GA71	Intellectual Property Rights	DBA
5GA72	Human Resource Management	DBA

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Regulations: **R15** Programme Code: **G2**

IV Year B. Tech. II Semester

Subject Code	Subject Name	Hours / Week			C
		L	T	P	
PROFESSIONAL ELECTIVE-III					
5G281	Embedded Systems	3	1	0	3
5G282	Utilization of Electrical Energy				
5G283	Fundamentals of HVDC & FACTS Devices				
PROFESSIONAL ELECTIVE-IV					
5G284	Modern Control Theory	3	1	0	3
5G285	Design of Electrical Systems				
5G286	Energy Auditing and Demand side Management				
Massive Open Online Course		0	0	3	3
5G287	Seminar - III	--	--	2	2
5G288	Project work	0	0	8	8
	Total	**6**	**2**	**13**	**19**

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

I Year B. Tech. I Semester

Every Truth has Four Corners; As a Teacher I give you one corner, and it is for you to find the other three.

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I Year B. Tech. I Semester

(5GC11) ENGLISH THROUGH LITERATURE
(Common to all branches)

Course Objectives:

- To improve the language proficiency of the students in English through literature
- To enhance the vocabulary of the students in English through the use of diverse authentic materials
- To enable the students absorb the human values expressed in literature

Text Books:

1. For Detailed study: Texts from Open Sources (Available on Web)
2. For Non-detailed study: *Trailblazers* published by Orient Black Swan

- Texts from open sources are included in the syllabus to make the teaching-learning process more interesting and inspiring. Also, the literary texts from open sources will allow the student learn language through 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.

Unit I

Detailed Study: *Cabuliwallah* by Rabindranath Tagore; *The Road not Taken* by Robert Frost

Non-detailed Study: G. D. Naidu

Unit II

Detailed Study: *A Dog's Tale* by Mark Twain*; If* by Rudyard Kipling

Non-detailed Study: Sudha Murthy

Unit III

Detailed Study: *The Gift of Magi* by O. Henry; *Leisure* by W. H. Davies

Non-detailed Study: Vijay Bhatkar

Unit IV

Detailed Study: *An Astrologer's Day* by R. K. Narayan: *Night of the Scorpion* by Nissim Ezekiel*;*

Non-detailed Study: Jagadish Chandra Bose

Unit V

Detailed Study: *The Proposal* by Anton Chekhov

Non-detailed Study: HomiJehangir Baba

Course Outcomes:

- The student will appreciate the significance of silent reading and comprehension
- 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

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I Year B. Tech. I Semester

(5GC13) ENGINEERING PHYSICS

(Common to EEE and ECE)

COURSE OBJECTIVS:

- 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 is to provide basic understanding of different engineering materials (semiconductors, magnetic, superconducting and nano materials).

Unit I

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. Holography: Construction and Re-Construction of hologram - Applications

Fiber 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 – Inter planar spacing in cubic crystals – X-ray diffraction - Bragg's law – Powder method– Defects in solids: point defects and types.

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's hypothesis - Heisenberg's uncertainty principle - Schrodinger's time independent wave equation – Significance of wave function - Particle in a one dimensional infinite potential well.

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 dc Josephson 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 vapor deposition, sol-gel, plasma arcing methods – Carbon nanotubes (CNT) and properties – Applications of nanomaterials.

Text Books:

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

Reference Books:

1. Engineering Physics – RV.S.S.N. Ravi Kumar and N.V. Siva Krishna, Maruthi Publications , 2013
2. Engineering Physics – D.K.Battacharya and A.Bhaskaran,OxfordHeigher Education I Edi 2010.
3. Engineering Physics – D K Pandey, S. Chaturvedi, Cengage Learning, I Edition, 2012.
4. Engineering Physics – D.K.Bhattacharya and A.Bhaskaran, Oxford University press.
5. Engineering Physics – M. Arumugam, Anuradha Publications II Edition, 1997.
6. Engineering physics – M.N. Avadhanulu and P.G. KrshiSagar, Chand and Co, Revised Edi 2013.
7. Solid State Physics – A.J. Dekkar, McMillan Publishers, Latest edition, 2012.
8. Engineering Physics – Gaur and Gupta Dhanapati, RaiPublishers , 7th Edition, 1992.
9. Text book of Nanoscience and Nanotechnology: B S Murthy, P.Shankar, Baldev Raj B BRath, 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.
- Analysis of basic concepts of quantum mechanics and electron theory and consequences.
- Explain about basic mechanism of different types of advanced materials used in engineering field.
- Get brief idea about synthesis, properties and applications of nano materials.

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I Year B. Tech. I Semester

(5GC14) ENGINEERING 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 understand the concept of partial differentiation and its applications.
- To understand the concept of curve tracing in various forms

Unit I

Linear and Bernoulli equations, Applications to Newton's law of cooling, law of natural growth and decay, Rate of decay of radio-active materials, Chemical reaction and solutions, orthogonal trajectories.

Unit II

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

Unit III

Series solutions of differential equations: Validity of series solution of the equation, series solution when x=0 is an ordinary point of the equation, Frobenius method .

Rolle's Theorem – Lagrange's Mean Value Theorem (without proof). Simple examples of Taylor's and Maclaurin's Series

Unit IV

Functions of several variables – Partial differentiation- Chain rule-Jacobian – Maxima and Minima of functions of two variables, Lagrangian method of Multipliers with three variables only.

Unit V

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

Text Books:

1.Higher Engineering Mathematics, B.S.Grewal, Khanna publishers-43rd Edition (2014)

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.

Course Outcomes:

Upon completion of the course, students should be able to

- Understand the various types of ordinary differential equations
- Have the knowledge on functions of several variables.
- Understand the concepts of curve tracing

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I Year B. Tech. I Semester

(5G111) PROBLEM SOLVING TECHNIQUES AND INTRODUCTION TO C PROGRAMMING

(Common to ALL branches)

Course Objectives:

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

Unit I

Introduction to Computer Problem Solving: Introduction to Computer Systems, Computer Environments, Computer Languages, Introduction to Problem Solving Aspect, Top- down Design, Implementation of Algorithms, Flow Charts, SDLC.

Unit II

Introduction to C Language: Structure of a C Language program, Creating and Running C programs, Keywords, Identifiers, Data types, typedef, enumerated types variables, constants, input/output. Operators and Expressions, precedence and associatively, Type Conversions, Bitwise Operators. Example programs for each topic.

Unit III

C 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, Loops in C-while loop, do…while loop, for loop, Other Related Statements -break, continue, goto. Example programs for each topic.

Unit IV

ARRAYS: Declaring and Referencing Arrays, Array Subscripts, Using for Loops for Sequential Access, Multidimensional Arrays.

Strings: String Basics, String Library Functions, Array of Strings. Example programs for each topic.

Unit V

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. Example programs for each topic.

Text Books:

1.C Programming and Data Structures.B.AForouzan,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 McGraw Hill.

4.How to Solve it By Computer, R.G.Dromey,PHI.

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, YeswanthKanitkar, Ninth Edition, BPB Publication.

Course Outcomes:

After completion of the course student will be able to

- Understand the importance of the software development process and System development tools.
- Understand general principles of C programming language and able to write simple program in C. Able to develop programs based on arrays and functions.

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I Year B. Tech. I Semester

(5G311) ELECTRONIC DEVICES AND CIRCUITS - I

(**Common to EEE and ECE**)

Course Objectives:

- To learn the basic fundamentals of circuit components, circuit laws and network theorems.
- To understand the concepts of semiconductor diode and its applications.
- To understand the basic concepts of BJT.

Unit-I

CIRCUIT ELEMENTS: Sources: Voltage and Current Sources, Resistors-Types- resistance colour coding-potentiometer-types, Capacitors-types-uses of capacitors, Inductors-types.

Unit-II

NETWORK THEOREMS (D.C. Excitation only):- Ohm's law, Kirchhoff laws-network reduction techniques-series, parallel, series parallel circuits-source transformations. Thevenin's Theorem- Norton's Theorem- Superposition Theorem-maximum power transfer theorem.

Unit-III

SEMICONDUCTOR DIODE: Energy Band Diagram, V-I Characteristics of PN Junction Diode (Ideal, Simplified and Piece-wise), Temperature Dependency, Transition and Diffusion Capacitances, Breakdown Mechanisms in semiconductor diodes, Zener diode characteristics.

Unit-IV

DIODE APPLICATIONS: 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-V

INTRODUCTION OF BJTs: Transistor construction - Transistor operation, CB, CE and CC configurations and Characteristics

TextBooks:

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. Engineering basics: Electrical, Electronics and computer Engineering" , T.Thyagarajan, New Age International, 2007

REFERENCEBOOKS:

1. "Electronic Devices and Circuits" J. Millman and Halkias, 1991 edition, 2008, TMH.
2. "Electronic Devices and Circuit Theory" Robert L.Boylestad and Louis Nashelsky, 9th edition, PHI.
3. "Electronic Principles" Albert Malvino, David J Bates, MGH, SIE 2007.
4. "Micro Electronic Circuits" Sedra and Smith, Oxford University Press.

Course Outcomes:

Upon completion of the course students will be

- Have the knowledge to analyze basic electrical circuits.
- Have the knowledge of semiconductor diode and its applications.
- Understand the basic concepts of BJT.

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I Year B. Tech. I Semester

(5G513) ENGINEERING DRAWING- I
(Common to EEE, ECE, CSE and IT)

Course Objectives:

- To enable the students with various concepts like Dimensioning, Conventions and standards related to working drawing in order to become professionally efficient.
- To introduce fundamental concepts of curves used in engineering, projection of points, lines.
- To impart and inculcate proper understanding of the theory of projections.
- To improve the visualization skills.

Unit I

INTRODUCTION: Lettering –Geometrical constructions - Construction of polygons by General method – Inscribing a triangle, square. Pentagon, hexagon in a circle.

Unit II

CONICS: Ellipse, Parabola and Hyperbola (General method only). Special Methods: Ellipse - Concentric Circles method, Oblong method & Arcs of Circles method - Drawing tangent& normal to the conics.

Unit III

CYCLOIDAL CURVES: Cycloid, Epi cycloid, Hypo cycloid (simple problems) - Drawing tangent & normal to the cycloidal curves.

Unit IV

PROJECTIONS OF POINTS & LINES: Projections of points - Projections of lines inclined to one reference plane.

Unit V

PROJECTIONS OF LINES INCLINED TO BOTH REFERENCE PLANES: Projections of lines; inclined to both reference planes.

Text Book:

Engineering drawing by N.D.Bhatt

Reference Books:

1. Engineering graphics by K.L. Narayana& P. Kannayya
2. Engineering drawing and graphics by Venugopal/ New age
3. Engineering drawing by Johle / TMI

Course Outcomes:

- Students will be able to know and understand the conventions and the methods of Engineering Drawing.
- Able to understand the application of industry standards and techniques applied in Engineering Drawing.
- Dimension and annotate two-dimensional engineering drawings.
- Students will be able to improve their visualization skills.

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I Year B. Tech. I Semester

(5GC16) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB – I

(Common to all branches)

Course Objectives:

- To train students to use language effectively in everyday conversations
- To expose the students to a varied blend of self-instructional, learner-friendly modes of language learning
- To enable the students learn better pronunciation through emphasis on individual speech sounds

SYLLABUS:

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

1. **Introduction to the Sounds of English- Vowels, Diphthongs & Consonants**
2. **Situational Dialogues and Role-play**
3. **Telephone Skills**
4. **Describing Objects / Situation / People**

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 learn how to neutralize his accent

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I Year B. Tech. I Semester

(5GC18) ENGINEERING PHYSICS LAB
(Common to EEE and ECE)

ENGINEERING PHYSICS LAB

COURSE OBJECTIVES:

- The student will be able to handle and understand different apparatus to perform experiments.
- The student will learn practical measurement of different physical quantities.
- The student will be able to characterize the materials and their properties.
- The student will be allowed to learn practical experience of theory conceptual values.

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. Meldi's experiment: Determination of the frequency of tuning fork
10. Determination of particle size by using laser.
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

Manual cum Record:

Prepared by Engineering Physics Faculty Members of Annamacharya Institute of Technology and Sciences.

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

Equipment required:

- Spectrometers
- Microscopes
- Meldi's apparatus
- Stewart-Gee's apparatus
- Torsional pendulum
- Light sources
- Optical fiber cables

Course outcomes:

- The student would be confident in handling apparatus to perform experiments.
- The student would have developed practical skill.
- The student would have knowledge in practical values and applications

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I Year B. Tech. I Semester

(5G113) PROBLEM SOLVING THROUGH C LAB

(Common to ECE, EEE, ME and CE branches)

Objectives:

- To make the student learn a programming language.
- To teach the student to write programs in C to solve the problems.
- To introduce the student to simple linear data structures such as lists, stacks, queues.

Recommended Systems/Software Requirements:

- Intel based desktop PC with ANSI C/ TURBO C Compiler and Supporting Editors

Exercise l:

Minimum of 4 programs on Data types, Variables, Constants and Input and Output.

Exercise 2:

Minimum of 4 programs on Operator, Expressions and Type Conversions.

Exercise 3:

Minimum of 4 programs on Conditional Statements [two way and multipath].

Exercise 4:

Minimum of 4 programs on Loop Control Statements [for, while and do-While]

Exercise 5:

Minimum of 4 programs on Unconditioned JUMP Statements- break, continue, Goto.

Exercise 6:

Minimum of 4 programs on Declaring Arrays, Referencing Arrays, Array Subscripts. Using for loop for sequential Access.

Exercise 7:

Minimum of 4 programs on Multidimensional Arrays.

Exercise 8:

Minimum of 4 programs on String Basics, String Library Functions and Array of Strings.

Exercise 9:

Minimum of 4 programs on simple user defined functions, Parameter passing methods- pass by value, pass by reference.

Exercise 10:

Minimum of 4 programs on Storage classes- Auto, Register, Static and Extern

Exercise 11:

Minimum of 4 programs on Recursive Functions, Preprocessor commands.

Exercise 12:

Minimum of 4 programs on using Array Elements as Function Arguments.

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I Year B. Tech. I Semester

(5G312) ELECTRONIC DEVICES AND CIRCUITS LAB -I

(Common to EEE & ECE)

Course Objectives:

The Course aims to provide the students with the ability

- To determine the characteristics of semiconductor diode.
- To perform various rectifier circuits in practical approach.
- To perform input and output characteristics of BJT for various configurations.

Perform the following Experiments

1. Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers, Switches (SPDT, DPDT, and DIP), Coils, Gang Condensers, Relays, Bread Boards, PCBs, Diodes, BJTs.
2. Study and operation of
   - Multi-meters (Analog and Digital)
   - Function Generator
   - Regulated Power Supplies
   - CRO
3. Verification of Kirchhoff's Voltage and Current Law
4. Forward and Reverse Bias Characteristics of PN junction Diode.
5. V-I Characteristics of Zener Diode
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. Zener Diode as a Voltage Regulator
10. Input and Output Characteristics of Transistor CB Characteristics.
11. Input and Output Characteristics of Transistor CE Characteristics.
12. Input and Output Characteristics of Transistor CC Characteristics.

Course Outcomes:

Upon completion of the course students will be

- Able to determine the parameters like cut-in voltage , resistances and breakdown voltage of semiconductor diode
- Able to design DC power supply circuits using rectifiers and filters
- Able to choose the desired configuration for specified applications.

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I Year B. Tech. I Semester

(5G114) I.T. WORKSHOP
(Common to CSE, EEE, ECE and IT)

Course Objective:

- To provide Technical training to the students on Productivity tools like Word processors, Spreadsheets, Presentations
- To make the students know about the internal parts of a computer, assembling a computer from the parts, preparing a computer by installing the operating system
- To learn about Networking of computers and use Internet facility for Browsing and Searching.

Preparing your Computer

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

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.

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

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
- 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

Reference Books:

1.Introduction to Computers, Peter Norton, McGraw Hill

2.MOS study guide for word, Excel, Powerpoint& Outlook Exams", Joan Lambert, Joyce Cox, PHI.

2.Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.

3.Networking your computers and devices, Rusen, PHI

4.Trouble shooting, Maintaining & Repairing PCs", Bigelows, TMH

Course Outcomes:

- Disassemble and Assemble a Personal Computer and prepare the computer ready to use.
- Prepare the Documents using Word processors
- Prepare Slide presentations using the presentation tool
- Interconnect two or more computers for information sharing
- Access the Internet and Browse it to obtain the required information
- Install single or dual operating systems on computer

I Year B. Tech. II Semester

Learn from yesterday, live for today, hope for tomorrow.

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I Year B. Tech. II Semester

(5GC21) TECHNICAL ENGLISH
(Common to all branches)

Course Objectives:

- To improve the language proficiency of the students in English with an emphasis on LSRW skills
- To equip the students with comprehension skills to study academic subjects with greater facility.
- To develop English communication skills of the students in formal and informal situations

Text Books:

Sure Outcomes **published by Orient Black Swan (with CD)**

- The book prescribed serves as students' handbook. The reader comprises essays which are particularly relevant to engineering students.
- 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

Sure Outcomes: Technology with a Human Face

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

Unit II

Sure Outcomes: Climatic Change and Human Strategy

Grammar: Tenses; Writing: Letters of Application; Vocabulary: One-word Substitutes

Unit III

Sure Outcomes: Emerging Technologies: Solar Energy in Spain

Grammar: Types of Sentences: Simple, Compound and Complex; Declarative, Interrogative, Imperative and Exclamatory; Writing: E-mails; Vocabulary: Commonly Confused Words

Unit IV

Sure Outcomes: Water: The Elixir of Life

Grammar: Subject-Verb Agreement; Writing: Official Reports, Technical Reports; Vocabulary: English Spelling, Commonly misspelt words

Unit V

Sure Outcomes: The Secret of Work

Grammar: Active and Passive Voice; Writing: Note-making; Vocabulary: Connotations

Reference Books:

1. Essential Grammar in Use, (with CD), Raymond Murphy, 3/e, Cambridge University Press, 2009
2. Basic Communication Skills for Technology, Andrea J Ruthurford, Pearson Education, Asia.
3. English for Technical Communication, AyshaViswamohan, Tata Mc-Graw Hill
4. English Grammar and Composition, David Grene, Mc Millan India Ltd.
5. Murphy's English Grammar, Raymond Murphy, CAMBRIDGE
6. Everyday Dialogues in English by Robert J. Dixson, Prentice-Hall of India Ltd., 2006.
7. Communication Skills for Technical Students, Farhathullah, T.M., Orient Blackswan, 2008
8. Developing Communication Skills, 2/e. by Krishna Mohan &MeeraBanerji, Macmillan, 2009
9. English for Technical Communication, Vol. 1 & 2, by K. R. Lakshmi Narayanan, Sci tech. Publications.
10. Longman Dictionary of Contemporary English with DVD, Pearson Longman

Course Outcomes:

- 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 will understand the components of different forms of writing
- The student will exhibit effective writing skills through his understanding of English Grammar

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I Year B. Tech. II Semester

(5GC22) ENGINEERING CHEMISTRY
(Common to ECE and EEE)

Course Objectives:

- 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 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 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 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-Definition, Kinds of disinfectants (Bleaching powder, Ozone, chloramine, UV light and Chlorine), Break point 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: Permutit/ Zeolite process, Ion-Exchange process, Desalination of brackish water by Reverse Osmosis.

Unit II:

ELECTROCHEMISTRY-Electrochemical cells: Basic concepts, classification of electrochemical cells, numerical calculations, Batteries: classification of batteries: Primary (Leclanche battery, mercury battery) and Secondary /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), Electrochemical Theory of corrosion, concentration cell corrosion, galvanic corrosion, factors affecting the corrosion, Prevention: Anodic and Cathodic protection, Electroplating (Nickel, copper and chromium) & Electrolessplating

Unit III:

POLYMERS -Introduction to polymers, Polymerization process- types (without mechanism), Plastics: Thermosetting and Thermoplastics, Preparation, properties and Engineering applications of PVC, Bakelite, nylons.

Natural Rubber: Processing, vulcanization and compounding of rubber. Elastomers: Preparation, properties and engineering applications of Buna-S, Buna-N and polyurethane rubbers.

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

Inorganic Polymers: Basic Introduction Silicones, polyphosphazines.

Unit IV:

FUEL TECHNOLOGY-Classification 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: Knocking, Octane Number, Synthetic Petrol: Bergius Processes, Fischer Tropsch's synthesis. Diesel and Cetane number. 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 with suitable examples, properties and applications

Lubricants: Definition and properties of lubricants, theory of lubrication, and applications of lubricants.

Rocket Propellants: Classification, Characteristics of a 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.

Reference Books:

1.A Text book of Engineering Chemistry by S.S Dhara, S.S.Umare, S. Chand Publications, New Delhi, 12th Edition, 2010.
2.Engineering Chemistry by K.B.ChandraSekhar, UN.Das and Sujatha Mishra, SCITECH, Publications India Pvt Limited, Chennai, 2nd Edition, 2012.
3.Concepts of Engineering Chemistry- Ashima Srivastava and N.N. Janhavi, Acme Learning Pvt Ltd, First Edition, 2013.
4.Text Book of Engineering Chemistry – C. Parameswara Murthy, C.V.AgarwalandAndra Naidu, BS Publications, Hyderabad, 3rd Edition, 2008.
5.Text Book of Engineering Chemistry, Shashichawla, DhanapathRai Publications, New Delhi, 4th Edition, 2011.
6.Engineering Chemistry, K. SeshaMaheswaramma and MrudulaChugh, Pearson Education, First Edition, 2013.

Course outcomes:

The student is expected to:

- Understand the functions of fuel cells, batteries and extends the knowledge to the processes of corrosion and its prevention.
- 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.

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I Year B. Tech. II Semester

(5GC24) ENGINEERING MATHEMATICS – II
(Common to all branches)

COURSE OBJECTIVES:

The course aims to provide the student with the ability

- 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

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

Unit II

Laplace transform of standard functions – Inverse transform – First shifting Theorem, Transforms of derivatives and integrals – Second shifting theorem– Laplace transform of Periodic functions – Inverse Laplace transform – Convolution theorem.

Unit III

Application of Laplace transforms to ordinary differential equations of first and second order.

Unit IV

Vector Calculus: Scalar and vector point functions, Gradient and its geometrical interpretation, Divergence –physical interpretation of divergence, Curl -physical interpretation of curl, Del applied twice to point functions, Line integral - Area, Surface and volume integrals.

Unit V

Vector Integral Theorems: Green's theorem – Stoke's theorem and Gauss's Divergence Theorem (without proofs) and their applications.

Text Book:

Higher Engineering Mathematics, B.S.Grewal, Khanna publishers- 43rdEdition (2014)

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.

COURSE OUTCOMES:

Upon completion of the course, students should be able to

- Understand the concepts of applications of integration.
- Have the knowledge of Laplace transforms and their applications.
- Master vector integral theorems.

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I Year B. Tech. II Semester

(5G121) C PROGRAMMING AND DATA STRUCTURES
(Common to ALL branches)

Course Objectives:

- 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

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 II

Structures – Definition, initialization, accessing structures, nested structures, array of structures, structures and functions. Pointers and Structures. Unions. Sample programs

Files: Introduction to Streams and Files, 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 III

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.

Unit IV

Linked List: Singly Linked List, Linked List with and without header, Insertion, Deletion and Searching Operations.

Doubly Linked List: Insertion, Deletion and Searching Operations.

Circular Linked List: Insertion, Deletion and Searching Operations.

Unit V

Trees: Introduction to Trees, Binary Trees, creation of binary tree, Operations on Binary Tree. Introduction to Binary Search Tree, Operations on Binary Search Trees.

Graphs: Defining graph, basic terminology, graph representation.

Text Books:

1.C Programming and Data Structures. B.AForouzan,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.Data Structures and Algorithms: Concepts, Techniques and Applications G.A.V. Pai [UNIT-V]

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, YeswanthKanitkar, Ninth Edition, BPB Publication.

Course Outcomes:

- Understand the purpose of pointers for parameter passing, referencing and dereferencing and understands the concepts of structures, unions and File management.
- Understand what and how to design data structure programs using C programming language.
- Understand how to solve applications like searching and sorting using C Programming language.

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I Year B. Tech. II Semester

(5G321) ELECTRONIC DEVICES AND CIRCUITS - II
(Common to EEE & ECE)

Course Objectives:

The Course aims to provide the students with the ability

- To understand the concepts of biasing and stabilization in BJT.
- To understand the concepts of FET, MOSFET and their biasing techniques.
- To analyze the parameters like band width, gain and impedances for single and multistage amplifier circuits.
- To understand the working principles of special purpose electronic devices.

Unit-I

BIASING & STABILITY: Overview of BJT Configurations, 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-II

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-III

SINGLE STAGE AMPLIFIERS: Single Stage Transistor Amplifier-How Transistor Amplifies- Graphical Demonstration of Transistor Amplifier-Practical Circuit of Transistor Amplifier-Phase Reversal- D.C. and A.C. Equivalent Circuits- Load line Analysis- A.C. emitter resistance-Formula for A.C. emitter resistance-Voltage gain in terms of A.C. emitter Resistance-Voltage gain-Classification of Amplifiers-Amplifier equivalent circuit-Equivalent circuit with signal source-Input impedance of and amplifier.

Unit-IV

MULTI STAGE AMPLIFIERS: Multistage transistor Amplifier-Important terms-R.C. Coupled Transistor amplifier-Direct coupled amplifier-Comparison of different types of coupling.

Unit-V

SPECIAL PURPOSE ELECTRONIC DEVICES: Varactor Diode, Tunnel Diode, LED, PIN Diode, Schottky Diode, SCR, UJT, Photodiode, Phototransistor.

Text Books:

1. "Electronic Devices and Circuits" David A Bell, Fifth Edition, 2008, Oxford University Press.
2. "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. "Principles of Electronics", V.K.Mehta, S.Chand Publications 2004
3. "Integrated Electronics, Analog and Digital Circuits and Systems" J. Millman and Halkias, TMH.
4. "Micro Electronic Circuits" Sedra and Smith, Oxford University Press.

Course Outcomes:

Upon completion of the course students will be

- Able to determine operating conditions of BJT in amplifier circuits.
- Able to design the amplifier circuits under given requirements.
- Able to have the knowledge and usage of special purpose electronic devices in various applications.

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I Year B. Tech. II Semester

(5G523) ENGINEERING DRAWING- II
(Common to EEE, ECE, CSE and IT)

Course Objectives:

- To impart and inculcate proper understanding of the theory of projections of planes, solids and simple machine components.
- To improve the visualization skills of the student.
- To prepare the student for future engineering positions.

Unit I

PROJECTIONS OF PLANES: Projection of planes inclined to one reference plane - and inclined to both the reference planes.

Unit II

PROJECTIONS OF SOLIDS: Cylinder, Cone, Prism and Pyramid - Axis Inclined to one reference plane.

Unit III

PROJECTIONS OF SOLIDS: Cylinder, Cone, Prism and Pyramid - Axis inclined to both the reference planes.

Unit IV

ISOMETRIC PROJECTIONS: Projections of Lines, Planes and Simple Solids – Prism, Pyramid, Cylinder and Cone in simple positions only.

Unit V

CONVERSION OF VIEWS: Conversions of Orthographic views into Isometric views and Conversion of Isometric views to Orthographic views.

Text Book:

Engineering drawing by N.D. Bhatt

Reference Books:

1.Engineering graphics by K.L. Narayana& P. Kannayya

2.Engineering drawing and graphics by Venugopal/ New age

3.Engineering drawing by Johle / TMI

Course Outcomes:

- Comprehend general projection theory, with an emphasis on the use of orthographic projection to represent three-dimensional objects in two-dimensional views.
- Can employ 3D pictorial sketching to aid in the visualization process and to efficiently communicate ideas graphically.
- Analyze a drawing and bring out any inconsistencies to put forth inferences graphically

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I Year B. Tech. II Semester

(5GC26) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB - II

(Common to all branches)

Course Objectives:

- 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 Stress and Intonation
2. 'Just A Minute' (JAM)
3. Oral Presentations
4. Information Transfer

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

Minimum Requirements:

The English Language Lab shall have two parts:

- **The Computer aided Language Lab** for 60 students with 60 systems, one master console, LAN facility and English language software for self- study by learners.
- **The Communication Skills Lab** with movable chairs and audio-visual aids with a 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
- Language in Use, Foundation Books Pvt Ltd with CD
- Learning to Speak English - 4 CDs
- Cambridge Advanced Learners' English Dictionary with CD.
- Murphy's English Grammar, Cambridge with CD

Course Outcomes

- 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

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I Year B. Tech. II Semester

(5GC27) ENGINEERING CHEMISTRY LAB
(Common to ECE and EEE)

Objectives:

- The student will learn practical understanding of the redox reaction.
- The student will learn the preparation and properties of synthetic polymers and other material that would provide sufficient impetus to engineer these to suit diverse applications.
- The student will also learn the hygiene aspects of water would be in a position to design methods to produce potable water using modern technology.

LIST OF EXPERIMENTS

Any 10 of the following experiments has to be performed

VOLUMETRIC ANALYSIS

Redox titrations

1. Estimation of iron (II) using Diphenylamine indicator (Dichrometry – Internal indicator method)
2. Estimation of Chloride ion using potassium Chromite indicator (Mohr's method)

Water analysis

3. Determination of total hardness of water by EDTA method
4. Estimation of Dissolved Oxygen by Winkler's method
5. Determination of acidity of Water
6. Determination of Alkalinity of Water.

Complexometry

7. Determination of Copper by EDTA method

Iodometry

8. Determination of Copper by Iodometry

INSTRUMENTATION

Colorimetry

9. Estimation of Iron in Cement by Colorimetry.

Conductometry

10. Conductometric titration of strong acid Vs strong base (Neutralization titration)

Fuel analysis

11. Determination of Calorific Value of fuel by using Bomb Calorimeter

Lubricants

12. Determination of Viscosity of oils using Redwood Viscometer I
13. Determination of Viscosity of oils using Redwood Viscometer II

PREPARATION OF POLYMERS

14. Preparation of Bakelite
15. Preparation of Thiokol rubber

Manual cum Record: Prepared by the Faculty Members of Engineering Chemistry of the college will be used by Students.

Equipment Required:

- ✓ Analytical weighing balance
- ✓ Digital Conductometer
- ✓ Photo-colorimeter
- ✓ Bomb calorimeter
- ✓ Redwood viscometers
- ✓ Deionizer plant
- ✓ Digital electronic balance

Glassware Required:

Pipettes, burettes, conical flasks, standard flasks, beakers, reagent bottles, spatulas, wash bottles, BOD Bottles, measuring cylinders, glass rods, Bunsen burners, funnels, thermometers etc.

Chemicals Required:

EDTA, Hypo, Mohr Salt Solution, HCl, Sulphuric Acid, Copper Solution, Iron Solution, Potassium Dichromate Solution, Potassium Iodide Solution, Buffer Solution, diphenyl amine, EBT indicator, NaOH solution, Benzoic acid Urea, distilled water etc.

REFERENCE 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.

Course Outcomes:

- The student would be confident in understanding of redox systems
- The student would have acquired the practical skill to handle the analytical methods with confidence.
- The student would feel comfortable to think of design materials with the requisite properties
- The student would be in a position to technically address the water related problems.

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I Year B. Tech. II Semester

(5G123) PROGRAMMING IN C AND DATA STRUCTURES LAB
(Common to ECE, EEE, ME and CE)

Objectives:

- To make the student learn a programming language.
- To teach the student to write programs in C to solve the problems.
- To introduce the student to simple linear data structures such as lists, stacks, queues.

Recommended Systems/Software Requirements:

- Intel based desktop PC with ANSI C/ TURBO C Compiler and Supporting Editors

Exercise 1

Minimum of 4 Programs on pointer basics[declaration, A, Pointers, pointers for inter function communication.

Exercise 2.

Minimum of 4 Programs on Pointers applications.

Exercise 3

Minimum of 4 programs on structures and unions

Exercise 4

Minimum of 4 programs on basic File operations.

Exercise 5

Minimum of 4 programs on searching and sorting techniques .

Exercise 6

Implementation of Stack and perform all Stack operations using

i) Arrays ii) Pointers

Exercise 7

Implementation of Queue and perform all Queue operations using

i) Arrays ii) Pointers

Exercise 8

Implement Circular Queue (its operations) using

i) Arrays ii) Pointers

Exercise 9

Implementation of Single Linked List and its operations using

i) Arrays ii) Pointers

Exercise 10

Implementation of Double Linked List and its operations using

i) Arrays ii) Pointers

Exercise 11

Implementation of Circular Linked List and its operations using

i) Arrays ii) Pointers

Exercise 12

C program that uses Stack operations to perform the following:

i) Converting infix expression into postfix expression

ii) Evaluating the postfix expression

Exercise 13

Implement Binary Tree using Double Linked List and its operations.

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I Year B. Tech. II Semester

(5G322) ELECTRONIC DEVICES AND CIRCUITS LAB -II

(Common to ECE & EEE)

Course Objectives:

The Course aims to provide the student with the ability

- To determine characteristics of JFET, MOSFET, SCR and UJT.
- To determine parameters like gain, impedances and band width of BJT and FET amplifier circuits.

Perform the following Experiments

1. Identification, Specifications and Testing of Active Devices, Low power JFETs, MOSFETs, Photodiode, Phototransistor, LEDs, SCR and UJT.
2. JFET Characteristics.
3. MOSFET Characteristics
4. Frequency response of CE Amplifier.
5. Frequency response of CB Amplifier.
6. Frequency response of CC Amplifier.
7. Frequency response of Common Source FET Amplifier.
8. V-I Characteristics of LED.
9. SCR Characteristics.
10. UJT Characteristics.
11. Photodiode and Phototransistor Characteristics
12. Soldering Practice

Course Outcomes:

Upon completion of the course students will be

- Able to gain the knowledge and practical usage of JFET, MOSFET and some special electronic devices.
- Able to design the amplifier circuits under given requirements.

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I Year B. Tech. II Semester

(5G524) ENGINEERING WORKSHOP
(Common to CSE, EEE, ECE and IT)

Course Objectives:

The budding Engineer may turn out to be a technologist, scientist, entrepreneur, practitioner, consultant etc. There is a need to equip the engineer with the knowledge of common and newer engineering materials as well as shop practices to fabricate, manufacture or work with materials. Essentially, know the labour involved, machinery or equipment necessary, time required to fabricate and also should be able to estimate the cost of the product or job work. Hence engineering work shop practice is included to introduce some common shop practices and on hand experience to appreciate the use of skill, tools, equipment and general practices to all the engineering students.

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 50 x 50 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 gauge 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, SaravanaPandian, 4/e Vikas.

4.Dictionary of Mechanical Engineering, GHF Nayler, Jaico Publishing House.

II Year B. Tech. I Semester

Learning is finding out what we already know. Doing is demonstrating that you know it. Teaching is reminding others that you know just as well as you.

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II Year B. Tech. I Semester

(5GC32) MATHEMATICAL METHODS-III

Course Objectives:

- 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.
- To improve your ability to think logically, analytically and abstractly.
- 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.
- Introduce students to how to solve linear partial differential with different methods.
- 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.
- To equip students with adequate knowledge of mathematics that will enable them in formulating problems and solving problems analytically.

Unit I

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. Cayley Hamilton theorem.

Unit II

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 III

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 IV

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

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

Unit V

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.

Text Book:

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

Reference Books:

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 Outcomes:

Upon completing this course students should be able to:

- 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 result.
- 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.
- Apply numerical method to obtain approximate solutions to mathematical problems.
- Have the knowledge of interpolation, numerical integrations, and numerical differentiation; know how to approximate definite integrals and derivatives.
- Be competent in solving linear PDEs using classical solution methods.
- Compute the Fourier series representation of a periodic functions, 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.

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II Year B. Tech. I Semester

(5G231) SWITCHING THEORY AND LOGIC DESIGN

COURSE OBJECTIVE:

- To understand the concepts and techniques associated with the number systems and codes.
- To minimize the logical expressions using Boolean postulates.
- 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.

Unit V

FSM MINIMIZATION AND ASM CHARTS: Finite state machine-capabilities and limitations, Mealy and Moore models and their conversions, minimization of completely specified sequential machines, Partition technique. **Algorithmic State Machines:** Salient features of the ASM chart, examples of weighing machine and binary multiplier.

Text Books:

1. M.Morris Mano, *Digital Design*. Pearson, 3rd Ed,2006.
2. ZviKohavi and NirajK.Jha.*Switching& Finite Automata Theory*. Cambridge university press, 3rd Ed,2012.

Reference Books:

1. Charles H. Roth,Jr.*Fundamentals of Logic Design*. Cengage Learning, 2015, 5th Ed.
2. William I. Fletcher, *An Engineering Approach to Digital Design*. Pearson, 3rd Ed,2015.
3. A.Anand Kumar, *Switching Theory and Logic Design*.2nd Edition, Prentice Hall of India, 2008.

Course outcomes:

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

- Analyze the number systems and codes.
- Simplify the logics expressions using Boolean laws and postulates and design them by using logic gates.
- Minimize the logic expressions using map method and tabular method.
- Design of combinational logic circuits using conventional logic gates and various programmable logic devices.
- Design of sequential logic circuits.
- Design the FSM for completely specified and incompletely specified sequential circuits.

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II Year B. Tech. I Semester

(5G232) ELECTRICAL MACHINES-I

COURSE OBJECTIVE:

Electrical machines course is one of the important courses of the Electrical Engineering discipline. In this course 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 windings(Progressive only) - equalizer rings and dummy coils.

Unit II

TYPESOF DC GENERATORS & ARMATURE REACTION: 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 Shunt Motors - Armature voltage and field flux control methods - Ward-Leonard system - Speed control of DC Series Motors -3 point and 4 point starters, Applications of DC motors.

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, 4th Edition, 2010.

2.P.S. Bimbhra, *Electrical Machinery*. Khanna Publishers. New Delhi, 7th Ed, 2011.

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, 2013.

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, 4th edition, 2014.

4.A.E. Fitzgerald, C.Kingsley and S.Umans, *Electric Machinery*. McGraw-Hill Companies, New Delhi, 2013, 7th Ed.

Course Outcomes:

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

- Demonstrate the construction and principle of DC generator.
- Compute the performance of DC generators.
- Emphasize the concept of armature reaction and commutation.
- Analyze the characteristics and parallel operation of DC Generators
- Understand principle, starting and speed control of DC motors.
- Evaluate the performance of DC machines by conducting various tests.

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II Year B. Tech. I Semester

(5G233) 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 Basic concepts, 1-Φ AC circuits, Network theorems, Two port networks, Magnetic circuits and Network topology etc

Unit I

BASIC CONCEPTS OF ELECTRICALCIRCUITS: Circuit Concept, R-L-C Parameters, Voltage-Current Relationship for Passive Elements, Kirchhoff's Laws, Network Reduction Techniques-Series, Parallel and Series-Parallel Circuits , Star-Delta Transformations, Voltage and Current division rules, Voltage and Current Sources-Independent and Dependent Sources, Source Transformation, Mesh, Super Mesh, Nodal and Super Node analysis.

Unit II

FUNDAMENTALS OF 1-Φ AC CIRCUITS: Advantages of AC supply, Types of AC waveforms, Importance of Sine Wave, Basic definitions: Cycle. Time period, frequency, Peak value, peak –peak value. Determination of Average ,R.M.S Values, Peak and Form Factor for different Periodic Waveforms, Phase and Phase Difference , j-notation, Steady State Analysis of R, L and C with Sinusoidal Excitation, Concept of Reactance, Impedance, Susceptance and Admittance, Real and Reactive Power, Complex Power, Concept of Power Factor. Resonance – Definition, Resonant frequency, bandwidth and Q-factor for series and parallel resonant circuits, Problems.

Unit III

NETWORK THEOREMS: Superposition, Thevenin's, Norton's, Maximum Power Transfer, Millman's, Reciprocity, Compensation and Tellegen's Theorems for DC and AC excitations.

Unit IV

TWO PORT NETWORKS: Two Port Network Parameters – Impedance, Admittance, Transmission and Hybrid Parameters and Their Relations, Inter connections, Concept of Transformed Network - Two Port Network Parameters using Transformed Variables.

Unit V

MAGNETICALLY COUPLED CIRCUITS AND NETWORK TOPOLOGY: Coupled circuits – self & mutual inductance, Dot convention, Coefficient of coupling, Analysis of Magnetic circuits: Series, Parallel and Composite circuits, comparison of electrical and magnetic circuits.

Network Topology: Basic Definitions – Graph – Tree, Basic Cutset and Basic Tieset Matrices for Planar Networks, Duality & Dual Networks.

Text Books:

1.A. Sudhakar&Shyam Mohan. *Electric Circuits*. 5th Edition, Tata McGraw Hill Company, 2015.

2.A. Chakrabarti. *Circuit Theory*. 6th edition, DhanpatRai& Co, New Delhi, 2014.

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*. 8th edition, TATA McGraw Hill Company, 2013.

3.J.A.Edminister&M.D.Nahvy. *Theory and Problems of Electric Circuits*. 4th Edition Schaums Outline series, New Delhi TATA McGraw 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*. 5th Edition, Tata McGraw hill Publishing Company Limited, New Delhi, 2012.

Course Outcomes:

- Analyze the Basic concepts of Electrical Circuits.
- Analyze the Concepts of 1-Φ electric circuits.
- Analyze the Phenomenon of Resonance.
- Solve electric circuits for voltage, current and power using network theorems.
- Compute Two port Network parameters.
- Analyze magnetic circuits.
- Compute the Basic Cutset and Basic Tieset Matrices.

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II Year B. Tech. I Semester

(5G539) 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, venture meter, 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.

Learning Outcomes:

- 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.
- 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.
- 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.
- An ability to understand the fundamentals of turbo machinery, elements of hydro electric power plant.
- An ability to understand the performance of hydraulic turbines and hydraulic pumps.

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II Year B. Tech. I Semester

(5G234) 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-I: 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

ELECTROSTATICS-II: 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: Static magnetic fields-Biot-Savart's law, Magnetic Field Intensity(MFI) - MFI due to a straight current carrying filament, Circular, Square, Solenoid 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-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. Matthew N.O. Sadiku. *Elements of Electromagnetic Fields*. 6thedition, Oxford Publications, Jan' 2014
2. William H. Hayt& John A. Buck. *Engineering Electromagnetics*. 8thEdition, Mc. GrawHill Companies, Sep'2014.

REFERENCE BOOKS:

1.Joseph A.Edminister ,Theory and problems of Electromagnetics 4th Edition ,Schaum's Outline series Mc.Graw Hill companies,New Delhi,2009.

2.A.Gangadhar& P.M. Ramanathan. *Field Theory*. 5th edition, Khannapublishers, New Delhi, 2008.

3.AshutoshPramanik. *Electromagnetism*,Problems with solutions. 3rdEdition.PHI

Course Outcomes

Analyze the behavior of

- Static Electric fields due to electric charges at rest.
- Static magnetic fields due to DC currents.
- Time varying electric and magnetic fields.
- Demonstrate the Physical significance of Maxwell's equations for both time variant and time invariant electric and magnetic fields.
- Evaluate Electric field and capacitance by applying Gauss's Law.
- Evaluate Magnetic field and Inductance by applying Ampere's Law.
- Find the operation of different types of Electric machines by applying various laws of Electromagnetics.

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II Year B. Tech. I Semester

(5G53A) FLUID MECHANICS AND HYDRAULIC MACHINES LAB

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

a) Impact of jets on Vanes.
b) Performance Test on Pelton Wheel.
c) Performance Test on Francis Turbine.
d) Performance Test on Kaplan Turbine.
e) Performance Test on Single Stage Centrifugal Pump.
f) Performance Test on Multi Stage Centrifugal Pump.
g) Performance Test on Reciprocating Pump.
h) Calibration of Venturimeter.
i) Calibration of Orifice meter.
j) Determination of friction factor for a given pipe line.
k) Determination of loss of head due to sudden contraction in a pipeline.
l) Turbine flow meter.

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II Year B. Tech. I Semester

(5G237) 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 tests 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.

II Year B. Tech. II Semester

Education is not filling of a pail but the lighting of a fire

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II Year B. Tech. II Semester

(5G241) ELECTRICAL MACHINES-II

Course objective:

As an extension of Electrical machines-I course, this subject facilitates to study the performance of Transformers and Induction motors which are the major part of Transmission of electrical power, 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 (Qualitative treatment only), 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 interrelation-torque equation - deduction from torque equation - expressions for maximum torque and starting torque - torque slip characteristics - double cage and deep bar rotors - equivalent circuit - 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, *Electrical Machines*. Tata McGraw – Hill Publishers, New Delhi, 4th Edition, 2010.

2.P.S. Bimbhra, *Electrical Machinery*. Khanna Publishers. New Delhi, 7th Ed, 2011.

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, 2013.

2.A.E. Fitzgerald, C.Kingsley and S.Umans, *Electric Machinery*. McGraw-Hill Companies, New Delhi, 2013, 7th Ed.

3.MG.Say, *Performance and Design of AC Machines*, 3rd edition, BPB Publishers, 2002.

4.Langsdorf, *Theory of Alternating Current Machinery*. Tata McGraw-Hill Companies, 2nd Ed, 2004.

5.B.L. Theraja& A.K. Theraja, *A. text of Electrical Technology in SI units* Vol: II. S. Chand publishers, 23rd edition 2006.

Course outcomes:

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

- Demonstrate the construction and operation of single phase transformer.
- Compute the performance of single phase transformer.
- Compute the performance of single phase Auto transformer.
- Analyze the three phase transformer connections.
- Demonstrate the construction and principle of three phase induction motor.
- Plot the Torque-Slip characteristics of three phase induction motor.
- Compute the performance of three phase induction motor.
- Control the speed of three phase induction motor.

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II Year B. Tech. II Semester

(5G242) 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: Initial conditions-DC Transient response of RL, RC and RLC series circuits by using differential equation approach and Laplace transform method , Problems. Response of RL and RC networks to pulse excitation.

AC Transient response of RL, RC and RLC series circuits by using differential equation and Laplace transform method, Problems.

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: Network functions – necessary conditions for driving point function-necessary conditions for transfer function-applications of network analysis in deriving network functions-Positive real functions-definitions and properties. Synthesis of single port networks (RL, RC and LC networks) in Foster and Cauer forms.

Text books:

1.A. Sudhakar, Shyammohan S Palli. *Circuits and Networks*. (Analysis and Synthesis), 5th edition, Tata McGraw Hill Publishing company Ltd., 2015.
2.D. Roy Choudhury. *Networks and Systems*. 2nd edition, New Age international publishers, 2010.

Reference books:

1. A. Chakrabarthi. *Circuit Theory (Analysis and Synthesis)*.6th edition, DhanpatRai& Co. New Delhi, 2014.
2. M.E. Van Valkenburg. *Network analysis*. 3rd edition, PHI, 2006.
3. William H Hayt, Jr. Jack E. Kemmerly, Steven M. Durbin. *Engineering Circuit Analysis*. 8th edition, Tata McGraw Hill publishing company Ltd. 2013.
4. Umesh Sinha. *Network Analysis and Synthesis*. 5th edition, Satyaprakashan, New Delhi, 2010.
5. *Engineering Network Analysis & FilterDesign*. GopalBhise G, DurgeshKulshreshta C, Prem Chadha R. 2009.

Course outcomes:

- Analyze the concepts of 3-Φ ac circuits.
- Analyze the Laplace transforms.
- Compute the transient response of electrical circuits for DC and AC excitations.
- Analyze the Fourier analysis.
- Determine the Network functions for electrical circuits.
- Design electrical circuits using synthesis.

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II Year B. Tech. II Semester

(5G345) ELECTRONIC CIRCUIT THEORY

COURSE OBJECTIVES:

- The course aims to provide the student with the ability
- To analyze and design the transistor amplifiers, feedback and tuned amplifiers.
- To design oscillators.

Unit I

SMALL SIGNAL ANALYSIS OF AMPLIFIERS:- Small Signal model of BJT – h-parameter model of BJT – Analysis of CB, CE and CC configurations using h-parameters – simplified hybrid model – miller's theorem – dual of miller's theorem – Small signal model of JFET and MOSFET – Common source and common Drain amplifiers, using FET, Analysis of Cascaded Transistor Amplifiers, RC Coupled amplifier, Frequency response of RC Coupled, Direct coupled and Transformer coupled amplifiers.

Unit II

BJT Frequency Response: General frequency considerations, Low and high frequency response of BJT amplifier , Effect of coupling and Bypass capacitors, Hybrid- π transistor model, CE short circuit current gain, Current gain with resistive load, Gain Bandwidth product, Emitter follower at High frequencies.

Unit III

Feedback Amplifiers: concept of Feedback, Classification of feedback amplifiers, Transfer Gain with feedback, General characteristics of negative feedback amplifiers. Voltage series, voltage shunt, current series, and current shunt feedback amplifiers with discrete components(Topologies).

Unit IV

Oscillators: Condition for oscillations. Oscillator Types, Frequency and amplitude stability of oscillators, generalized analysis of LC oscillators-Hartley and Colpitts oscillators, RC-phase shift and Wien bridge oscillators, Crystal Oscillators-Quartz and Pierce.

Unit V

Large Signal and Small Signal Single Tuned Amplifiers:

Direct coupled and Transformer Coupled Class A power Amplifiers, Efficiency of Class A power amplifier, Push-pull and Complementary Symmetry Class B power Amplifiers, phase inverter, Transistor power dissipation. Introduction to tuned amplifiers, Q-Factor, Analysis of Small Signal Single Tuned Amplifiers– Capacitive coupled, Inductive coupled amplifiers.

Text Books:

1.J. Millman and C.C. Halkias- Integrated Electronics, McGraw-Hill, 1972.
2.Robert T. Paynter- Introductory Electronic Devices and Circuits, Pearson Education, 7th Edition.

Reference Books:

1. Robert L. Boylestad and Louis Nashelsky, Electronic Devices and Circuits Theory, Pearson/Prentice Hall, 9th Edition, 2006.
2. Donald A. Neumann- Electronic Circuit Analysis and Design, McGraw Hill.

COURSE OUTCOMES:

Upon completion of the course, student can

- Analyze the single stage and multistage amplifiers using h-parameter model at low frequencies.
- Understand the concept and analysis of BJT amplifier circuits at High frequencies using Hybrid- π model.
- Design the feedback amplifiers and oscillators.
- Design and analyze large signal and tuned amplifier

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II Year B. Tech. II Semester

(5G243) 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 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 ANDGAS 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 – Tariffs - flat rate - block rate - two part - three part and power factor tariffs

Unit-V:

NON CONVENTIONAL ENERGY SOURCES: Over View of – Solar, wind, Geothermal, Ocean thermal energy conversion, Tidal, Wave, Bio mass/Bio gas, MHD generators, Fuel Cells, Thermo Electric Power and Piezeo Electric power.

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*. DhanpatRai& Co. Pvt. Ltd., 1999.

3.G.D. Rai. Non-Conventional Energy Sources. Khanna Publishers, Delhi, 2007.

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

5.Khan B.H., Non-Conventional Energy Resources, Tata McGraw Hill, New Delhi,2006

Course Outcomes:

- Learns about generation of electric power from thermal sources.
- Demonstrates the working of Hydro and Gas power Plants.
- Understands the importance of Nuclear Power Generation.
- Able to know the economic aspects of Power generation.
- Basic knowledge about different Non conventional Sources.

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II Year B. Tech. II Semester

(5G244) 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. NagoorKani "*Control Systems"* – First Edition RBA Publications, 2006.
3.B. C. Kuo and FaridGolnaraghi *"Automatic Control Systems"*— John wiley and son's, 8th edition, 2003.

Course Outcomes

- To Understand the basic components of control systems.
- To Gain knowledge in various time domain and frequency domain tools foranalysis and design of linear control systems and compensators.
- To Understand the methods to analyze the stability of systems from transferfunction forms.
- To Understand the concept of state variable analysis.

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II Year B. Tech. II Semester

(5GC41) COMPLEX VARIABLES & SPECIAL FUNCTIONS

Course Objectives:

- The course aims to provide the students with the ability
- To understand the complex variables and their functions.
- 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 $\int_{-\infty}^{\infty} f(x)dx \quad and \quad \int_{0}^{2®} f(\cos^{-}, \sin^{-})d^{-}$.

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 Book:

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

- Understand the properties of Beta and Gamma functions.
- Have the knowledge on functions of a complex variable.
- Understand the concepts of exponential, trigonometric, hyperbolic functions and their properties.
- Have the knowledge of complex integration and apply it solve complex integrals of different type.
- Learn about conformal mapping.

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II Year B. Tech. II Semester

(5G247) ELECTRICAL CIRCUITS AND SIMULATION LAB

Any **TEN** 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.
12. Simulation of DC Circuits
13. DC Transient Response

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II Year B. Tech. II Semester

(5G248) CONTROL SYSTEMS & SIMULATION 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.

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II Year B. Tech. II Semester

(5GC44) APTITUDE AND REASONING SKILLS
(Common to EEE, ECE & IT)

Quantitative Aptitude:

Number Systems, Averages, Problems on ages, Allegations, Percentages, Profit and loss, Simple interest and Compound interest, Ratio and Proposition and variation, Time and Work, Time and Distance, Mensuration, Permutation and Combinations.

Progressions, Inequalities, Logarithms, HCF and LCM, Decimal Fractions, Simplification, Square Roots and Cube Roots, Pipes and Cisterns, Area, Volume and Surface Areas, Calendar, Clocks, True Discount, Banker's Discounts, Data Interpretation– Tabulation, Bar Graphs, Pie charts, Line Graphs

Reasoning:

Directions, Blood Relations, Problems on Cubes, Series and Sequences, Odd man out, Coding and Decoding, Data sufficiency, Logical deductions, Arrangements and Combinations, Groups and Teams, Puzzles to Puzzle you. More puzzles, Brain Teasers, Puzzles and Teasers

Text Books:

1.R.S. Agarwal, Quantitative Aptitude, S. Chand Publishers, New Delhi, 2005.
2.R.S.Agarwal, Verbal and Non-Verbal Reasoning, S.Chand Publishers, New Delhi, 1998.

Reference Books:

1.Arun Sharma, How to Prepare for Quantitative Aptitude, TMH Publishers, New Delhi, 2003.
2.Sharon Weiner-Green, IrnK.Wolf, Barron's GRE, Galgotia Publications, New Delhi, 2006.
3.Shakuntala Devi, Puzzles to Puzzle you, Orient Paper Backs Publishers(OPB), New Delhi, 2005.
4.Shakuntala Devi, More Puzzles, OPB, New Delhi, 2006.
5.Ravi Narula, Brain Teasers, Jaico Publishing House, New Delhi, 2005.
6. 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.
4.Material for Soft Skills, By Globarena

III Year B. Tech. I Semester

Tell me and I forget. Teach me and I remember. Involve me and I learn.

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III Year B. Tech., I Semester

(5G359) LINEAR & DIGITAL IC APPLICATIONS

Course Objectives:

The course aims to provide the student with the ability

- To Understand the Concepts of differential amplifier and OP-Amp.
- To learn Timers, converters, PLLs 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, OP-Amp parameters and measurement, slew rate, CMRR, PSRR, Thermal drift. Inverting and non-inverting amplifier, integrator and differentiator, difference amplifier, instrumentation amplifier, AC amplifier, V-I, I-V converters, Voltage follower, comparators, Monostable Multivibrator, Triangular and square wave generators, Log and antilog amplifiers, precision rectifiers-Half wave, Full wave.

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.

Unit III

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

Unit IV

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

UnitV

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.

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:

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

- Understand the analysis of OP-Amp and its characteristics.
- Design of Op-Amp circuits for liner & nonlinear applications.
- Understand the applications of 555 timer and PLL.
- Know the principles of converters.
- Understand Logic Design concepts

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III Year B. Tech., I Semester

(5G251) 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 machines. 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 GENERATORS: Armature reaction - leakage reactance - synchronous reactance and impedance -experimental determination - phasor diagram - load characteristics - regulation by E.M.F., 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, *Electrical Machines*. Tata McGraw – Hill Publishers, New Delhi, 4th Edition, 2010.

2.P.S. Bimbhra, *Electrical Machinery*. Khanna Publishers. New Delhi, 7th Ed, 2011.

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, 2013.

2. A.E. Fitzgerald, C.Kingsley and S.Umans, *Electric Machinery*. McGraw-Hill Companies, New Delhi, 2013, 7th Ed.
3. MG.Say, *Performance and Design of AC Machines*, 3rd edition, BPB Publishers, 2002.
4. Langsdorf, *Theory of Alternating Current Machinery*. Tata McGraw-Hill Companies, 2nd Ed, 2004.

Course Outcomes:

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

- Demonstrate the construction and operation of three phase Alternator.
- Analyze the characteristics of three phase synchronous generator.
- Compute the performance of three phase synchronous generator.
- Analyze the parallel operation of the synchronous generators.
- Demonstrate the construction and operation of three phase synchronous motor.
- Compute the performance of three phase synchronous motor.
- Demonstrate the construction and operation of single phase motors.

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III Year B. Tech., I Semester

(5G252) 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

INSULATORS, CORONA AND MECHANICAL DESIGNOF 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 IV

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 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.

TEXTBOOKS:

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.

REFERENCEBOOKS :

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, 4thEdition, TMC Companies, 2003.

3.B.R.Gupta, Power System Analysis and Design, 3rd edition, WheelerPublishers, 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:

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

- Able to determine the resistance, inductance and capacitance for different overhead transmission lines.
- Able to evaluate the performance of short, medium and long transmission lines.
- Understands the behavior of a transmission line for different transients.
- Knows the importance of different types of insulators.
- Able to know the significance of mechanical design of transmission lines.
- Learns different features of underground cables.

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III Year B. Tech., I Semester

(5G253) 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

Unit V

AC TO AC CONVERTERS & INVERTERS

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

AC voltage controllers – Single phase two SCRs in anti parallel – With R and RL loads– Derivation of RMS load voltage, current and power factor – Numerical problems -Cyclo converters – Single phase midpointcyclo 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 AgeInternational (P) Limited, 2008.
2. M. H. Rashid. *Power Electronics Circuits Devices and Applications*. 3rdEdition, Pearson, 2014.
3. John G. Kassakian, Martin F. Schlecht and George.C.Verghese. *Principles ofPower 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 student will be able to

- Analyze the characteristics of different types of semiconductor devices
- Analyze the Firing circuits & protection circuits of SCR
- Analyze the operation of controlled rectifiers
- Analyze the operation of choppers
- Analyze the operation of AC-AC converters, Inverters
- Acquainted with the applications of power electronic converters

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III Year B. Tech., I Semester

(5G254) ELECTRICAL & ELECTRONICS MEASUREMENTS

Course Objective:

This 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 & INSTRUMENT TRANSFORMERS: 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.

CT and PT – Ratio and phase angle errors – design considerations.

Unit-II:

MEASUREMENT OF P.F, POWER, ENERGY: Types of P.F. Meters – dynamometer and moving iron type – 1-phase and 3-phase meters

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

D.C & A.C BRIDGES: Method of measuring low, medium and high resistance – sensitivity of Wheatstone's bridge – Kelvin's double bridge for measuring low resistance, measurement of high resistance – loss of charge method.

Measurement of inductance – Maxwell's bridge, Anderson's bridge. Measurement of capacitance and loss angle – Desauty's bridge, Schering Bridge. Measurement of frequency – Wien's bridge.

Unit-IV

POTENTIOMETERS & MAGNETIC MEASUREMENTS: Principle and operation of D.C. Crompton's potentiometer – standardization – Measurement of unknown resistance, current, voltage. A.C. Potentiometers: Polar and Coordinate type's standardization – applications.

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 – Iron loss of bar samples.

UNIT – V

OSCILLOSCOPE & DIGITAL METERS: Cathode Ray Oscilloscope-Cathode Ray tube-Time base generator- Horizontal and Vertical amplifiers – application of CRO – Measurement of phase, frequency, current & voltage-Lissajous pattern.

Digital Voltmeter-Successive approximation, ramp and integrating type-Digital frequency meter-Digital multimeter-Digital Tachometer

TEXT 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:

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

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

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III Year B. Tech., I Semester

(5GC52) ENVIRONMENTAL SCIENCE

Course Objectives*:*

- Understand & appreciate the importance of Environmental Science.
- In order to make the students environmentally educated
- 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.

TEXTBOOKS:

1.1. 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:

At the end of the course the student will

- Be aware about global environment crisis & understand the different resources and their problems.
- Know about different types of pollution, their sources, effects & control measures.
- Get Broad awareness about ecosystems, biodiversity, solid waste & disaster management.
- Understand the main social issues & population issues related to the environment.

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III Year B. Tech., I Semester

(5G255) 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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III Year B. Tech., I Semester

(5G256) ELECTRICAL MEASUREMENTS LAB

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

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, Wheatstone Bridge – Measurement of resistance – Determination of Tolerance.
5. Measurement of % ratio error and phase angle of given C.T. bySilsbee’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.
15. Measurement of frequency by Wien’s Bridge.

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III Year B. Tech. I Semester

ADVANCED ENGLISH COMMUNCATION SKILLS LAB
(AUDIT COURSE)

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 -transition – handling questions from audience.

ORAL PRESENTATIONS (TEAM)

Appropriate use of visual aids – Using PowerPoint for 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.

III Year B. Tech. II Semester

Don’t count every hour in the day. Make every hour in the day count!

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III Year B. Tech., II Semester

(5GA61) MANAGEMENT SCIENCE

Course Objectives:

- The objective of this course is to get basic knowledge of management and organization.
- To understand the concepts of plant location plant layouts its types& types of productions.
- To get the concepts of work study & method study.
- Learn about the materials management and inventory classification techniques.
- To know the concepts of PERT & CPM.
- 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 Of Scientific Management, Modern Management. Principles Need Of Organisation 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 Organisation.

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, TataMcGraw Hill, New Delhi, 1979.
2.Human Resource Management, Dessler Gary, 10th Edition, Pearson/PrenticeHall 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:

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

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

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III Year B. Tech., II Semester

(5G261) POWER SYSTEM ANALYSIS

Course Objectives:

- To know the formation of Y_{bus} and Z_{bus} for Power flow studies.
- To calculate Load flows by using various Methods.
- To model and analyze the power system under abnormal conditions
- 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.

Unit–IV

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
3.Grainger and Stevenson. Power System Analysis, Tata McGraw Hill. 2003.
2. M A Pai, Computer Techniques in Power System Analysis, 2nd Edition. TataMcGraw Hill. 2006.
3.Glovar and Sarma, Power System Analysis.4th Edition Thomson Publishers. 2008.
4.Hadi & Sadath, Power System Analysis. Tata McGraw Hill. 2004.
5.B.R.Gupta, Power System Analysis and Design. 6th Revised Edition. S. Chand & Co. 2010.

Course Outcomes:

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

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

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III Year B. Tech., II Semester

(5G262) 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 ARCHITECTURE AND 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

I/O & PROGRAMMABLE TIMER INTERFACING OF 8086: I/O Interfacing methods – I/O mapped I/O, Memory mapped I/O Interfacing, I/O ports – latches and buffers.8255 PPI-various modes of operation and interfacing to 8086, Seven segment Display, stepper motor, D/A, A/D converters. Architecture of 8253 programmable interval timer/counter, Modes of operation, interfacing with 8086.

Unit–III

MEMORY INTERFACING AND DMA CONTROLLER: Basic structure of SRAM and DRAM cell, Memory interfacing to 8086 (static RAM and EPROM). Need for DMA, Architecture of 8257 and interfacing with 8086.

Unit–IV

INTERRUPT CONTROLLER & COMMUNICATION INTERFACE : Interrupt structure of 8086, Vector interrupt table. Interrupt service routines. 8259 PIC architecture and interfacing. Asynchronous and synchronous data transfer schemes. Necessity of communication interfaces, 8251 USART architecture and interfacing. Serial communication standard-RS-232C, 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 microprocessors and peripherals*. 3rd edition. TMH. 2013.

2.Muhammad Ali Mazidi. 8051 *Microcontroller and embedded systems using assembly and c*. Pearson Eduction. 2008

3.Barry B.Brey The Intel microprocessors architecture, programming and interfacing.8th addition Pearson Eduction. 2009

REFERENCE BOOKS:

1.Kenneth J Ayala. *The 8051 Microcontroller* ,3rd edition, cengage learning.

2.Douglas V.Hall. *Microprocessors and Interfacing*. 2nd edition,TMH, 2007.

3.Rajkamal. *Microcontrollers Architecture, programming, interfacing and system design*. . 2nd edition,TMH .Pearson Eduction, 2012.

Course Outcomes:

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

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

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III Year B. Tech., II Semester

(5G263) 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 control 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 Edi, Tata McGraw Hill.

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:

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

- 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.

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III Year B. Tech., II Semester

(5G466) OBJECT ORIENTED PROGRAMMING CONCEPTS

Course Objective:

The aim of this course is to introduce programming in Java in accordance with Object-Oriented Programming concepts.

Unit–I:

INTRODUCTION: Introduction to structure programming - Object-oriented paradigm, elements of object oriented programming – Merits and demerits of OO methodology - Data types - loops - pointers –arrays – structures – functions – Classes – Objects- Constructor and destructor

Unit–II:

Overloading-Operator overloading – function overloading - **Inheritance** – Types of Inheritance- virtual base class - friend function - Polymorphism –this pointer – virtual functions-pure virtual function- Input / Output streams - **Files** streams — manipulators – Templates

Unit–III:

Introduction to Java –Java vs. C++ - data types – operators – Decision making - branching -loops - classes – objects-arrays- methods –scope -string handling.

Unit–IV:

Inheritance-Types **Packages**– API packages – creating packages – adding class to package - interfaces - **Exception handling**- predefined and user defined.

Unit–V:

Multithreaded programming –creating threads- extending the thread class- life cycle of threads- **Applet Programming** – applet life cycle-creating executable applet – passing parameters to applets - Streams in Java.

TEXT BOOKS

1. E.Balaguruswamy, “Object Oriented Programming with C++”,(4th Edition), Tata McGraw Hill Publications Limited, 2008 (Unit I & II)
3.E. Balaguruswamy, “Programming with Java- A Primer ” (3rd Edition), Tata McGraw Hill Publications Limited, 2007. (Unit III,IV,V)
4.Patrick naughton , “The Java Handbook “,Tata McGraw Hill Publications Limited, 2006.(Unit III,IV,V)

REFERENCE BOOKS:

1. K.R.Venugopal, RajkumarBuyya, T.Ravishankar, "Mastering C++", TMH, 2003
2. Robert Lafore – “OBJECT ORIENTED PROGRAMMING IN Turbo C++”, Waite Group; 3rd edition (December 1998)
3. Bruce Eckel, “Thinking in Java”, (4th Edition) Prentice Hall PTR, 2006
4. Herbert Schildt, "the Java 2 : Complete Reference", Fourth edition, Tata McGraw Hill Publications Limited, 2002.

Course Outcomes:

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

- Understand the Basics object-oriented programming concepts
- Understand and apply the object oriented concept like Classes and Objects, encapsulation, Inheritance, Polymorphisms in c++
- Understand java environment and its features
- Understand and apply the object oriented concept like Classes and Objects, encapsulation, Inheritance, Interface, Polymorphisms in java.

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III Year B. Tech., II Semester

(5G264) 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 Switchgear* 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 will be able to

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

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III Year B. Tech., II Semester

(5G46C) OBJECT ORIENTED PROGRAMMING CONCEPTS LAB

EXERCISE PROGRAMS

PROGRAMS IN C++ / JAVA

1. Classes and objects, Constructor and Destructors.
2. Function Overloading.
3. Inheritance.
4. Operator overloading.
5. Friend function, Templates.
6. Simple Java applications - Handling Strings in java.
7. Simple Package creation - Developing user defined packages in Java.
8. Interfaces in JAVA.
9. Threading and Multithreading (Simple Experiments).
10. Exception Handling Mechanism in Java - Handling pre - defined exceptions – Handling user-defined exceptions.
11. Applets creations.

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III Year B. Tech., II Semester

(5G265) POWER ELECTRONICS AND SIMULATION LAB

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

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. Simulation of single-phase full converter using RLE loads.
13. Simulation of single phase Inverter with PWM control.
14. Simulation of single-phase AC voltage controller using RLE loads.

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III Year B. Tech., II Semester

(5GC62) 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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III Year B. Tech., II Semester

PROFESSIONAL ETHICS
(AUDIT COURSE)

COURSE OBJECTIVE

To make the students understand ethics in engineering and infuse them with confidence to apply the same in their professional life.

INSTRUCTIONAL OBJECTIVES

- To understand the relevance of ethics and morals in engineering
- To appreciate the vulnerability to failure of engineering processes
- To comprehend the finer aspects of safety and risk with reference to theresponsibilities of engineers.
- To understand the link between responsibility, rights and accountability
- To understand the global impact of engineering profession

Unit–I

MORALS AND ETHICS IN ENGINEERING Senses of 'Engineering Ethics' – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory –Indian Theory-Consensus and Controversy – Professions and Professionalism – Professional Ideals and Virtues – Uses of Ethical Theories

Unit–II

ENGINEERING AS SOCIAL EXPERIMENTATION Engineering as Experimentation – Engineers as responsible Experimenters – Research Ethics - Codes of Ethics – Industrial Standards - A Balanced Outlook on Law – The Challenger Case Study – Titanic disaster as Case Study

Unit–III

ENGINEER'S RESPONSIBILITY FOR SAFETY: Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis – Reducing Risk – The Government Regulator's Approach to Risk – Disasters at Chernobyl and Bhopal - Case Studies

Unit–IV

RESPONSIBILITIES, RIGHTS AND ACCOUNTABILITY Collegiality and Loyalty – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination

Unit–V

GLOBAL ISSUES Multinational Corporations – Business Ethics - Environmental Ethics – Computer Ethics - Role in Technological Development – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Honesty – Moral Leadership – Sample Code of Conduct

Text Book

Mike Martin and Roland Schinzinger, “Ethics in Engineering”, McGraw Hill, New York, 2005.

Reference Books

1.Charles E Harris, Michael S Pritchard and Michael J Rabins, “Engineering Ethics oncepts and Cases”, Thompson Learning, 2000.

2.Charles D Fleddermann, “Engineering Ethics”, Prentice Hall, New Mexico,1999.

3.John R Boatright, “Ethics and the Conduct of Business”, Pearson Education, 2003.

4.Edmund G Seebauer and Robert L Barry, “Fundamentals of Ethics for Scientists and Engineers”, Oxford University Press, 2001.

5.Prof. (Col) P S Bajaj and Dr. Raj Agrawal, “Business Ethics – An Indian Perspective”, Biztantra, New Delhi, 2004.

6.David Ermann and Michele S Shauf, “Computers, Ethics and Society”, Oxford University Press, 2003.

7.Jayashree Suresh, Raghavan, B.S., “Professional Ethics”, S. Chand & Company Ltd., 2005

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III Year B. Tech., II Semester

STRESS MANAGEMENT
(AUDIT COURSE)

COURSE OBJECTIVE

This course examines different sources from where individuals experience a stress response. Through diligent individual and group study, students will be able to learn to apply stress management principles in order to achieve high levels of performance and understand the role of relationships to the management of stress and health.

INSTRUCTIONAL OBJECTIVES

- Understand the physiological systems that are affected by stressors and the long-term effects and illnesses that can result from stressors.
- Understand the specific applications of stress as it relates to the workplaceand different target groups.
- Create effective stress management plans for individual clients and forworkplace environments. Enhancing significance of training anddevelopment, performance evaluation

Unit– I

UNDERSTANDING STRESS Meaning – Symptoms – Work Related Stress – Individual Stress – Reducing Stress -sources of stress –consequence of stress-burnout-symptoms of Burnout- stress verses Burnout-model of stress-strategies for coping stress (individual and organizational strategies) –case study

Unit–II

TIME MANAGEMENT Techniques – Importance of Planning the day – developing concentration – Prioritizing Beginning at the start – Techniques for conquering procrastination – Sensible delegation – Taking the right breaks – Learning to say “No”

Unit–III

CAREER PLATEAU Career plateau – Identifying Career plateaus – Structural and Content - Plateauing – Making a fresh start – Importance of Sabbaticals – Counseling out – Executive leasing – Sustaining a marketable Career.

Unit–IV

CRISIS MANAGEMENT Implications – People issues – Structure issues – Environmental issues – Learning to keep calm - Preventing interruptions – Controlling crisis – Pushing new ideas – Empowerment – Work place Humour, developing a sense of Humour – Learning to laugh – role of group cohesion and team spirit.

Unit–V

SELF DEVELOPMENT Improving personality – Leading with Integrity – Enhancing Creativity – Effective decision making – Sensible Communication – The Listening Game – Managing Self – Mediation for peace – Yoga for Life

Text Books

1.Bhatia R.L., The Executive Track: An Action Plan for Self-Development Wheeler Publishing, New Delhi
2.Charavathy.S.K, “Human Values for Manager”, McGraw Hill/HenelyManagement Series

Reference Books

1.Jeffr Davison, Managing Stress, Prentice Hall of India, New Delhi
2.Jerrold S Greenberg, Comprehensive Stress Management, Jain Books, 2009

IV Year B. Tech. I Semester

Our greatest weakness lies in giving up. The most certain way to succeed is always to try

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IV Year B. Tech., I Semester

(5G271) 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 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,2nd Edition,2016.
2.M.H.Rashid, *Power Electronic Circuits, Devices and applications,* PHI, 4th Edition,2013.

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 Publications.
4.S K Pillai, *Analysis of Thyristor Power – conditioned motors*. Universities press, 1st Edition.

Course Outcomes:

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

- Analyze the control of DC motors by single phase converters.
- Analyze the control of DC motors by three phase converters.
- Analyze the Four quadrant operation of converters.
- Analyze the control of DC motors by choppers.
- Analyze the control of AC motors by single phase AC voltage controllers.
- Analyze the control of AC motors by single phase AC voltage controllers

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IV Year B. Tech., I Semester

(5G272) 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. Basic definitions – Connected Load, Maximum demand, Load factor, Plant utilization factor, Plant Capacity factor, 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, factors affecting primary feeder 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 with ‘n’ primary feeders. 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 bus 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:

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

- 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.

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IV Year B. Tech., I Semester

(5G379) DIGITAL SIGNAL PROCESSING

Course objectives:

The course aims to provide the student with the ability

- To understand application of Discrete Fourier series and Transforms
- 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:

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

- Understand the types of discrete time signals & systems and analyze using Fourier series and Fourier transforms.
- Know the basics of digital filters and design using different techniques**.**
- Know the applications in Real life

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IV Year B. Tech. I Semester

(5G679) DISASTER MANAGEMENT
(OPEN ELECTIVE)

Course Objectives:

- To make the students convergent with various disasters and its impacts, risk reduction methods.

Unit I

INTRODUCTION- Concepts and definitions: disaster, hazard, vulnerability, risk, capacity, impact, prevention, mitigation).

Unit II

DISASTERS- Disasters classification; natural disasters (floods, draught, cyclones, volcanoes, earthquakes, tsunami, landslides, coastal erosion, soil erosion, forest fires etc.); manmade disasters (industrial pollution, artificial flooding in urban areas, nuclear radiation, chemical spills etc); hazard and vulnerability profile of India, mountain and coastal areas, ecological fragility.

Unit III

DISASTER IMPACTS- Disaster impacts (environmental, physical, social, ecological, economical, political, etc.); health, psycho-social issues; demographic aspects (gender, age, special needs); hazard locations; global and national disaster trends; climate-change and urban disasters.

Unit IV

DISASTER RISK REDUCTION (DRR)- Disaster management cycle–its phases; prevention, mitigation, preparedness, relief and recovery; structural and non-structural measures; risk analysis, vulnerability and capacity assessment; early warning systems, Post-disaster environmental response (water, sanitation, food safety, waste management, disease control); Roles and responsibilities of government, community, local institutions, NGOs and other stakeholders; Policies and legislation for disaster risk reduction, DRR programmes in India and the activities of National Disaster Management Authority.

Unit V

Disasters, Environment and Development- Factors affecting vulnerability such as impact of developmental projects and environmental modifications (including of dams, land-use changes, urbanization etc.), sustainable and environmental-friendly recovery; reconstruction and development methods.

TEXT BOOKS:

1.http://ndma.gov.in/ (Home page of National Disaster Management Authority).

2.http://www.ndmindia.nic.in/ (National Disaster management in India, Ministry of Home Affairs).

3. Pradeep Sahni, 2004, Disaster Risk Reduction in South Asia, Prentice Hall.

4. Singh B.K., 2008, Handbook of Disaster Management: techniques & Guidelines, Rajat Publication.

5. Ghosh G.K., 2006, Disaster Management,APH Publishing Corporation.

Course Outcomes

- The students will learn basic concepts of various disasters.
- The students must learn various classification of disasters hazard and vulnerability profile of India.
- The students will learn impacts, global and national disaster trends.
- The students will learn disaster management cycle and its phases and DRR programmes in India and activities of national disaster management academy.
- The students should be able to analyze factors affecting vulnerability of developmental projects and environmental modifications for sustainable development.

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IV Year B. Tech., I Semester

(5G27C) SYSTEM MODELLING & SIMULATION

(OPEN ELECTIVE)

Course Objectives:

The course aims to provide the student with the ability

- To understand the basic system concepts and definitions of system.
- Techniques to model and to simulate various systems.
- To analyze a system and to make use of the information to improve the performance

Unit–I

Basic Simulation Modeling, Systems, Models and Simulation, Discrete Event Simulation, Simulation of Single Server Queuing System, Simulation of Inventory System, Alternative approach to Modeling and Simulation.

Unit–II

SIMULATION SOFTWARE: Comparison of Simulation Packages with Programming Languages, Classification of Software, Desirable Software Features, General Purpose Simulation Packages – Arena, Extend and Others, Object Oriented Simulation, Examples of Application Oriented Simulation Packages.

Unit–III

BUILDING SIMULATION MODELS: Guidelines for Determining Levels of Model Detail, Techniques for Increasing Model Validity and Credibility,**Modeling Time Driven Systems:** Modeling Input Signals, Delays, System Integration, Linear Systems, Motion Control Models, Numerical Experimentation.

Unit–IV

EXOGENOUS SIGNALS AND EVENTS: Disturbance Signals, State Machines, Petri Nets & Analysis, System Encapsulation,

MARKOV Process: Probabilistic Systems, Discrete Time Markov Processes, Random Walks, Poisson Processes, the Exponential Distribution, Simulating a Poison Process, Continuous-Time Markov Processes.

Unit–V

EVENT DRIVEN MODELS AND SYSTEM OPTIMIZATION: Simulation Diagrams, Queuing Theory, Simulating Queuing Systems, Types of Queues, Multiple Servers, System Identification, Searches, Alpha/Beta Trackers, Multidimensional Optimization, Modeling and Simulation Mythology.

TEXT BOOKS:

1. System Modeling & Simulation, an Introduction – Frank L. Severance, John Wiley & Sons, 2001.
2. Simulation Modeling and Analysis – Averill M. Law, W. David Kelton, TMH, 3rd Edition, 2003.

REFRENCE BOOK:

Systems Simulation – Geoffrey Gordon, PHI, 1978.

Course Outcomes:

- Define basic concepts in Modeling and Simulation.
- Understand the fundamental logic, structure, components and management of simulation modeling& demonstrate knowledge of how to use arena
- Classify various simulation models and give practical examples for each category
- Generate and test random number variates and apply them to develop simulation models
- Analyze output data produced by a model and test validity of the model
- Perform statistical analysis of output from terminating simulation

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IV Year B. Tech.I Semester

(5G57D) TOTAL QUALITY MANAGEMENT (OPEN ELECTIVE)

Course Objectives:

The course aims to provide the student with the ability

- To demonstrate knowledge of quality management principles, techniques and philosophies.
- To apply statistical process control techniques to improve the quality.
- To demonstrate knowledge of TQM tools for industries.
- To apply appropriate techniques for reliability assessment.
- To demonstrate knowledge of advanced techniques for reliability engineering.

Unit I

INTRODUCTION : Definition of Quality, Historical Review, Principles of TQM, Leadership – Concepts, Role of Senior Management, Quality Council, Strategic Planning, Deming Philosophy, Continuous Process Improvement – Juran Trilogy, PDSA Cycle, 5S, Kaizen

Unit II

STATISTICAL PROCESS CONTROL (SPC) : The seven tools of quality, Statistical Fundamentals, Population and Sample, Normal Curve, Control Charts for variables and attributes, Process capability, Concept of six sigma, New seven Management tools.

Unit III

TQM TOOLS AND QUALITY SYSTEMS : Quality Function Deployment (QFD) – House of Quality, QFD Process, Benefits, Taguchi Quality Loss Function, Total Productive Maintenance (TPM) – Concept, Improvement Needs, Need for ISO 9000 and Other Quality Systems, ISO 9000:2000 Quality System – Elements, Implementation of Quality System, Quality Auditing

Unit IV

INTRODUCTION TO RELIABILITY : Importance of reliability, performance cost and reliability, quality and safety, system configuration with examples, stochastic processes, bathtub concept, MTBF, MTTR, hazard rate, failure rate, probability and sampling, cumulative probability distribution function, data and distributions.

Unit V

RELIABILITY IN DESIGN AND LIFE CYCLE COSTING : Survival rate, bath-tub curve analysis of characteristics of failure regimes, design synthesis, reliability effort function, safety margin, allocation of reliabilities by AGREE, ARINC, proportional distribution of unreliability, heuristic method, mean and median methods.

Text Books :

1.Joel E. Rose, *Total Quality Management*, 3rd Edition, Kogan Page Ltd., USA 1999

2.Srinath, L. S., *Reliability Engineering*, Affiliated East West Press, New Delhi 2005

Reference Books :

1.James R.Evans& William M.Lidsay, "The Management and Control of Quality", (5th Edition), South-Western (Thomson Learning), 2002 (ISBN 0-324-06680-5).

2.Feigenbaum.A.V. "Total Quality Management", McGraw Hill, 1991.

3.Zeiri. "Total Quality Management for Engineers", Wood Head Publishers, 1991.

4.E. E. Lewis, "Introduction to Reliability Engineering", John Wiley and Sons.

Course Outcomes:

- Understand the concept of quality management principles, techniques and philosophies.
- Understand how to apply statistical process control techniques to improve the quality
- Can able to demonstrate knowledge of TQM tools for industries.
- Able to apply appropriate techniques for reliability assessment.
- Understand the concept of advanced techniques for reliability engineering

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IV Year B. Tech. I Semester

(5G57E) INTEGRATED PRODUCT DEVELOPMENT (OPEN ELECTIVE)

Course Objectives:

The course aims to provide the student with the ability

- To know the concepts of tools and techniques in the Integrated Product Development area of the Engineering Services industry.
- To Relate the engineering topics into real world engineering applications.

Unit I

FUNDAMENTALS OF PRODUCT DEVELOPMENT Global Trends Analysis and Product decision: Types of various trends affecting product decision - Social Trends-Technical Trends- Economical Trends- Environmental Trends- Political/ Policy Trends- PESTLE Analysis.Introduction to Product Development Methodologies and Management: Overview of Products and Services- Types of Product Development- Overview of Product Development methodologies - Product Life Cycle - Product Development Planning and Management .

Unit II

REQUIREMENTS AND SYSTEM DESIGN Requirement Engineering: Types of Requirements- Requirement Engineering- Analysis -Traceability Matrix and Analysis- Requirement Management.System Design & Modeling: Introduction to System Modeling- introduction to System Optimization- System Specification-Sub-System Design- Interface Design.

Unit III

DESIGN AND TESTING Conceptualization -Industrial Design and User Interface Design- Introduction to Concept generation Techniques-Concept Screening & Evaluation- Concept Design- S/W Architecture- Hardware Schematics and simulation-Detailed Design: Component Design and Verification- High Level Design/Low Level Design of S/W Programs- S/W Testing-Hardware Schematic- Component design- Layout and Hardware Testing.

Unit IV

IMPLEMENTATION & INTEGRATION Prototyping: Types of Prototypes -Introduction to Rapid Prototyping and Rapid Manufacturing.System Integration- Testing- Certification and Documentation: Introduction to Manufacturing /Purchase and Assembly of Systems- Integration of Mechanical, Embedded and S/W systems- Introduction to Product verification and validation processes - Product Testing standards, Certification and Documentation.

Unit V

SUSTENANCE ENGINEERING AND BUSINESS DYNAMICS Sustenance -Maintenance and Repair- Enhancements Product End of Life (EoL): Obsolescence Management-Configuration Management- EoL Disposal.

The Industry - Engineering Services Industry overview- Product development in Industry versus AcademiaThe IPD Essentials- Introduction to vertical specific product development processes- Product development Trade-offs- Intellectual Property Rights and Confidentiality- Security and configuration management

Text Books :

1.NASSCOM student Handbook "Foundation Skills in Integrated Product Development".

2.Anita Goyal, Karl T Ulrich, Steven D Eppinger, “Product Design and Development”, 4th Edition, 2009, Tata McGraw-Hill Education, ISBN-10-007-14679-9

Reference Books:

1.George E.Dieter, Linda C.Schmidt, “Engineering Design”, McGraw-Hill International Edition, 4th Edition, 2009, ISBN 978-007-127189-9

2.Kevin Otto, Kristin Wood, “Product Design”, Indian Reprint 2004, Pearson Education,ISBN. 9788177588217

3.Yousef Haik, T. M. M. Shahin, “Engineering Design Process”, 2nd Edition Reprint, Cengage Learning, 2010, ISBN 0495668141

4.Clive L.Dym, Patrick Little, “Engineering Design: A Project-based Introduction”, 3rd Edition, John Wiley & Sons, 2009, ISBN 978-0-470-22596-7

5.Product Design Techniques in Reverse Engineering and New Product Development, KEVIN OTTO & KRISTIN WOOD, Pearson Education (LPE), 2001.

6.The Management and control of Quality-6th edition-James R. Evens, William M Lindsay Pub:son south-western(www.swlearning.com)

Course Outcomes:

- Students able to summarise the various trends affecting product decision.
- Students able to identify the requirements to create new product.
- Students able to compare different techniques involved in design creation and design testing.
- Students able to rephrase the methods of model creation and integration between software and hardware.
- Students able to illustrate the need of end of life and patenting.

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IV Year B. Tech. I Semester

(5G377) NANOTECHNOLOGY AND APPLICATIONS (OPEN ELECTIVE)

Course Objectives:

The course aims to provide the student with the ability

- To learn the fundamentals of Nano materials and technology.
- To understand the applications and limitation of Nano Technology.

Unit-I

INTRODUCTION: Introduction to nanotechnology and materials, Nano materials, Introduction to nano-sizes and properties comparison with the bulk materials, Different shapes and sizes and morphology.

FABRICATION OF NANO MATERIALS: Top Down Approach Grinding, Planetory milling and Comparison of particles, Bottom Up Approach, Wet Chemical Synthesis Methods, Micro emulsion Approach, Colloidal Nano particles Production, Sol Gel Methods, Sono chemical Approach, Microwave and Atomization, Gas phase Production Methods : Chemical Vapour Depositions.

Unit-II

KINETICS AT NANOSCALE: Nucleation and growth of particles, Issues of Aggregation of Particles, Oswald Ripening, Stearic hindrance, Layers of surface charges, Zeta Potential and pH.

Carbon Nano materials: Synthesis of carbon bucky-balls, List of stable carbon allotropes extended, fullerenes, metallo fullerenes, solid C60, bucky onions, nano tubes, nano cones.

Unit-III

QUANTUM MECHANICS: Quantum dots and its Importance, Pauli exclusion principle, Schrödinger's equation, Application of quantum Dots: quantum well, wire, dot, characteristics of quantum dots, Synthesis of quantum dots Semi-conductor quantum dots

Unit-IV

NANOMATERIALS CHARACTERIZATION: Fractionation principles of Particle size measurements, Particle size and its distribution, XRD, Zeta potential, Electronic band structure Electron statistics Application:

Unit-V

NANOBIOLOGY: Biological synthesis of nano particles and applications in drug delivery, Nano containers and Responsive Release of active agents, Layer by Layer assembly for nano spheres, Safety and health Issues of nano materials, Environmental Impacts, Case Study for Environmental and Societal Impacts.

Text Books:

1.Kulkarni Sulabha K, Nanotechnology: Principles and Practices, Capital Publishing Company, 2007
2.Stuart M. Lindsay, Introduction to Nanoscience, Oxford University Press, 2009.
3.Robert Kelsall, Ian Hamley, Mark Geoghegan, Nanoscale Science and Technology, John Wiley & Sons, 2005.
4.Gabor L. Hornyak , H.F. Tibbals , Joydeep Dutta , John J. Moore Introduction to Nanoscience and Nanotechnology CRC Press
5.Davies, J.H. 'The Physics of Low Dimensional Semiconductors: An Introduction', Cambridge University Press, 1998

Course Outcomes:

Upon completion of the course, students can

- Learn the basics of Nano Materials and Nano Scale
- Knows the fundamentals of Quantum Mechanics.
- Understands the basics of different Nano Materials.

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IV Year B. Tech. I Semester

(5G378) MEDICAL INSTRUMENTATION
(OPEN ELECTIVE – I)

Course Objectives:

The course aims to provide the student with the ability

- To learn the fundamentals of Electro neurogram and Blood Pressure.
- To understand the applications of Blood flow measurement and Pulse Oximeter.

Unit-I

GENERAL INTRODUCTION: The cell, body fluids, Musculoskeletal system, respiratory system, gastrointestinal system, Nervous system, endocrine system and circulatory system. Origin of Bio potentials: electrical activity of Excitable cells: the resting state, The active state, Volume conductor fields, Functional organization of the peripheral nervous system: Reflex are & Junctional transmission.

Unit-II

THE ELECTRONEUROGRAM (ENG): The H-Reflex, The Electromyogram (EMG), The Electrocardiogram (ECG), heart and the circulatory system, Electro conduction system of the heart and heart problems, ECG waveform and Physical significance of its wave features, Electrical behavior of cardiac cells, The standard lead system, The ECG preamplifier, DC ECG Amplier, Defibrillator protection circuit, Electro surgery Unit filtering, Functional blocks of ECG system, Multichannel physiological monitoring system, Common problems encountered and remedial techniques.

Unit-III

BLOOD PRESSURE: indirect measurement of blood pressure, korotkoff sounds, auscultatory method using sphygmo manometer, Oscillometric and ultrasonic non invasive pressure measurement, Direct measurement of blood pressure H2O manometers, electronic manometry, Pressure transducers,. Pressure amplifier designs, Systolic, diastolic mean detector circuits

Unit-IV

BLOOD FLOW AND VOLUME MEASUREMENT: indicator dilution methods, Transit time flow meter, DC flow meter, Electromagnetic flow meter AC electromagnetic flow meter, Quadrature suppression flow meter, Ultrasonic flow meter, Continuous-wave Doppler flow meter, Electric impedance plethysmography, chamber plethysmography, Photo plethysmography.

Unit-V

PULSE OXIMETR: Principles of Operation, Absorption Spectrum, Sensor design, Pulse oximeter, Therapeutic and Prosthetic Devices. Cardiac Pacemakers: Lead wires and electrodes, Synchronous Pacemakers, rate responsive pacemaking, Defibrillators, cardioverters, Electrosurgical-unit, Therapeutic applications of laser, Lithotripsy Haemodialysis.

TEXT BOOKS:

1. John G Webster, Medical Instrumentation: Application and Design , John Wiley,3rd Ed. 2012.
2. Joseph J. Carr & John M. Brown , Introduction to biomedical Equipment Technology, 4th Ed., Prentice Hall India, 2001

Course Outcomes:

Upon completion of the course, students can

- Learn the basics of Human being Bio potentials.
- Know the fundamentals of Blood flow and volume measurement.

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IV Year B. Tech. I Semester

(5G178) .NET TECHNOLOGIES
(OPEN ELECTIVE)

Course Objectives:

The Objective of the course is the student should be able to do the following things:

- Develop programs using C# programming language.
- Learn Assemblies, AppDomains, COM, Code Access Security, Code Optimization, Cryptography and data protection.
- Develop data driven applications using ADO.NET, data providers.
- Data base programming using sql server 2005 programming.
- Learn ASP.NET fundamentals, state management, master pages, web parts, security, Web Services.
- Learn Advanced Web Services Programming.
- Develop Windows Applications using Windows Forms, Control Library, Advanced UI Programming, Data Binding concepts.
- Learn Smart Clients, ClickOnce technology, Enterprise Services, Remoting.

Unit I

INRODUCTION TO .NET FRAMEWORK: .NET Overview- Behind Microsoft .NET- The .NET Platform-.NET Framework Design Goals- .NET Framework- Common Language Runtime –CLR Environments and Executables-Metadata-JIT Compilation-Automatic Memory Management-Assemblies and Manifests-Intermediate Language(IL)- CTS and CLS- CLR Execution.

Unit II

INTRODUCTION TO C# .NET PROGRAMMING: A Demonstration of Visual C#- Common Elements in Visual C- C# Core Language Features- Types-Classes- Structures- Enumeration- Inheritance- Interfaces- Polymorphism-Arrays and Collections- Generics- Operator Overloading- Delegates and Events-Introduction to LINQ Programming- Exception Handling- MSIL Programming.

Unit III

APPLICATION DEVELOPMENT USING ADO .NET: Features of ADO .NET- Architecture of ADO .NET- ADO .NET Providers- Accessing Database using ADO .NET- Connection Opening and Closing- Command Object- Data Adapter- Dataset- Data Tables- Controlling table views with Data Views and Data Relation Objects- Data-binding in Windows Forms and Web Forms.

Unit IV

INTRODUCTION TO ASP.NET: Introduction- Working in ASP.NET Controls- Session and Cookies- Caching- Authentication and Authorization-Web User Controls- Working with Web Config file- Implementing Security-Crystal Reports-Creating Setup and Deployment.

Unit V

WEB SERVICES: Introduction to Web Services- Web Services Protocol and Standards- WSDL-Overview of UDDI- Calling a Web Service from a Browser- Calling a Web Service by using a proxy- Creating a Simple Web Service-AJAX

Text Books:

1. Thuan L. Thai. .NET Framework Essentials. O'Reilly, 2003, 3rd Ed.
2. Donis Marshall. Programming Microsoft Visual C# 2008. Microsoft Press 2008.
3. Francesco Balena. Programming Microsoft Visual Basic .NET. Microsoft Press 2006.

Reference Books:

1. Rebecca M. Riordan. Microsoft ADO.NET Step by Step. Microsoft Press2002.
2. Kogent, ASP.NET 3.5 Black Book, Dream Tech Publications, 2010.
3. Andy Wigley, Peter Roxburgh. Building Microsoft ASP.NET Applications for Mobile Devices. Microsoft Press 2003, 2nd Ed.

Course Outcomes:

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

- Develop programs using C# programming language.
- Create fully functional data driven applications using ADO.Net
- Build secure web applications using ASP.Net.
- Create dynamic Web applications that interact with a database using server-side programming.
- Create Web Services.
- Develop Windows Forms Applications and data driven applications using various controls.
- Develop Enterprise Services and Remote Applications.

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IV Year B. Tech. I Semester

(5G473) CYBER LAWS
(OPEN ELECTIVE)

Course Objectives:

- To explain the basic information on cyber security.
- To understand the issues those are specific to amendment rights.
- To have knowledge on copy right issues of software's.
- To understand ethical laws of computer for different countries.

Unit I

FUNDAMENTALS OF CYBER SECURITY Introduction-Cyber Security and its Problem-Intervention Strategies: Redundancy, Diversity and Autarchy.

Unit II

ISSUES IN CYBER SECURITY Private ordering solutions, Regulation and Jurisdiction for global Cyber security, Copy Right-source of risks, Pirates, Internet Infringement, Fair Use, postings, criminal liability, First Amendments, Data Loss.

Unit III

INTELLECTUAL PROPERTY RIGHTS Copy Right-Source of risks, Pirates, Internet Infringement, Fair Use, postings, Criminal Liability, First Amendments, Losing Data, Trademarks, Defamation, Privacy-Common Law Privacy, Constitutional law, Federal Statutes, Anonymity, Technology expanding privacy rights.

Unit IV

PROCEDURAL ISSUES Duty of Care, Criminal Liability, Procedural issues, Electronic Contracts & Digital Signatures, Misappropriation of information, Civil Rights, Tax, Evidence.

Unit V

LEGAL ASPECTS OF CYBER SECURITY Ethics, Legal Developments, Late 1990 to 2000, Cyber security in Society, Security in cyber laws case. studies, General law and Cyber Law-a Swift Analysis.

Reference Books:

1. Jonathan Rosenoer,"Cyber Law: The law of the Internet", Springer-Verlag, 1997.
2. Mark F Grady, FransescoParisi, "The Law and Economics of CyberSecurity", Cambridge University Press, 2006.

Course Outcomes:

At the end of the course, students should be able to:

- Critically evaluate ongoing developments in law relating to information technologies
- Display an understanding of how these developments relate to one another.
- Examine areas of doctrinal and political debate surrounding rules and theories;
- Evaluate those rules and theories in terms of internal coherence and practical outcomes;
- Draw on the analysis and evaluation contained in primary and secondary sources.

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IV Year B. Tech. I Semester

(5GA71) INTELLECTUAL PROPERTY RIGHTS (OPEN ELECTIVE)

Course Objectives:

- This course is aimed at familiarizing students with the nuances of Intellectual Property Rights (IPR) so as to help them integrate the IPR process in their academic, research (project) activities and to facilitate the students to explore career options in IPR.
- To make the technological students familiar with basics of IPR and their implications in research, development and commercialization.

Unit I

CONCEPT OF PROPERTY: Meaning of Property, Kinds of property: Movable and Immovable property; Tangible and Intangible property; Intellectual property; Private and Public property. Possession and ownership.

Unit II

INTELLECTUAL PROPERTY RIGHTS: Introduction and the need for Intellectual Property Rights (IPR), IPR in India – Genesis and Development, Forms of Intellectual Property- Copyright, Trademarks, Patents, Designs, Geographical Indicators, Merchandise, Franchise and Forms of Unfair Competition. Competing rationales of the legal regimes for the protection of Intellectual Property.

Unit III

COPYRIGHTS & TRADEMARKS: Copy Right: Meaning of Copyright, Copyright in literary, dramatic, musical work and cinematograph films Ownership, Assignment, Author's special rights, Importation and infringement, Fair use provisions. **Trademarks:** Definition; conception of trademarks, Registration, Distinction between trademark and property mark, Standards of proof in passing off action.

Unit IV

PATENTS, DESIGNS & GEOGRAPHICAL INDICATORS: Conception of Patent, Patentable Inventions, Process of obtaining a Patent: application, examination, opposition and sealing of patents; Rights and obligations of a Patentee, International Patents, Transfer of technology, know-how and problems of self-reliant development. Basic provisions related to Designs, Geographical Indicators.

Unit V

INTERNATIONAL INSTRUMENTS CONCERNING INTELLECTUAL PROPERTY RIGHTS: The Berne Convention, Universal Copyright Convention, The Paris Union, The World Intellectual Property Rights Organization (WIPO), UNESCO, TRIPS, TRIMS, and WTO.

Reference Books:

- Intellectual Property Rights: Basic Concepts, MMS Karki, Atlantic, 2009.
- Intellectual Property Rights, Pandey, Neeraj, Dharani, Khushdeep.
- Intellectual Property Rights in India: General Isuues and Implications, Dr. Prankrishna Pal, Regal Series.
- Intellectual Property, W.R. Cornish, Sweet & Maxwell, London, 2012.
- Principles of Intellectual Property, N.S. Gopalakrishnan & T.G. Agitha, Eastern Book Company, Lucknow, 2009.

Course Outcome:

The students will able to understand the issues related to intellectual properties. The knowledge gained by the students on copyrights, trademarks, patents, designs, etc. shall be useful to focus on new inventions and their commercialization.

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IV Year B. Tech. I Semester

(5GA72) HUMAN RESOURCE MANAGEMENT (OPEN ELECTIVE)

Course Objective

The course is designed broadly to promote understanding of procurement, development, maintenance, evaluation and overall effective utilization of manpower.

Unit I

INTRODUCTION TO HUMAN RESOURCE MANAGEMENT: Definition, Introduction, Nature of HRM, Scope of HRM, Functions of HRM - Managerial Functions, Operative Functions, Role of HRM. Personnel Management and HRM, Competitive Challenges influencing HRM, Ethical Aspects of HRM.

Unit II

HUMAN RESOURCE PLANNING: Introduction to Human Resource Planning (HRP), Nature of HRP, Need and Importance of HRP in Organizations, Factors Affecting HRP, HRP Process, Barriers to Human HRP. Human Resource Information System**. Job Analysis and Job Design** – Definition, Steps in Job Analysis, Methods for Collecting Job Analysis Data, Job Description, Job Specification, Job Design - Methods of Job Design.

Unit III

PROCUREMENT OF MANPOWER: Recruitment - Meaning and Definition, Process of Recruitment, Factor Affecting Recruitment, Sources of Recruitment, Methods of Recruitment. **Selection** – Introduction, Selection Procedure, Selection Decision Outcomes. Placement and Orientation.

Unit IV

DEVELOPMENT OF MANPOWER: Employee Training – Concept, Need for Employee Training, Process of Employee Training, Methods of Employee Training, Advantages and disadvantages. **Executive Development** –Objectives, Importance, Factors Influencing Executive Development, Process, Methods of Executive Development, Career Planning and Development.

Unit V

COMPENSATING, MAINTAINING AND EVALUATING THE MANPOWER: Compensation - Objectives, components of pay structure in India, Wage Policy in India - Minimum Wage, Fair Wage and Living Wage. **Discipline and Grievance Procedures** - Disciplinary Procedure, Grievance Handling Procedure, importance and approaches of Industrial Relations. Collective Bargaining Process. **Performance Appraisal -** Definition, Purpose of appraisal, Procedures and Techniques including 360 degree Performance Appraisal, Job Evaluation.

Reference Books:

1.Noe A.Raymond John Hollenbeck, Barry Gerhart and Patrick Wright - Human Resource Management, (Tata McGraw Hill.).

2.Ian Beardwell & Len Holden - Human Resource Management, (Macmillan India Ltd.).

3.Aswathappa K - Human Resource and Personnel Management (Tata McGraw Hill, 5th Ed.).

4.Rao VSP – Human Resource Management, Text and Cases (Excel Books, 2nd Ed.).

5.Ivansevich – Human Resource Management (Tata McGraw Hill, 10th Ed.).

6.Dessler – Human Resource Management (Prentice Hall, 10th Ed.).

7.Bernardi – Human Resource Management (Tata McGraw Hill, 4th Ed.).

8.Human Resource Management, T.N Chhabra, Dhanpat Rai & Sons Pvt Ltd.

Course Outcome

After completion of the course the student will be able to understand all functions of human resource management.

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IV Year B. Tech., I Semester

(5G273) INSTRUMENTATION
(PROFESSIONAL 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, aperiodic, 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*. DhanpatRaii& Co.

REFERENCE BOOKS:

1.D O Doeblin, *Measurements Systems, Applications and Design*. McGraw Hill Edition.

2.A.S Morris, *Principles of Measurement and Instrumentation*. Pearson /Prentice Hall of India.

3.H.S.Kalsi, *Electronic Instrumentation*. Tata McGraw-Hill Edition, 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:

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

- Understand basic principles involved in the meters for measuring voltage, current, resistance, frequency and so on.
- Understand principles of data transmission system and data acquisition system
- Get complete knowledge regarding working of advanced instruments such as logic analyzers and spectrum analyzers.
- understand the principles of transducers and signal conditioning circuits used in Process control industry, manufacturing industry and Automation plants
- Get complete knowledge regarding working of non electrical quantities.

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IV Year B. Tech., I Semester

(5G274) HIGH VOLTAGE ENGINEERING
(PROFESSIONAL ELECTIVE-I)

Course 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 controlof 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 student will be able to

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

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IV Year B. Tech., I Semester

(5G275) RENEWABLE ENERGY SOURCES
(PROFESSIONALELECTIVE-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-MASSANDGEOTHERMAL 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:

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

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

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IV Year B. Tech., I Semester

(5G276) PRINCIPLES OF POWER QUALITY
(PROFESSIONALELECTIVE-II)

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 lightning 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*, 2ndedition, 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:

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

- Understand the definition of power quality and learns different terms and definitions used in power quality.
- Understand sources of voltage sags and interruptions, estimating and solutions.
- Understandsources of transient over voltages and devices for over voltage protection.
- Understand Harmonic distortion, Harmonic sources and principles of controlling Harmonics.
- Understanddevices used for regulating long duration voltage variations.
- Understand the benchmarking process and power quality monitoring conditions.

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IV Year B. Tech., I Semester

(5G277) RELIABILITY ENGINEERING & APPLICATIONS TO POWER SYSTEMS

(PROFESSIONAL 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:

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

- Understand the fundamental definitions and concepts of reliability assessment
- Analyze techniques for reliability assessment of the system
- Network modelling
- Component importance techniques
- Markov modelling
- Lifetime models

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IV Year B. Tech., I Semester

(5G278) SPECIAL ELECTRICAL MACHINES
(PROFESSIONAL ELECTIVE-II)

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, 2002.

REFERENCE BOOKS:

1.K.Venkatarathnam. *Special Electrical Machines*. University press, 2013.

2.R.K.Rajput. *Electrical Machines*. 4th Edition. Laxmi publications, 2006.

3.M.G.Say & E.O.Taylor, *DC Machines*, 2nd Edition, EBLS.

4.T. Kenjo. *Stepping Motors and Their Microprocessor Controls*. Clarendon Press London, 1990.

5.T. Kenjo and S. Nagamori, *Permanent Magnet and Brushless DC Motors*, Clarendon Press, London, 1990.

Course Outcomes:

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

- Demonstrate the special types of DC machines.
- Demonstrate the construction and operation of synchronous reluctance motors & Switched reluctance motors.
- Design stepping motors.
- Analyze the characteristics and control of P.M.B.L.D.C. & P.M.S.M. motors.
- Demonstrate the construction and operation of Linear Induction motor.

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IV Year B. Tech., I Semester

(5G279) 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.
   b) Number of 1's and 0's in a given word.
3. String Operations
   a) Relocate a string of N words/bytes.
   b) Reverse String.
   c) Length of the String
   d) String Insertion
   e) String Deletion
   f) Scanning a byte/ word.
4. Write near procedure for ascending and descending order of numbers.
5. Interfacing with 8255 PPI
   a. DAC Interfacing: Square wave generation in BSR mode-Triangular, sinusoidal and square wave generation in I/O 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., I Semester

(5G27A) POWER SYSTEMS LAB

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

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 Y_{bus} using MATLAB program
4. Formation of Z_{bus} using MATLAB program
5. Load flow analysis using Gauss-Seidel method
6. Load flow analysis using Newton Raphson method
7. Short Circuit Analysis For SLG and LL Faults
8. Short Circuit Analysis For DLG and 3-ϕ Faults
9. Transient Stability Analysis of single machine System
10. Modeling of Single Area Load Frequency Control system.
11. Modeling of synchronous machine with and Without AVR.
12. Analysis of Linear System
13. Transfer function of a given dynamical model from input mode to state space model and vice versa using MATLAB

IV Year B. Tech. II Semester

The great end of education is to discipline rather than to furnish the mind; to train it to the use of its own powers rather than to fill it with the accumulation of others

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IV Year B. Tech., II Semester

(5G281) EMBEDDED SYSTEMS
(PROFESSIONAL ELECTIVE-III)

Course Objectives*:*

The course aims to provide the student with the ability

- To understand concepts of embedded systems.
- 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, specialties: reliability, performance, power consumption cost, size, user interface, software up gradation 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:

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

- Understand basic concepts to design embedded applications.
- Understand different programming models and their suitable application areas.
- Analyze the operation of I/O ports and different communication protocols.
- Design different embedded applications.

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IV Year B. Tech., II Semester

(5G282) UTILIZATION OF ELECTRICAL ENERGY
(PROFESSIONAL ELECTIVE-III)

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 student will be able to

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

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IV Year B. Tech., II Semester

(5G283) FUNDAMENTALS OF HVDC & FACTS DEVICES
(PROFESSIONAL ELECTIVE-III)

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, Applications 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.

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 AC/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 (TSSC), 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 student will be able to

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

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IV Year B. Tech., II Semester

(5G284) MODERN CONTROL THEORY
(PROFESSIONAL ELECTIVE-IV)

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 method – 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:

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

- Understand the concepts of state, assigning of state variables,controllability & Observability
- Design the feedback controllers to make system stable
- Understand the concepts of non linear systems and stability concepts.
- Gain knowledge in the basics of optimal and adaptive controls

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IV Year B. Tech., II Semester

(5G285) DESIGN OF ELECTRICAL SYSTEMS (PROFESSIONAL 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.

ENERGYECONOMICS 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:

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

- Estimate and design of electrical installation for industries and Building
- Know the importance of Power factor improvement and Earthing
- Understand the power quality.
- Know the Economic Aspects of electrical system design

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IV Year B. Tech., II Semester

(5G286) ENERGY AUDITING AND DEMAND SIDE MANAGEMENT

(PROFESSIONAL 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 Instruments watt meter, data loggers, thermocouples, pyrometers, lux meters, tongue testers ,application of PLC’s

Unit IV

ENERGY ECONOMIC ANALYSIS: The time value of money concept, developing cash flow models, payback analysis, depreciation, taxes and tax credit – numerical problems.

Unit V

DEMAND SIDE MANAGEMENT: Introduction to DSM, concept of DSM, benefits of DSM, different techniques of DSM – time of day pricing, multi-utility power exchange model, time of day models for planning. Load management, load priority technique, peak clipping, peak shifting, valley filling, strategic conservation, energy efficient equipment. Management and Organization of Energy Conservation awareness Programs.

TEXT 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:

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

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