

ANURAG ENGINEERING COLLEGE

(AUTONOMOUS)

Ananthagiri(V & M), Suryapet (Dt.)

Academic Regulations - for B. Tech (Regular)

(Effective for the students admitted into I year from the Academic Year 2014-2015 onwards)

1. Award of B.Tech. Degree

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

- i. Pursued a course of study for not less than four academic years and not more than eight academic years.
- ii. Register for 200 credits and secure 200 credits

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

3. Courses of study

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

Branch Code	Branch
	Civil Engineering
	Computer Science and Engineering.
	Electrical and Electronics Engineering.
	Electronics and Communication Engineering
	Mechanical Engineering.

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

4. Credits

	For I Year – I/II semester		II, III, IV years per Semester	
	Periods / Week	Credits	Periods / Week	Credits
Theory	03	03	03	03
	02	02	04	04
Practical	03	02	03	02
Drawing	03T/03D	03	03	02
			06	04
Mini Project	--	--	--	02
Comprehensive Viva Voce	--	--	--	02
Seminar	--	--	6	02
Project	--	--	15	10

5. Distribution and Weightage of Marks

- i. The performance of a student in each semester shall be evaluated subject –wise with a maximum of 100 marks for theory and 75 marks for practical subject. In addition, Industry oriented mini-project, seminar, comprehensive viva-voce and project work shall be evaluated for 50, 50,100 and 200 marks respectively.
- ii. For theory subjects the distribution shall be 25 marks for Internal Evaluation and 75 marks for the End-Examination.
- iii. For theory subjects, during the semester there shall be 2 midterm examinations. Each mid term examination consists of Part-A (Short Answer) for 5 marks and Part-B (subjective paper) for 15 marks with duration of 90 Minutes and one assignment carrying 5 marks.

Subjective paper shall contain 5 questions of which student has to answer 3 questions each 5 marks. First mid term examination shall be conducted for 2.5 units of syllabus and second mid term examination shall be conducted for 2.5 units. First Assignment should be submitted before the conduct of the first mid, and the second Assignment should be submitted before the conduct of the second mid.

The total marks secured by the student in each mid term examination for 25 marks is considered and the average of the two mid term examinations shall be taken as the final marks secured by each candidate. If he/she is absent for any test / assignment, he/she is awarded zero marks for that test / assignment.

- iv. For practical subjects there shall be a continuous evaluation during the semester for 25 sessional marks and 50 end examination marks. Out of the 25 marks for internal, day-to-day work in the laboratory shall be evaluated for 15 marks and internal examination for practical shall be evaluated for 10 marks conducted by the concerned laboratory teacher. The end examination shall be conducted with one external examiner and one internal examiner. The external examiner shall be appointed from the panel of examiners as recommended by Chairman, Board of Studies in respective Branches.
- v. For the subject having design and / or drawing, (such as Engineering Graphics, Engineering Drawing, Machine Drawing) and estimation, the distribution shall be 25 marks for internal evaluation (15 marks for day-to-day work and 10 marks for internal tests) and 75 marks for end examination. There shall be two internal tests in a Semester and the average of the two shall be considered for the award of marks for internal tests.
- vi. There shall be an industry-oriented mini-Project, in collaboration with an industry of their specialization, to be taken up during the vacation after III year II Semester examination.

However, the mini project and its report shall be evaluated in IV year I Semester. The industry oriented mini project shall be submitted in report form and should be presented before the committee, which shall be evaluated for 50 marks. The committee consists of an external examiner, head of the department, the supervisor of mini project and a senior faculty member of the department. There shall be no internal marks for industry oriented mini project.

- vii. There shall be a seminar presentation in IV year II Semester. For the seminar, the student shall collect the information on a specialized topic and prepare a technical report, showing his understanding over the topic, and submit to the department, which shall be evaluated by the Departmental committee consisting of Head of the department, seminar supervisor and a senior faculty member. The seminar report shall be evaluated for 50 marks. There shall be no external examination for seminar.
- viii. There shall be a Comprehensive Viva-Voce in IV year II semester. The Comprehensive Viva-Voce will be conducted by a Committee consisting of (i) Head of the Department (ii) two Senior Faculty members of the Department. The Comprehensive Viva-Voce is aimed to assess the students' understanding in various subjects he / she studied during the B.Tech course of study. The Comprehensive Viva-Voce is evaluated for 100 marks by the Committee. There are no internal marks for the Comprehensive viva-voce.
- ix. Out of a total of 200 marks for the project work, 50 marks shall be for Internal Evaluation and 150 marks for the End Semester Examination. The End Semester Examination (viva-voce) shall be conducted by the committee. The committee consists of an external examiner, head of the department, the supervisor of project and a senior faculty member of the department. The topics for industry oriented mini project, seminar and project work shall be different from each other. The evaluation of project work shall be conducted at the end of the IV year. The internal evaluation shall be on the basis of two seminars given by each student on the topic of his project.

6. Attendance Requirements:

- i. A student shall be eligible to appear for the end examinations if he / she acquires a minimum of 75% of attendance in aggregate of all the subjects.
- ii. Condonation of shortage of attendance in aggregate up to 10% (on genuine medical grounds) in each semester may be granted by the College Academic Council on the basis of recommendation by the principal.
- iii. Shortage of Attendance below 65% in aggregate shall in NO case be condoned.

- iv. Students falling short of attendance as specified above will be detained.
- v. A student will not be promoted to the next semester unless he satisfies the attendance requirement of the present semester. They may seek re-admission for that semester when offered next.
- vi. 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 shall stand cancelled.
- vii. A stipulated fee decided by the Academic Council shall be payable towards condonation of shortage of attendance.

7. Minimum Academic Requirements:

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

- i. A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory or practical design or drawing subject or project if he secures not less than 35% of marks in the end examination and a minimum of 40% of marks in the sum total of the internal evaluation and end examination taken together.
- ii. A student shall be promoted from II to III year only if he fulfils the academic requirement of

Rule (I): 30 credits (out of 75 credits) secured from all the exams (both regular and supplementary) conducted up to end of II year, excluding the performance in II – B.Tech – II – Semester examination.

(OR)

Rule (II): 40 credits (out of 100 credits) secured from all the exams (both regular and supplementary) conducted up to end of II year, including the performance in II – B.Tech – II – Semester examination.

- iii. A student shall be promoted from third year to fourth year only if he fulfils the academic requirements of

Rule (I): Total 50 credits (out of 125 credits) secured from all the exams (both regular and supplementary) conducted up to end of III year, excluding the performance in III – B.Tech – II – Semester examination.

(OR)

Rule (II): 60 credits (out of 150 credits) secured from all the exams (both regular and supplementary) conducted up to end of III year, including the performance in III – B.Tech – II – Semester examination.

- iv. A student shall register and put up minimum attendance in all 200 credits and earn the 200 credits. Marks obtained in all 200 credits shall be considered for the calculation of percentage of marks.
- v. Students who fail to earn 200 credits as indicated in the course structure within eight academic years from the year of their admission shall forfeit their seat in B.Tech course and their admission shall stand cancelled.

8. Course pattern:

- i. The entire course of study is of four academic years. All years shall be on semester pattern.
- ii. A student eligible to appear for the end examination in a subject, but absent at it or has failed in the end examination may appear for that subject at the supplementary examination.
- iii. When a student is detained due to lack of credits / shortage of attendance he may be re-admitted when the semester is offered after fulfilment of academic regulations.

9. Award of Class:

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

Class Awarded	% of marks to be secured	From the aggregate marks secured for the best 200 Credits.
First Class with Distinction	70% and above	
First Class	Below 70% but not less than 60%	
Second Class	Below 60% but not less than 50%	
Pass Class	Below 50% but not less than 40%	

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

10. Minimum Instruction Days:

For each semester there shall be 90 clear instruction days.

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

12. General:

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

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

(Effective for the students getting admitted into II year from the Academic Year 2015-2016 and onwards)

1. The Students have to acquire 150 credits from II to IV year of B.Tech. Program (Regular) for the award of the degree.

Register for **150** credits and secure **150** credits.

2. Students, who fail to fulfil the requirement for the award of the degree in 6 consecutive academic years from the year of admission, shall forfeit their seat.
3. The same attendance regulations are to be adopted as that of B. Tech. (Regular).
4. **Promotion Rule:**

A student shall be promoted from third year to fourth year only if he fulfils the academic requirements of

Rule (I) : 30 Credits (out of 75 credits) secured from all the exams (both regular and supplementary) conducted upto end of 3rd year, excluding the performance in III-B.Tech-II-Sem Exam. (OR)

Rule (II) : 40 Credits (out of 100 credits) secured from all the exams (both regular and supplementary) conducted upto end of 3rd year, including the performance in III-B.Tech-II-Sem Exam.

5. **Award of Class:**

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

First Class with Distinction	70% and above	From the aggregate marks secured for 150 Credits. (i.e. II year to IV year)
First Class	Below 70% but not less than 60%	
Second Class	Below 60% but not less than 50%	
Pass Class	Below 50% but not less than 40%	

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

6. All other regulations as applicable for B. Tech. Four-year degree course (Regular) will hold good for B. Tech. (Lateral Entry Scheme)

**MALPRACTICES RULES
DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS**

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

		a case is registered against him.
4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. The candidate is also debarred for two consecutive semesters from class work and all END examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
6.	Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall or any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. The candidate is also debarred for two

		consecutive semesters from class work and all END examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. The candidate is also debarred and forfeits the seat.
9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.
10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the PRINCIPAL for further action to award suitable punishment.	



ANURAG ENGINEERING COLLEGE

(AUTONOMOUS)

Electrical & Electronics Engineering

I YEAR I SEMESTER

COURSE STRUCTURE

S. No.	Course Code	Course	Lectures	T/P/D	Credits	Internal Marks	External Marks	Total Marks
1	A51001	English-I	2	0	2	25	75	100
2	A51002	Mathematics-I	3	1	3	25	75	100
3	A51003	Engineering Physics-I	2	1	3	25	75	100
4	A51005	Computer Programming-I	3	1	3	25	75	100
5	A51008	Electrical Circuits	3	1	3	25	75	100
6	A51009	Engineering Graphics	0	6	3	25	75	100
7	A51205	English Language Communication Skills Lab-I	0	3	2	25	50	75
8	A51206	Computer Programming- I Lab	0	3	2	25	50	75
9	A51207	Engineering Physics Lab	0	3	2	25	50	75
10	A51208	Engineering Workshop	0	3	2	25	50	75
Total			13	22	25	250	650	900

I YEAR II SEMESTER

COURSE STRUCTURE

S. No.	Course Code	Course	Lectures	T/P/D	Credits	Internal Marks	External Marks	Total Marks
1	A52001	English-II	2	0	2	25	75	100
2	A52002	Mathematics-II	3	1	3	25	75	100
3	A52003	Engineering Physics-II	2	1	3	25	75	100
4	A52006	Computer Programming-II	3	1	3	25	75	100
5	A52008	Mathematics-III	3	1	3	25	75	100
6	A52009	Engineering Chemistry	3	1	3	25	75	100
7	A52205	English Language Communication Skills Lab-II	0	3	2	25	50	75
8	A52206	Computer Programming- II Lab	0	3	2	25	50	75
9	A52207	Engineering Chemistry Lab	0	3	2	25	50	75
10	A52208	IT Workshop	0	3	2	25	50	75
Total			16	17	25	250	650	900

Note: All End Examinations (Theory and Practical) are of three hours duration.

T – Tutorial

P – Practical

D – Drawing



ANURAG ENGINEERING COLLEGE

(AUTONOMOUS)

Electrical & Electronics Engineering

II YEAR I SEMESTER

COURSE STRUCTURE

S. No	Course Code	Course	Lectures	T/P/D	Credits	Internal Marks	External Marks	Total Marks
1	A53007	Mathematics-IV	3	1	3	25	75	100
2	A53008	Fluid Mechanics & Hydraulic Machinery	3	1	3	25	75	100
3	A53009	Electronic Devices and Circuits	4	1	4	25	75	100
4	A53010	Network Theory	3	1	3	25	75	100
5	A53011	Electromagnetic Fields	4	1	4	25	75	100
6	A53012	Electrical Machines-I	4	1	4	25	75	100
7	A53203	Fluid Mechanics & Hydraulic Machinery lab	0	3	2	25	50	75
8	A53204	Electrical Circuits and Simulation Lab	0	3	2	25	50	75
Total			21	12	25	200	550	750

II YEAR II SEMESTER

COURSE STRUCTURE

S. No	Course Code	Course	Lectures	T/P/D	Credits	Internal Marks	External Marks	Total Marks
1	A54006	Electronic Circuits	2	0	2	25	75	100
2	A54007	Managerial Economics and Financial Analysis	3	1	3	25	75	100
3	A54008	Power Systems-I	3	0	3	25	75	100
4	A54009	Control Systems	3	1	3	25	75	100
5	A54010	Environmental Studies	3	1	3	25	75	100
6	A54011	Electrical Machines-II	3	1	3	25	75	100
7	A54205	Electrical Machines-I Lab	0	3	2	25	50	75
8	A54206	Electronic Devices and circuits lab	0	3	2	25	50	75
9	A54207	Gender Sensitization	0	3	2	25	50	75
Total			17	13	23	225	600	825

Note: All End Examinations (Theory and Practical) are of three hours duration.

T – Tutorial

P – Practical

D – Drawing



ANURAG ENGINEERING COLLEGE

(AUTONOMOUS)
Electrical & Electronics Engineering

III YEAR I SEMESTER

COURSE STRUCTURE

S. No	Course code	Course	Lectures	T/P/D	Credits	Internal Marks	External Marks	Total Marks
1	A55007	IC Applications	3	1	3	25	75	100
2	A55008	Management Science	3	0	3	25	75	100
3	A55009	Power Electronics	4	1	4	25	75	100
4	A55010	Power Systems –II	4	1	4	25	75	100
5	A55011	Electrical machines –III	4	1	4	25	75	100
6	A55012	Switching Theory and Logic Design	3	0	3	25	75	100
7	A55203	Control Systems and Simulation Lab	0	3	2	25	50	100
8	A55204	Electrical machines Lab-II	0	3	2	25	50	100
		Total	21	10	25	200	550	750

III YEAR II SEMESTER

COURSE STRUCTURE

S. No.	Course code	Course Name	Lectures	T/P/D	Credits	Internal Marks	External Marks	Total Marks
1	A56010	Switch Gear and Protection	4	1	4	25	75	100
2	A56011	Computer Methods in Power Systems	4	1	4	25	75	100
3	A56012	Electrical Measurements	3	1	3	25	75	100
4	A56013	Utilization of Electrical Energy	4	1	4	25	75	100
5	A56014	Electrical Distribution Systems	3	0	3	25	75	100
		Open Elective:						
6	A56015	1.Disaster Management	3	0	3	25	75	100
	A56016	2.Intellectual Property Rights				25	75	100
	A56017	3.Renewable Energy Sources				25	75	100
7	A56203	Power Electronics and Simulation Lab	0	3	2	25	50	75
8	A56204	Advanced English Communication Skills lab	0	3	2	25	50	75
		Total	21	10	25	200	500	750

Note: All End Examinations (Theory and Practical) are of three hours duration.

T – Tutorial

P – Practical

D – Drawing



ANURAG ENGINEERING COLLEGE

Electrical & Electronics Engineering

(AUTONOMOUS)

IV YEAR I SEMESTER
IV YEAR II SEMESTER

COURSE STRUCTURE
COURSE STRUCTURE

Note: All End Examinations (Theory and Practical) are of three hours duration.

T – Tutorial

P – Practical

D – Drawing

S. No	Course code	Course	Lectures	T/P/D	Credits	Internal marks	External marks	Total
1	A57010	Micro Processors & Micro Controllers	3	1	3	25	75	100
2	A57011	Instrumentation	3	1	3	25	75	100
3	A57012	Power System operation and control	4	1	4	25	75	100
4	A57013	Power semiconductor drives	4	1	4	25	75	100
		Elective-I						
5	A57014	1.High Voltage Engineering	3	1	3	25	75	100
	A57015	2.VLSI Design						
	A57016	3.Optimization Techniques						
		Elective-II						
6	A57017	1.Nano Technology	3	0	3	25	75	100
	A57018	2.Digital Signal processing						
	A57019	3.Neural Networks and Fuzzy Logic						
7	A57204	Micro processors & Micro Controllers lab	0	3	2	25	50	75
8	A57205	Electrical Measurements Lab	0	3	2	25	50	75
9	A57206	Industry Oriented Mini Project	-	-	2	-	50	50
		Total	20	11	26	200	600	800

S. No	Course code	Course	Lectures	T/P/D	Credits	Internal marks	External marks	Total
1	A58010	HVDC Transmission	4	1	4	25	75	100
		Elective –III						
2	A58011	1-Linear System Analysis	3	1	3	25	75	100
	A58012	2-Digital Control Systems						
	A58013	3-Power system Reliability						
		Elective –IV						
3	A58014	1-Advanced Control Systems	3	1	3	25	75	100
	A58015	2-EHV AC transmission						
	A58016	3-Computer Organization						
4	A58204	Technical Seminar	-	6	2	50	-	50
5	A58205	Project Work	-	12	10	50	150	200
6	A58206	Comprehensive Viva-Voce	-	-	2	100	-	100
		Total	10	21	24	275	375	650

ANURAG ENGINEERING COLLEGE
(AUTONOMOUS)

I Year B.Tech. EEE – I Sem

L T/P/D C

ENGLISH - I

1. INTRODUCTION:

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training students to acquire communicative competence, the syllabus has been designed to develop linguistic and communicative competencies of Engineering students. The prescribed books and the exercises are meant to serve broadly as students' handbooks.

In the English classes, the focus should be on the skills of reading, writing, listening and speaking and for this the teachers should use the text prescribed for detailed study. For example, the students should be encouraged to read the texts/selected paragraphs silently. The teachers can ask comprehension questions to stimulate discussion and based on the discussions students can be made to write short paragraphs/essays etc. The text for non-detailed study is for extensive reading/reading for pleasure. Hence, it is suggested that they read it on their own the topics selected for discussion in the class. The time should be utilized for working out the exercises given after each section, as also for supplementing the exercises with authentic materials of a similar kind for example, from newspaper articles, advertisements, promotional material etc.. *However, the stress in this syllabus is on skill development, fostering ideas and practice of language skills.*

2. OBJECTIVES:

- To improve the language proficiency of the students in English with emphasis on LSRW skills.
- To equip the students to study academic subjects more effectively using the theoretical and practical components of the English syllabus.
- To develop the study skills and communication skills in formal and informal situations.

LEARNING OUTCOMES:

1. Usage of English Language, written and spoken.
2. Enrichment of comprehension and fluency
3. Gaining confidence in using language in verbal situations.

SYLLABUS:

Listening Skills:

Objectives

1. To enable students to develop their listening skill so that they may appreciate its role in the LSRW skills approach to language and improve their pronunciation.
2. To equip students with necessary training in listening so that they can comprehend the speech of people of different backgrounds and regions.

Students should be given practice in listening to the sounds of the language to be able to recognise them, to distinguish between them to mark stress and recognise and use the right intonation in sentences.

- Listening for general content
- Listening to fill up information
- Intensive listening
- Listening for specific information.

Speaking Skills:

Objectives

1. To make students aware of the role of speaking in English and its contribution to their success.
 2. To enable students to express themselves fluently and appropriately in social and professional contexts.
- Oral practice
 - Describing objects/situations/people
 - Role play – Individual/Group activities (Using exercises from the five units of the prescribed text: **Skills Annexe - Functional English for Success**)
 - Just A Minute(JAM) Sessions.

Reading Skills:

Objectives

1. To develop an awareness in the students about the significance of silent reading and comprehension.
 2. To develop the ability of students to guess the meanings of words from context and grasp the overall message of the text, draw inferences etc.
- Skimming the text
 - Understanding the gist of an argument
 - Identifying the topic sentence
 - Inferring lexical and contextual meaning
 - Understanding discourse features
 - Scanning
 - Recognizing coherence/sequencing of sentences

NOTE : *The students will be trained in reading skills using the prescribed text for detailed study.*

They will be examined in reading and answering questions using 'unseen' passages which may be taken from authentic texts, such as magazines/newspaper articles.

Writing Skills :

Objectives

1. To develop an awareness in the students about writing as an exact and formal skill
 2. To equip them with the components of different forms of writing, beginning with the lower order ones.
- Writing sentences
 - Use of appropriate vocabulary
 - Paragraph writing
 - Coherence and cohesiveness
 - Narration / description
 - Note Making
 - Formal and informal letter writing
 - Describing graphs using expressions of comparison.

TEXTBOOKS PRESCRIBED:

For Detailed study:

First Textbook: “**Skills Annexe -Functional English for Success**”, Published by Orient Black Swan, Hyderabad

For Non-detailed study:

Second text book “Epitome of Wisdom”, Published by Maruthi Publications, Guntur

UNIT –I

Chapter 1: ‘**Wit and Humour**’ from ‘Skills Annexe’ -Functional English for Success, Published by Orient Black Swan, Hyderabad

2 hrs

L-Listening For Sounds, Stress and Intonation	1
S-Greeting and Taking Leave, Introducing Oneself and Others (Formal and Informal Situations)	1
R- Reading for Subject/ Theme	1
W- Writing Paragraphs	1

UNIT –II

Chapter 2:‘**Mokshagundam Visvesvaraya**’ from “Epitome of Wisdom”, Published by Maruthi Publications, Hyderabad.

3 hrs

G-Types of Nouns and Pronouns	1
V- Homonyms, homophones synonyms, antonyms	2

UNIT-III

Chapter 3: “**Cyber Age**” from “Skills Annexe -Functional English for Success” Published by Orient Black Swan, Hyderabad.

2 hrs

L – Listening for themes and facts	1
S – Apologizing, interrupting, requesting and making polite conversation	1
R- For theme and gist	1
W- Describing People, Places, Objects, Events	1

UNIT-IV

Chapter 4:‘**Three Days To See**’ from “Epitome of Wisdom”, Published by Maruthi Publications, Hyderabad

2 hrs

G- Verb forms	2
V- noun, verb, adjective and adverb	2

UNIT-V

Chapter 5‘**Risk Management**’ from “Skills Annexe -Functional English for Success” Published by Orient Black Swan, Hyderabad

2 hrs

L – for main points and sub-points for note taking	1
S – giving instructions and directions; Speaking of hypothetical situations	1
R – reading for details	1
W – note-making, information transfer, punctuation	1

REFERENCES:

1. Contemporary English Grammar Structures and Composition by David Green, MacMillan Publishers, New Delhi.2010.

2. Innovate with English: A Course in English for Engineering Students, edited by T Samson, Foundation Books.
3. English Grammar Practice, Raj N Bakshi, Orient Longman.
4. Technical Communication by Daniel Riordan. 2011. Cengage Publications. New Delhi.
5. Effective English, edited by E Suresh Kumar, A RamaKrishna Rao, P Sreehari, Published by Pearson
6. Handbook of English Grammar & Usage, Mark Lester and Larry Beason, Tata Mc Graw – Hill.
7. Spoken English, R.K. Bansal & JB Harrison, Orient Longman.
8. Technical Communication, Meenakshi Raman, Oxford University Press
9. Objective English Edgar Thorpe & Showick Thorpe, Pearson Education
10. Grammar Games, Renuvolcuri Mario, Cambridge University Press.
11. Murphy's English Grammar with CD, Murphy, Cambridge University Press.
12. Everyday Dialogues in English, Robert J. Dixson, Prentice Hall India Pvt Ltd.,
13. ABC of Common Errors Nigel D Turton, Mac Millan Publishers.
14. Basic Vocabulary Edgar Thorpe & Showick Thorpe, Pearson Education
15. Effective Technical Communication, M Ashraf Rizvi, Tata Mc Graw –Hill.
16. An Interactive Grammar of Modern English, Shivendra K. Verma and Hemlatha Nagarajan , Frank Bros & CO
17. A Communicative Grammar of English, Geoffrey Leech, Jan Svartvik, Pearson Education
18. Enrich your English, Thakur K B P Sinha, Vijay Nicole Imprints Pvt Ltd.,
19. A Grammar Book for You And I, C. Edward Good, MacMillan Publishers

ANURAG ENGINEERING COLLEGE
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MATHEMATICS-I (Calculus and Matrices)

Course Objectives:

- Able to know the Mean value theorems and determine the maxima and minima for function of several variables, Concepts of matrix algebra and methods of solving system of linear equations.
- Determine eigen values and eigen vectors of a matrix, Cayley Hamilton theorem and inverse by Cayley Hamilton theorem and sol of higher order differential equations.
- Develop a strategy for finding a solution of given arbitrary differential equation, using different methods and application of ODE in Bending of beams, electrical circuits and simple harmonic motion.

UNIT-I: Functions of Single Variable and Functions of several variables:

Rolle's Theorem – Lagrange's Mean Value Theorem – Cauchy's mean value Theorem – Generalized Mean Value theorem (all theorems without proof) – Geometrical interpretation of Mean value theorems. Functions of several variables – Partial Differentiation and total differentiation - Functional dependence-Jacobian Determinant-Maxima and Minima of functions of two variables with constraints and without constraints.

UNIT-II: Matrices and Linear System of Equations:

Matrices and Linear systems of equations: Real matrices – Symmetric, skew - symmetric, orthogonal, Linear Transformation – Orthogonal Transformation. Complex matrices: Hermitian, Skew – Hermitian and Unitary. Elementary row transformations-Rank-Echelon form, Normal form – Solution of Linear Systems – Direct Methods (Gauss Elimination, Gauss Jordan).

UNIT-III: Eigen Values and Eigen Vectors:

Eigen values, Eigen vectors – properties, Cayley-Hamilton Theorem (without Proof) - Inverse and powers of a matrix by Cayley-Hamilton theorem – Diagonalization of matrix.

UNIT-IV: Differential Equations of first order and their Applications:

Differential equations of first order and first degree: exact, linear and Bernoulli, Applications to Newton's law of cooling, law of natural growth and decay, orthogonal trajectories.

UNIT-V: Higher Order Linear Differential Equations and their Applications:

Linear differential equations of second and higher order with constant coefficients, RHS term of the type $f(x) = e^{ax}, \sin ax, \cos ax$ and $x^k, e^{ax}V(x), x^kV(x)$. Method of variation of parameters. Applications - Bending of beams, Electrical circuits, simple harmonic motion.

Course Outcomes:

- *Understand Rolle's and the Mean value theorems and to verify the Mean value theorems, derivatives to study maxima and minima of functions of two variables.*
- *Define rank and elementary transformations of a matrix and Non homogeneous and homogeneous system of equations and Compute eigen values and corresponding eigen vectors of a square matrix.*
- *Specify standard methods for solving differential equations and their applications in geometrical and physical problems, different types of higher order differential equations and their applications in engineering problem solving.*

TEXT BOOKS:

1. Grewal B.S (2007), Higher Engineering Mathematics, 40th Edition, New Delhi, Khanna Publishers.
2. Iyengar T.K.V., Krishna Gandhi B. & Others (2011), Engineering Mathematics Vol - I, 10th Revised Edition, New Delhi, S. Chand & Company Limited.
3. Iyengar T.K.V., Krishna Gandhi B. & Others (2011), Mathematical Methods, 10th Revised Edition, New Delhi, S. Chand & Company Limited.
4. Advanced Engineering Mathematics: Erwin Kreyszig, Wiley.

REFERENCE BOOKS:

1. Jain R. K., and Iyengar S. R. K (2008), Advanced Engineering Mathematics, 3rd Edition, New Delhi, Narosa Publication House.
2. Shahanaz Bathul (2007), Engineering Mathematics-I, 3rd Edition, Hyderabad, Right Publishers.
3. Ramana B.V (2010), Engineering Mathematics, New Delhi, Tata McGraw Hill Publishing Co. Limited
4. Mathematical Methods: S.R.K. Iyengar and R.K. Jain, Narosa Publishing House. Mathematical Methods of Science and Engineering (Aided with Matlab) Kanti B.Datta (2012), Seventh Edition, CENGAGE Learning.

(AUTONOMOUS)

I Year B.Tech. EEE – I Sem

L	T/P/D	C
2	1	3

ENGINEERING PHYSICS – I

Course objectives:

- *To appraise the students about the importance and role of chemistry in the field of Engineering by explaining the relevant topics and the properties of engineering materials.*
- *To provide the students with the necessary knowledge to solve the problems and make decisions with regards to the application of materials in a variety of engineering disciplines.*
- *To equip the students with the required fundamentals of engineering chemistry to carry out in the interdisciplinary research such that the findings benefit the common man.*

UNIT- I

INTERFERENCE AND DIFFRACTION:

Superposition principle, resultant amplitude, coherence, methods to obtain coherent sources, interference, Young's double slit experiment (Qualitative), interference in thin films by reflection, Newton's rings Experiment, Distinction between Fraunhofer and Fresnel diffraction, Diffraction at single slit, Diffraction grating (Qualitative), Introduction to polarization, Brewster's law and Double refraction.

UNIT - II

CRYSTAL STRUCTURES:

Space lattice – Unit cell – Lattice parameter – Crystal systems – Bravais lattices, Atomic radius – Co-ordination number - Structures and Packing fractions of Simple Cubic – Body Centered Cubic – Face Centered Cubic crystals.

DIRECTIONS, PLANES AND X-RAY DIFFRACTION:

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

UNIT - III

ELEMENTS OF STATISTICAL MECHANICS:

Introduction, Phase space, Definition of Ensembles, Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac statistics – Photon gas – Planck's law of black body radiation – Deduction of Wien's law and Rayleigh-Jeans law from Planck's law.

UNIT – IV

MAGNETIC PROPERTIES :

Introduction – Basic definitions - Origin of magnetic moment, Bohr magneton – Classification of magnetic materials (Dia, Para and Ferro)- Domain theory of ferromagnetism, Hysteresis curve – Soft and Hard magnetic materials – properties of Anti ferro and Ferri magnetic materials .

SUPERCONDUCTIVITY: Introduction, Meissner effect – Critical fields, Type I and Type II superconductors-Applications of super conductors.

UNIT - V

DIELECTRIC PROPERTIES:

Electric dipole, Dipole moment, Dielectric constant – Parallel plate Capacitor, Electronic, Ionic and Orientation Polarization – Calculation of Polarizabilities – Internal fields – Clausius – Mossotti equation – Basic concepts of Piezo, Pyro and Ferro electricity.

Course Outcomes:

- *Finally the students may be familiar with the topics of crystals, dielectrics, optics etc... which will be useful in various branches of technology.*
- *There will be a chance for them use the subject as a mathematical tool to solve their real life problems.*
- *Understand the students with the necessary knowledge to solve the problems and make decisions with regards to the application of materials*

TEXT BOOKS:

- (1) Modern Engineering Physics by, Dr.K. Vijay Kumar & Dr.S.Chandralingam:S.Chand.Co
- (2) Eengineering Physics by P K Palanisamy :Scietech publication
- (3) Solid State Physics by M Armugam; Anuradha Publications

REFERENCE BOOKS:

- (1) Introduction to Solid State Physics by Charles Kittel : John Wiley & Sons
- (2) Engineering Physics by R.K.Gaur and S.L.Gupta; Dhanpat Rai and Sons
- (3) Engineering Physics by V Rajendran; McGraw hill education private ltd.
- (4) A Text book of Engineering Physics by M N Avadhanulu, P G Kshirsagar; S Chand
- (5) Engineering Physics by K Malik, A K Singh; Tata Mc Graw hill book publishers
- (6) Engineering Physics by M.R.Srinivasan, New Age Publishers

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COMPUTER PROGRAMMING - I

Course Objectives:

- *To explain representation of numbers, alphabets and other characters in computer system, the basic concepts in C Programming Language and selection and repetition statements in 'C' Language*
- *To explain software development tools like algorithm, pseudo codes and programming structure.*
- *To explain arrays to solve problems and strings and string operations, modular programming in 'C' Language.*

UNIT - I

Introduction to Computers – Computer Systems, Computing Environments, Computer Languages, operating system functions, language processor concepts.

Overview of C Language : Program structure and simple programs using scanf and printf functions.

Data representations- Binary, octal, hexa number systems, ASCII and EBCDIC, data types, Identifiers, Variables, Constants, declarations.

UNIT - II

Operators, Expressions, Precedence and Associativity, evaluation of expressions, sample programs using expressions, Type conversions, unformatted I/O.

Algorithms- control structure – grouping, selectors, repetitions.

Step wise refinement, flowchart.

UNIT - III

Statements- Selection Statements – if and switch statements, algorithm and program example using selectors.

Repetition statements (loops)-while, for, do-while statements, algorithm development using repetition and programs using repetition, break, continue, goto, exit, Simple C Program examples.

UNIT - IV

Arrays – Introduction, declaration, reading and printing arrays , programs using arrays, two – dimensional arrays,

Multidimensional arrays, C program examples.

Strings – Concepts, C Strings, String Input / Output functions, arrays of strings, string manipulation functions, C program examples.

UNIT – V

Functions- procedural abstraction, function declarations, function calls and parameter passing Standard functions, Storage classes- recursion- recursive functions, example C programs.

Course Outcomes:

Upon completion of this course the students will have an:

- *Ability to design algorithmic solutions to problem*
- *Ability to convert algorithms to C-Programs*
- *Ability to write, compile and debug programs in C Language*
- *Ability to write Programs using selection and repetition statements*
- *Ability to write programs using Arrays and Strings*
- *Ability to design structured programming.*

TEXT BOOKS:

1. Computer Science: A Structured Programming Approach Using C, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.
2. Programming in C. P. Dey and M Ghosh , Oxford University Press.

REFERENCE BOOKS:

1. C& Data structures – P. Padmanabham, Third Edition, B.S. Publications.
2. C for All, S. Thamarai Selvi, R.Murugesan, Anuradha Publications.
3. Problem Solving and Program Design in C, J.R. Hanly and E.B. Koffman, 7th Edition, Pearson education.
4. Programming in C, Ajay Mittal, Pearson.
5. Programming with C, B.Gottfried, 3rd edition, Schaum's outlines, TMH.
6. Problem solving with C, M.T.Somasekhara, PHI
7. Programming with C, R.S.Bickar, Universities Press.
8. Computer Programming & Data Structures, E.Balagurusamy, 4th edition, TMH.

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ELECTRICAL CIRCUITS

Course Objective:

- *This course introduces the basic concept of circuit analysis which is the fundamental for all subjects of the Electrical engineering discipline.*
- *The emphasis of this course is laid on the basic analysis of circuit which includes single phase circuits, magnetic circuits and theorems.*
- *This course introduces various types of connections of R-L, R-C, R-L-C and their solutions, concept of resonance of A.C circuits.*

UNIT-I: Introduction to Electrical Circuits:

Circuit concept, R-L-C parameters, voltage and current sources, dependent and independent sources, source transformations, relationship for passive elements for different input signals (square, ramp, saw-tooth, triangular). KCL, KVL, network reduction technique, series, parallel, series-parallel, Star-Delta, Delta-Star transformations. Nodal analysis, Mesh analysis - super node and super mesh for DC excitations.

UNIT-II: Magnetic circuits:

Magnetic circuits, Faraday's laws of electro magnetic induction - concept of self and mutual inductance. Dot convention, coefficient of coupling, composite magnetic circuits, analysis of series and parallel magnetic circuits.

UNIT-III: Single Phase AC Circuits:

R.M.S, average values and form factor for different periodic wave forms – steady state analysis of R,L,C (in different combination) with sinusoidal excitation - concept of reactance, impedance, susceptance and admittance. Phase and phase difference, concept of power factor, real and reactive power, J – notation , complex and polar forms of representation, complex power.

UNIT-IV: Locus diagram and Resonance:

Locus diagram: Series R-L, R-C, R-L-C and parallel combination with variation of various parameters. **Resonance:** Series, parallel circuits, concept of bandwidth and Q-factor.

UNIT –V: Network Theorems(with A.C and D.C Excitations):

Super position, Norton's, Reciprocity, Thevenin's, Maximum power transfer, Milliman's, and compensation theorems. Problems on all above theorems.

Course Outcomes:

- *To develop a basic concepts of electrical components, energy sources, their various types of connections and solutions of D.C circuits, basic concepts of magnetic circuits, Faraday's Laws and analysis of series and parallel magnetic circuits.*

- *To develop a To develop a basic concept of different periodic wave forms, complex power, J-notation, basic concepts of various types of connections of R-L, R-C,R-L-C and their solutions, concept of resonance of A.C circuits.*
- *To develop a solutions of various complex circuit connections by using different theorems of D.C & A.C excitations.*

TEXT BOOKS:

1. Engineering circuits analysis by William Hayt and Jack E. Kemmerly, McGraw Hill company, 6th edition.
2. Network Analysis by A. sudhakar and Shyamohan S Palli, Tata McGraw-Hill.
3. Electrical circuits by A. Chakrabarthy, Dhanpat Rai & Sons.

REFERENCE BOOKS:

1. Network Analysis by M.E Van Valkenberg.
2. Linear circuits analysis(time domain, phasor and laplace transform approaches) Second edition by Raymond A. Decarlo and Penmin-Lin, Oxford University Press. Second edition, 2004.
3. Electrical circuits theory by K. Rajeswaran, Pearson Education, 2004.
4. Basic circuits analysis by D.R.Cunningham & J.A. Stuller, Jaico publications.

(AUTONOMOUS)

I Year B.Tech. EEE – I Sem

L	T/P/D	C
0	-/6/-	3

ENGINEERING GRAPHICS

Course Objectives:

- *To visualize and communicate geometrical elements like Polygons, Curves, Conic Sections, Cycloids and Involutés*
- *To understand the fundamentals of geometry like Orthographic Projections and its applications in design and manufacturing of various engineering components and the fundamentals of geometry like Principles involved in Planes and Solids and its applications in design and manufacturing of various engineering components.*
- *To understand the fundamentals of geometry like Isometric Projections and its applications in design and manufacturing of various engineering components, the fundamentals of geometry like Conversion of Orthographic Views to Isometric Views and its applications in design and manufacturing of various engineering components.*

UNIT – I

Introduction to Engineering Drawing: Drawing Instruments and their uses, types of lines, use of pencils, Lettering, Rules of dimensioning.

Construction of polygons: Inscription and superscription of polygons given the diameter of circle.

Curves used in Engineering Practice and their Constructions:

Conic Sections: Ellipse, Parabola, Hyperbola including the Rectangular Hyperbola - General method only.

Cycloidal curves - Cycloid, Epicycloid and Hypocycloid

Involutés

UNIT – II

Drawing of Projections or Views (Orthographic Projection in First Angle Projection Only): Principles of Orthographic Projections – Conventions – First and Third Angle Projections, Projection of Points, Projection of Lines - inclined to both planes, True lengths. (Mid points & Traces are eliminated).

UNIT – III

Projections of Planes: Projections of regular Planes – Inclined to both planes.

Projections of Solids: Projections of Regular Solids – Regular Polyhedra, solids of revolution, Axis inclined to both planes – Change of position.

UNIT –IV

Isometric Projections/views: Principles of Isometric Projection – Isometric Scale – Isometric Views – Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines.

UNIT –V

Conversion of Orthographic Views to Isometric Views of simple objects.

Transformation of Projections: Conversion of isometric views to orthographic views of simple objects.

Course Outcomes:

- *To Know the importance of Engineering Graphics and to represent the various Polygons, Curves, Conic Sections, Cycloids and Involutives used in Engineering Graphics.*
- *To Draw and understand the Principles involved in Orthographic Projections and to represent the Principles involved in Points, Lines and Traces, Conversion of Orthographic Views to Isometric Views and also represent its Transformation of Projections.*
- *To Draw and understand the construction Principles involved in Planes and Solids and the construction Principles involved in Isometric Projections.*

TEXT BOOKS:

1. Engineering Drawing, N.D. Bhatt / Charotar publishers
2. Engineering Drawing, K.L.Narayana and Kannaiah / Sciotech publishers.

REFERENCES:

1. Engineering Drawing, K.Venugopal/G.Sreekanjana, New Age International Publishers.

ANURAG ENGINEERING COLLEGE

(AUTONOMOUS)

I Year B.Tech. EEE – I Sem

L	T/P/D	C
0	-/3/-	2

English Language Communication Skills Lab-I

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

Objectives:

- To facilitate computer-aided multi-media instruction enabling individualized and independent language learning
- To sensitise the students to the nuances of English speech sounds, word accent, intonation and rhythm and consistent accent and intelligibility in their pronunciation of English by providing an opportunity for practice in speaking
- To improve the fluency in spoken English and neutralize mother tongue influence and train students to use language appropriately for interviews, group discussion and public speaking

Learning Outcomes:

1. Better Understanding of nuances of language through audio- visual experience and group activities
2. Neutralization of accent for intelligibility
3. Speaking with clarity and confidence thereby enhancing employability skills of the students

Syllabus: English Language Communication Skills Lab shall have two parts:

a. Computer Assisted Language Learning (CALL) Lab

b. Interactive Communication Skills (ICS) Lab

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

Exercise-I

CALL Lab: Introduction to Sounds of English Language
Speech Sounds
Vowels and Consonants

Exercise-II

ICS Lab: Ice-Breaking activity and Articles, Prepositions, Word formation- Prefixes & Suffixes, Synonyms & Antonyms

Exercise-III

CALL Lab: Structure of Syllables
Past Tense Marker and Plural Marker
Weak Forms and Strong Forms
Consonant Clusters.

Exercise-IV

ICS Lab: Situational Dialogues -Role-Play- (Self-introduction and introducing others- Greetings- Apologies- Requests), JAM Session.

Exercise-V

ICS Lab: Social and Professional Etiquette and Telephone Etiquette-Tenses-Non-Verbal Communications.

Minimum Requirement of infra structural facilities for ELCS Lab:

1. Computer Assisted Language Learning (CALL) Lab: the Computer aided Language Lab for 60 students with 60 systems, one master console, LAN facility and English language software for self- study by learners. **System Requirement (Hardware component):**

(computers with suitable configuration as per the purchased software demands)

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

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

2. Interactive Communication Skills (ICS) Lab:

The Interactive Communication Skills Lab: A Spacious room with movable chairs and audio-visual aids with a Public Address System, a T. V., a digital stereo –audio & video system and camcorder etc.

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

- 1. Suresh Kumar, E. & Sreehari, P. 2009. A Handbook for English Language Laboratories. New Delhi: Foundation
- 2. **Strengthen Your Steps** - Dr. M. Hari Prasad and others, Maruthi Publications
- 3. Speaking English Effectively 2nd Edition by Krishna Mohan and N. P. Singh, 2011. Macmillan Publishers India Ltd. Delhi.
- 4. Kumar, V & Dhamija, P.V. How to Prepare for Group Discussion and Interviews. Tata McGraw Hill
- 5. Hancock, M. 2009. English Pronunciation in Use. Intermediate. Cambridge: CUP
- 6. Spoken English: A Manual of Speech and Phonetics by R. K. Bansal & J. B. Harrison. 2013. Orient Blackswan. Hyderabad.
- 7. Hewings, M. 2009. English Pronunciation in Use. Advanced. Cambridge: CUP
- 8. Marks, J. 2009. English Pronunciation in Use. Elementary. Cambridge: CUP
- 9. Nambiar, K.C. 2011. Speaking Accurately. A Course in International Communication. New Delhi: Foundation
- 10. Soundararaj, Francis. 2012. Basics of Communication in English. New Delhi: Macmillan
- 11. **Spoken English** (CIEFL) in 3 volumes with 6 cassettes, OUP.
- 12. **English Pronouncing Dictionary** Daniel Jones Current Edition with CD.
- 13. **A textbook of English Phonetics for Indian Students** by T. Balasubramanian (Macmillan)
- 14. **Lab Manual:** A Manual entitled “**English Language Communication Skills (ELCS) Lab Manual- cum- Work Book**”, published by Cengage Learning India Pvt. Ltd, New Delhi. 2013

ANURAG ENGINEERING COLLEGE

(AUTONOMOUS)

I Year B.Tech. EEE – I Sem

L	T/P/D	C
0	-/3/-	2

COMPUTER PROGRAMMING – I LAB

Course Objectives:

- To make the student learn Linux commands and learn a programming language.
- To teach the student to write programs in C to solve the problems
- To make the student to write the programs using control statements, use arrays for solving the problems and write modular programming

Week 1:

1. Familiarity with Linux Commands – Login, Wild Chars, ls, cp, mv, mkdir, wc, chdir.
2. Creation of text files using vi editor.

Week 2:

Using vi editor – perform operations of pattern search, insertion, deletion and substitution operations

Week 3:

Write simple programs using scanf and printf functions and familiarity with format strings.

Week 4 & 5:

Write programs to illustrate the Assignment Operators

Week 6:

Write programs to illustrate the Logical Operators

Week 7:

Write programs to illustrate the Relational Operators

Week 8:

Write programs using If Statement

Week 9:

Write programs using while, do-while loops

Week 10:

Write programs using for loop

Week 11:

Write programs to illustrate one dimensional arrays.

Week 12:

Write programs to illustrate two dimensional arrays.

Week 13:

Write programs to illustrate String concepts.

Week 14:

Write programs using functions

Week 15:

Review

ANURAG ENGINEERING COLLEGE

(AUTONOMOUS)

I Year B.Tech. EEE – I Sem

L	T/P/D	C
0	-/3/-	2

ENGINEERING PHYSICS LAB

1. Diffraction Grating with sodium vapor lamp
2. Single Slit with laser source
3. Newton's Rings
4. Energy gap of a semiconductor material
5. Torsional Pendulum Expt. to determine the rigidity modulus of material of a wire
6. Seebeck Effect
7. Decay of charge - R C circuit and time constant
8. L C R Series circuits
9. Dispersive Power of the material of a Prism using Spectrometer
10. Stewart & Gee's experiment
11. LED Characteristics
12. Numerical Aperture of an Optical Fibre & Bending losses of an Optical Fibre
13. Diffraction Grating with laser source

ANURAG ENGINEERING COLLEGE

(AUTONOMOUS)

I Year B.Tech. EEE – I Sem

L	T/P/D	C
0	-/3/-	2

ENGINEERING WORKSHOP

Course Objectives:

- To impart the knowledge regarding the various techniques, skills and tools necessary for engineering workshop practice.
- To provide the students with hands on experience on different trades of engineering workshop like carpentry, tin-smithy, fitting, welding and house wiring.
- To learn about the machines in view of constructions details, different operations to be performed on the machines and different tools and introduce the concepts of power tools in constructions, wood working, electrical engineering and mechanical engineering in manufacturing applications

1. TRADES FOR EXERCISES:

At least two exercises from each trade:

1. Carpentry
2. Fitting
3. Tin-smithy and development of jobs carried out and soldering.
4. House-wiring
5. Welding

2. TRADES FOR DEMONSTRATION&EXPOSURE:

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

Course Outcomes:

1. To make a lap joint.
2. To make a dovetail- joint.
3. To make a T-bridle joint.
4. To prepare a flat filing.
5. To prepare a step cutting.
6. To prepare a angular cutting.
7. To prepare a open scoop.
8. To prepare a rectangular tray.
9. To prepare a square tin.
10. To understand and to give the connections for one light point control by one single pole switch.

11. To understand and to give the connections for one light point control by two-two way switches (parallel connections).
12. To understand and to give the connections for to-connect a electrical bell by using bell-push.
13. To understand and to give the connections for two light point controlled by one single pole switch.
14. To prepare a pipe joint,tap and pressing- connections by using pluming.
15. To apply different operations to be performed on the lathe machines.
16. To prepare a switch boards , wood drilling and threading different various sizes.

TEXT BOOKS:

1. Work shop manual - P.Kannaiah/K.L Narayana/scitech publishers.
2. Workshop manual by Venkat Reddy

ANURAG ENGINEERING COLLEGE

(AUTONOMOUS)

I Year B.Tech. EEE – II Sem

L	T/P/D	C
2	0	2

ENGLISH - II

1. INTRODUCTION:

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training students to acquire communicative competence, the syllabus has been designed to develop linguistic and communicative competencies of Engineering students. The prescribed books and the exercises are meant to serve broadly as students' handbooks.

In the English classes, the focus should be on the skills of reading, writing, listening and speaking and for this the teachers should use the text prescribed for detailed study. For example, the students should be encouraged to read the texts/selected paragraphs silently. The teachers can ask comprehension questions to stimulate discussion and based on the discussions students can be made to write short paragraphs/essays etc. The text for non-detailed study is for extensive reading/reading for pleasure. Hence, it is suggested that they read it on their own the topics selected for discussion in the class. The time should be utilized for working out the exercises given after each section, as also for supplementing the exercises with authentic materials of a similar kind for example, from newspaper articles, advertisements, promotional material etc.. *However, the stress in this syllabus is on skill development, fostering ideas and practice of language skills.*

2. OBJECTIVES:

- To improve the language proficiency of the students in English with emphasis on LSRW skills.
- To equip the students to study academic subjects more effectively using the theoretical and practical components of the English syllabus.
- To develop the study skills and communication skills in formal and informal situations.

LEARNING OUTCOMES:

- Usage of English Language, written and spoken.
- Enrichment of comprehension and fluency
- Gaining confidence in using language in verbal situations.

SYLLABUS:

Listening Skills:

Objectives

1. To enable students to develop their listening skill so that they may appreciate its role in the LSRW Skills approach to language and improve their pronunciation
2. To equip students with necessary training in listening so that they can comprehend the speech of people of different backgrounds and regions

Students should be given practice in listening to the sounds of the language to be able to recognise them, to distinguish between them to mark stress and recognise and use the right intonation in sentences.

- Listening for general content
- Listening to fill up information
- Intensive listening
- Listening for specific information

Speaking Skills:

Objectives

1. To make students aware of the role of speaking in English and its contribution to their success.
 2. To enable students to express themselves fluently and appropriately in social and professional contexts.
- Oral practice
 - Describing objects/situations/people
 - Role play – Individual/Group activities (Using exercises from the five units of the prescribed text: **Skills Annexe - Functional English for Success**)
 - Just A Minute(JAM) Sessions.

Reading Skills:

Objectives

1. To develop an awareness in the students about the significance of silent reading and comprehension.
 2. To develop the ability of students to guess the meanings of words from context and grasp the overall message of the text, draw inferences etc.
- Skimming the text
 - Understanding the gist of an argument
 - Identifying the topic sentence
 - Inferring lexical and contextual meaning
 - Understanding discourse features
 - Scanning
 - Recognizing coherence/sequencing of sentences

NOTE : *The students will be trained in reading skills using the prescribed text for detailed study. They will be examined in reading and answering questions using 'unseen' passages which may be taken from authentic texts, such as magazines/newspaper articles.*

Writing Skills :

Objectives

1. To develop an awareness in the students about writing as an exact and formal skill
 2. To equip them with the components of different forms of writing, beginning with the lower order ones.
- Writing sentences
 - Use of appropriate vocabulary
 - Paragraph writing
 - Coherence and cohesiveness
 - Narration / description
 - Note Making
 - Formal and informal letter writing
 - Describing graphs using expressions of comparison

TEXTBOOKS PRESCRIBED:**For Detailed study:****First Textbook:** “*Skills Annexe -Functional English for Success*”, Published by Orient Black Swan, Hyderabad**For Non-detailed study:****Second text book** “*Epitome of Wisdom*”, Published by Maruthi Publications, Guntur**UNIT-I**Chapter 1: ‘**Leela’s Friend**’ by R.K. Narayan from “Epitome of Wisdom”, Published by Maruthi Publications, Hyderabad

2 hrs

G – Present Tense 2

V – Synonyms and Antonyms 2

UNIT-IIChapter 2: ‘**Human Values and Professional Ethics**’ from “Skills Annexe -Functional English for Success” Published by Orient Black Swan, Hyderabad

2 hrs

L -Listening for specific details and information 1

S- Narrating, expressing opinions and telephone interactions 1

R -Reading for specific details and information 1

W- Writing formal letters and CVs 1

UNIT-IIIChapter 3: ‘**The Convocation Speech**’ by N.R. Narayanmurthy’ from “Epitome of Wisdom”, Published by Maruthi Publications, Hyderabad

2 hrs

G- Past and future tenses 2

V- Vocabulary - idioms and Phrasal verbs 2

UNIT-IVChapter 4: ‘**Sports and Health**’ from “Skills Annexe -Functional English for Success” Published by Orient Black Swan, Hyderabad

2 hrs

L- Critical Listening and Listening for speaker’s tone/ attitude 1

S- Group discussion and Making presentations 1

R- Critical reading, reading for reference 1

W-Project proposals; Technical reports, Project Reports and Research Papers 1

UNIT-VChapter5: ‘**The Secret of Work**’ from “Epitome of Wisdom”, Published by Maruthi Publications Hyderabad.

2 hrs

G- Adjectives, Prepositions and Concord 2

V- Collocations and Technical Vocabulary 2

REFERENCES :

1. Contemporary English Grammar Structures and Composition by David Green, MacMillan Publishers, New Delhi.2010.
2. Innovate with English: A Course in English for Engineering Students, edited by T Samson, Foundation Books.
3. English Grammar Practice, Raj N Bakshi, Orient Longman.
4. Technical Communication by Daniel Riordan. 2011. Cengage Publications. New Delhi.
5. Effective English, edited by E Suresh Kumar, A RamaKrishna Rao, P Sreehari, Published by Pearson
6. Handbook of English Grammar& Usage, Mark Lester and Larry Beason, Tata Mc Graw – Hill.
7. Spoken English, R.K. Bansal & JB Harrison, Orient Longman.
8. Technical Communication, Meenakshi Raman, Oxford University Press
9. Objective English Edgar Thorpe & Showick Thorpe, Pearson Education
10. Grammar Games, Renuvolcuri Mario, Cambridge University Press.
11. Murphy’s English Grammar with CD, Murphy, Cambridge University Press.
12. Everyday Dialogues in English, Robert J. Dixson, Prentice Hall India Pvt Ltd.,
13. ABC of Common Errors Nigel D Turton, Mac Millan Publishers.
14. Basic Vocabulary Edgar Thorpe & Showick Thorpe, Pearson Education
15. Effective Technical Communication, M Ashraf Rizvi, Tata Mc Graw –Hill.
16. An Interactive Grammar of Modern English, Shivendra K. Verma and Hemlatha Nagarajan , Frank Bros & CO
17. A Communicative Grammar of English, Geoffrey Leech, Jan Svartvik, Pearson Education
18. Enrich your English, Thakur K B P Sinha, Vijay Nicole Imprints Pvt Ltd.,
19. A Grammar Book for You And I, C. Edward Good, MacMillan Publishers

ANURAG ENGINEERING COLLEGE

(AUTONOMOUS)

I Year B.Tech. EEE – II Sem

L	T/P/D	C
3	1/-/	3

MATHEMATICS – II (Mathematical Techniques)

Course Objectives:

- To introduce some special functions like Gamma, Beta and learn how to evaluate definite integrals with the help of special functions.
- Able to know the Laplace, Inverse Laplace transform and sol of ODE by using Laplace transforms, the multiple integrals and analyze the DEL properties.
- Apply the theorems by using line, surface and volume integrals and determine the Fourier coefficients of a given function. Analyze the characteristics and properties of Fourier transforms.

UNIT-I: Laplace transform and its applications to Ordinary differential equations

Laplace transform of standard functions – Inverse transform – first shifting Theorem, Transforms of derivatives and integrals – Unit step function – second shifting theorem – Dirac's delta function – Convolution theorem – Periodic function - Differentiation and integration of transforms – Application of Laplace transforms to ordinary differential equations.

UNIT-II: Gamma and Beta Functions:

Gamma and Beta Functions-Relation between them, their properties – evaluation of improper integrals using Gamma / Beta functions.

UNIT – III: Multiple Integrals

Multiple integrals - double and triple integrals – change of order of integration- change of variables. Gradient- Divergence- Curl and their related properties - Potential function - Laplacian and second order operators.

UNIT-IV: Vector Calculus

Line integral – work done — Surface integrals - Flux of a vector valued function. Vector integrals theorems: Green's – Stoke's and Gauss's Divergence Theorems (Only Statements & their Verifications).

UNIT-V: Fourier Series

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

Course Outcomes:

- *Apply Beta and Gamma functions to evaluate many integrals which cannot be expressed in terms of elementary functions and Laplace transform to solve differential equations which will be converted to algebraic*
- *Evaluate double integrals by changing variables , changing order and triple integration Calculate line integrals along piecewise smooth paths, interpret such quantities as work done by a force*
- *Apply Green's theorem to evaluate line integrals along simple closed contours on the plane, Stoke's theorem to give physical interpretation of the curl of a vector field and Divergence theorem to give physical interpretation of the divergence of a vector field and Develop Fourier series of periodic functions.*

TEXT BOOKS:

1. Grewal B.S (2007), Higher Engineering Mathematics, 40th Edition, New Delhi, Khanna Publishers.
2. Iyengar T.K.V., Krishna Gandhi B. & Others (2011), Mathematical Methods, 10th Revised Edition, New Delhi, S. Chand & Company Limited.
3. Iyengar T.K.V., Krishna Gandhi B. & Others (2011), Engineering Mathematics Vol - I, 10th Revised Edition, New Delhi, S. Chand & Company Limited.
4. Advanced Engineering Mathematics: Erwin Kreyszig, Wiley.

REFERENCE BOOKS:

1. Shahanaz Bathul (2007), Mathematical Methods, 3rd Edition, Hyderabad, Right Publishers.
2. Jain R. K., and Iyengar S. R. K (2008), Advanced Engineering Mathematics, 3rd Edition, New Delhi, Narosa Publication House.
3. Dass H.K. and Rajnish Verma Er (2007), Higher Engineering Mathematics, First Edition, New Delhi, S. Chand & Company Limited.
4. Integral Transforms by A.R.Vasista
5. Schaum's outline series on Vector Analysis; Linear Algebra.
6. Larry C. Andrews and Bhimsen K. Shivamoggi, Integral Transforms for Engineers, Prentice – Hall of India Private Limited, New Delhi.
7. Mathematical Methods of Science and Engineering (Aided with Matlab) Kanti B.Datta (2012), Seventh Edition, CENGAGE Learning.

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I Year B.Tech. EEE – II Sem

L	T/P/D	C
2	1	3

ENGINEERING PHYSICS – II

Course Objectives:

- To impart the knowledge of mathematics and science to determine the working of semiconductor devices .
- Emphasize the study of Quantum mechanics to apply it to solve problems of micro & macro particles.
- To have the knowledge of laser technology to know about the working & applications of laser and importance of nanotechnology which has the world wide importance.

UNIT- I PRINCIPLES OF QUANTUM MECHANICS:

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

UNIT- II FREE ELECTRON THEORY OF METALS:

Classical Theory, Electrical Conductivity and Ohm's Law – Drawbacks, Sommerfield theory (Qualitative), Density of States, Effect of temperature on the Fermi-Dirac distribution.

BAND THEORY OF SOLIDS: Electron in a periodic potential – Bloch Theorem - Kronig-Penney model (Qualitative) – Origin of energy band formation in solids – Classification of materials into conductors, semiconductors & Insulators - Concept of effective mass of an electron.

UNIT- III SEMICONDUCTOR PHYSICS:

Fermi level in Intrinsic and Extrinsic semiconductors - Intrinsic semiconductor and carrier concentration – Extrinsic semiconductor and carrier concentration – Characteristics of p-n junction diode - Hall effect, LED, Photodiode.

FIBRE OPTICS

Basic principle of optical fibre, Acceptance angle, Acceptance cone, numerical aperture (Quantitative), Types of optical fibre, applications of optical fibre.

UNIT IV LASERS:

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

UNIT V BASIC PRINCIPLES OF NANO SCIENCE:

Introduction, surface to volume ratio, quantum confinement – Fabrication of nano materials- Top down fabrication, Bottom up fabrication: sol-gel Technique, CVD method– Characterization (XRD & TEM) - Applications of nanomaterials.

Course Outcomes:

- *Having the knowledge of semiconductors & fiber optics, there will be a chance to know their applications.*
- *There will be a chance for them to use the subject as a mathematical tool to solve their real life problems.*
- *The students will be able to know the working of different lasers & their real life applications.*

TEXT BOOKS:

1. Engineering Physics by P K palanisamy :Sciotech publication
2. Solid State Physics by M Armugam; Anuradha Publications

REFERENCE BOOKS:

1. Introduction to Solid State Physics by Charles Kittel : John Wiley & Sons
2. Engineering Physics by R.K.Gaur and S.L.Gupta; Dhanpat Rai and Sons
3. Engineering Physics by V Rajendran; McGraw hill education private ltd.
4. A Text book of Engineering Physics by M N Avadhanulu, P G Kshirsagar; S Chand
5. Engineering Physics by K Malik, A K Singh; Tata Mc Graw hill book publishers
6. Engineering Physics by M.R.Srinivasan, New Age Publishers

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I Year B.Tech. EEE – II Sem

L	T/P/D	C
3	1/-/-	3

COMPUTER PROGRAMMING - II

Course Objectives:

- To explain various sorting and searching techniques
- To explain structures, unions, and enumeration types and operations on them
- To understand dynamic memory management using pointers and basic data structures such as stacks, queues and linked lists.

UNIT - I

Searching and Sorting – Sorting- selection sort, bubble sort, Insertion sort, Quick Sort, Merge sort, Searching-linear and binary search methods.

UNIT - II

Structures - Declaration, initialization, accessing structures, operations on structures, nested structures, arrays of structures, Unions, Enumerated types, Type Definition (typedef), C programming examples.

UNIT - III

Pointers – Concepts, declarations, usage, pointers to pointers, pointer expressions, Arrays and Pointers, array of pointers, parameter passing of pointers, pointers to void, pointers to functions, structures through pointers, self referential structures, C programming examples

UNIT - IV

Lists- Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, Stacks- Push and Pop Operations, Queues- Enqueue and Dequeue operations.

UNIT - V

Input and Output – Concept of a file, streams, text files and binary files, Differences between text and binary files, State of a file, Opening and Closing files, file input / output functions (standard library input / output functions for files), file status functions (error handling), Positioning functions, command –line arguments, C program examples.

Course Outcomes:

- Upon completion of this course the students will have an:
- Ability to design various sorting and searching technique and data types to solve real world problems
- Ability to manage heap memory and implement and use data structures like stacks, queues and linked lists, create and use various types of files in 'C' Language.

TEXT BOOKS:

1. Computer Science: A Structured Programming Approach Using C, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.
2. Programming in C. P. Dey and M Ghosh , Oxford University Press.

REFERENCE BOOKS:

1. C& Data structures – P. Padmanabham, Third Edition, B.S. Publications.
2. C for All, S. Thamarai Selvi, R.Murugesan, Anuradha Publications.
3. Problem Solving and Program Design in C, J.R. Hanly and E.B. Koffman, 7th Edition, Pearson education.
4. Programming in C, Ajay Mittal, Pearson.
5. Programming with C, B.Gottfried, 3rd edition, Schaum's outlines, TMH.
6. Problem solving with C, M.T.Somasekhara, PHI
7. Programming with C, R.S.Bickar, Universities Press.
8. Computer Programming & Data Structures, E.Balagurusamy, 4th edition, TMH.

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I Year B.Tech. EEE – II Sem

L	T/P/D	C
3	1/-/	3

MATHEMATICS-III

(Numerical Techniques and Partial Differential Equations)

Course Objectives:

- *Determination of roots of an equation and calculate some simple methods of obtaining approximate roots of algebraic and transcendental equations.*
- *Interpolate the values using the techniques of Newton's forward and backward, Gauss forward and backward, Lagrange's and spline interpolations, calculate numerical differentiation and numerical integration methods.*
- *Calculate sol of ODE using Taylor's, Euler's, Picard's, Runge Kutta and Predictor-Corrector method, sol of PDE and calculate boundary value problems.*

UNIT-I: Solution of Non-linear Equations and Linear System of Equations.

Solution of Algebraic and Transcendental Equations – The Bisection Method – The Method of False Position – The Iteration Method – Newton-Raphson Method. Solving system of non-homogeneous equations by L-U Decomposition method (Crout's Method) Jacobi's and Gauss-Seidel Iteration method,

UNIT-II: Interpolation:

Introduction- Errors in Polynomial Interpolation – Finite differences- Forward Differences- Backward differences – Central differences – Symbolic relations and separation of symbols- Difference Equations - Differences of a polynomial-Newton's formulae for interpolation – Central difference interpolation Formulae – Gauss Central Difference Formulae – Interpolation with unevenly spaced points-Lagrange's Interpolation formula.

UNIT-III: Numerical Differentiation, Numerical Integration & Curve fitting

Numerical Differentiation, Generalized Quadrature (Newton's Cote's formula), Trapezoidal, Simpson's and Weddle's rules and problems. Curve fitting: Fitting a straight line – Second degree curve – exponential curve-power curve by method of least squares.

UNIT – IV: Numerical solution of IVP's in ODE

Numerical solution of Ordinary Differential equations: Solution by Taylor's series- Picard's Method of successive Approximations-Euler's Method-Runge-Kutta Methods – Predictor-Corrector Methods- Adams-Bashforth Method-Milne-Thomson Method.

UNIT-V: Partial differential equations

Introduction and Formation of partial differential equation by elimination of arbitrary constants and arbitrary functions, solutions of first order linear (Lagrange) equation and nonlinear (Standard type) equations, Charpit's Method, Method of separation of Variables for second order equations. Classification of general second order partial differential equations. Applications of Partial Differential Equations-One dimensional wave equation, Heat equation.

Course Outcomes:

- *calculate some simple methods of obtaining approximate roots of algebraic and transcendental equations.*
- *Ability to Interpolate the values using the techniques of newtons forward and backward, Gauss forward and backward*
- *Ability to Calculate sol of ODE using Taylor's, Euler's, Picasrd's, Runga Kutta*

TEXT BOOKS:

1. Grewal B.S (2007), Higher Engineering Mathematics, 40th Edition, New Delhi, Khanna Publishers.
2. Iyengar T.K.V., Krishna Gandhi B. & Others (2011), Mathematical Methods, 10th Revised Edition, New Delhi, S. Chand & Company Limited.
3. Advanced Engineering Mathematics: Erwin Kreyszig, Wiley.

REFERENCE BOOKS:

1. Shahanaz Bathul (2007), Mathematical Methods, 3rd Edition, Hyderabad, Right Publishers.
2. Jain R. K., and Iyengar S. R. K (2008), Advanced Engineering Mathematics, 3rd Edition, New Delhi, Narosa Publication House.
3. Introductory Methods of Numerical Analysis. S.S. Sastry, Prentice Hall.
4. Numerical Analysis (Paper IV), First Edition 2010, Telugu Akademi, Hyderabad.
5. Schaum's outline series on Matrices.
6. Mathematical Methods of Science and Engineering (Aided with Matlab) Kanti B.Datta (2012), Seventh Edition, CENGAGE Learning.

ANURAG ENGINEERING COLLEGE

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I Year B.Tech. EEE – II Sem

L	T/P/D	C
3	1	3

ENGINEERING CHEMISTRY

Course objectives:

- To appraise the students about the importance and role of chemistry in the field of Engineering by explaining the relevant topics.
- To provide the students with the necessary knowledge to solve the problems and make decisions with regards to the application of materials in a variety of engineering disciplines.
- To equip the students with the required fundamentals of engineering chemistry carry out in the interdisciplinary research such that the findings benefit the common man and polymer chemistry, electrochemistry (including batteries) and advanced engineering materials.

UNIT I: WATER: Hardness of water, expression of hardness (CaCO_3 equivalent), units and types of hardness. Estimation of temporary and permanent hardness of water by EDTA method. Numerical problems based on hardness of water. Potable water: characteristics, treatment of water for domestic supply. Desalination of brackish water: reverse osmosis. Alkalinity of water and its determination. Boiler troubles: priming and foaming, boiler corrosion, scales, sludges and caustic embrittlement. Boiler feed water and its treatment: Internal treatment (colloidal, phosphate calgon conditioning of water). External treatment (zeolite process and ion –exchange process) , Numerical problems on softening of water.

UNIT II: ELECTROCHEMISTRY : Conductance and its types . Electrode, electrode potential, galvanic cell , cell reactions and cell notation, cell EMF , types of electrodes (Normal Hydrogen Electrode , calomel electrode, glass electrode and quinhydrone electrode), Nernst equation Numerical problems. Potentiometric titrations. Concentration cells, classification with examples.

BATTERIES: Introduction to cell and battery, characteristics of a cell. Primary (dry cell and lithium cell) and secondary cells, (lead-Acid cell, Ni-Cd cell and Lithium ion cells,). Solar battery, engineering applications of batteries. Fuel cells – Hydrogen – Oxygen fuel cell, advantages and engineering applications of fuel cells.

UNIT III: CORROSION AND ITS CONTROL Introduction, types of corrosion : chemical and electrochemical corrosion, mechanism of chemical and electrochemical corrosion , galvanic , water line and pitting corrosion, factors affecting the rate of corrosion : nature of the metal , galvanic series, purity of metal, nature of corrosion product , nature of environment : effect of temperature, effect of pH, humidity. Corrosion control methods: Cathodic protection: sacrificial anode method and impressed current cathode method. Protective coatings : metallic coatings (anodic and cathodic), methods of application on metals , hot dipping (galvanizing), cladding, cementation, electroplating(of copper) electroless plating (of nickel) . Organic coatings – paints, its constituents and their functions.

UNIT IV: POLYMER CHEMISTRY : Introduction, classification of polymers, types of polymerization (addition and condensation, *mechanisms not included*). Plastics- types of plastics -thermoplastics and thermosetting plastics. Compounding and moulding of plastics. Preparation, properties and engineering applications of PVC, Teflon and Bakelite. Fibers: Nylon 6, 6 and Terelene (Dacron). Elastomers: natural rubber, structure, vulcanization. Synthetic rubbers: Buna-S, butyl rubber, Thikol rubber. Conducting polymers: classification, mechanism of conduction, Poly acetylene - preparation and effects of doping on conduction. Applications of conducting polymers.

UNIT V: ADVANCED ENGINEERING MATERIALS: Biodegradable polymers, types, examples: Polyhydroxy butyrate (PHB) ,Poly-Hydroxybutyrate-co-b-Hydroxy valerate (PHBV) ,Polyglycolic acid (PGA) , Polylactic acid (PLA) ,Poly (Î-caprolactone) (PCL). Applications of biodegradable polymers.

Composite materials: Constituents of composite materials. Types of composite materials. Advantages and engineering applications of composite materials.

Nano materials: Introduction, basic methods of preparation and applications of nano materials.

Insulators- Classification, characteristics of thermal & electrical insulators and applications.

Biofuels – biodiesel, general methods of preparation and advantages

Course Outcomes:

- *As commences with fundamentals which indeed takes the individual students to be more conversant with apparatus and allied.*
- *Gets equipped with the technical importance of knowing the extent of hardness and consciousness of units and with fundamentals which indeed takes the individual students to be more conversant with apparatus and allied .*
- *Students gets augmented the adroitness and keep aware of some industrial determination techniques , the adroitness and keep aware of some industrial determination techniques*

TEXT BOOKS:

1. Engineering Chemistry by NYS.Murthy, Pearson, India.
2. Engineering Chemistry by P.C Jain & Monica Jain, Dhanpat Rai Publishing Company

REFERENCE BOOKS:

- 1.Text Book of Engineering Chemistry by Shasi Chawla, Dhantpat Rai publishing Company,
2. Engineering Chemistry by C.Daniel Yesudian , Anuradha publications

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I Year B.Tech. EEE – II Sem

L	T/P/D	C
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English Language Communication Skills Lab-II

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

Objectives

- To facilitate computer-aided multi-media instruction enabling individualized and independent language, learning of English speech sounds, word accent, intonation and rhythm.
- To bring about a consistent accent and intelligibility in their pronunciation of English by providing an opportunity for practice in speaking English and neutralize mother tongue influence.
- To train students to use language appropriately for interviews, group discussion and public speaking

Learning Outcomes:

1. Better Understanding of nuances of language through audio- visual experience and group activities
2. Neutralization of accent for intelligibility
3. Speaking with clarity and confidence thereby enhancing employability skills of the students

Syllabus: English Language Communication Skills Lab shall have two parts:

1. **Computer Assisted Language Learning (CALL) Lab**
2. **Interactive Communication Skills (ICS) Lab**

The following course content is prescribed for the English Language Communication Skills Lab

Exercise-I

CALL Lab: Minimal Pairs
Word accent and Stress Shifts
Listening Comprehension

Exercise-II

ICS Lab: Descriptions- Narrations- Giving Directions and Guidelines
Question Tags and One-Word Substitutes

Concord (Subject in agreement with verb) and Words often misspelt- confused/misused

Exercise-III

CALL Lab: Intonation and Common Errors in Pronunciation.-Neutralization of Mother Tongue Influence and Conversation Practice.

Exercise-IV

ICS Lab: Extempore - Oral Presentation Skills
Active and Passive Voice,

Exercise-V

ICS Lab: Information Transfer

Public Speaking

Reading Comprehension

Job Application with Resume preparation.

Minimum Requirement of infra structural facilities for ELCS Lab:

1. Computer Assisted Language Learning (CALL) Lab:

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

System Requirement (Hardware component):

(computers with suitable configuration as per the purchased software demands)

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

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

2. Interactive Communication Skills (ICS) Lab:

The Interactive Communication Skills Lab: A Spacious room with movable chairs and audio-visual aids with a Public Address System, a T. V., a digital stereo –audio & video system and camcorder etc.

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

1. Suresh Kumar, E. & Sreehari, P. 2009. A Handbook for English Language Laboratories. New Delhi: Foundation
2. Strengthen Your Steps - Dr. M. Hari Prasad and others, Maruthi Publications
3. Speaking English Effectively 2nd Edition by Krishna Mohan and N. P. Singh, 2011. Macmillan Publishers India Ltd. Delhi.
4. Sasi Kumar, V & Dhamija, P.V. How to Prepare for Group Discussion and Interviews. Tata McGraw Hill
5. Hancock, M. 2009. English Pronunciation in Use. Intermediate. Cambridge: CUP
6. Spoken English: A Manual of Speech and Phonetics by R. K. Bansal & J. B. Harrison. 2013. Orient Blackswan. Hyderabad.
7. Hewings, M. 2009. English Pronunciation in Use. Advanced. Cambridge: CUP
8. Marks, J. 2009. English Pronunciation in Use. Elementary. Cambridge: CUP
9. Nambiar, K.C. 2011. Speaking Accurately. A Course in International Communication. New Delhi: Foundation
10. Soundararaj, Francis. 2012. Basics of Communication in English. New Delhi: Macmillan
11. Spoken English (CIEFL) in 3 volumes with 6 cassettes, OUP.
12. A textbook of English Phonetics for Indian Students by T. Balasubramanian (Macmillan)
13. Lab Manual: A Manual entitled “English Language Communication Skills (ELCS) Lab Manual- cum- Work Book”, published by Cengage Learning India Pvt. Ltd, New Delhi. 2013.

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I Year B.Tech. EEE – II Sem

L	T/P/D	C
0	-/3/-	2

COMPUTER PROGRAMMING – II LAB

Course Objectives:

- To make the student to implement various sorting and searching techniques
- To introduce the student to structures, unions, and enumeration types and operations on them, create various types of files in 'C' Language.
- To introduce the student dynamic memory management using pointers, basic data structures such as stacks, queues and linked lists.

Week 1:

Review of Arrays and functions.

Week 2:

Write programs to illustrate the implementation of Bubble Sort and Selection Sort

Week 3:

Write programs to illustrate the implementation of Insertion Sort and Quick Sort

Week 4:

Write programs to illustrate the implementation of Merge Sort.

Week 5:

Write programs to illustrate the implementation of Binary Search and Linear Search.

Week 6 & 7:

Write programs to illustrate the various concepts of structures

Week 8:

Write programs to illustrate the concepts of accessing variables using pointers

Week 9:

Write programs to illustrate the implementation of call by reference

Week 10:

Write programs to illustrate the implementation of arrays using pointers

Week 11:

Write programs to implement structures using pointers

Week 12:

Write program to illustrate the implementation of Single Linked List

Week 13:

Write programs to illustrate Stack operations using arrays and pointers

Week 14:

Write programs to illustrate Queue operations using arrays and pointers

Week 15:

Write programs to illustrate the various concepts of files.

Week 16:

Review

ANURAG ENGINEERING COLLEGE

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I Year B.Tech. EEE – II Sem

L	T/P/D	C
0	-/3/-	2

ENGINEERING CHEMISTRY LAB

Course objectives:

- To impart fundamental knowledge in handling the equipment /glassware and chemicals in the chemistry laboratory.
- To offer hands on experience on the basic equipment related to engineering chemistry.
- For practical understanding of theoretical concepts of chemistry.

(Any ten experiments out of the following fourteen experiments should be performed)

Titrimetry:

1. Fundamentals of volumetric analysis : (a) Determination of strength of an acid (HCl)
2. Estimation of ferrous iron by dichrometry
3. Estimation of hardness of water by EDTA method.
4. Determination of alkalinity of water.
5. Determination of free chlorine or chlorides in water.
6. Determination of iron by permanganometry.
7. Estimation of copper by colorimetric method.
8. Estimation of HCl by conductometry using standard NaOH solution.
9. Estimation of HCl by potentiometry using standard NaOH solution.
10. Determination of viscosity of sample oil by Redwood/Oswald's viscometer
11. Determination surface tension of lubricants.
12. Determination of the rate constant of acid catalyzed hydrolysis of methyl acetate .
13. Preparation of thiokol rubber and nylon 6,6.
14. Preparation of Biodiesel from Waste Vegetable Oil (WVO).

Course Outcomes:

- As commences with fundamentals which indeed takes the individual students to be more conversant with apparatus and allied.
- Gets equipped with the technical importance of knowing the extent of hardness and consciousness of units and the adroitness and keep aware of some industrial determination techniques.
- Students gets augmented As commences with fundamentals which indeed takes the individual students to be more conversant with apparatus and allied .

TEXT BOOKS:

1. [Vogel's Textbook of Quantitative Chemical Analysis](#)
2. Essentials of experimental engineering chemistry, Shashi Chawla, Dhanpat Rai & Co
3. Laboratory manual of engineering chemistry, S.K.Bhasin and Sudha Rani , Dhanpat Rai & Co.
4. A text book on experiments and calculations. S.S. Dara, S. Chand & Co

REFERENCE BOOKS:

1. Instrumental methods of chemical analysis, Chatwal, Anand, Himalaya Publications.

ANURAG ENGINEERING COLLEGE

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I Year B.Tech. EEE – II Sem

L	T/P/D	C
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IT WORKSHOP

Objectives:

The IT Workshop for engineers is a training lab course spread over 40 hours. The modules include training on PC Hardware, Internet & World Wide Web and Productivity tools including Word, Excel, and Power Point.

PC Hardware introduces the students to a personal computer and its basic peripherals, the process of assembling a personal computer, installation of system software like MS Windows, Linux and the required device drivers. In addition hardware and software level troubleshooting process, tips and tricks would be covered. **The students should work on working PC to disassemble and assemble to working condition and install Windows and Linux on the same PC. Students are suggested to work similar tasks in the Laptop scenario wherever possible.**

Internet & World Wide Web module introduces the different ways of hooking the PC on to the internet from home and workplace and effectively usage of the internet. Usage of web browsers, email.

Productivity tools module would enable the students in crafting professional word documents, excel spread sheets and power point presentations. **(Recommended to use Microsoft office 2007 in place of MS Office 2003)**

PC Hardware

Exercise 1 – Task 1: Identify the peripherals of a computer, components in a System Cabinet and its functions. Draw the block diagram of the compute mother board along with the configuration of each peripheral and submit to your instructor.

Exercise 2 – Task 2 : Every student should disassemble and **assemble the PC back to working condition**. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.

Exercise 3 – Task 3 : Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

Exercise 4 – Task 4: Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both windows and Linux. Lab instructors should verify the installation and follow it up with a Viva.

Internet & World Wide Web

Exercise 5 - Task 1 : Orientation & Connectivity Boot Camp : Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.

Exercise 6 - Task 3: Search Engines & Netiquette: Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student.

MS Word

Exercise 7&8: The mentor needs to give an overview of Microsoft (MS) word 2007: Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word. Give a task covering to create project certificate. Features to be covered:-Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Inserting table, using Drawing toolbar in word.

MS Excel

Exercise 9&10: The mentor needs to tell the importance of MS office 2007 Excel as a Spreadsheet tool covering Accessing, overview of toolbars, saving excel files, Using help and resources., Also give a task that is covering the features like Gridlines, Format Cells, Summation, auto fill, Formatting Text.

MS Power Point

Exercise 11&12: Students will be working on MS power point which help them create basic power point presentation. Topic covered during this Exercise includes :- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in Power point. Students will be given model power point presentation which needs to be replicated (exactly how it's asked).

REFERENCES:

1. Comdex Information Technology course tool kit Vikas Gupta, WILEY Dream tech
2. The Complete Computer upgrade and repair book,3rd edition Cheryl A Schmidt, WILEY Dreamtech
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
4. PC Hardware and A+Handbook – Kate J. Chase PHI (Microsoft)
5. IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson and Ken Quamme. – CISCO Press, Pearson Education.
6. IT Essentials PC Hardware and Software Labs and Study Guide Third Edition by Patrick Regan – CISCO Press, Pearson Education.

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MATHEMATICS-IV

COURSE OBJECTIVE:

- Series solutions for Legendre and Bessel differential equations, analyzing the properties of Legendre and Bessel polynomials.
- Evaluation of integrals using Cauchy's integral formula.
- Taylor's series, Maclaurin's series and Laurent's series expansions of complex functions.
- Identify the transformations like translations, magnification, rotation and reflection and inversion.

UNIT-I: Fourier Transformations

Fourier integral theorem – Fourier sine and cosine integrals. Fourier transforms – Fourier sine and cosine transforms – properties – inverse transforms – Convolution theorem – Finite Fourier transforms.

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. Elementary functions: Exponential, trigonometric, hyperbolic functions and their properties – General power Z (c is complex), principal value.

UNIT-III: Complex Integration and Complex Power series

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

Radius of convergence – Expansion in Taylor's series, Maclaurin's series and Laurent series.

Singular point – Isolated singular point – pole of order m – essential singularity.

UNIT-IV: Contour Integration

Residue – Evaluation of residue by formula and by Laurent series - Residue theorem. Evaluation of integrals of the type

(a) Improper real integrals $\int_{-\infty}^{\infty} f(x) dx$

(b) $\int_C^{c+2\pi} f(\cos \theta, \sin \theta) d\theta$

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

(d) Integrals by indentation.

UNIT-V: Conformal mapping

Transformation by $e^z, \ln z, z^2, z^n$ (n positive integer), $\sin z, \cos z, z + a/z$. Translation, rotation, inversion and bilinear transformation – fixed point – cross ratio – properties – invariance of circles and cross ratio – determination of bilinear transformation mapping 3 given points

COURSE OUTCOMES:

- Apply the forbenius method to obtain a series solution for the given linear 2nd ODE.
- Identify Bessel equation and legendre equation and solve them under special conditions with the help of series solutions method. Also recurrence relations and orthogonality properties of Bessel and legendre Polynomials
- Analyze the complex functions with reference to their analyticity, integration using cauchy's integral theorem.
- Find the taylor's and Laurent series expansion of complex functions.

TEXT BOOKS:

1. A text Book of Engineering Mathematics, Vol-III T. K. V. Iyengar, B. Krishna Gandhi and Others, S. Chand & Company.
2. Grewal B.S (2007), Higher Engineering Mathematics, 40th Edition, New Delhi, Khanna Publishers.
3. Iyengar T.K.V., Krishna Gandhi B. & Others (2011), Mathematical Methods, 10th Revised Edition, New Delhi, S. Chand & Company Limited.
4. A text Book of Engineering Mathematics, C. Sankaraiah, V. G. S. Book Links.
5. A text Book of Engineering Mathematics, P. Nageshwara Rao, Y. Narasimhulu & N. Prabhakar Rao, Deepthi Publications.

REFERENCE BOOKS:

1. A text Book of Engineering Mathematics, B. V. Raman, Tata Mc Graw Hill.
2. Advanced Engineering Mathematics, Irvin Kreyszig, Wiley India Pvt. Ltd.
3. A text Book of Engineering Mathematics, Thamson Book Collection.
4. Shahanaz Bathul (2010), Engineering Mathematics - III, 2nd Edition, Hyderabad, PHI Learning Private Limited.
5. Schaum's outline series on Complex Anlysis.
6. Mathematical Methods of Science and Engineering (Aided with Matlab) Kanti B.Datta (2012), Seventh Edition, CENGAGE Learning.

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FLUID MECHANICS AND HYDRAULIC MACHINERY

Course Objective:

- *This course will introduce fluid mechanics and establish its relevance in many areas such as Water supply system, Hydraulic turbines and Pumps etc.*
- *The main objective of this subject is to impart fluid power applications and to understand the behavior of the fluids in all the situations.*
- *Develop the fundamental principles underlying the subject. Demonstrate how these are used for the design of simple hydraulic components.*
- *Train the students to acquire the knowledge and skill of analyzing different Hydraulic Machines.*

UNIT I

Fluid statics: Units and Dimensions: 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-steady & unsteady, uniform, non uniform, laminar, turbulent, rotational, and irrotational 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: Reynolds’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: pilot tube, venturimeter, and orifice meter, Flow nozzle.

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: Unit and specific quantities, Model Analysis, characteristic curves, governing of turbines, selection of type of turbine, cavitation, surge tank,

UNIT V

Centrifugal pumps: classification, working, work done – manometric head, static head-losses and efficiencies specific speed- Model analysis, pumps in series and parallel-performance characteristic curves, NPSH, water hammer

Course Outcomes:

- *Understand various properties of fluid*
- *Apply various laws for measuring the total pressure and centre of pressure on surfaces of various geometries using various manometers*
- *Apply Euler's and Bernoulli's equations for various fluid flow applications*
- *Estimate various major and minor losses in pipes*
- *Apply concept of boundary layer theory on fluid flow*
- *Estimate the forces exerted by jet on plates of various geometries*
- *Estimate the performance of various turbines*

TEXT BOOKS:

1. Hydraulics, Fluid Mechanics and Hydraulic Machinery MODI and SETH.
2. A Text book of Fluid Mechanics /R.K.Bansal/Laxmi Publication (p) Ltd. /9th Edition.
3. Fluid Mechanics and Fluid Power Engineering by D.S. Kumar, Kotaria & Sons.

REFERENCE BOOKS:

1. Fluid Mechanics and Machinery by D. Rama Durgaiyah, New Age International.
2. Hydraulic Machines by Banga & Sharma, Khanna Publishers.
3. Instrumentation for Engineering Measurements by James W. Dally, William E. Riley, John Wiley & Sons.
4. Fluid Mechanics and Hydraulic Machines by Rajput.

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ELECTRONIC DEVICES AND CIRCUITS

Course Objectives:

- To provide clear explanation about the operation of basic semiconductor devices available today.
- To show how each device and its characteristics is used in appropriate circuits
- Demonstration of Amplifier Design with different gain & Oscillator circuits with different frequency operation.

UNIT I – P-N JUNCTION DIODE AND RECTIFIERS:

Quantative theory of P-N Junction, P-N Junction as Diode, Diode Equation, Volt-Ampere Characteristics, Temperature Dependence of VI Characteristic, Transition and Diffusion Capacitances, Diode Equivalent Circuits, Breakdown Mechanisms in Semi Conductor Diodes, Zener Diode Characteristics, Principle of Operation and Characteristics of Tunnel Diode, Schottky Barrier Diode.

The P-N Junction as a Rectifier, Half wave Rectifier, Full wave Rectifier, Bridge Rectifier, Harmonic Components in a Rectifier Circuit, Inductor Filters, Capacitor Filters, L-Section Filters, Π -Section Filters, Comparison of Filters, Voltage Regulation Using Zener Diode, SCR.

UNIT II - BIPOLAR JUNCTION TRANSISTOR AND FIELD EFFECT

TRANSISTOR:

The Junction Transistor, Transistor Current Components, Transistor Construction, BJT Operation, BJT Symbol, Transistor as an Amplifier, Common Base, Common Emitter and Common Collector Configurations, Limits of Operation, BJT Specifications.

The Junction Field Effect Transistor (Construction, Principle of Operation, Symbol), Pinch – Off Voltage –Volt –Ampere Characteristics, The JFET Small Signal Model, MOSFET (Construction, Principle of Operation, Symbol) MOSFET Characteristics In Enhancement and Depletion Modes.

UNIT III - TRANSISTOR BIASING AND STABILIZATION:

Operating Point, The DC and AC Load Lines, Need For Biasing, Fixed Bias, Collector Feedback Bias, Emitter Feedback Bias, Collector Emitter Feedback Bias, Voltage Divider Bias, Bias Stability, Stabilization Factors, Stabilization Against Variation In V_{BE} and β , Bias Compensation Using Diodes and Transistors. Thermal Runway, Thermal Stability, Biasing FET.

UNIT IV - BJT AND FET AMPLIFIERS:

BJT Hybrid Model, Determination of h-Parameters From Transistor Characteristics, Analysis of A Transistor Amplifier Circuit Using h-Parameters, Comparison of CB,

CE And CC Amplifier Configurations. FET Common Source Amplifier, Common Drain Amplifier, Generalized FET Amplifier, FET, As Voltage Variable Resistor, Comparison of BJT And FET, The Uni Junction Transistor

UNIT – V: FEED BACK AMPLIFIERS AND OSCILLATORS:

Concepts of feedback. Classification of feedback amplifiers, General characteristics of negative feedback amplifiers, Effect of Feedback on Amplifier characteristics, Simple problems.

Course Outcomes:

- *Concepts of physical electronics particularly solid state devices and its conductivity.*
- *Operation of PN-junction diode, zener diode and other diodes and interpret its characteristics.*
- *Construction of different rectifier circuits with and without filters.*
- *Ability to draw characteristics of a transistor in various configurations and interpret its usages in different regions.*
- *The concepts of the load line or bias-curve which are used to establish the quiescent operating conditions in a different amplifier circuits.*
- *Design specifications and circuit construction for Amplifiers & Oscillators.*

TEXT BOOKS:

1. Millman's Electronic Devices and Circuits – J. Millman, C.C.Halkias, and Satyabrata Jit Tata McGraw Hill, 2nd Ed., 2007.
2. Electronic Devices and Circuits – R.L. Boylestad and Louis Nashelsky, Pearson/Prentice Hall, 9th Edition, 2006.
3. Introduction to Electronic Devices and Circuits- Rober T. Paynter PE.
4. Electronics Devices and Circuits – A. P. Godse Technical Publications.

REFERENCE BOOKS:

1. Electronic Devices and Circuits – T.F. Bogart Jr., J.S.Beasley and G.Rico, Pearson Education, 6th edition, 2004.
2. Principles of Electronic Circuits – S.G.Burns and P.R.Bond, Galgotia Publications, 2nd Edn., 1998.
3. Microelectronics – Millman and Grabel, Tata McGraw Hill, 1988.
4. Electronic Devices and Circuits – Dr. K. Lal Kishore, B.S.

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NETWORK THEORY

Course Objective:

- To introduces the basic concepts of circuit analysis which is the foundation for all of the Electrical Engineering discipline.
- The emphasis of this course is laid on the basic analysis of circuits which includes network topology, three phase circuits, two port networks, transient analysis and Fourier analysis.

UNIT –I: Network Topology

Definitions - Graph - Tree, Basic cut-set and Basic Tie-set matrices for planar networks - Duality & Dual networks.

Three Phase Circuits

Phase sequence- Star and delta connection-Relation between line and phase voltages and currents in balanced systems- Analysis of balanced and unbalanced three phase circuits-Measurement of active and reactive power.

UNIT-II: D.C and A.C Transient Analysis

Transient response of R-L, R-C, R-L-C circuits (series and parallel) for D.C excitation-Initial conditions- Solution method using differential equation and Laplace transforms .

Transient response of R-L, R-C, R-L-C circuits (series only) for sinusoidal excitation-Initial conditions- Solution method using differential equation and Laplace transforms .

UNIT-III: Network Functions

The concept of complex frequency, Physical interpretation of complex frequency, Transform impedance and Transform circuits, Series and Parallel combination of elements, Terminal pairs or ports, Network functions for the one port and two port, poles and zeros of network functions, Significance of poles and zeros, Properties of driving point functions, Properties of transfer functions, Necessary conditions for driving point function, Necessary conditions for transfer functions, Time domain response from pole zero plot.

UNIT-IV: Network Parameters

Two port network parameters- Z, Y, A, B, C, D and Hybrid parameters and their relations. Cascaded networks, Concept of transformed network- Two port network parameters using transformed variables.

UNIT-V: Filters and Fourier Analysis of A.C Circuits

Low pass, High pass, Band pass, Band Elimination, Prototype filter design. The Fourier theorem, Fourier series consideration of symmetry, exponential form of Fourier series.

Course Outcomes:

- *After going through this course the student can able to understand*
- *Fundamentals on network topology, Connections and Calculation of power in three phase balanced and unbalanced networks.*
- *How to find Transient response of different circuits using Laplace and differential for simple electrical circuits.*
- *Behavior of linear circuits using Laplace transform and transfer function of single port and two port networks Design of filters, Fourier analysis of AC circuits.*

TEXT BOOKS:

1. Electric circuits - *A.Chakrabarthy*, Dhanpat Rai & Sons,2006.
2. Circuits & Networks - *A.Sudhakar and Shyammohan S.Palli*, Tata McGraw Hill, 2012.

REFERENCE BOOKS:

1. Electric Circuit analysis - *B.Subrahmanyam*, I.K International
 2. Network analysis - *Mahmood Nahvi, Joseph Edminister*, Schaum's Outlines, 4th edition, McGraw-Hill Companies, Incorporated, 2003.
 3. Network Analysis - *M.E Van Valkenberg*. Prentice-Hall, 1974.
 4. Electric circuit analysis - *C.L.Wadhwa*, New Age International, 2006.
 5. Electrical circuits theory-*K.Rajeswaran*, Pearson Education, 2004.
- Basic circuits analysis - *D.R Cunningham. & J.A. Stuller*, Jaico Publications, 1993

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ELECTRO MAGNETIC FIELDS

Course Objective:

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

UNIT – I: Electrostatics

Sources and effects of electromagnetic fields – Vector fields – Different co-ordinate systems

– Divergence theorem –Stoke's theorem. Electrostatic Fields – Coulomb's Law – Electric Field Intensity (EFI) – EFI due to a line and a surface charge – Work done in moving a point charge in an electrostatic field – Electric Potential– Properties of potential function – Potential gradient – Guass's law – Application of Guass's Law – Maxwell's first law. Laplace's and Poison's equations – Solution of Laplace's equation in one variable.

UNIT – II: Conductors, Dielectric & Capacitance

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

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

UNIT – III: Magneto Statics, Ampere's circuital law

Static magnetic fields – Biot-Savart's law – Oesterd's experiment - Magnetic field intensity (MFI) – MFI due to a straight current carrying filament – MFI due to circular, square and solenoid current – Carrying wire – Relation between magnetic flux, magnetic flux density and MFI – Maxwell's second Equation. Ampere's circuital law and its applications viz. MFI due to an infinite sheet of current and a long current carrying filament – Point form of Ampere's circuital law – Maxwell's third equation, Field due to a circular, rectangular and square loops.

UNIT –IV: Force in Magnetic fields, Magnetic Potential

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

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

UNIT – V: Inductance, Time Varying Fields

Self and Mutual inductance – Neumann's formulae – determination of self-inductance of a solenoid and toroid and mutual inductance between a straight long wire and a square loop wire in the same plane – energy stored and density in a magnetic field. Introduction to permanent magnets, their characteristics and applications.

Time varying fields – Faraday's laws of electromagnetic induction – Its integral and point forms – Maxwell's fourth equation – Statically and Dynamically induced EMFs – Simple problems -Modification of Maxwell's equations for time varying fields – Displacement current – Poynting Theorem and Poynting vector.

Course Outcomes:

After going through this course the student can able to understand

- *Ability to apply vector mathematics and physics to calculate parameters electro magnetic problems.*
- *Properties and behavior of conductors, dielectrics & capacitance.*
- *Magneto statics and Physical laws of electro magnetism, Force in magnetic fields, Magnetic potential and its properties.*
- *Calculation of inductance, Basic concepts on time varying fields in Integral form and point form.*

TEXT BOOKS:

1. Engineering Electromagnetics - William H. Hayt & John. A. Buck McGraw Hill Companies, 7th Edition, 2012.
2. Electromagnetic Fields - Sadiku, Oxford Publications, 7th edition, 2006.

REFERENCE BOOKS:

1. Introduction to Electro Dynamics - D J Griffiths, Prentice-Hall of India Pvt. Ltd, 2nd editon, 1989.
2. Electromagnetic - J P Tewari, Khanna Publishers, 2nd edition, 2005.
3. Electromagnetics - J. D Kraus, McGraw Hill Inc, 4th edition 1992.
4. Electromagnetic fields - S. Kamakshiah, Right Publishers, 2007.

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3.

ELECTRICAL MACHINES-1

Course Objective:

- The objective of the course is to provide the student with lucid and comprehensive treatment of the most important Direct Current machines (motors and generators).
- This course emphasizes the physical understanding of the basic principles underlying the operation and performance of DC machines

UNIT-I: Electromechanical Energy Conversion

Electromechanical Energy conversion – forces and torque in magnetic field systems – energy balance – energy and force in a singly excited magnetic field system, determination of magnetic force - co-energy – multi excited magnetic field systems.

UNIT-II: D.C. Generators – Construction & Operation

D.C. Generators – Principle of operation – Action of commutator – constructional features – classification of DC generators – separately excited and self excited generators – armature windings – lap and wave windings – simplex and multiplex windings – use of laminated armature – E. M.F Equation – Armature reaction – cross magnetizing and demagnetizing AT/pole – compensating winding – commutation – reactance voltage – methods of improving commutation.

UNIT-III: Operating Characteristics of D.C. Generators

Build up of EMF – magnetization curve/occ characteristics – critical field resistance and critical speed – causes for failure of self excitation – remedial measures – load characteristics of d.c shunt, series and compound generators – parallel operation of d.c series generators – use of equalizer bar and cross connection of field windings – load sharing – applications.

UNIT-IV: D.C. Motors

D.C Motors – Principle of operation – Back E.M.F. - Torque equation – characteristics and applications of shunt, series and compound motors – Armature reaction and commutation – speed control of D.C. Motors: armature voltage and field flux control methods – Ward-Leonard system.
Principle of operation of 3 point and 4 point starters with protective devices.

UNIT-V: Testing of D.C. Machines

Testing of D.C. machines: Losses – Constant & Variable losses – calculation of efficiency – condition for maximum efficiency
Methods of Testing – direct, indirect and regenerative testing – brake test – Swinburne's test
– Hopkinson's test – Field's test – Retardation test – separation of stray losses in a D.C. motor test.

Course Outcomes:

After going through this course the student can able to understand

- *Electromagnetic conversion, operation of single and multi excited systems and construction of D.C machine, different types of DC generators their characteristics, industrial applications, effect of armature reaction and its assessment.*
- *The principle of DC motor, electrical characteristics and industrial application, purpose of starter and its design.*
- *Various losses, different tests in DC machines and calculation of their efficiency.*

TEXT BOOKS

1. Electric Machinery- *P.S. Bimbra*, Khanna Publishers, 7th edition, 2010,
2. Theory and performance of Electrical machines – *J.B Gupta*, S.K Kataria & Sons publishers, 2009.

REFERENCE BOOKS

1. Electrical Machines – *S.K. Bhatta Charya*, McGraw Hill Companies, 2007.
2. Electrical Machines - *I.J. Nagrath & Kothari*, McGraw Hill Companies, 3rd edition, 2004.
3. Electric Machines – *M.V. Deeshpande*, Wheeler Publishing, 1997.
4. Electrical machinery - *A.E. Fitzgerald C. Kingsley and S. Umans*, McGraw Hill Companies, 5th edition, 2010.

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13.

FLUID MECHANICS AND HYDRAULIC MACHINES LAB

Objectives:

The course will give the student an insight into working of various fluid machines and be able to compare performance of fluid machines under different working conditions

1. Impact of jets on Vanes
2. Performance test on Pelton wheel
3. Performance test on Francis Turbine.
4. Performance test on single stage centrifugal pump.
5. Performance test on Multi stage centrifugal pump.
6. Performance test on Reciprocating pump.
7. Calibration of Venturi meter.
8. Calibration of Orifice meter.
9. Determination of friction factor for a given pipe line.
10. Determination of loss of head due to sudden contraction in a pipeline.
11. Verification of Bernoulli's Equation.
12. Performance test on Kaplan turbine.

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

Learning Outcomes:

1. Impact of jet
2. Performance test on Pelton wheel
3. Performance test on Francis turbine
4. Performance test on single stage centrifugal pump.
5. Performance test on multi stage centrifugal pump.
6. Performance test on reciprocating pump.
7. Calibration of venturimeter.
8. Calibration of orifice meter
9. Determine of friction factor for a given pipe line.
10. Determine of loss of head due to sudden contraction in a pipeline.
11. Performance test on turbine flow meter
12. Performance test on Kaplan turbine

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ELECTRICAL CIRCUITS & SIMULATION LAB

Course Objectives:

This course introduces the basic concept of circuit analysis which is the foundation for all of the electrical discipline. The emphasis of the course is lied on the basic analysis of circuit which includes theorems, Application of PSPICE on electrical Circuit

PART-A: Electrical Circuits

Any Eight experiments should be conducted

- 1) Verification of Kirchhoff's current law and Kirchhoff's Voltage law.
- 2) Verification of Thevenin's, Norton's and Maximum Power Transfer Theorems.
- 3) Verification of Superposition theorem.
- 4) Verification of Compensation Theorem.
- 5) Verification of Reciprocity and Millmann's Theorems.
- 6) Time response of first order RL/RC network for periodic non-sinusoidal inputs-time constant and steady state error determination.
- 7) Series and Parallel Resonance.
- 8) Determination of Self, Mutual Inductances and Coefficient of coupling.
- 9) Verification of Z and Y Parameters.
- 10) Transmission and hybrid parameters.
- 11) Measurement of Active Power for Star and Delta connected balanced loads.
- 12) Measurement of Reactive Power for Star and Delta connected balanced loads.
- 13) Measurement of 3-phase Power by two Wattmeter Method for unbalanced loads.
- 14) Locus Diagrams of RL and RC Series Circuits.

PART-B: PSPICE Simulation

Any Two experiments should be conducted

- 1) Simulation of DC Circuits & AC Circuits of Thevenins Theorem.
- 2) Simulation of DC Transient response of series parallel RLC circuits.
- 3) Simulation of Mesh Analysis and Super Mesh Analysis.
- 4) Simulation of Nodal Analysis with super node.

NOTE:

- PSPICE Software Package is necessary.

Outcomes:

1. To get the practical exposure on Electrical circuits and Networks.
2. To obtain the practical knowledge on Application of PSPICE on electrical Circuits.
3. Able to compare theoretical Results with practical Results.

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ELECTRONIC CIRCUITS

Course Objectives:

- To provide clear explanation about the operation of transistor parameters.
- To show how each device and its characteristics used in appropriate circuits
- Demonstration of Amplifier Design with different gain & Oscillator circuits with different frequency operation.
- To provide clear explanation about the operation of multi-vibrators to generates different waveforms.

UNIT-1: SINGLE STAGE AMPLIFIERS DESIGN AND ANALYSIS:

Review of CE, CB, CC& CS amplifiers-Classification of Amplifiers, Distortion in amplifiers-exact and Approximate analysis, CE, CB, CC amplifiers comparison.

BJT& FET Frequency response - Low frequency analysis-Low frequency response of BJT amplifiers-Low frequency response of FET amplifier-Miller effect capacitance-High frequency response of BJT amplifier-Square wave testing

UNIT II: OSCILLATORS: Condition for oscillations. RC and LC type oscillators, Crystal oscillators, Frequency and amplitude stability of oscillators, Generalized analysis of LC oscillators, Quartz (Hartley, Colpitts), RC-phase shift and Wien-bridge oscillators.

UNIT III: LARGE SIGNAL AMPLIFIERS:

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

UNIT IV: CLIPPERS AND CLAMPERS:

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

UNIT V: SWITCHING CHARACTERISTICS OF DEVICES

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

MULTIVIBRATORS

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

Course Outcomes:

- *Ability to find out the different parameters of the transistor.*
- *Design specifications and circuit construction for Amplifiers & Oscillators.*
- *Ability to find out the different parameters of the power amplifiers.*
- *Design specifications and circuit construction for Clippers & Clampers.*
- *Ability to design different types of multi-vibrators*

TEXT BOOKS:

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

REFERENCE BOOKS:

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

ANURAG ENGINEERING COLLEGE

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II Year B.Tech. EEE – II Sem

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MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Objective: To explain the basic principles of managerial economics, accounting and current business environment underlying business decision making.

UNIT – I

Introduction to Managerial Economics: Definition, Nature and scope of Managerial Economics – Demand Analysis: Demand Determinants, Law of Demand and its exceptions.

Elasticity of Demand: Definition, Types, Measurement and Significance of Elasticity of Demand. Demand Forecasting, methods of demand forecasting (survey methods, statistical methods, expert opinion method, test marketing, controlled experiments, judgmental approach to demand forecasting)

UNIT – II

Theory of Production and Cost Analysis: Production Function – Isoquants and Isocosts, MRTS, Least Cost Combination of inputs, Laws of Returns, internal and External Economics of scale.

Cost Analysis: Cost concepts, Opportunity cost, Out of pocket costs vs. Imputed costs. Break – even Analysis (BEA) – Determination of Break – Even Point (simple problems) – Managerial Significance and limitations of BEA.

UNIT – III

Introduction to Markets & Pricing Policies:

Market structures: Types of competition, Features of Perfect competition, Monopoly and Monopolistic Competition, Price – Output determination in case of Perfect Competition

Objectives and Policies of Pricing – Methods of Pricing: Cost Plus Pricing, Marginal Cost Pricing, Sealed Bid Pricing, Going Rate Pricing, Limit Pricing, Market Skimming Pricing, Penetration Pricing, Two – Part Pricing, Block Pricing, Peak Load Pricing, Cross Subsidization.

UNIT – IV

Capital and Capital Budgeting: Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements, Nature and scope of capital budgeting, features of capital budgeting proposals, Methods of capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value Method, Profitability Index, Internal rate of return (simple problems)..

UNIT – V

Introduction to Financial Accounting: Double – Entry Book Keeping, Journal, Ledger, and Trial Balance – Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments).

Financial Analysis through ratios: Computation, Analysis and interpretation of Liquidity Ratios (Current Ratio and quick ratio), Activity Ratios (inventory turnover ratio and Debtor Turnover ratio), Capital structure Ratios (Debt – Equity, interest Coverage ratio), and Profitability ratios (Gross Profit Ratio, Net Profit ratio, Operating Profit Ratio, P/E Ratio and EPS).

Learning Outcomes:

Expected to achieve the overall course objective to understand and enhancing the knowledge regarding managerial concepts and obtaining optimal solutions.

And to get an idea of analysis of firm's financial position with the techniques of financial analysis and ratio analysis.

TEXT BOOKS:

1. Aryasri, Managerial Economics and Financial Analysis, TMH, 2009.
2. Varshney & Maheshwari; Managerial Economics, Sultan Chand, 2009.

REFERENCES:

1. Raghunatha Reddy & Narasimhachary; Managerial Economics & Financial Analysis, Scitech, 2009.
2. V. Rajasekarn & R.Lalitha, Financial Accounting, Pearson Education, New Delhi, 2010.
3. Suma Damodaran, Managerial Economics, Oxford University Press, 2009.
4. Domnick Salvatore; Managerial Economics in a Global Economy, 4th Edition, Cengage, 2009.
5. Subhash Sharma & M.P.Vittal, Financial Accounting for Management, Text & Cases, Machmillan, 2008.
6. S.N. Maheshwari & S.K .Maheshwari, Financial Accounting, Vikas 2008.
7. Truet and Truet; Managerial Economics; Analysis, Problems and Cases, Wiley, 2009.
8. Dwivedi; Managerial Economics, Vikas 2009.
9. M. Kasi Reddy, S.Saraswathi; Managerial Economics and Financial Accounting, PHI, 2007.
10. Erich A. Helfert; Techniques of Financial Analysis, Jalco, 2007.

Codes / Tables: Present Value Tables need to be permitted into the examinations Hall.

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POWER SYSTEMS-I

Course Objective:

Electrical Power plays significant role in day to day life of entire mankind. This course concerns the generation and distribution of power along with the economic aspects.

UNIT-I:

Power Stations:

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

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

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

UNIT-II:

General Aspects of D.C & A.C Distribution Systems: Classification of Distribution Systems - Comparison of DC vs. AC and Under-Ground vs. Over - Head Distribution Systems- Requirements and Design features of Distribution Systems- Voltage, Drop Calculations (Numerical Problems in D.C Distributors for the following cases: Radial D.C Distributor fed one end and at the both the ends (equal/unequal voltages) and Ring Main Distributor. Voltage Drop Calculations (Numerical Problems) in A.C. Distributors for the following cases: Power Factors referred to receiving end voltage and with respect to respective load voltages.

UNIT-III:

Air Insulated & Gas Insulated (GIS) Substations: Classification of substations: - Indoor & Outdoor substations: Substations layout showing the location of all the substation equipment. Bus bar arrangements in the Sub-Stations: Simple arrangements like single bus bar, sectionalized single bus bar, main and transfer bus bar system with relevant diagrams. Advantages of Gas insulated substations, different types of gas insulated substations, single line diagram of gas insulated substations, busbar, construction aspects of GIS, Installation and maintenance of GIS, Comparison of Air insulated substations and Gas insulated substations.

UNIT-IV:

Power Factor & Voltage Control: Causes of low power factor -Methods of Improving power factor -Phase advancing and generation of reactive KVAR using static Capacitors-Most economical power factor for constant KW load and constant KVA type loads, Numerical Problems.

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

UNIT-V:

Economic Aspects of Power Generation & Tariff: Load curve, load duration and integrated load duration curves-load, demand, diversity, capacity, utilization and plant use factors-Numerical Problems. Costs of Generation and their division into Fixed, Semi-fixed and Running Costs.

Desirable Characteristics of a Tariff Method-Tariff Methods: Flat Rate, Block- Rate, two-part, three —part, and power factor tariff methods and Numerical Problems.”

Course Outcomes:

After going through this course the students can able to understand

- How the electrical power will be generated from different sources.
- Layout of substations, their Equipments and distribution systems.
- The economical aspects of power generation and different types of tariffs.

TEXT BOOKS:

1. Principles of Power Systems by V.K Mehta and Rohit Mehta S.Chand Company Pvt. Ltd, New Delhi 2004.
2. Electrical Power Systems, PSR. Murty, BS Publications.

REFERENCE BOOKS:

1. A Text book of Power system Engineering, R.K. Rajput, Laxmi Publications (P) Limited.
2. Electrical Power Generation, Transmission and Distribution, S.N.Singh', PHI.
3. Electrical Power Systems by C.L.Wadhawa New Age International (P) Limited, Publishers.
4. Generation of Electrical Energy, Dr. B.R. Gupta, S. Chand.

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CONTROL SYSTEMS

Course Objective:

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

UNIT – I: Introduction to Control System

Concepts of Control Systems- Open Loop and closed loop control systems and their differences- Different examples of control systems- Classification of control systems, Feed-Back Characteristics, Effects of feedback. Mathematical models – Differential equations, Impulse Response and transfer functions – Translational and Rotational mechanical systems and electrical systems.

Transfer Function Representation

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

UNIT-II: Time and Frequency Response Analysis

Standard test signals - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants – Effects of proportional derivative, proportional- integral systems. sinusoidal transfer function, Determination of Frequency domain specifications

UNIT –III: Stability Analysis in Time and Frequency Domain

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

Root Locus Technique

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

Bode plots

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

Polar plots and Nyquist Plots -.Nyquist stability criterion.

UNIT – IV: Classical Control Design Techniques

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

UNIT – V: State Space Analysis of Continuous Systems

Concepts of state, state variables and state model, derivation of state models - Solving the Time invariant state Equations- State Transition Matrix and its Properties.

Course Outcomes:

After going through this course the student can able to understand

- *The basic concepts and applications of control systems in day to day life.*
- *The transfer function analysis in mathematical modeling of control system which helps mainly in stability and designing of control systems.*

TEXT BOOKS:

1. Control Systems Engineering – I.J.Nagrath and M.Gopal, New Age International(P) Limited, Publishers, 2nd edition, 2009.
2. Automatic Control Systems - B. C. Kuo, John wiley and son's., 8th edition, 2003.

REFERENCE BOOKS:

1. Modern Control Engineering –Katsuhiko Ogata – Prentice Hall of India Pvt. Ltd., 3rd Edition, 1998.
2. Control Systems-N.K.Sinha, New Age International (P) Limited Publishers, 3rd Edition,1998.
3. Control Systems Engg. -- John wiley, NISE, 4rd edition, 2007.
4. Control Systems – Nagoorkani, 1998.

ANURAG ENGINEERING COLLEGE

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II Year B.Tech. EEE – I Sem

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ENVIRONMENTAL STUDIES

Course Objectives:

- *Make them to understand the essence of ecosystem, biodiversity and their importance*
- *Understanding the availability, consumption and deterioration of natural resources; anthropogenic activities towards pollutions and their counter measures*
- *Inculcating in glance the current management techniques to deal with wastes generated; also environmental policies, rules..*
- *Imparting the importance of sustainability and steps towards stewardship in the extant scenario*
- *Get the students engaged in practical approach through mini project via personal involvement and supervision*

UNIT – I

Multidisciplinary nature of Environmental Studies: Definition, Scope and Importance.

(a) Ecosystems: Concept of an ecosystem – Classification, structure and function of Forest, Pond, Grass Land ecosystems - Producers, consumers and decomposers. - Energy flow in the ecosystem - Food chains, food webs and ecological pyramids- Ecological succession.

(b) Biodiversity and its conservation: Introduction - Definition: genetic, species and ecosystem diversity. - Bio-geographical classification of India - Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. India as a mega-diversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. ICUN categories of biodiversity and RED DATA book - Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT - II

Natural Resources: Renewable and non-renewable – Natural resources and associated problems

Forest resources – Use and over – exploitation, deforestation,– Timber extraction, mining, dams and other effects on forest and tribal people

Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources.

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

Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources. Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources: Equitable use of resources for sustainable lifestyle

UNIT – III

(a) **Environmental Pollution:** Definition, Cause, effects and control measures of different kinds of pollution (Air, Water , Soil , Nuclear, e –Waste)

(b) **Social Issues and the Environment:** From Unsustainable to Sustainable development - Urban problems related to energy -Water conservation, rain water harvesting, and watershed management. -Climate change, global warming, ozone layer depletion, nuclear accidents and holocaust.

UNIT – IV:

(a) **Waste management technology:** Solid waste Management: Causes, effects and control measures of Solid and Biomedical wastes. Disaster management: floods, earthquake, cyclone and landslides.

Waste water treatment technology: Sewage Water and Effluent Water- primary, secondary and tertiary treatments. Brief account on Bioremediation and Phytoremediation, R.O technology. Application of GIS and GPS system in environment.

(b) **Environmental policy, Rules and regulations.** EIA(Environmental Impact Assessment)

–Definition, Baseline Data acquisition, Impacts Assessment, EIS(Environment Impact Statement) & EMP(Environment Management Plan) – Environment Protection Act-1986, - Air (Prevention and Control of Pollution) Act- 1981, -Water (Prevention and control of Pollution) Act-1974, -Wildlife Protection Act-1974, –Forest Conservation Act.

UNIT – V

(a) **Towards sustainable future:** concept of sustainable development, threats of sustainability, population and its explosion, over exploitation of resources, strategies for achieving sustainable development. Environmental education, Conservation of resources. Urban sprawl, sustainable cities and sustainable communities, human health. Environmental ethics, concept of green building, Basic principles of Green engineering, clean development mechanism (CDM), Low carbon life cycle, Polluters-pay principle.

(b) **Field work:** Visit to a local area to document environmental assets River/forest grassland/hill/ mountain Visit to a local polluted site-Urban/Rural/industrial/Agricultural Study of common plants, insects, birds, Visit to effluent treatment plant/sewage treatment plant Study of simple eco systems pond, river, hill slopes, etc.

Mini projects by students which is mandatory.

Course Outcomes:

- *Make the dynamic students indeed capable of explaining the various prime aspects of ecosystem and biodiversity*
- *Augmented to the fundamental ideas on natural resources with statistics to be aware of what is available around so as to tackle the deterioration situation*
- *Intellectual students expand and try to exhort the immense affects of pollutions*
- *Industrious, indeed by proper approach well conversion of causes and control of wastes; create awareness in prevention of pollution and other disastrous events so also get imbibed on environmental policies, rules and acts*

- *Technical minded students ardent enough in familiarizing on threats, populace, exploitation of resources and thorough with Clean Development Mechanism, Low Carbon Life Cycle etc.*
- *Arduous students indulge in the field work and inclined in visits to vulnerable sites of pollution in general*

TEXT BOOK:

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission, University Press.
2. Environmental studies, From Crisis to cure by R.Rajagopalan,2005

REFERENCES:

1. Environmental Science: towards a sustainable future by Richard T.Wright.2008 PHL Learning Private Ltd .New Delhi
2. Environmental Engineering and science by Gilbert M.Masters and Wendell P.Ela.2008 PHI Learning Pvt. Ltd.

ANURAG ENGINEERING COLLEGE

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II Year B.Tech. EEE – I Sem

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ELECTRICAL MACHINES – II

Course Objective:

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

UNIT-I: Single phase transformers:

Types - constructional details- minimization of hysteresis and eddy current losses-emf equation - operation on no load and on load - phasor diagrams.

Equivalent circuit - losses and efficiency-regulation. All day efficiency - effect of variations of frequency & supply voltage on iron losses.

Performance of transformers: OC and SC tests - Sumpner's test - predetermination of efficiency and regulation-separation of losses test.

UNIT II:

Parallel Operation & Auto Transformers

Parallel operation with equal and unequal voltage ratios - auto transformers-equivalent circuit - comparison with two winding transformers.

Three phase Transformers

Poly-phase connections - Y/Y, Y/ Δ , Δ /Y, Δ / Δ and open Δ , Third harmonics in phase voltages-three winding transformers-tertiary windings. Determination of Z_p , Z_s and Z_t transients in switching - off load and on load tap changing; Scott connection.

UNIT III: Three Phase Induction Motors

Construction details of cage and wound rotor machines-production of a rotating magnetic field - principle of operation - rotor emf and rotor frequency - rotor reactance, rotor current and pf. at standstill and during operation.

Rotor power input, rotor copper loss and mechanical power developed and their inter relation-torque equation-deduction from torque equation - expressions for maximum torque and starting torque - torque slip characteristic - double cage and deep bar rotors - equivalent circuit - phasor diagram - crawling and cogging.

UNIT IV: Performance of Three Phase Induction Motors

Circle diagram-no load and blocked rotor tests-predetermination of performance. Methods of starting, starting current and torque calculations of Induction Motors.

Speed control-change of frequency- change of poles and methods of consequent poles; cascade connection. injection of an emf in to rotor circuit (qualitative treatment only)-induction generator-principle of operation.

UNIT V: Single Phase Induction Motors:

Single phase Induction motor – Constructional features- Cross field theory, Double revolving field theory Equivalent circuit- split –Phase motors- Capacitor start Capacitor run motors.

Course Outcomes:

After going through this course the student can be able to understand

- *Construction, working principle, operating characteristics of single phase and 3 phase transformers. Able to solve the problems about regulation, efficiency, sharing of load in parallel operation.*
- *construction, working principle, speed torque characteristics, able to solve the problems, with different types of motors for efficiency, torque, speed control methods and their industrial applications.*
- *Upon completing the course, student should be able to understand double field theory, construction of single phase motor and their characteristics and industrial applications.*

TEXT BOOKS:

1. Electric Machinery- P.S. Bimbra, Khanna Publishers, 7th edition, 2010.
2. Theory and Performance of Electrical Machines - JB Gupta, SK Kataria & ISons, 2009.

REFERENCE BOOKS:

1. Performance and Design of AC Machines - MG.Say, BPB Publishers, 1968.
2. Theory of Alternating Current Machinery- Langsdorf, Tata McGraw Hill Companies, 2nd edition, 2001.
3. Electromechanics-II (transformers and induction motors) - S. Kamakashaiah, Hitech publishers.
4. Electric Machines – I.J.Nagrath & D.P.Kothari,Tata McGraw Hill, 7th Edition, 2005.
5. A Text Book of Electrical Technology – B.L. Theraja and A.K. Theraja,Vol2, S.Chand Publications

ANURAG ENGINEERING COLLEGE

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II Year B.Tech. EEE – II Sem

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0	3	2

ELECTRICAL MACHINES LAB-I

Course Objective:

To prepare the students to have a basic knowledge of DC machines. To obtain the practical knowledge on real time objects..Able to compare theoretical Results with practical Results.

PART A

All eight experiments are to be conducted compulsorily

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. Determination of characteristics.
5. Hopkinson's tests on DC shunt machines. Predetermination of efficiency.
6. Fields test on DC series machines. Determination of efficiency.
7. Swinburne's test on DC shunt machine. Predetermination of efficiency at various loads as motor and generator.
8. Speed control of DC shunt motor by Armature Voltage Control and Field Flux Control Method.

PART B

Any two of the following experiments are to be conducted

1. Brake test on DC shunt motor. Determination of performance curves.
2. Brake test on DC compound motor. Determination of performance curves.
3. Separation of losses in DC shunts motor.
4. Retardation test on DC shunt motor. Determination of losses.

Outcomes:

- *To get the practical exposure on DC machines.*
- *To obtain the practical knowledge on real time objects.*
- *Able to compare theoretical Results with practical Results.*

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0	3	2

ELECTRONIC DEVICES AND CIRCUITS LAB

COURSE OBJECTIVES:

- To obtain the characteristics of the PN junction diode and Zener diode
- To obtain the input and output characteristics of Transistor in CB and CE Configuration.
- To understand the operation of half wave and full wave rectifiers without filters.
- To understand the operation of half-wave and full-wave rectifiers with filters.
- To obtain the FET Characteristics.
- To obtain the frequency response of CC and CE Amplifier.
- To obtain the frequency response of FET Amplifier.

PART A: (Only for Viva-voce Examination)

ELECTRONIC WORKSHOP PRACTICE (in 3 lab sessions):

1. Identification, Specifications, Testing of R, L, C, Components (Color Codes), Potentiometers, Switches (SPDT, DPDT, and DIP), Coils, Gang Condensers, Relays, Bread Boards, PCB's
2. Identification, Specification and Testing of Active Devices, Diodes, BJT's LOW power JFET's, MOSFET's, Power Transistors, LED's, SCR, UJT.
3. Study and operation of
 - Multi-meters (Analog and Digital)
 - Regulated Power Supplies
 - Function Generator
 - CRO

PART B (For Laboratory Examination – Minimum of 10 experiments)

1. Forward & Reverse Bias Characteristics of PN Diode.
2. Zener diode characteristics and Zener as voltage Regulator.
3. Half Wave Rectifier with & without filters.
4. Full Wave Rectifier with & without filters
5. Input & output characteristics of Transistor in CB Configuration.
6. Input & output Characteristics of Transistor in CE Configuration.
7. FET characteristics.
8. Measurement of h- parameters of transistor in CB, CE, CC configurations
9. Frequency Response of CC Amplifier.
10. Frequency Response of CE Amplifier.
11. Frequency Response of FET Amplifier (Common source).
12. SCR Characteristics
13. UJT Characteristics.

PART C: Equipment required for laboratories:

1. Regulated power supplies (RPS)
2. CRO's : 0-20MHZ
MHZ
3. Function Generator :
4. Multimeters
5. Decade Resistance Boxes / Rheostats
6. Decade Capacitance Boxes
7. Ammeters (Analog or Digital) : 0-20 μ A, 0-50 μ A, 0-100 μ A, 0-200 μ A, 0-10 mA
8. Voltmeters (Analog or Digital) : 0-50V, 0-100V, 0-250V
Resistors, Capacitors, BJTs, LCDs, SCRs,
9. Electronic Components : UJTs,
FETs, LEDs, MOSFETs, diodes Ge & Si type,
Transistors NPN, PNP type

COURSE OUTCOMES:

- *The course intends to provide an overview of the principles, operation and application of the basic electronic components.*
- *Understand the Characteristics of the active devices.*
- *To understand the frequency response of different amplifiers.*

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GENDER SENSITIZATION

Course Objectives:

- To develop students sensibility with regard to issues of gender in contemporary India.
- To provide critical perspective or the socialization of men and women.
- To introduce students to information about some key biological aspects of genders.
- To expose the students to debates on the politics and economics of work.
- To help students reflect critically on gender vigilance.
- To expose students to more egalitarian interactions between men and women.

Learning Outcomes:

- Students will have developed a better understanding of important issues related to gender in contemporary India.
- Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials from research, facts, everyday life, literature and film.
- Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
- Students will acquire insight into the gendered division of labour and its relation to politics and economics.
- Men and women students and professions a will be better equipped to work and live together as equals.
- Students will develop a sense of appreciation of women in all walks of life.
- Through providing accounts of studies and movements as well as the now laws that provide protection and relief to women, the textbook will empower students to understand respond to gender violence.

Unit-I:-

UNDERSTANDING GENDER:

Gender: Why should we Study it? (Towards a world of equals: Unit - 1)

Socialization: Making women, Making Men (Towards a world of equals: Unit – 2)

Introduction. Preparing for Womanhood Growing up male. First lessons in Cases. Different masculinities.

Just Relationships: Being Together as Equals (Towards a world of equals: Unit – 12) Mary Kom and onles love and Acid just do not Mix. Love Letters, Mothers and Fathers. Furthur Reading: Rose Parks The Brave Heart.

Unit – II:

GENDER AND BIOLOGY:

Missing Women: Sex Selection and its consequences (Towards a world of equals: Unit – 4) Destining Sex Ratio, Demographic Consequences.

Gender Spectrum: Beyond the Binary (Towards a world of Equals unit – 10) Two or Many? Struggles with Discrimination

Additional reading: Our Bodies, Our Health (Towards a world of equals: Unit – 13).

Unit – III:

GENDER AND LABOUR:

Housework: the Invisible Labour (Towards a world of equals: Unit – 3)

“My Mother doesn’t Work.” “Share the Load.”

Women’s Work: Its Politics and Economics (Towards a world of equals: Unit – 7) Fact and Fiction. Unrecognized and Unaccounted work. Further

Reading: Wages and Conditions of Work.

Unit – IV:

ISSUES OF VIOLENCE:

Sexual Harassment: Say Not (Towards a world of equals: Unit – 6)

Sexual Harassment: not Eve teasing Coping with Everyday Harassment Further Reading:

“Chupalu”.

Domestic Violence: Speaking Out (Towards a world of equals: Unit – 8)

Is home a safe place? – When women unite [Film]. Rebuilding lives Further Reading New Forums for Justice.

Thinking about Sexual Violence (Towards a world of equals: Unit – 11)

Blaming the Victim-“I fought for my life....” – Further Reading: The Caste Face of Violence

Unit – V:

GENDER STUDIES:

Knowledge: Through the Lens of Gender (Towards a world of equals: Unit – 5)

Point of view Gender and the structure of knowledge. Further Reading: Unacknowledged women Artists of Telangana.

Whose History? Questions for historians and others (Towards a world of equals: Unit – 9) Reclaiming a Past. Writing other Histories. Further Reading: Missing Pages from Modern Telangana History.

Essential Reading: All The Units In the Textbook, “ Towards a World of Equals: A Bilingual Textbook on Gender” written by A.Suneetha, Uma Bhrugubanda, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Thanu.

Note: Since it is interdisciplinary course, Resource Persons can be drawn from the fields of English Literature or Sociology or political science or any other qualified faculty who has expertise in this field.

REFERENCE BOOKS:

1. Sen, Amartya. “More than One Million Women are Missing.” New York of books 37.20 (20 December 1990). Print. “we Were Making History...” Life Stories of Women in the Telangana People’s Struggle. New Delhi: Kall for Women. 1989.
2. Tripti Lahiri. “By the Numbers: Where Indian Women Work.” Women’s Studies Journal (14 November 2012) Available online at : [http:// blogs.wsj.com/india real time/2012/11/14/by- The numbers-where-Indian-women-work/>](http://blogs.wsj.com/india-real-time/2012/11/14/by-the-numbers-where-indian-women-work/)
3. K.Satyanaraya and Susie Tharu (Ed.) Steel Nibs Are Sorouting: New Dalit Writing From South India, Dussier 2. Telugu And Khannada <http://harpercolling.co.in/BookDetail.aso?BookCodes3732>
4. Vimala. “Vartillu (the Kitchen)”. Women Writing in India: 600 BC to the Present. Volume II: The 20th Century. Ed. Susie Tharu and K.Lalits. Delhi:Oxford University Press, 1995. 599-601.
5. Shatruguna. Veana At . Women’s Work and its Impact on Child Health and Nutrition Hyderabad, National Institute of Nutrition . India council of research. 1993.

6. Stree Shakti Sangeetana. "We Were Making History ... 'Life Stories of women in the Telangana People's Struggle. New Delhi: Kai for Women. 1989.
7. Menon. Nivedita. Seeing Like a Feminist New Delhi: Zubaan-Penguin Books, 2012.
8. Yayaprabha, A. "Chupulu (states)". Women Writing in India: 500BC to the Present. Volume II: The 20th Century Ed. Susie Tharu and K.Lalita Delhi: Oxford University Press. 1995.596-597.
9. Haveed Shayam and Anupam Maruhaar, "Women and Wage Discrimination in India: A Critical Analysis. " I International journal of Humanities and Social Science Invention 2.4(2013)
10. Gautam. Liela and Gita Ramaswamy. "A Conversation between a Daughter and a Mohter. " Eroadsheet on contemporary Politics. Special Issue on Sexually and Harassment: Gender Politics on Campus Today. Ed. Madhumeeta Sinha and Asma Rasheed. Hyderabad Anveshi Research Center for Women's Studies. 2014
Aodulali Sohaila. "I fought for My Life .. and Won. " Available online at

ANURAG ENGINEERING COLLEGE

(AUTONOMOUS)

B.Tech EEE III Year I-Semester

L	T	P	C
3	1	0	3

IC APPLICATIONS

Objectives:

- *Study about electrical properties of analog ICs like Op-Amps, IC 555 timer, PLL.*
- *Analyze and know the design concepts of various applications of ICs.*
- *Study the design concepts Digital circuits using ICs.*

UNIT – I

Integrated Circuits: Classification, chip size and circuit complexity, Classification of Integrated circuits, comparison of various logic families, standard TTL NAND Gate-Analysis & characteristics, TTL open collector O/Ps, Tristate TTL, MOS & CMOS open drain and tri-state outputs, CMOS transmission gate, IC interfacing- TTL driving CMOS & CMOS driving TTL.

UNIT - II:

OP-AMP and Applications: Basic information of OP-AMP, ideal and practical OP-AMP, internal circuits, OP-AMP characteristics, DC and AC characteristics, 741 OP-AMP and its features, modes of operation-inverting, non-inverting, differential. Basic application of OP-AMP, instrumentation amplifier, ac amplifier, V to I and I to V converters, sample & hold circuits, multipliers and dividers, Differentiators and Integrators, Comparators, introduction to voltage regulators.

UNIT - III:

Active Filters & Oscillators: Introduction, 1st order LPF, HPF filters, Band pass, Band reject and all pass filters. Oscillator types and principle of operation - RC, Wien and quadrature type, waveform generators - triangular, sawtooth, square wave and VCO.

UNIT - IV:

Timers & 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 of 565.

UNIT - V: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 slope ADC. DAC and ADC specifications.

Course Outcomes:

- *To Summarize the basics of linear integrated circuits and explain operational amplifiers with applications*
- *Be able to explain the characteristics of op-amp*
- *Able to explain the comparator circuits like Schmitt trigger, astable multivibrator etc*
- *Able to construct filter circuits for particular application*
- *To describe analog to digital converters (ADC), and digital to analog converters (DAC) with its Specifications*
- *Be able to explain a stable voltage regulators*
- *To construct and explain the timer circuits*
- *To interpret the applications of PLL and special ICs like 565,566*

TEXT BOOKS:

1. Linear Integrated Circuits, D. Roy Chowdhury, New Age International(p) Ltd.
2. Op-Amps & Linear ICs, Ramakanth A. Gayakwad, PHI

REFERENCES BOOKS:

1. Operational Amplifiers & Linear Integrated Circuits, R.F. Coughlin & Fredrick F. Driscoll, PHI.
2. Operational Amplifiers & Linear Intergrated Circuits: Theory & Applications, Denton J. Daibey, TMH.
3. Design with Operational Amplifiers & Analog Integrated Circuits, Sergio Franco, McGraw Hill.
4. Digital Fundamentals - Floyd and Jain, Pearson Education.

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MANAGEMENT SCIENCE

Objectives:

- The aim of this course is to enable the students to see that many managerial decision-making situations can be addressed using standard techniques and methods.
- To provide a comprehensive and concise introduction to the key techniques and methods used within management science those are directly relevant to the managerial context.
- To enable you to see both the benefits, and limitations, of the techniques and methods presented.

Unit-I:

Introduction to Management: Nature and importance of management, Functions of Management, Taylor's Scientific Management Theory, Fayol's principles of management, Maslow's theory of Human Needs, Douglas Mc Gregor's Theory X and Theory Y, Herzberg's Two factor Theory of Motivation. Systems Approach to Management, Leadership Styles, Social Responsibilities of Manager, Organization levels and types of organization structures.

Unit-II

Operations Management: Principles and Types of Plant Layout-Methods of production (Job, batch and Mass production), Work Study - Basic procedure involved in Method Study and Work measurement- Statistical Quality Control - X chart, R chart, C chart, P chart, (simple problems), Acceptance Sampling, Deming's contribution to quality.

Materials Management: Objectives, Need for inventory control, EOQ, ABC Analysis, Purchase procedure, Stores management and Stores records, Supply chain management.

Unit –III

Human Resources Management (HRM): Evolution of HRM, Concepts of HRM, Basic functions of HR Manager - Manpower Planning, Recruitment, Selection, Training and Development, Placement, Wage and Salary Administration, Promotion, Transfer, Separation, Performance Appraisal, Grievance Handling and Welfare Administration, Job Evaluation and Merit Rating.

Marketing: Functions of Marketing, Marketing Mix, Marketing strategies based on Product Life cycle, Channels of distribution.

Unit –IV

Project Management(PERT/CPM): Network Analysis, Programme Evaluation and Review Technique (PERT), Critical Path Method(CPM), Identifying critical path, Probability of Completing the project within given time, Project Cost Analysis, Project Crashing.(Simple problems)

Unit –V

Strategic & Contemporary Management Practices: Mission, Goals, Objectives, Policy, Strategy, Programmes, Elements of corporate planning process, Environmental Scanning, SWOT analysis, Steps in Strategy Formulation and Implementation, Generic Strategy alternatives. Basic concepts of Just-In-Time(JIT) system, Total Quality Management(TQM), Six Sigma and Capability Maturity Model(CMM) levels, Value chain Analysis.

Course Outcomes:

- On completion of the course, the student should be able to discuss the main techniques and methods used within management science.
- Able to critically appraise the strengths and limitations of these techniques and methods, carry out simple exercises using such techniques and methods themselves.

Text books:

1. Aryasri, Management Science, TMH, New Delhi, 2009

References:

1. Kotler Philip and Keller Kevin Lane, Marketing Management, Pearson, 2012.
2. Koontz and Weihrich, Essentials of Management, McGraw Hill, 2012.
3. Thomas N. Duening and John M. Ivancevich Management, Principles and Guidelines, Biztantra, 2012.
4. Kanishka Bedi, Production and Operations Management, Oxford University Press, 2012.
5. Samuel C. Certo, Modern Management, 2012.
6. Schermerhorn, Capling, Poole and Wiesner, Management, Wiley, 2012.
7. Parnell, Strategic Management, Cengage, 2012.
8. Lawrence R Jauch, R. Gupta and William F. Glueck: Business Policy and Strategic Management Science, McGraw Hill, 2012.

ANURAG ENGINEERING COLLEGE

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B.Tech EEE III Year I-Semester

L	T	P	C
4	1	0	4

POWER ELECTRONICS

Objectives:

- *To introduce the basic concepts of power semiconductor devices,*
- *To introduce the analysis of wide variety of converters and their applications.*

UNIT-I

Power Semi Conductor Devices and Commutation Circuits

Thyristors – Silicon Controlled Rectifiers (SCRs) – BJT – Power MOSFET – Power IGBT and their characteristics and other thyristors .Basic theory of operation of SCR – Static characteristics – Turn on and turn off methods- Dynamic characteristics of SCR - Turn on and Turn off times -Salient points.

Two transistor analogy of SCR - UJT firing circuit - Series and parallel connections of SCRs Snubber circuit details – Specifications and Ratings of SCRs, BJT, IGBT - Numerical problems – Line Commutation and Forced Commutation circuits.

UNIT-II

Single Phase Converters

Phase control technique - Single phase Line commutated converters Midpoint and Bridge connections – Half controlled converters with R, RL and RLE loads with continuous current mode of operation –Derivation of average load voltage and current - Active and Reactive power inputs to the converters without and with free wheeling Diode.

Fully controlled converters, Midpoint and Bridge connections with R, RL and RLE loads for continuous current mode of operation. Derivation of average load voltage and current – Line commutated inverters. Active and Reactive power inputs to the converters without and with Freewheeling Diode. Effect of source inductance – Derivation of load voltage and current – Numerical problems.

UNIT-III

Three Phase Line Commutated Converters

Three 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) - Waveforms –Numerical Problems.

UNIT-IV

AC Voltage Controllers & Cyclo Converters

AC voltage controllers – Single phase two SCRs in anti parallel – With R and RL loads – modes of operation of Triac with R and RL loads – Derivation of RMS load voltage, current and power factor wave forms. Firing circuits -Numerical problems.

Cyclo-converters – Single phase midpoint Cyclo converters with Resistive and inductive load (Principle of operation only) – Bridge configuration of single phase Cyclo converter (Principle of operation only) – Waveforms

UNIT-V

Choppers and Inverters

Choppers – Time ratio control and Current limit control strategies – Step down choppers Derivation of load voltage and currents with R, RL and RLE loads for continuous and discontinuous modes. Step up Chopper – load voltage expression. Morgan's chopper – Jones chopper (Principle of operation only) Waveforms - AC Chopper – Problems.

Inverters – Single phase inverter – Basic series inverter – Basic parallel Capacitor inverter-3ph Bridge inverters 120° and 180° conduction modes of operation – Waveforms – Simple forced commutation circuits for bridge inverters. Voltage control techniques for inverters-Pulse width modulation techniques – Numerical problems.

TEXT BOOKS:

1. Power electronics-P.S. Bimbhra-khanna Publishers
2. Power electronics – M.D. Singh & K.B. Kanchandhani, Tata Mc Graw – Hill Publishing Company, Latest edition.
3. Power Electronics: Circuits Devices and Applications – M.H. Rashid, Prentice Hall of India, 3rd edition.

REFERENCE BOOKS:

1. Power Electronics – Vedam Subramanyam, New Age International (p) Limited, Publishers.
2. Power Electronics – P.C. Sen, Tata Mc Graw-Hill Publishing.
3. Thyristorised power Controllers – G.K. Dubey, S.R Doradra, A. Joshi and R.M.K. Sinha, New Age international Pvt Ltd. Publishers latest edition

ANURAG ENGINEERING COLLEGE

(AUTONOMOUS)

B.Tech EEE III Year I-Semester

L	T	P	C
4	1	0	4

POWER SYSTEMS-II

Objective:

- *To deal with basic theory of transmission lines modeling and their performance analysis.*
- *To emphasis on mechanical design of transmission lines, cables and insulators.*

UNIT-I

Transmission Line Parameters

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

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

UNIT-II

Performance of Transmission Lines

Classification of Transmission Lines - Short, medium and long line and their model representations - Nominal-T, Nominal-Pie and A, B, C, D Constants for symmetrical & Asymmetrical Networks, Numerical Problems, Mathematical Solutions to estimate regulation and efficiency of all types of lines - Numerical Problems.

Long Transmission Line-Rigorous Solution, evaluation of A,B,C,D Constants, Interpretation of the Long Line Equations, SIL of Long Lines, Representation of Long Lines - Equivalent-T and Equivalent Pie network models.

Skin and Proximity effects - Description and effect on Resistance of Solid Conductors - Ferranti effect - Charging Current - Effect on Regulation of the Transmission Line, Shunt Compensation.

UNIT-III

Power System Transients

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

UNIT-IV

Corona & Overhead Line Insulators

Corona - Description of the phenomenon, factors affecting corona, critical voltages and power loss, Radio Interference. Types of Insulators, String efficiency and Methods for improvement, Numerical Problems voltage distribution, calculation of string efficiency, Capacitance grading and Static Shielding.

UNIT-V

Sag and Tension Calculations and Underground Cables

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

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

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Power system Analysis- John J Grainger William D Stevenson, TMC Companies, 4th edition
2. Power System Analysis and Design- B.R.Gupta, Wheeler Publishing.
3. Power System Analysis - Hadi Saadat – TMH Edition..
4. Modern Power System Analysis- I.J.Nagaraj and D.P.Kothari, Tata McGraw Hill, 2nd Edition.
5. A course in Power systems-J.B.Gupta, S.K.Kataria & Sons, 2003 edition.

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B.Tech EEE III Year I-Semester

L	T	P	C
4	1	0	4

ELECTRICAL MACHINES- III

Objective:

- *To deal with the detailed analysis of Synchronous generators and motors which are the prime sources of electrical power generation and its utilities.*
- *To read with the different types of special motors which are having significant applications in domestic and industrial applications.*

UNIT-I

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 – armature reaction - leakage reactance – synchronous reactance and impedance – experimental determination - phasor diagram – load characteristics.

UNIT-II

Voltage Regulation of Synchronous Generators

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

UNIT-III

Parallel Operation of Synchronous Generator

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

UNIT-IV

Synchronous Motors

Principle of operation-methods of starting-phasor diagram-Variation of current and power factor with excitation-synchronous condenser-Mathematical analysis for power developed-circle diagrams of synchronous machines-hunting and its suppression-damper windings-Applications.

UNIT-V

Special Motors

Basic Principle of operation and application of AC series motor-Universal motor-Stepper motor –shaded pole motor-Reluctance motor-BLDC motor (Elementary treatment only)

TEXT BOOKS:

1. Electrical Machinery – P.S. Bimbra, Khanna Publishers.
2. Theory and Performance of Electrical machines - J.B Gupta, S.K. Kataria & Sons.

REFERENCE BOOKS:

1. Electric Machines – I.J.Nagrath & D.P.Kothari, Tata Mc Graw-Hill Publishers, 3rd Edition 2006.
2. Electrical Machines- Milukutla S Sarma, Mukesh K Pathak, Cengage Learning, 2009
3. Electric Machinery – A.E. Fitzgerald, C.Kingsley and S.Umans, Mc Graw-Hill Companies, 5th edition, 1990.
4. Electromechanics-III (Synchronous and single phase machines),S.Kamakashiah, Right Publishers.
5. A Text book of Electrical Technology – B.L. Thereja and A.K. Theraja, S. Chand Publications, Vol2.

ANURAG ENGINEERING COLLEGE

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B.Tech EEE III Year I-Semester

L	T	P	C
3	0	0	3

SWITCHING THEORY AND LOGIC DESIGN

Objective:

- *To learn basic tools for the design of digital circuits and fundamental concepts.*
- *To understand number representation in digital electronic circuits.*
- *To design combinational and sequential logic circuits.*
- *To implement synchronous state machines using flip-flops.*

UNIT I

Number Systems

Number systems, Base Conversion Methods, complement of numbers, Codes-binary codes, Binary coded decimal code and its properties, Unit distance codes, Alpha numeric codes, error detecting & correcting codes.

Boolean algebra: Basic theorems and properties - switching functions–Canonical and Standard forms–Algebraic simplification digital logic gates, properties of XOR gates – universal gates–Multilevel NAND/NOR realizations.

UNIT II

Combinational Circuits

Introduction, The minimization with theorem, The karnaugh Map method, Five and six variable maps, Prime and essential implications, Don't care map entries, using the maps for simplifying, Tabular Method, Partially specified expressions, Multi-output minimization, minimization and combinational design, Arithmetic circuits, Comparator, Multiplexer, Code converters, Wired logic, Tristate bus system, Practical aspects related to combinational logic design, Hazards and hazard free realizations.

UNIT III

Sequential Machines

Introduction, Basic architectural distinctions between combinational and sequential circuits, The binary cell, Fundamentals of sequential machine operation, The flip-flop, The D-latch flip-flop, The "clocked T" flip-flop, "clocked J-K" flip-flop, Design of a clocked flip-flop, Conversion from one type of flip-flop to another, Timing and Triggering consideration, Clock skew.

UNIT IV

Sequential Circuit Design and Analysis

Introduction, State diagram, Analysis of synchronous sequential circuits, Approaches to the design of synchronous sequential finite state machines, Design aspects, State reduction, Design steps, Realization using flip-flop counters – Design of single mode counter, Ripple counter, Ring counter, Shift register, Shift register sequences, Ring counter using Shift register.

UNIT V

Sequential Circuits

Finite state machine-capabilities and limitations, Mealy and Moore models-minimization of completely specified and incompletely specified sequential machines, Partition techniques and Merger chart methods-concept of minimal cover table.

Algorithmic state machines: Salient features of the ASM chart-Simple examples-System design using data path and control subsystems-control implementations-examples of Weighing machine and Binary multiplier.

TEXTBOOKS

1. Switching & Finite Automata theory – Zvi Kohavi & Niraj K. Jha, 3rd Edition, Cambridge.
2. Digital Design – Morris Mano, PHI, 3rd Edition, 2006.

REFERENCES

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

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B.Tech EEE III Year I-Semester

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CONTROL SYSTEMS AND SIMULATION LAB

Any EIGHT Experiments from PART-A any TWO Experiments from PART-B are to be conducted.

PART-A

1. Time response of Second Order System
2. Effect of P, PD, PI, PID controller on a second order system
3. Characteristics of Synchros
4. Lead and Lag Compensation –Magnitude and phase plot
5. Characteristics of AC Servomotor
6. Transfer function of a DC Generator
7. Transfer function of a DC Motor.
8. Verification of Truth Tables by using Programmable Logic Controller.
9. Temperature Controller using PID.
10. Characteristics of Magnetic Amplifier.

PART-B

Simulation experiments:

1. Simulation of OP-AMP based Integrator and Differentiator circuits.
2. Linear system analysis (Time domain analysis).
3. Stability analysis of linear time invariant systems (Bode, Root locus, Nyquist).
4. State space model for a given classical transfer function.

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ELECTRICAL MACHINES LAB-II

Any TEN 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. Brake test on three phase Induction motor.
4. No-load & blocked rotor tests on three phase Induction motor.
5. Regulation of a three phase alternator by synchronous impedance method & MMF method.
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. Scott connection of Transformers.
10. Efficiency of a three phase alternator
11. Parallel operation of alternators.
12. Parallel Operation of Single Phase Transformers.
13. Separation of core losses of a single phase transformer.
14. Regulation of a three phase alternator by ZPF & ASA method.
15. Heat run test on a bank of 3 Nos. of single phase delta connected transformers.
16. Measurement of sequence Impedance of a 3phase alternator.

ANURAG ENGINEERING COLLEGE

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B.Tech EEE III Year II-Semester

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SWITCHGEAR AND PROTECTION

Objective:

- *To study various types of Circuit Breakers and Relays for protection of Generators, Transformers and feeder bus bars from over voltages and other hazards.*
- *To emphasis on Neutral grounding for overall protection.*

UNIT - I

Circuit Breakers

Circuit Breakers: Elementary principles of arc interruption, Recovery, Restriking Voltage and Recovery voltages.- Restriking Phenomenon, Average 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

Relays

Principle of Operation and Construction of Attracted armature, Balanced Beam, Induction Disc and Induction Cup relays. Relays Classification: Instantaneous, DMT and IDMT types. Applications of relays: Over current/ under voltage relays, Direction relays, Differential Relays and Percentage Differential Relays. Universal torque equation, Distance relays: Impedance, Reactance and Mho and Off-Set Mho relays, Characteristics of Distance Relays and Comparison.

Static Relays: Introduction to static Relays- phase comparators- Amplitude comparators- Static Relays verses Electromagnetic Relays. Introduction to Numerical Relays.

UNIT-III

Generator and Transformer Protection

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 Problems on Design of CT s Ratio in differential protections, Buchholtz relay Protection.

UNIT-IV

Feeder and Bus-Bar Protection

Protection of Lines: Over Current, Carrier Current and Three-zone distance relay protection using Impedance relays. Translay Relay.

Protection of Bus bars – Differential protection.

UNIT-V

Neutral Grounding and Protection against over voltages

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

Generation of Over Voltages in Power Systems.-Protection against Lightning Over Voltages - Valve type and Zinc-Oxide Lightning Arresters - Insulation Coordination -BIL, Impulse Ratio, Standard Impulse Test Wave, Volt-Time Characteristics.

TEXT BOOKS:

1. Switchgear and Protection – Sunil S Rao, Khanna Publishers
2. Power System Protection and Switchgear - Badri Ram, D.N Viswakarma, TMH Publications

REFERENCE BOOKS:

1. Transmission network Protection -Y.G. Paithankar, Taylor and Francis, 2009.
2. Power System Protection and Switch Gear - Bhuvanesh Oza, TMH 2010.
3. Electrical Power systems – C.L. Wadhwa, New Age International (P) Limited, Publishers, latest editon.
4. Power Systems Engineering – A. Chakrabarathi, M.L. Soni, P.V. Gupta, Dhanpat Rai & Co.

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B.Tech EEE III Year II-Semester

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COMPUTER METHODS IN POWER SYSTEMS

Objectives:

- Ability to understand formation of Power System matrices & Power flow studies by various computer methods.
- Ability to apply the mathematical concepts to solve power flow analysis.
- Analyze the power system behavior under normal & fault conditions.
- It deals with short circuit analysis of power system for steady state and transient stability.

UNIT-I

Network Matrices

Graph theory: Definitions, Bus incidence Matrix, Y_{bus} formation by direct and singular transformation methods, Numerical Problems.

Formation of Z_{bus} : Partial network, algorithm for the modification of Z_{bus} for addition element for the following cases: addition of element from a new bus to reference, addition of element from a new bus to an old bus, Addition of element between an old bus to reference and Addition of element between two old busses. Modification of Zbus 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 solution 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 and losses for the given Bus Voltages.

Newton Raphson Method in Rectangular and Polar Co-Ordinates form: Load flow solution with or without PV busses- Derivation of Jacobian Elements, Algorithm and Flowchart. Decoupled and Fast Decoupled Methods.- Comparison of Different Methods

UNIT-III

Short Circuit Analysis

Per unit system representation. Per unit equivalent reactance network of three phase Power System, Numerical Problems. Symmetrical fault Analysis: short circuit current and MVA Calculations, Numerical Problems. Symmetrical Component Theory: Symmetrical Component Transformation, Positive, Negative and Zero sequence components: Voltages, Currents and Impedances. Sequence Networks: Positive, Negative and Zero sequence Networks, Numerical Problems. Unsymmetrical Fault Analysis: LG, LL, LLG faults with and without fault impedances, Numerical Problems.

UNIT-IV

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

Transient Stability Analysis

Derivation of Swing Equation, Determination of Transient Stability by Equal Area Criterion. Application of EAC, Critical Clearing Angle calculation. Solution of swing equation. Point by point method. Methods to improve stability.

TEXT BOOKS:

1. Modern Power System Analysis- I.J.Nagrath and D.P.Kothari, Tata McGraw-Hill Publishing Company, 2nd edition, 2003.
2. Power Systems Analysis – PSR Murthy, BS Publications
3. Power system Analysis – A. Nagoorkani, RBA publications

REFERENCE BOOKS:

1. Computer Methods in Power System Analysis - G.W. Stagg & A.H. El-Abiad, International Student Edition, 1968.
2. Power System Analysis - Grainger and Stevenson, Tata McGraw-Hill Publishing Company, 1st Edition , 2003.
3. Power System Analysis - Hadi Saadat, Tata McGraw-Hill Publishing Company, 2nd Edition, 2002.
4. Power System Analysis & Design - B.R. Gupta, Wheeler Publications, 3rd Edition, 2003.
5. Electrical Power Systems - C.L. Wadwa - New Age International (P) Ltd, 6th edition, 2006.

ANURAG ENGINEERING COLLEGE

(AUTONOMOUS)

B.Tech EEE III Year II-Semester

L	T	P	C
3	1	0	3

ELECTRICAL MEASUREMENTS

Objectives:

- *To deal with the basic principles of all measuring instruments.*
- *To deal with the measurement of RLC parameters voltage, current, Power factor, power, energy and magnetic parameters.*

UNIT-I

Measuring Instruments

Classification – deflecting, control and damping torques – Ammeters and Voltmeters – PMMC, moving iron type instruments – expression for the deflecting torque and control torque – Errors and compensations, extension of range using shunts and series resistance. Electrostatic Voltmeters-electrometer type and attracted disc type – Extension of range of E.S. Voltmeters.

UNIT-II

Instrument transformers

CT and PT – Ratio and phase angle errors – design considerations. Type of P.F. Meters – dynamometer and moving iron type – 1-ph and 3-ph meters – Frequency meters – Resonance type and Weston type – Synchrosopes.

UNIT-III

Measurement of Power and Energy

Single phase dynamometer wattmeter, LPF and UPF, Double element dynamometer wattmeter, expression for deflecting and control torques – Extension of range of wattmeter using instrument transformers – Measurement of active and reactive powers in balanced and unbalanced systems

Single phase induction type energy meter – driving and braking torques – errors and compensations – testing. Three phase energy meter – trivector meter, maximum demand meters.

UNIT IV:

Potentiometers and Magnetic Measurements

Principle and operation of D.C. Crompton's potentiometer – standardization – Measurement of unknown resistance, current, voltage. A.C. Potentiometers: polar and coordinate types– applications.

Magnetic Measurements: Ballistic galvanometer, flux meter.

UNIT-V:**Measurement of R, L & C**

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, Quality Factor - Maxwell's bridge, Hay's bridge, Anderson's bridge, Owen's bridge. Measurement of capacitance and loss angle - Desauty bridge. Wien's bridge – Schering Bridge.

TEXT BOOKS:

1. Electrical & Electronic Measurement & Instruments - A.K.Sawhney Dhanpat Rai & Co. Publications
2. Electrical Measurements and measuring Instruments – J. B. Gupta, S.K. Kataria & Sons.
3. Electrical and Electronic Measurements and Instruments – R. K. Rajput – S. Chand Company Ltd.

REFERENCE BOOKS:

1. Electrical Measurements – Buckingham and Price, Prentice – Hall
2. Electrical Measurements – forest klarie Harris – John Wiley & Sons.
3. Electrical Measurements: Fundamentals, Concepts, Applications – Reissland, M.U, New Age International (P) Limited, Publishers.
4. Electrical Measurements and measuring Instruments – E.W. Golding and F.C. Widdis, wheeler publications fifth edition

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B.Tech EEE III Year II-Semester

L	T	P	C
4	1	0	4

UTILIZATION OF ELECTRICAL ENERGY

Objectives:

- *Understand concepts of drives, heating, welding, illumination and traction.*
- *Identifying and troubleshooting the various applications of electrical equipments.*
- *Able to design suitable schemes for welding, heating, drives, illumination and traction.*
- *Able to identify the job/higher education / research opportunities in Electric Utilization.*

UNIT – I

Electric Drives

Type of electric drives, choice of motor, starting and running characteristics, speed control, temperature rise, types of industrial loads, continuous, intermittent and variable loads, load equalization, applications of electric drives.

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, Discharge lamps, MV, SV and LED lamps – comparison between tungsten filament lamps and fluorescent tubes, Basic principles of light control, Types and design of interior lighting and 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 and 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 and coefficient of adhesion.

TEXT BOOKS:

1. Art & Science of Utilization of electrical Energy – Partab, Dhanpat Rai & Sons, 2nd edition, 1975.
2. Utilization of Electric Power and Electric Traction by J.B. Gupta, S.K. Kataria & Sons, 8th edition.

REFERENCE BOOKS:

1. Generation, Distribution and Utilization of electrical Energy – C.L.Wadhwa, New Age International (P) Limited, Publishers, 1997.
2. Utilization of Electrical Power including Electric drives and Electric traction – by N.V.Suryanarayana, New Age International (P) Limited, Publishers, 1996.

ANURAG ENGINEERING COLLEGE

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B.Tech EEE III Year II-Semester

L	T	P	C
3	0	0	3

ELECTRICAL DISTRIBUTION SYSTEMS

Objectives:

- Ability to apply the knowledge on distribution systems, Load Modeling and Characteristics.
- Ability to analyze substations and benefits derived through optimal location of substations.
- Ability to calculate Voltage drop and power – loss and manual methods of solution for radial networks.

UNIT – I

General Concepts

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

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

UNIT – II

Substations

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

System Analysis: Voltage drop and power-loss calculations: Derivation for voltage drop and power loss in lines, manual methods of solution for radial networks, three phase balanced primary lines.

UNIT – III

Protection

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

UNIT – IV

Power Factor Improvement

Capacitive compensation for power-factor control. Different types of power capacitors, shunt and series capacitors, effect of shunt capacitors (Fixed and switched), Power factor correction, capacitor allocation - Economic justification - Procedure to determine the best capacitor location.

UNIT – V

Voltage Control

Voltage Control: Equipment for voltage control, effect of series capacitors, effect of AVB/AVR, line drop Compensation.

TEXT BOOKS:

1. Electric Power Distribution system, Engineering – Turan Gonen, Mc Graw-hill Book Company, 1986.
2. Electric Power Distribution – A.S. Pabla, Tata Mc Graw-hill Publishing company, 4th edition, 1997.

REFERENCE BOOKS:

1. Electrical Power Distribution and Automation - S.Sivanagaraju, V.Sankar, Dhanpat Rai & Co, 2006
2. Electrical Power Distribution Systems - V.Kamaraju, Tata McGraw-Hill Education, 2009.

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B.Tech EEE III Year II-Semester

L	T	P	C
3	0	0	3

DISASTER MANAGEMENT (OPEN ELECTIVE)

UNIT-I

Environmental Hazards & Disasters: Meaning of Environmental hazards, Environmental disasters and environmental stress. Concept of Environmental hazards, Environmental Stress & Environmental Disasters. Different Approaches & relation with human ecology- Landscape approach – Ecosystem Approach – Perception Approach – Human ecology & its application in Geographical researches.

UNIT-II

Types of Environmental Hazards & Disasters: Natural hazards & Disasters – Man induced Hazards & Disasters – Natural Hazards – Planetary Hazards / Disasters – Extra planetary hazards / Disasters- Planetary Hazards – Endogenous hazards – Exogenous hazards.

UNIT-III

Endogenous Hazards – Volcanic eruption – Earthquakes – Land slides – Volcanic hazards/ Disasters – Causes and distribution of volcanic – Hazardous effects of volcanic eruptions – Environmental impacts of volcanic eruptions – Earthquake hazards/ Disasters – Causes of Earthquakes- Distribution of earthquakes- Hazardous effects of Earthquakes – Earthquake hazards in India – Human adjustment, Perception & mitigation of earthquake.

UNIT-IV:

Exogenous hazards/ disasters – Infrequent events –Cumulative atmospheric hazard/disasters.

Infrequent events: Cyclones –Lightening –Hailstorms.

Cyclones: tropical cyclones and local storms –distribution by tropical cyclones and local storms (causes, distribution human adjustment, perception & mitigation) cumulative atmospheric hazards /disasters, floods – droughts cold waves, heat waves

Flood:-causes of floods –flood hazards India

Droughts: impact of droughts –droughts hazards in India –droughts control measures – extra planetary hazards /disasters – man induced hazards /disasters-physical hazards /disasters- soil erosion

Soil Erosion: mechanics & forms of soil erosion –factors and causes of soil erosion – conservation measures of soil erosion

Chemical hazards/disasters: - Release of toxic chemicals, nuclear explosion-sedimentation processes. Sedimentation processes: - Global sedimentation problems - regional sedimentation problems-sedimentation and environmental problems-corrective measures of erosion & sedimentation biological hazards/disasters:- Population explosion.

UNIT-V

Emerging Approaches in Disaster Management – Three stages

1. Pre- disaster stage (Preparedness)
2. Emergency Stage
3. Post-disaster stage- Rehabilitation

TEXT BOOKS:

1. Disaster mitigation: Experiences And Reflections by Pardeep Sahn
2. Natural Hazards & Disasters by Donald Hyndman & David Hyndman- Cengage Learning.

REFERENCES:

1. R.B. Singh (Ed) Environmental Geography, Heritage Publishers New Delhi 1990.
2. Savinder Singh Environmental Geography, Prayag Pustak Bhavan, 1997.
3. Kates, B.I & White , G. F The Environment as Hazards, Oxford, New Delhi, 1978.
4. R. B. Singh (Ed) Disaster Management, Rawat Publications, New Delhi, 2000.
5. H.K. Gupta (Ed) Disaster Management, Universiters Press, India 2003.
6. R. B. Singh, Space Technology for Disaster mitigation in India (INCED) , University of Tokyo, 1994.
7. Dr. Satender, Disaster Management in Hills, Concept Publishing Co., New Delhi, 2003.
8. A.S. Arya Action Plan for Earthquake, Disaster, mitigation in V.K Sharma (Ed) Disaster Management IIPA Publications New Delhi, 1994.
9. R.K. Bhandani an overview on Natural and manmade Disaster & their reduction, CSIR, New Delhi.
10. M.C.Guptha Manuals on Natural Disaster management in India, National Centre for Disaster Management, IIPA, New Delhi, 2001.

ANURAG ENGINEERING COLLEGE

(AUTONOMOUS)

B.Tech EEE III Year II-Semester

L	T	P	C
3	0	0	3

INTELLECTUAL PROPERTY RIGHTS (OPEN ELECTIVE)

UNIT - I:

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT - II:

Trade Marks: Purpose and function of trade marks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

UNIT - III:

Law of copy rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

UNIT - IV:

Trade Secrets: Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade secrete litigation.

Unfair competition: Misappropriation right of publicity, False advertising.

UNIT - V:

New development of intellectual property: new developments in trade mark law; copy right law, patent law, intellectual property audits.

International overview on intellectual property, international - trade mark law, copy right law, international patent law, international development in trade secrets law.

TEXT BOOKS & REFERENCES:

1. Intellectual property right, Deborah, E. Bouchoux, cengage learning.
2. Intellectual property right - Unleashing the knowledge economy, prabuddhaganguli, Tata McGraw Hill Publishing Company Ltd.

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B.Tech EEE III Year II-Semester

L	T	P	C
3	0	0	3

RENEWABLE ENERGY SOURCES

(Open Elective)

Objectives:

- *Ability to learn Renewable energy sources, generating systems, its performance characteristics and potential in India.*
- *Ability to design solar panels such as flat plate collectors, dish collectors, fuel cells and etc.*

UNIT – I

Principles of Solar Radiation

Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on tilted surface, instruments for measuring solar radiation and sun shine, solar radiation data.

Solar Energy Collection: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

UNIT-II

Solar Energy Storage and Applications

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 Energy

Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria

Bio-Mass: 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.

UNIT-IV

Geothermal Energy

Resources, types of wells, methods of harnessing the energy, potential in India.

Ocean Energy: 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-V

Direct Energy Conversion

Need for DEC, Carnot cycle, limitations, principles of DEC. Seebeck effect, MHD generators,

TEXT BOOKS:

1. Non-Conventional Energy Sources - G.D. Rai, Khanna Publishing House, 2011.
2. Renewable Energy Technologies - Ramesh & Kumar, Narosa Publishing House.

REFERENCE BOOKS:

1. Renewable energy resources- Tiwari and Ghosal, Narosa Publishing House, 2007.
2. Non-Conventional Energy - Ashok V Desai, Wiley Eastern Ltd, New Delhi, 2003.
3. Non-Conventional Energy Systems - K Mittal, Wheeler Publishing Co.
4. Solar Energy – Sukhame, Tata McGraw-Hill Education, 3rd edition, 2008.

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B.Tech EEE III Year II-Semester

L	T	P	C
0	0	3	2

POWER ELECTRONICS AND SIMULATION LAB

Any EIGHT experiments from Part-A. Any TWO experiments from Part-B.

PART – A

1. Gate firing circuits for SCR.
2. Single phase ac voltage controller with R and RL loads.
3. Single phase half controlled converter with R load.
4. Single phase fully controlled bridge rectifier with R and RL loads.
5. Forced commutation circuits (Class A, Class B, Class C, Class D & Class E).
6. DC Jones chopper with R and RL loads.
7. Single phase parallel inverter with R and RL load.
8. Single phase series inverter with R and RL load.
9. Single phase cycloconverter with R and RL loads.
10. Single phase Dual Converter with RL loads.
11. Operation of MOSFET based Chopper.
12. Three Phase Half Controlled Bridge Converter with R Load.
13. Single Phase Bridge Converter with R and RL Loads.

PART –B

Simulation experiments:

1. Simulation of single phase full converter using RLE loads & single phase AC voltage controller using RLE loads.
2. Simulation of single phase inverter with PWM control.
3. Simulation of resonant pulse commutation circuit and buck chopper.

REFERENCE BOOKS:

1. Simulation of Electric and Electronic circuits using PSPICE-by M.H.Rashid,M/s PHI publications.
2. PSPICE A/D users manual- Microsim, USA.
3. PSPICE Reference guide- Microsim, USA.
4. MATLAB and its Tool Books users manual and Mathworks,USA.
5. SPICE for power electronics and electric power by Rashid,CRC Press.

ANURAG ENGINEERING COLLEGE

(AUTONOMOUS)

B.Tech EEE III Year II-Semester

L	T	P	C
0	0	3	2

ADVANCED ENGLISH COMMUNICATION SKILLS LAB

1. Introduction

The introduction of the English Language Lab is considered essential at 3rd year level. At this stage the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalised context.

The proposed course should be an integrated theory and lab course to enable students to use good' English and perform the following:

- Gather ideas and information, to organize ideas relevantly and coherently.
- Participate in group discussions.
- Face interviews.
- Write formal letters
- Write project/research reports/technical reports.
- Make oral presentations.
- To take part in social and professional communication.

2. Objectives:

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

To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.

Further, they would be required to communicate their ideas relevantly and coherently in writing.

3. Syllabus:

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

Vocabulary Building –Word Roots, Prefixes and Suffixes, Study of Word Origin, Analogy, One-Word Substitutes, Synonyms and Antonyms, Idioms and Phrases.

Reading Comprehension – Reading for Facts, Guessing meanings from context, Skimming, Scanning, Inferring Meaning, and Critical Reading.

Writing Skills – Coherence, Cohesion, Sub-skills in writing, Letter Writing, Resume Writing, Covering Letter, e-correspondence.

Technical Writing- Formats and Styles of Technical Report Writing, Research Abilities/Data Collection/Organizing Data/Tools/Analysis.

Group Discussion – Dynamics of Group Discussion, Intervention, Summarizing, Modulation of Voice, Body Language, Relevance, Fluency.

Presentation Skills – Oral presentations (individual and group) through JAM sessions/Seminars, Written Presentations (Projects/ PPTs) through e-mails.

Interview Skills – Strategies of Pre, During and Post – Interview Skills, Opening, Answering Strategies, Interview through Telephone and Video-Conferencing.

4. Minimum Requirement: The English Language Lab shall have two parts:

i) The Computer aided Language Lab for 30 students with 30 systems, one master console, LAN facility and English language software for self- study by learners.

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

System Requirement (Hardware component): Computer network with LAN with minimum 30 multimedia systems with the following specifications:

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

5. Suggested Software:

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

Suggested Software:

- Clarity Pronunciation Power – part II □
- Oxford Advanced Learner's Compass, 7th Edition □
- DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.
- Lingua TOEFL CBT Insider, by Dreamtech.
- TOEFL & GRE(KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS) □
- The following software from 'train2success.com' □
 - i. Preparing for being Interviewed,
 - ii. Positive Thinking,
 - iii. Interviewing Skills,
 - iv. Telephone Skills,
 - v. Time Management
 - vi. Team Building,
 - vii. Decision making
- English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge

6. Books Recommended:

1. Technical Communication by Meenakshi Raman & Sangeeta Sharma, Oxford University Press 2009.
2. Advanced Communication Skills Laboratory Manual by Sudha Rani, D, Pearson Education 2011.
3. English Language Communication : A Reader cum Lab Manual Dr A. Ramakrishna Rao, Dr G. Natanam & Prof S.A. Sankaranarayanan, Anuradha Publications, Chennai 2008.
4. English Vocabulary in Use series, Cambridge University Press 2008.
5. Management Shapers Series by Universities Press(India)Pvt Ltd., Himayatnagar, Hyderabad 2008.
6. Communication Skills by Leena Sen, PHI Learning Pvt Ltd., New Delhi, 2009.
7. Handbook for Technical Writing by David A McMurrey & Joanne Buckely CENGAGE Learning 2008.
8. Job Hunting by Colm Downes, Cambridge University Press 2008.
9. Master Public Speaking by Anne Nicholls, JAICO Publishing House, 2006.
10. English for Technical Communication for Engineering Students, Aysha Vish hwamohan, Tata Mc Graw-Hil 2009.
11. Books on TOEFL/GRE/GMAT/CAT/ IELTS by Barron's/DELTA/Cambridge University Press.
12. International English for Call Centres by Barry Tomalin and Suhashini Thomas, Macmillan Publishers, 2009.

ANURAG ENGINEERING COLLEGE

(AUTONOMOUS)

B.Tech EEE IV Year I-Semester

L	T	P	C
3	1	0	3

MICROPROCESSORS AND MICROCONTROLLERS

Objectives:

- *To learn the Architecture, addressing modes and instruction set of 8086, 8051 and ARM processor.*
- *To learn the programming concepts of 8086, 8051 and ARM processor.*
- *Interface various peripherals to 8086 and 8051*

UNIT I:

8086 Architecture: Functional Diagram, Register Organization, Addressing modes, Instructions, Functional schematic, Minimum and Maximum mode operations of 8086, 8086 Control signal interfacing, Timing diagrams.

UNIT II:

Assembly Language Programming Of 8086: Assembly Directives, Macro's, Simple Programs using Assembler, Implementation of FOR Loop, WHILE, REPEAT and IF-THEN-ELSE Features.

UNIT III:

I/O Interface: 8255 PPI, Various modes of operations and interface of I/O devices to 8086, A/D, D/A Converter Interfacing.

Interfacing with advanced devices:8086 System bus structure, Memory and I/O Interfacing with 8086, Interfacing through various IC Peripheral Chips, 8257 (DMA Controller), 8259 (Interrupt Priority Control).

Communication Interface: Serial Communication Standards, USART Interfacing RS-232, IEEE-488, 20mA Current Loop, Prototyping and Trouble shooting, Software Debugging tools, MDS.

UNIT IV:

Introduction To Micro Controllers :Overview of 8051 Micro Controller, Architecture, I/O ports and Memory Organization, Addressing modes and Instruction set of 8051, Simple Programs using Stack Pointer, Assembly language programming.

UNIT V:

8051 Real Time Control and Industrial Applications: Interrupts, Timer/Counter and Serial Communication, Programming Timer Interrupts, Programming External H/W interrupts, Programming the serial communication interrupts, Interrupt Priority in the 8051, Programming 8051 Timers, Counters and Programming. Applications of Micro Controllers, Interfacing 8051 to LED's, Push button, Relay's and Latch Connections, Keyboard Interfacing, Interfacing Seven Segment Display, ADC and DAC Interfacing.

Course Outcomes:

- *Explain the internal Architecture of 8086 microprocessors and evolution of microprocessors, Demonstrate the 8086 microprocessor Maximum mode and Minimum mode systems*
- *Use 8086 Instructions and Assembler directives for developing 8086 assembly programs with an assembler*
- *Develop interfacing of 8086 microprocessor with digital peripherals using Programmable parallel port, analog peripherals – ADC and DAC*
- *Discover the use of Interrupts and Interrupt responses, Demonstrate Direct Memory Access data transfer*
- *Explain the serial communication standards, USART architecture and interfacing*
- *Explain the 8051Architecture and evolution of microcontrollers*
- *Demonstrate about real time control(Interrupts serial communication, timers/counters)*
- *Demonstrate the internal architecture of AVR RISC MI*

TEXT BOOKS:

1. Kenneth J Ayala, “ The 8051 Micro Controller Architecture, Programming and Applications”, Thomson Publishers, 2nd Edition.
2. D.V.Hall, “Micro Processor and Interfacing “, Tata McGraw-Hill.

REFERENCE BOOKS:

1. Ajay V. Deshmukh, “Microcontrollers – theory applications”, Tata McGraw-Hill Companies – 2005.
2. Ray and BulChandi, “ Advanced Micro Processors”, Tata McGraw-Hill.
3. Kenneth J Ayala, “ The 8086 Micro Processors Architecture, Programming and Applications”, Thomson Publishers, 2005.
4. Microcomputer Systems: The 8086/8088 Family: Architecture, Programming and Design, 2nd ed., Liu & Gibson

ANURAG ENGINEERING COLLEGE

(AUTONOMOUS)

B.Tech EEE IV Year I-Semester

L	T	P	C
3	1	0	3

INSTRUMENTATION

Objectives:

- *Deals with instrumentation systems having conversion from Non-electrical quantities to electrical quantities*
- *Can able to analyze and implement instrumentation systems concerned with pressure, force, temp & flow etc.*

UNIT-I

Characteristics of Signals

Measuring Systems, Performance Characteristics, - Static characteristics, Dynamic Characteristics; Errors in Measurement – Gross Errors, Systematic Errors, Random Errors.

Signals and their representation: Signal and their representation: Standard Test, periodic, aperiodic, modulated signal, sampled data, pulse modulation and pulse code modulation

UNIT-II

Oscilloscope

Cathode ray oscilloscope-Cathode ray tube-time base generator-horizontal and vertical amplifiers-CRO probes-applications of CRO-Measurement of phase and frequency-lissajous patterns-Sampling oscilloscope-analog and digital type

UNIT-III

Digital Voltmeters

Digital voltmeters- Successive approximation, ramp, dual-Slope integration continuous balance type-Micro processor based ramp type DVM digital frequency meter-digital phase angle meter

Signal Analyzers: Wave Analyzers- Frequency selective analyzers, Heterodyne, Application of Wave analyzers- Harmonic Analyzers, Total Harmonic distortion, spectrum analyzers, Basic spectrum analyzers, spectral displays, vector impedance meter, Q meter. Peak reading and RMS voltmeters

UNIT-IV

Transducers

Definition of transducers, Classification of transducers, Advantages of Electrical transducers, Characteristics and choice of transducers; Principle operation of resistor, inductor, LVDT and capacitor transducers; LVDT Applications, Strain gauge and its principle of operation, 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 and Liquid level.

TEXT BOOKS:

1. Transducers and Instrumentation - D.V.S Murthy, Prentice-Hall Of India Pvt. Limited, 2nd edition, 2004.
2. A course in Electrical and Electronic Measurements and Instrumentation- A.K. Sawhney, Dhanpat Raj and Sons, New Delhi, 1999.

REFERENCE BOOKS:

1. Measurement Systems, Applications and Design – Ernest O. Doebelin, International Student Edition, IV Edition, McGraw Hill Book Company, 1998.
2. Principles of Measurement and Instrumentation – A.S Morris, 2nd Edition, Prentice Hall of India, 2003.
3. Electronic Instrumentation- H.S. Kalsi, Tata MC-Graw Hill Edition, 1995.
4. Modern Electronic Instrumentation and Measurement techniques – A.D Helfrick and W.D.Cooper, Pearson/Prentice Hall of India, 2007.

ANURAG ENGINEERING COLLEGE

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B.Tech EEE IV Year I-Semester

L	T	P	C
4	1	0	4

POWER SYSTEM OPERATION & CONTROL

Objectives:

- *To deal with economic operation of power systems.*
- *To deal with modeling of turbines and generators and Automatic controllers*
- *To emphasis load frequency control and reactive power control.*

UNIT - I

Economic Operation

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

UNIT - II

Hydro Thermal Scheduling

Optimal scheduling of Hydrothermal System: Hydroelectric power plant models, scheduling problems-Short term hydrothermal scheduling problem.

UNIT- III

Modelling of Power System Components

Modelling of Governor: Mathematical Modelling of Speed Governing System – Derivation of small signal transfer function.

Modelling of Turbine: First order Turbine model, Block Diagram representation of Steam Turbines and Approximate Linear Models.

Modelling of Generator (Steady State and Transient Models): Description of Simplified Network

Model of a Synchronous Machine (Classical Model), Description of Swing Equation (No Derivation) and State-Space II-Order Mathematical Model of Synchronous Machine - Generator – Load Model.

Modelling of Excitation System: Fundamental Characteristics of an Excitation system, Transfer function, Block Diagram Representation of IEEE Type-1 Model

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 –Controlled and Uncontrolled cases. Load frequency control of 2-area system – uncontrolled case and controlled case, tie-line bias Control Proportional plus Integral control of single area and its block diagram representation, steady state response – Load Frequency Control and Economic dispatch control.

UNIT-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. Modern Power system Analysis - D P Kothari and I J Nagrath - Tata McGraw-Hill - Latest Edition.
2. Modelling of Power Systems – P S R Murthy– BS Publications.
3. Power System Operation and Control - S. Sivanagaraju - Pearson Education India, Latest Edition.

REFERENCES:

1. Operation and Control in Power Systems - P S R Murthy.
2. Power generation, Operation and Control – Allen J Wood.
3. Power System Analysis' – C.L. Wadhwa, Newage International – Latest Edition

ANURAG ENGINEERING COLLEGE

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B.Tech EEE IV Year I-Semester

L	T	P	C
4	1	0	4

POWER SEMICONDUCTOR DRIVES

Objectives:

- *This course deals with control of DC drives.*
- *This course Provides knowledge about four quadrant operations of DC drives.*
- *This course deals with control of AC drives.*

UNIT – I

Control of DC motors by Single 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.

UNIT-II

Control of DC motors by Three phase Converters

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 – III

Four Quadrant operations of DC Drives & Control of DC motors by Choppers

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

Single quadrant, Two –quadrant and four quadrant chopper fed dc separately excited and series excited motors – Continuous current operation – Output voltage and current wave forms – Speed torque expressions – speed torque characteristics – Problems on Chopper fed dc Motors.

UNIT – IV

Control of Induction Motor

From Stator Side: Variable voltage characteristics-Control of Induction Motor by Ac Voltage Controllers – Waveforms – speed torque characteristics. Variable frequency characteristics-V/F control of induction motor.

From Rotor side: Static rotor resistance control – Slip power recovery – Static Scherbius drive – Static Kramer Drive –their performance and speed torque characteristics – advantages applications – problems

UNIT – V

Control of Synchronous Motors

Separate control & 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 – Advantages – Applications.

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Power Electronics – MD Singh and K B Khanchandani, Tata – McGraw-Hill Publishing company, 1998
2. Modern Power Electronics and AC Drives by B.K.Bose, PHI.
3. Thyristor Control of Electric drives – Vedam Subramanyam Tata McGraw Hill Publications.
4. A First course on Electrical Drives – S K Pillai New Age International(P) Ltd. 2nd Editon.

ANURAG ENGINEERING COLLEGE

(AUTONOMOUS)

B.Tech EEE IV Year I-Semester

L	T	P	C
3	1	0	3

HIGH VOLTAGE ENGINEERING (Elective-I)

Objectives:

- *Deals with Various Dielectric Materials, Numerical methods for electric field computation and Applications.*
- *Deals with high voltage testing of materials and electrical apparatus.*

UNIT I

Introduction

Electric Field Stresses, Gas / Vacuum as Insulator, Liquid Dielectrics, Solids and Composites, Estimation and Control of Electric Stress, Numerical methods for electric field computation, Surge voltages, their distribution and control, Applications of insulating materials in transformers, rotating machines, circuit breakers, cable power capacitors and bushings.

UNIT II

Break Down in Gaseous, Solid and Liquid Dielectrics

Gases as insulating media, collision process, Ionization process, Townsend's criteria of breakdown in gases, Paschen's law. Liquid as Insulator, pure and commercial liquids, breakdown in pure and commercial liquids. Intrinsic breakdown, electromechanical breakdown, thermal breakdown, breakdown of solid dielectrics in practice, Breakdown in composite dielectrics, solid dielectrics used in practice.

UNIT III

Generation and Measurements of High Voltages and Currents

Generation of High Direct Current Voltages, Generation of High alternating voltages, Generation of Impulse Voltages, Generation of Impulse currents, Tripping and control of impulse generators.

Measurement of High Direct Current voltages, Measurement of High Voltages alternating and impulse, Measurement of High Currents-direct, alternating and Impulse, Oscilloscope for impulse voltage and current measurements.

UNIT IV

Over Voltage Phenomenon and Insulation Co-Ordination

Natural causes for over voltages – Lightning phenomenon, Overvoltage due to switching surges, system faults and other abnormal conditions, Principles of Insulation Coordination on High voltage and Extra High Voltage power systems.

UNIT V

Non-Destructive and High Voltage Testing

Measurement of D.C Resistivity, Measurement of Dielectric Constant and loss factor, Partial discharge measurements. Testing of Insulators and bushings, Testing of Isolators and circuit breakers, Testing of cables, Testing of Transformers, Testing of Surge Arresters, Radio Interference measurements.

TEXT BOOKS:

1. High Voltage Engineering - M.S.Naidu and V. Kamaraju – TMH Publications, 3rd Edition, 2009.
2. High Voltage Engineering - C.L.Wadhwa, New Age Internationals (P) Limited, 1997 1st & 3rd edition.

REFERENCE BOOKS:

1. High Voltage Engineering: Fundamentals - E.Kuffel, W.S.Zaengl, J.Kuffel, Elsevier publications, 2nd Edition, 2000.
2. High Voltage Insulation Engineering - Ravindra Arora, Wolfgang Mosch, New Age International (P) Limited, 1995.

ANURAG ENGINEERING COLLEGE

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B.Tech EEE IV Year I-Semester

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3	1	0	3

VLSI DESIGN (Elective-I)

Objectives:

- *To learn the various fabrication steps of IC and come across basic electrical properties of MOSFET.*
- *To study the concepts of stick diagrams and layouts with the knowledge of MOS layers through design rules.*
- *To study gate level design of subsystem, integrated circuit and CMOS testing.*

UNIT I

INTRODUCTION: Introduction to MOS Technology – MOS, PMOS, NMOS, CMOS and BiCMOS technologies, fabrication fundamentals: Oxidation, Lithography, Diffusion, Ion implantation, Metallization and Encapsulation.

BASIC ELECTRICAL PROPERTIES : Basic Electrical Properties of MOS ,CMOS and BiCMOS Circuits: IDS-VDS relationships, MOS transistor threshold Voltage, g_m , g_{DS} , figure of merit w_0 , Pass transistor, NMOS inverter, Various pull - ups, Determination of pull-up to pull-down ratio(Z_{pu} / Z_{pd}) , CMOS Inverter analysis and design, BiCMOS inverters, Latch-up in CMOS circuits.

UNIT II

VLSI CIRCUIT DESIGN PROCESSES : VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layouts, Lambda based design rules, Contact cuts , CMOS Lambda based design rules, Layout Diagrams for logic gates, Transistor structures, wires and vias, Scaling of MOS circuits- Scaling models, scaling factors, scaling factors for device parameters, Limitations of Scaling.

UNIT III

GATE LEVEL DESIGN AND LAYOUT: Architectural issues, Switch logic networks: Gate logic, Alternate gate circuit: Pseudo-NMOS , Dynamic CMOS logic. Basic circuit concepts, Sheet Resistance R_S and its concept to MOS, Area Capacitance Units, Calculations, The delay unit T , Inverter Delays, Driving large Capacitive Loads, Wiring Capacitances, Fan-in and fan-out, Choice of layers.

UNIT IV

SUBSYSTEM DESIGN: Subsystem Design, Shifters, Adders, ALUs, Multipliers: Array multiplier, Serial-Parallel multiplier, Parity generator, Comparators, Zero/One Detectors, Up/Down Counter, Memory elements.

SEMICONDUCTOR INTEGRATED CIRCUIT DESIGN: PLDs, FPGAs, CPLDs, Standard Cells, Programmable Array Logic, Programmable Logic Array Design Approach.

UNIT V

VHDL SYNTHESIS: VHDL Synthesis, Circuit Design Flow, Circuit Synthesis, Simulation, Layout, Design capture tools, Design Verification Tools.

CMOS TESTING : CMOS Testing, Need for testing, Test Principles, Design Strategies for test, Over view of Chip level Test Techniques and System-level Test Techniques, Layout Design for Improved Testability.

Course Outcomes:

- *Acquire qualitative knowledge about the fabrication process of integrated circuit using MOS transistors.*
- *Choose an appropriate inverter depending on specifications required for a circuit.*
- *Draw the layout of any logic circuit which helps to understand and estimate parasitic of any circuit.*
- *Design different types of logic gates using CMOS inverter and analyze their transfer characteristics.*
- *Provide design concepts required to design building blocks of data path using gates.*
- *Design simple memories using MOS transistors and can understand design of large memories.*
- *Design simple logic circuit using PLA, PAL, FPGA and CPLD.*
- *Understand different types of faults that can occur in a system and learn the concept of testing and adding extra hardware to improve testability of a system.*

TEXT BOOKS

- Essentials of VLSI circuits and systems – Kamran Eshraghian, Douglas and A. Pucknell, PHI Edition, 2005.
- Modern VLSI Design –Wayne Wolf, Pearson Education , 3rd Edition, 1997.
- CMOS VLSI Design – A circuits and systems perspective, Neil H.E Weste , David Harris , Ayan Banerjee, pearson ,2009.

REFERENCES

1. CMOS logic circuit Design – John P. Uyemura , Springer , 2007
2. VLSI DESIGN – K.Lal Kishore , VSV Prabhakar – I.K..International ,2009
3. VLSI Design – A.Albert Raj, Latha PHI, 2008.
4. Introduction to VLSI Design- Mead and Convey , BS Publications, 2010.
5. VLSI Design – M. Michal Vai, CRC Press, 2009.

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B.Tech EEE IV Year I-Semester

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OPTIMIZATION TECHNIQUES (Elective-I)

Objectives:

- Deals with Classical Optimization Techniques and Linear Programming.
- Deals with optimization techniques and dynamic programming.

UNIT – I

Introduction and Classical Optimization Techniques:

Statement of an Optimization problem – design vector – design constraints – constraint surface – objective function – objective function surfaces – classification of Optimization problems.

Single variable Optimization – multi variable Optimization without constraints – necessary and sufficient conditions for minimum/maximum – multivariable Optimization with equality constraints.

Solution by method of Lagrange multipliers – multivariable Optimization with inequality constraints – Kuhn – Tucker conditions.

UNIT – II

Linear Programming and Transportation Problem

Linear Programming:

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

Transportation Problem:

Finding initial basic feasible solution by north – west corner rule, least cost method and Vogel's approximation method – testing for optimality of balanced transportation problems.

UNIT – III

Unconstrained Nonlinear Programming and Optimization Techniques

Unconstrained Nonlinear Programming:

One – dimensional minimization methods: Classification, Fibonacci method and Quadratic interpolation method

Unconstrained Optimization Techniques

Univariate method, Powell's method and steepest descent method.

UNIT – IV Constrained Nonlinear Programming:

Characteristics of a constrained problem, Classification, Basic approach of Penalty Function method; Basic approaches of Interior and Exterior penalty function methods. Introduction to convex Programming Problem.

UNIT – V Dynamic Programming:

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

TEXT BOOKS:

1. Engineering optimization: Theory and practice- S. S.Rao, New Age International (P) Limited, 3rd edition, 1998.
2. Operations Research – Dr. S.D.Sharma, Kedar Nath Ram Nath and Co. ,Meerut, 10th edition, 1992
3. Optimization Methods in Operations Research and systems Analysis” – K.V. Mital and C. Mohan, New Age International (P) Limited, Publishers, 3rd edition, 1996.

REFERENCE BOOKS:

1. Introductory Operations Research - H.S. Kasene & K.D. Kumar, Springer(India), Pvt. Ltd.
2. Operations Research: An Introduction – H.A. Taha, PHI Pvt. Ltd., 6th edition, 2012.
3. Linear Programming – G. Hadley, Addison-Wesley. Publishing Co, 1963.

ANURAG ENGINEERING COLLEGE

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B.Tech EEE IV Year I-Semester

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3	0	0	3

NANO TECHNOLOGY

(Elective-II)

UNIT – I

INTRODUCTION TO NANOTECHNOLOGY: Importance of Nano scale, Nanostructure types, electronic, magnetic, optical Properties of Nano materials, top-down and bottom – up approach to nanostructures.

QUANTUM MECHANICAL PHENOMENON IN NANO STRUCTURES: Quantum confinement of electrons in semiconductor Nano structures, one dimensional confinement (Quantum wires), two dimensional confinements (Quantum Wells), three dimensional confinements (Quantum dots).

UNIT – II

CARBON NANO STRUCTURES: Carbon Nano tubes (CNT's), Fullerenes, C60, C80 and C240 Nanostructures, Properties (mechanical, optical and electrical) and applications.

FABRICATION OF NANO MATERIALS: Physical methods; inert gas condensation, Arc discharge, RF PLASMA, Plasma arc technique, ion sputtering, Laser ablation, Laser pyrolysis, Molecular beam epitaxy, Chemical vapour deposition method.

UNIT – III

NANO SCALE CHARACTERIZATION TECHNIQUES: Scanning probe techniques (AFM, MFM, STM, SEM, TEM), XRD

NANODEVICES AND NANOMEDICINE: Lab on chip for bioanalysis, Core / shell Nanoparticles in drug delivery systems (site specific and targeted drug delivery), cancer treatment, and bone tissue treatment.

UNIT- IV

NANO AND MOLECULAR ELECTRONICS: Resonant – tunneling structures, single electron tunneling, Single Electron transistors, coulomb blockade, giant magneto resistance, tunneling magneto resistance.

UNIT – V

NANOLITHOGRAPHY AND NANOMANIPULATION: e – beam lithography and SEM based nanolithography and nanomanipulation, ion beam lithography, oxidation and metallization. Mask and its application. Deep UV lithography, X-ray based lithography.

TEXT BOOKS:

- Charles.p.pode, introduction to nanotechnology, springer publications.
- Springer Handbook of Nanotechnology – Bharat Bhusan
- Phani Kumar, Principles of nanotechnology, scitech publications.

REFERENCE BOOKS:

1. David Ferry “ Transport in Nano structures” Cambridge University press 2000
2. Nanobiotechnology; ed. C.M.Niemeyer, C.A. Mirkin.
3. Nanofabrication towards biomedical application, Techniques, tools, Application and impact – Ed. Challa S.S.R.Kumar, J.H.Carola.
4. Encyclopedia of Nanotechnology – Hari Singh Nalwa
5. Carbon Nanotubes; Properties and Applications – Micheal J.O’ Connell
6. S.Dutta “ Electon Transport in Mesoscopic systems” Cambridge University press.
7. H.Grabert and M. Devoret “ Single charge Tunneling” Plenum press 1992.

ANURAG ENGINEERING COLLEGE

(AUTONOMOUS)

B.Tech EEE IV Year I-Semester

L	T	P	C
3	0	0	3

DIGITAL SIGNAL PROCESSING (Elective-II)

Objectives:

- *To understand characteristics of discrete time signals and systems*
- *To analyze and process signals using various transform techniques*
- *To understand various factors involved in design of digital filters*
- *To understand the effects of finite word length implementation.*

UNIT I:

Introduction: Introduction to Digital Signal Processing: Discrete time signals & sequences, linear shift invariant systems, stability, and causality. Linear constant coefficient difference equations. Frequency domain representation of discrete time signals and systems.

Realization Of Digital Filters: Review of Z-transforms, Applications of Z – transforms, solution of difference equations of digital filters, Block diagram representation of linear constant-coefficient difference equations, Basic structures of IIR systems, Transposed forms, Basic structures of FIR systems, System function,

UNIT II:

Discrete Fourier Series: Properties of discrete Fourier series, DFS representation of periodic sequences, Discrete Fourier transforms: Properties of DFT, linear convolution of sequences using DFT, Computation of DFT. Relation between Z-transform and DFS

Fast Fourier Transforms: Fast Fourier transforms (FFT) - Radix-2 decimation in time and decimation in frequency FFT Algorithms, Inverse FFT, and FFT with General Radix N

UNIT III:

IIR Digital Filters: Analog filter approximations – Butter worth and Chebyshev, Design of IIR Digital filters from analog filters, Step and Impulse Invariant Techniques, Bilinear Transformation Techniques, Spectral transformation, Design Examples: Analog-Digital transformations.

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 & FIR filters.

UNIT V:

Multirate Digital Signal Processing: Decimation, interpolation, sampling rate conversion, Implementation of sampling rate conversion and applications. Finite Word Length Effects: Limit Cycles, Overflow Oscillations, Round Off Noise In IIR Filters, Computational Output Round Off Noise, Methods To Prevent Overflow, Trade Off Between Round Off And Overflow Noise, Dead Band Effects.

Course Outcomes:

- *Perform time frequency and Z transform analysis on signals and systems*
- *Understanding the inter-relationship between DFT and various transforms*
- *Understand the significance of various filter structures and effects of round-off errors.*
- *Design a digital filter for a given specification.*
- *Understand the fast computation of DFT and appreciate the FFT processing.*
- *Understand the trade-offs between normal and Multirate DSP techniques and finite length word effects.*

TEXT BOOKS:

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

REFERENCE BOOKS:

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

ANURAG ENGINEERING COLLEGE

(AUTONOMOUS)

B.Tech EEE IV Year I-Semester

L	T	P	C
3	0	0	3

NEURAL NETWORKS AND FUZZY LOGIC

(Elective-II)

Objectives:

- *This course introduces the basics of Neural Networks and essentials of Artificial Neural Networks with Single Layer and Multilayer Feed Forward Networks.*
- *It also deals with Associate Memories and introduces Fuzzy sets and Fuzzy Logic system components. The Neural Network and Fuzzy Network system application to Electrical Engineering is also presented.*

UNIT – I

Introduction to Neural Networks

Introduction, Humans and Computers, Organization of the Brain, Biological Neuron, Biological and Artificial Neuron Models, ANN Architectures, Types of neuron models: Integrate-and-Fire Neuron Model, Spiking Neuron Model, McCulloch-Pitts Model, Characteristics and Operation of ANN, Historical Developments and Potential Applications of ANN. Types of Neuron Activation Function, Classification Taxonomy of ANN – Connectivity, Neural Dynamics (Activation and Synaptic), Learning Strategy (Supervised, Unsupervised, Reinforcement), Learning Rules, Types of Applications

UNIT-II

Feed Forward Neural Networks

Single layer: Introduction, Perceptron Models- Discrete, Continuous, Training Algorithms- Discrete and Continuous Perceptron Networks,
Multi layer: Generalized Delta Rule, Derivation of Back propagation (BP) Training, Summary of Back propagation Algorithm, Learning Difficulties and Improvements.

UNIT- III

Associative Memories

Paradigms of Associative Memory, Pattern Mathematics, Hebbian Learning, General Concepts of Associative Memory (Associative Matrix, Association Rules, Hamming Distance, The Linear Associator, Matrix Memories, Content Addressable Memory), Bidirectional Associative Memory (BAM) Architecture, BAM Training Algorithms: Storage and Recall Algorithm
Architecture of Hopfield Network: Discrete and Continuous versions

UNIT – IV

Classical & Fuzzy Sets

Introduction to classical sets - properties, Operations and relations; Fuzzy sets, Membership, Uncertainty, Operations, properties, fuzzy relations, cardinalities, membership functions.

Fuzzy Logic System Components:Fuzzification, Membership value assignment, development of rule base and decision making system, Defuzzification to crisp sets, Defuzzification methods.

UNIT- V

Applications

Neural network applications: Process identification, control, fault diagnosis and load forecasting.

Fuzzy logic applications: Fuzzy logic control and Fuzzy classification.

TEXT BOOKS:

1. Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications - Rajasekharan and Rai – PHI Publication, 2009.
2. Introduction to Artificial Neural Systems – Jacek M Zurada, Jaico publishing house 1997

REFERENCE BOOKS:

1. Neural and fuzzy systems : Foundations, Architectures and applications – N Yadaiah and S.BapiRaju, Pearson Education
2. Neural Networks – James A Freeman and Davis Skapura, Pearson Education, 2002.
3. Neural Networks – Simon Hakens , Pearson Education, 2nd edition, 2008.
4. Neural Engineering - C.Eliasmith and CH.Anderson, PHI, 2003.
5. Neural Networks and Fuzzy Logic System - Bart Kosko, PHI Publications,2003.

ANURAG ENGINEERING COLLEGE

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B.Tech EEE IV Year I-Semester

L	T	P	C
0	0	3	2

MICROPROCESSORS AND MICROCONTROLLERS LAB

Note: Minimum 12 experiments should be conducted:

The Following programs are to be written for assembler and to be executed the same with 8086 and 8051 kits

List of Experiments:

1. **Programmes for 16 bit arithmetic operations for 8086 (Using Various Addressing Modes).**
2. **Program for sorting an array for 8086.**
3. **Program for searching for a number or character in string for 8086.**
4. **Program for string manipulations for 8086.**
5. **Program for digital clock design using 8086.**
6. **Interfacing ADC and DAC to 8086.**
7. **Interfacing 8255 to 8086.**
8. **Serial communication between two microprocessor kits using 8251.**
9. **Interfacing to 8086 an programming to control stepper motor.**
10. **Interfacing LCD to 8086**
11. **Interfacing 8259 PIC to 8086.**
12. **Interfacing 8279 keyboard controller to 8086.**
13. **SRAM/DRAM Interfacing to 8086.**
14. **Programming using arithmetic, logical and bit manipulation instructions of 8051.**
15. **Program and verify Timer/counter in 8051.**
16. **Program and verify Interrupt handling in 8051.**
17. **Communication between 8051 kit and PC.**
18. **Interfacing Matrix/Keyboard to 8051.**
19. **Data Transfer from Peripheral to Memory through DMA controller 8237/8257.**

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B.Tech EEE IV Year I-Semester

L	T	P	C
0	0	3	2

ELECTRICAL MEASUREMENTS LAB

Any TEN experiments are to be conducted.

1. Calibration and Testing of single phase energy Meter
2. Calibration of dynamometer power factor meter
3. Measurement of % ratio error and phase angle of given C.T. by comparison.
4. Schering Bridge & Anderson Bridge.
5. Measurements of 3 phase reactive power with single-phase wattmeter.
6. Measurement of parameters of a choke coil using 3 voltmeter and 3 ammeter methods.
7. Measurement of 3 phase power with single watt meter and 2 No's of C.T.
8. LVDT and capacitance pickup – characteristics and Calibration
9. PT Testing by Comparison – VG as Null Detector - Measurement of ratio error and phase angle of the given PT.
10. Resistance strain gauge – Strain measurements and calibrations.
11. Calibration LPF wattmeter – by Phantom testing
12. Dielectric oil testing using H.T. testing Kit
13. CT Testing using Mutual Inductor – Measurement of ratio error and phase angle of the given CT by Null Method.
14. Transformer turns ratio measurement using AC Bridge.

ANURAG ENGINEERING COLLEGE

(AUTONOMOUS)

B.Tech EEE IV Year II-Semester

L	T	P	C
4	1	0	4

HVDC TRANSMISSION

Objectives:

- *Deals with the importance of HVDC transmission.*
- *Deals with analysis of HVDC converters, faults and protections.*
- *It also deals with Reactive power control and power factor improvement in real time problems.*

UNIT – I

Basic Concepts

Economics & Terminal equipment of HVDC transmission systems: Types of HVDC Links – Apparatus required for HVDC Systems – Comparison of AC & DC Transmission, Application of DC Transmission System – Planning & Modern trends in D.C Transmission.

UNIT – II

Analysis of Converters & its Control

Choice of Converter configuration – analysis of Graetz – characteristics of 6 Pulse & 12 Pulse converters – Cases of two 3 phase converters in star – star mode – their performance. Principal of DC Link Control – Converters Control Characteristics – Firing angle control – Current and extinction angle control

UNIT-III

Reactive Power Control & Power Flow Analysis

Reactive Power Requirements in steady state-Conventional control strategies-Alternate control strategies-sources of reactive power-AC Filters – shunt capacitors-synchronous condensers. Modeling of DC Links-DC Network-DC Converter-Controller Equations-Solution of DC load flow

UNIT-IV

Converter Faults & Protection

Converter faults – protection against over current and over voltage in converter station – surge arresters – smoothing reactors – DC breakers –Audible noise-space charge field-corona effects on DC lines-Radio interference.

UNIT –V

Harmonics & Filters

Generation of Harmonics – Characteristics harmonics, calculation of AC Harmonics, on-Characteristics harmonics, adverse effects of harmonics – Calculation of voltage & Current harmonics – Effect of Pulse number on harmonics
Types of AC filters, Design of Single tuned filters –Design of High pass filters.

TEXT BOOKS:

1. HVDC Power Transmission Systems: Technology and system Interactions – K.R.Padiyar, New Age International (P) Limited, 1990.
2. HVDC Transmission – S Kamakshaiah, V Kamaraju, Tata Mc. Graw Hill Publications.

REFERENCE BOOKS:

1. EHVAC and HVDC Transmission Engineering and Practice – S.Rao, Khanna Publishers, 1990.
2. HVDC Transmission – J.Arrillaga, IEE, 2nd Edition, 1998.
3. Direct Current Transmission – E.W.Kimbark, Volume I, John Wiley & Sons, 1971.
4. Power Transmission by Direct Current – E.Uhlmann, B.S.Publications

ANURAG ENGINEERING COLLEGE

(AUTONOMOUS)

B.Tech EEE IV Year I-Semester

L	T	P	C
3	1	0	3

LINEAR SYSTEM ANALYSIS

(Elective III)

Objectives:

- Ability to find the Fourier transforms of some common signals using Laplace Transform and Parseval's theorem.
- Ability to test the polynomials using Sturm's theorem and reliability of elements.
- To Design Network Synthesis using Foster and Cauer methods for RL and RC networks

UNIT-I:

State Variable Analysis

Choice of state variables in Electrical networks-Formulation of state equations for Electrical networks-Equivalent source method. Network topological method - Solution of state equations-Analysis of simple networks with state variable approach.

UNIT-II

Fourier series and Fourier Transform Representation

Introduction, Trigonometric form of Fourier series, Exponential form of Fourier series, Wave symmetry, Fourier integrals and transforms, Fourier transform of a periodic function, Properties of Fourier Transform, Parseval's theorem, Fourier transform of some common signals, Fourier transform relationship with Laplace Transform. Introduction, Effective value and average values of non sinusoidal periodic waves, currents, Power Factor, Effects of harmonics, Application in Circuit Analysis, Circuit Analysis using Fourier Series.

UNIT - III

Laplace Transform

Application of Laplace transform Methods of Analysis – Response of RL, RC, RLC Networks to Step, Ramp, and impulse functions, Shifting Theorem – Convolution Integral – Applications

Testing of Polynomials & Network Synthesis: Elements of reliability-Hurwitz polynomials-positive real functions-Properties-Testing-Sturm's Test, examples. Synthesis of one port LC networks-Foster and Cauer methods-Synthesis of RL and RC one port networks-Foster and Cauer methods

UNIT-IV

Sampling

Sampling theorem – Graphical and Analytical proof for Band Limited Signal impulse sampling, natural and Flat top Sampling, Reconstruction of signal from its samples, effect of under sampling – Aliasing, introduction to Band Pass sampling, Cross correlation and auto correlation of functions, properties of correlation function, Energy density spectrum, Power density spectrum, Relation between auto correlation function and Energy / Power spectral density function.

UNIT-V

Z-Transforms

Fundamental difference between continuous and discrete time signals, discrete time complex, exponential and sinusoidal signals, periodicity of discrete time complex exponential, concept of Z-Transform of a discrete sequence. Distinction between Laplace, Fourier and Z-Transforms. Region of convergence in Z-Transforms, constraints on ROC for various classes of signals, Inverse Z-Transform properties of Z-Transforms.

TEXT BOOKS:

1. Signals, Systems and Communications - B.P. Lathi, BS Publications 2003.
2. Network Analysis and Synthesis – Umesh Sinha- Satya Prakashan Publications.

REFERENCE BOOKS:

1. Linear System Analysis – A N Tripathi, New Age International, 2007.
2. Network and Systems – D Roy Chowdhary, New Age International, 2nd edition, 2005.
3. Engineering Network Analysis and Filter Design- Gopal G. Bhise, Prem R. Chadha, Durgesh C. Kulshreshtha - Umesh Publications, 2009.
4. Linear system analysis - A.Cheng, Oxford publishers.

ANURAG ENGINEERING COLLEGE

(AUTONOMOUS)

B.Tech EEE IV Year II-Semester

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3	1	0	3

DIGITAL CONTROL SYSTEMS

(Elective III)

Objectives:

- *It deals with basics of Z transforms and z plane analysis of discrete control system.*
- *State space analysis and controllability Observability of digital control systems, stability analysis, design of discrete time control systems by conventional methods.*

UNIT – I

Sampling & Reconstruction

Introduction, Examples of Data control systems – Digital to Analog conversion and Analog to Digital conversion, sample and hold operations.

The Z – Transforms: Introduction, Linear difference equations, pulse response, Z – transforms, Theorems of Z – Transforms, the inverse Z – transforms, Modified Z-Transforms

UNIT-II

Z-Plane Analysis of Discrete-Time Control System

Z-Transform method for solving difference equations; Pulse transforms function, block diagram analysis of sampled – data systems, mapping between s-plane and z-plane.

State Space Analysis: State Space Representation of discrete time systems, Pulse Transfer Function Matrix solving discrete time state space equations, State transition matrix and it's Properties, Methods for Computation of State Transition Matrix, Discretization of continuous time state – space equations

UNIT –III

Controllability & Observability

Concepts of Controllability and Observability, Tests for controllability and Observability. Duality between Controllability and Observability, Controllability and Observability conditions for Pulse Transfer Function Stability Analysis: Mapping between the S-Plane and the Z-Plane – Primary strips and Complementary Strips – Constant frequency loci, Constant damping ratio loci, Stability Analysis of closed loop systems in the Z-Plane. Jury stability test – Stability Analysis by use of the Bilinear Transformation and Routh Stability criterion.

UNIT – IV

Design of Discrete Time Control System by Conventional Methods

Transient and steady – State response Analysis – Design based on the frequency response method – Bilinear Transformation and Design procedure in the w-plane, Lead, Lag and Lead-Lag compensators and digital PID controllers.

UNIT-V

State Feedback Controllers and Observers

Design of state feedback controller through pole placement – Necessary and sufficient conditions, Ackerman's formula.

State Observers – Full order and Reduced order observers.

TEXT BOOKS:

1. Discrete-Time Control systems - K. Ogata, Pearson Education/PHI, 2nd Edition, 2003.

REFERENCE BOOKS:

1. Digital Control Systems- Kuo, Oxford University Press, 2nd Edition, 2003.
2. Digital Control and State Variable Methods - M.Gopal, TMH , 4th Edition, 2008.

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L	T	P	C
3	1	0	3

POWER SYSTEM RELIABILITY (Elective III)

Objectives:

- *The course will give an introduction to the main principles and objectives of power system reliability analysis.*
- *It deals with overview of methodologies for reliability analysis of transmission and distribution systems, analysis of time dependencies and interruption costs, impact from protection systems, and life time modeling for maintenance optimization.*

UNIT – I

Basics of Probability theory & Distribution

Basic probability theory – rules for combining probabilities of events – Bernoulli's trials – probabilities density and distribution functions – binomial distribution – expected value and standard deviation of binomial distribution.

UNIT – II

Network Modeling and Reliability Analysis

Analysis of Series, Parallel, Series-Parallel networks – complex networks – decomposition method.

Reliability functions: Reliability functions $f(t)$, $F(t)$, $R(t)$, $h(t)$ and their relationships – exponential distribution – Expected value and standard deviation of exponential distribution – Bath tub curve – reliability analysis of series parallel networks using exponential distribution – reliability measures MTTF, MTTR, MTBF.

UNIT – III

Markov Modeling

Markov chains – concept of stochastic transitional probability Matrix, Evaluation of limiting state Probabilities. – Markov processes one component repairable system – time dependent probability evaluation using Laplace transform approach – evaluation of limiting state probabilities using STPM – two component repairable models.

UNIT – IV

Frequency & Duration Techniques

Frequency and duration concept – Evaluation of frequency of encountering state, mean cycle-time, for one, two component repairable models – evaluation of cumulative probability and cumulative frequency of encountering of merged states.

Generation System Reliability Analysis: Reliability model of a generation system – recursive relation for unit addition and removal – load modeling - Merging of generation load model – evaluation of transition rates for merged state model – cumulative Probability, cumulative frequency of failure evaluation – LOLP, LOLE.

UNIT – V

Composite Systems Reliability Analysis

Decompositions method – Reliability Indices – Weather Effects on Transmission Lines.
Distribution System and Reliability Analysis: Basic Concepts – Evaluation of Basic and performance reliability indices of radial networks.

TEXT BOOKS:

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

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ADVANCED CONTROL SYSTEMS

(Elective IV)

Objectives:

- *Able to learn about State Space Representation and find solution of State Equation, State Transition Matrix.*
- *Able to apply Controllability and Observability for controlling the systems.*
- *Able to analyze Describing functions, Phase Plane and Stability Analysis.*

UNIT – I

State Space Analysis , Controllability & Observability

State Space Representation, Solution of State Equation, State Transition Matrix, Canonical Forms – Controllable Canonical Form, Observable canonical Form, Jordan Canonical Form.

Test for controllability and Observability for continuous time systems – Time varying case, minimum energy control, time invariant case, Principle of Duality, Controllability and Observability from Jordan canonical form and other canonical forms.

UNIT – II

Stability Analysis

Stability: Stability in the sense of Lyapunov. Lyapunov's stability and Lyapunov's instability theorems, Direct method of Lyapunov for the linear and nonlinear continuous time autonomous systems.

UNIT – III

Phase-Plane Analysis

Introduction to phase-plane analysis, Method of Isoclines for Constructing Trajectories, singular points, phase-plane analysis of nonlinear control systems.

Describing Function Analysis: Introduction to nonlinear systems, Types of nonlinearities, describing functions, describing function analysis of nonlinear control systems.

UNIT – IV

Modal Control

Modal Control: Effect of state feedback on controllability and observability. Pole placement by state feedback, Full order observer and reduced order observer.

Calculus Of Variations: Calculus of variations approach: minimization of functionals of single function, constrained minimization, minimum principle, control variable inequality constraints. Control and state variable inequality constraints. Euler Lagrangie Equation.

UNIT – V

Optimal Control

Optimal Control: Formulation of optimal control problem, Minimum time, Minimum energy, minimum fuel problems, State regulator problem, Output regulator problem, Tracking problem, Continuous-Time Linear Regulators.

TEXT BOOKS:

1. Modern control system theory – M.Gopal, New Age international publishers, 2nd edition, 1996.
2. Advanced Control Theory – A. Nagoorkani, RBA Publications, 2nd edition.

REFERENCE BOOKS:

1. Modern control engineering – K.Ogata, Prentice-Hall of India, 3rd edition, 1998
2. Digital control and state variable methods – M.Gopal, Tata Mc.Grawhill companies, 1997]
3. Computational aids in control systems using MATLAB – HadiSaadat, Mc.GrawHill companies, 1993.
4. Distributed computer control systems – S.S.Lamba and V.P.Singh.

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EHVAC Transmission (Elective-IV)

Objectives:

- *This course introduces the necessity of EHVAC transmission system.*
- *It introduces calculation of voltage gradient of conductors corona effects in EHV lines and also calculation of electro static field of EHVAC lines and studying voltage control along with power circle diagram*

UNIT – I

Preliminaries

Necessity of EHV AC transmission – advantages and problems–power handling capacity and line losses- mechanical considerations — bundle conductor systems.

Line inductance and capacitances – sequence inductances and capacitances – modes of propagation.

UNIT – II

Voltage gradients of conductors

Electrostatics – field of sphere gap – field of line charges and properties – charge – potential relations for multi-conductors – surface voltage gradient on conductors – distribution of voltage gradient on sub-conductors of bundle – Examples.

UNIT – III

Corona Effects

Corona in E.H.V. lines – Corona loss formulae- attention of traveling waves due to Corona – Audio noise due to Corona, its generation, characteristic and limits. Measurements of audio noise radio interference due to Corona - properties of radio noise – frequency spectrum of RI fields –Measurements of RI and RIV.

UNIT – IV

Electro Static Field

Electrostatic field: calculation of electrostatic field of EHV/AC lines – effect on humans, animals and plants – electrostatic induction in unenergised circuit of double-circuit line – electromagnetic interference-Examples. Traveling wave expression and solution-source of excitation- terminal conditions- open circuited and short-circuited end-reflection and refraction coefficients-Lumped parameters of distributed lines-generalized constants-No load voltage conditions and charging current.

UNIT –V

Voltage control

Power circle diagram and its use – voltage control using synchronous condensers – cascade connection of shunt and series compensation – sub synchronous resonance in series capacitor – compensated lines – static VAR compensating system.

TEXT BOOKS:

1. EHVAC Transmission Engineering - R. D. Begamudre, New Age International (p) Ltd, 3rd Edition, 2006.
2. EHVAC and HVDC Transmission Engineering and Practice – S.Rao, Khanna Publishers, 1990.

REFERENCE BOOKS:

1. Extra High Voltage AC Transmission Engineering - Rokosh Das Begamudre, Wiley Eastern LTD., New Delhi, 1987.
2. EHV Transmission line - Electric Institution -Edison (GEC 1968).

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COMPUTER ORGANIZATION (ELECTIVE-IV)

Objectives:

- *Understand instruction format, life cycle and CPU Architecture and Organization*
- *Know the basic Architecture of Microprocessor.*
- *Understand different types of I/O interfaces.*
- *Familiar with the concepts of pipelining techniques.*
- *Understand the Multiprocessor concepts*

UNIT--I:

Instruction: Instruction Definition, instruction cycle, flow chart for instruction cycle, instruction storage, types of instruction formats (Zero, one, two and three address). Addressing modes: mode field, implied, immediate register, register direct, register indirect, auto increment, decrement, indexed, relative, base address mode, Numerical examples and problems.

UNIT -- II:

CPU-Organization: 8086 – CPU – Block diagram and pin diagram, concept of pipelining, minimum and maximum mode, General purpose registers; segment register and generation of 20 bits address, segmentation of main memory, Addressing modes, systems bus, Types of flags.

UNIT -- III:

Memory Hierarchy, Main memory, memory address map, memory connection to CPU; auxiliary memory, Magnetic disks, magnetic tapes; cache memory, hit and miss ratio, direct, associative and set associative mapping; Micro-programmed control: control memory, address sequencing.

UNIT -- IV:

I/O interface: I/O Bus and Interface modules, I/O versus Memory Bus, isolated vs Memory-mapped I/O. Asynchronous data transfer-strobe control, Hand shaking; Modes of Transfer: Example of programmed I/O, interrupt-initiated I/O, software considerations. Daisy- Chaining priority. DMA: DMA Controller, DMA Transfer, Intel 8089 IOP.

UNIT -- V:

Multi Processors: Characteristics of Multi Processor; Interconnection structures: Time shared common bus, multiport memory, crossbar switch, multi-stage switching network; Introduction to Flynn's classification: SISD, SIMD, MISD, MIMD (Introduction).

Course Outcomes: *Students will be able to:*

- *Understand the basic organization of computer and different instruction formats and addressing modes.*
- *Analyze the concept of pipelining, segment registers and pin diagram of CPU.*
- *Understand and analyze various issues related to memory hierarchy.*
- *Evaluate various modes of data transfer between CPU and I/O devices.*
- *Examine various inter connection structures of multi processors.*

TEXT BOOKS:

1. Computer System Architecture – M.Morris Mano, Third Edition, Pearson/PHI, 2011.
2. Microprocessor and Interfacing – Douglas V Hall, Second Edition, TATA McGraw Hill, 2006.

REFERENCE BOOKS:

1. Computer Organization – Carl Hamacher, ZvonksVranesic, SafeaZaky, V Edition, McGraw Hill.
2. Computer Organization and Architecture – William Stallings, 6th Edn. Pearson/PHI.

