MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
Sponsored by CMR Educational Society
(Affiliated to JNTU, Hyderabad, Approved by AICTE - Accredited by NBA & NAAC – 'A' Grade - ISO 9001:2015 Certified)
Maisammaguda, Dhulapally (Post Via. Kompally), Secunderabad – 500100, Telangana State, India.
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BACHELOR OF TECHNOLOGY
ELECTRICAL AND ELECTRONICS ENGINEERING

Course Structure and Syllabus
(Batches admitted from the academic year 2017 - 2018)

Note: The regulations hereunder are subject to amendments as may be made by the Academic Council of the College from time to time. Any or all such amendments will be effective from such date and to such batches of candidates (including those already pursuing the program) as may be decided by the Academic Council.

PRELIMINARY DEFINITIONS AND NOMENCLATURES

- ”Autonomous Institution /College” means an institution/college designated as autonomous institute / college by University Grants Commission (UGC), as per the UGC Autonomous College Statutes.
- “Academic Autonomy” means freedom to a College in all aspects of conducting its academic programs, granted by the University for promoting excellence.
- “Commission” means University Grants Commission.
- “AICTE” means All India Council for Technical Education.
- “University” the Jawaharlal Nehru Technological University, Hyderabad.
- “College” means Malla Reddy College of Engineering & Technology, Secunderabad unless indicated otherwise by the context.
- “Program” means:
  - Bachelor of Technology (B.Tech) degree program
  - UG Degree Program: B.Tech
- “Branch” means specialization in a program like B.Tech degree program in Electronics & Communication Engineering, B.Tech degree program in Computer Science and Engineering etc.
- “Course” or “Subject” means a theory or practical subject, identified by its course – number and course-title, which is normally studied in a semester.
- T–Tutorial, P–Practical, D–Drawing, L-Theory, C-Credits

FOREWORD

The autonomy is conferred on Malla Reddy College of Engineering & Technology (MRCET) by UGC based on its performance as well as future commitment and competency to impart quality education. It is a mark of its ability to function independently in accordance with the set norms of the monitoring bodies like UGC and AICTE. It reflects the confidence of the UGC in the autonomous institution to uphold and maintain standards it expects to deliver on its own behalf and thus awards degrees on behalf of the college. Thus, an autonomous institution is given the freedom to have its own curriculum, examination system and monitoring mechanism, independent of the affiliating University but under its observance.

Malla Reddy College of Engineering & Technology (MRCET) is proud to win the credence of all the above bodies monitoring the quality of education and has gladly accepted the responsibility of sustaining, and also improving upon the values and beliefs for which it has been striving for more than a decade in reaching its present standing in the arena of contemporary technical education. As a follow up, statutory bodies like Academic Council and Boards of Studies are constituted with the guidance of the Governing Body of the College and recommendations of the JNTU Hyderabad to frame the regulations, course structure and syllabi under autonomous status.

The autonomous regulations, course structure and syllabi have been prepared after prolonged and detailed interaction with several experts drawn from academics, industry and research, in accordance with the vision and mission of the college which reflects the mindset of the institution in order to produce quality engineering graduates to the society.

All the faculty, parents and students are requested to go through all the rules and regulations carefully. Any clarifications, if needed, are to be sought at appropriate time and with principal of the college, without presumptions, to avoid unwanted subsequent inconveniences and embarrassments. The Cooperation of all the stake holders is sought for the successful implementation of the autonomous system in the larger interests of the institution and brighter prospects of engineering graduates.

"A thought beyond the horizons of success committed for educational excellence"

PRINCIPAL

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

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VISION

- To establish a pedestal for the integral innovation, team spirit, originality and competence in the students, expose them to face the global challenges and become technology leaders of Indian vision of modern society.

MISSION

- To become a model institution in the fields of Engineering, Technology and Management.
- To impart holistic education to the students to render them as industry ready engineers.
- To ensure synchronization of MRCET ideologies with challenging demands of International Pioneering Organizations.

QUALITY POLICY

- To implement best practices in Teaching and Learning process for both UG and PG courses meticulously.
- To provide state of art infrastructure and expertise to impart quality education.
- To groom the students to become intellectually creative and professionally competitive.
- To channelize the activities and tune them in heights of commitment and sincerity, the requisites to claim the never ending ladder of SUCCESS year after year.

For more information: www.mrcet.ac.in

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

VISION

To strengthen the department into a center of academic excellence with focus on advanced technology and research by delivering the best quality technical education to the students in meeting the current and future challenges with emphasis on moral and ethical foundation.

MISSION

- To create and enrich academic environment with essential resources, so as to train and mould students to promote active learning, critical thinking with innovative ideas to solve real-world problems in the field of Electrical Engineering.
- To motivate and strengthen faculty to practice effective teaching learning process and advanced research and publication work.
- To enhance industry interaction and initiate best consultancy services.

PROGRAM EDUCATIONAL OBJECTIVES:

PEO 1. Excellence in Career

To provide students with in-depth knowledge in the fundamental and advanced areas of electrical and electronics engineering and there by excel in professional career and higher education.

PEO 2. Development of Research and Industry Interaction

To train students in the software/hardware design of electrical systems and promote the development of research activity as well as interaction with the industry.

PEO 3. Professional and Ethical Attitude

To inculcate professional and ethical attitude in students and enhance the ability to relate engineering issues to broader social context.

PROGRAM SPECIFIC OUTCOMES:

PSO1:

To make students strong in core and advanced subjects of electrical and electronics engineering by which they can excel in their future endeavors.

PSO2:

To make students exposed to latest simulation tools of electrical systems and provide a sense of direction towards research and industry interaction.

PSO3:

To make the students handle social related engineering issues without deviating from professional and ethical values.

PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to:

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design / development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multi disciplinary environments.
12. **Life- long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

COURSE STRUCTURE

I Year B. Tech (EEE) – I Semester

S.NO	SUBJECT CODE	SUBJECT	L	T/P/D	C	MAX.MARKS	
						Int	Ext
1	R17A0001	English	2		2	30	70
2	R17A0021	Mathematics-I	4	1	4	30	70
3	R17A0011	Engineering Physics-I	2	1	2	30	70
4	R17A0013	Engineering Chemistry	3		3	30	70
5	R17A0501	Computer Programming With C	3		3	30	70
6	R17A0302	Engineering Drawing	4	3	4	30	70
7	R17A0581	Computer Programming Lab	-	3	2	25	50
8	R17A0083	Engineering Physics / Engineering Chemistry Lab	-	3	2	25	50
9	R17A0081	English Language Communication Skills Lab-1	-	3	2	25	50
		TOTAL	**18**	**14**	**24**	**255**	**570**

I Year B. Tech (EEE) – II Semester

S.NO	SUBJECT CODE	SUBJECT	L	T/P/D	C	MAX.MARKS	
						Int	Ext
1	R17A0002	Professional English	2		2	30	70
2	R17A0022	Mathematics-II	4	1	4	30	70
3	R17A0012	Engineering Physics-II	2	1	2	30	70
4	R17A0502	Object Oriented Programming through C++	3	1	3	30	70
5	R17A0201	Electrical Circuits	4		4	30	70
6	R17A0014	Environmental Studies	3		3	30	70
7	R17A0582	Object Oriented Programming through C++ Lab	-	3	2	25	50
8	R17A0084	It Workshop/Engineering Workshop	-	3	2	25	50
9	R17A0082	English Language Communication Skills Lab-II	-	3	2	25	50
*10	R17A0003	Human Values And Societal Perspectives	2	-	-	50	-
		TOTAL	**20**	**12**	**24**	**305**	**570**

***Mandatory course: Non-credit subject, 50% of scoring is required for the award of the degree**

II Year B. Tech (EEE) – I Semester

S.NO.	SUBJECT CODE	SUBJECT	L	T/P/D	C	MAX MARKS	
						INT	EXT
1	R17A0023	Mathematics-III	3	1	3	30	70
2	R17A0401	Electronic Devices and Circuits	4	-	4	30	70
3	R17A0381	Basics of Mechanical Engineering	3	1	3	30	70
4	R17A0202	Electrical Machines – I	3	1	3	30	70
5	R17A0205	Electro Magnetic Fields (EMF)	4	-	4	30	70
6	R17A0061	Managerial Economics and Financial Analysis	3	-	3	30	70
7	R17A0481	Electronic Devices & Circuits Lab	-	3	2	25	50
8	R17A0395	Mechanical Engineering Lab	-	3	2	25	50
*9	R17A0004 R17A0005	Foreign Language: French Foreign Language: German	2	-	-	50	-
Total			**22**	**09**	**24**	**280**	**520**

***Mandatory course: Non-credit course, 50% of scoring is required for the award of the degree**

II Year B. Tech (EEE) – II Semester

S.NO.	SUBJECT CODE	SUBJECT	L	T/P/D	C	MAX MARKS	
						INT	EXT
1	R17A0206	Control Systems	3	1	3	30	70
2	R17A0203	Electrical Machines – II	4	1	4	30	70
3	R17A0207	Electrical Power Generation, Transmission And Distribution-I	4	1	4	30	70
4	R17A0209	Network Theory	3	1	3	30	70
5	R17A0407	Switching Theory and Logic Design	3	1	3	30	70
6	********	Open Elective 1	3	-	3	30	70
7	R17A0281	Electrical Machines Lab – I	-	3	2	25	50
8	R17A0283	Networks & Simulation Lab	-	3	2	25	50
9	R17A0006	Gender Sensitization	-	3	-	50	
Total			**20**	**14**	**24**	**280**	**520**

OPEN ELECTIVE I		
S.NO	**SUBJECT CODE**	**SUBJECT**
1	R17A0451	Digital Electronics
2	R17A0251	Elements of Electrical Engineering
3	R17A0551	Database Systems
4	R17A0351	Elements of Mechanical Engineering
5	R17A0352	Green Energy Systems
6	R17A0051	Intellectual Property Rights

III Year B. Tech (EEE) – I Semester

S.NO.	SUBJECT CODE	SUBJECT	L	T/P/D	C	MAX MARKS	
						INT	EXT
1	R17A0408	IC Applications	3	-	3	30	70
2	R17A0204	Electrical Machines-III	3	1	4	30	70
3	R17A0208	Electrical Power Generation, Transmission and Distribution-II	3	1	4	30	70
4	R17A0210	Power Electronics	3	-	3	30	70
5	R17A0463 R17A0211 R17A0212	**Core Elective I** 1. Systems & Signal Processing 2. High Voltage Engineering 3. Digital Control Systems	3	-	3	30	70
6	********	**Open Elective II**	3	-	3	30	70
7	R17A0282	Electrical Machines Lab – II	-	3	2	25	50
8	R17A0284	Control Systems and Simulation Laboratory	-	3	2	25	50
*9	R17A0007	Technical communications & soft skills Laboratory	2	-	-	50	-
Total			**20**	**08**	**24**	**280**	**520**

***Mandatory course: Non-credit course, 50% of scoring is required for the award of the degree**

OPEN ELECTIVE II		
S.NO	**SUBJECT CODE**	**SUBJECT**
1	R17A0452	Industrial Electronics
2	R17A0453	Communication Networks
3	R17A0552	Introduction to Java Programming
4	R17A1251	Introduction to Scripting Languages
5	R17A1252	Software Project Management
6	R17A0353	Enterprise Resource Planning

III Year B. Tech (EEE) – II Semester

S.NO.	SUBJECT CODE	SUBJECT	L	T/P/D	C	MAX MARKS	
						INT	EXT
1	R17A0213	Electrical Measurements and Instrumentation	3	-	3	30	70
2	R17A0414	Microprocessors and Microcontrollers	3	1	4	30	70
3	R17A0214	Power Semiconductor Drives	3	1	4	30	70
4	R17A0215	Power System Analysis	3	-	3	30	70
5	R17A0216 R17A0217 R17A0218	**Core Elective II** 1. EHV AC & HVDC Transmission 2. Electrical Estimation and Costing 3. Optimization Techniques	3	-	3	30	70
6	********	**Open Elective III**	3	-	3	30	70
7	R17A0285	Power Electronics and Simulation Laboratory	-	3	2	25	50
8	R17A0486	Microprocessors and Microcontrollers Laboratory	-	3	2	25	50
Total			**18**	**8**	**24**	**230**	**520**

OPEN ELECTIVE III		
S.NO	**SUBJECT CODE**	**SUBJECT**
1	R17A0454	Robotics & Automation
2	R17A1253	Management Information Systems
3	R17A0519	Web Technologies
4	R17A0553	Data Structures Using PYTHON
5	R17A0354	Nano Technology
6	R17A0355	Total Quality Management
7	R17A0554	Python Programming

IV Year B. Tech (EEE) – I Semester

S.No.	Subject Code	SUBJECT	L	T/P/D	C	Max. Marks	
						Int	Ext
1	R17A0219	Switch Gear and Protection	3	1	4	30	70
2	R17A0220	Industrial and Allied Electrical Systems	3	1	4	30	70
3	R17A0221	Power System Operation & Control	3	-	3	30	70
4	R17A0462	PLC Systems	3	-	3	30	70
5	R17A0514 R17A0222 R17A1261	Core Elective III 1. Computer Networks 2. Advanced Power Electronics 3. Artificial Neural Networks	3	-	3	30	70
6	R17A0223 R17A0224 R17A0225	Core Elective IV 1. Power Plant Engineering 2. Quality & Reliability Engineering 3. Solar Electrical Systems	3	-	3	30	70
7	R17A0286	Power Systems Laboratory	-	3	2	25	50
8	R17A0287	Electrical Measurements Laboratory	-	3	2	25	50
Total			**18**	**8**	**24**	**230**	**520**

IV Year B. Tech (EEE) – II Semester

S.No.	Subject Code	SUBJECT	L	T/P/D	C	Max. Marks	
						Int	Ext
1	R17A0226 R17A0227 R17A0228	Core Elective V 1. Wind Electrical Systems 2.Power System Dynamics and Stability 3. Electrical Machine Design	3	-	3	30	70
2	R17A0229 R17A0230 R17A0231	Core Elective VI 1. Power Quality & FACTS Devices 2. Power System Reliability 3. Electrical and Hybrid Vehicles	3	-	3	30	70
3	R17A0288	Mini Project	-	-	4	-	100
4	R17A0289	Technical Seminar		6	2	50	-
5	R17A0290	Major Project	15	-	12	100	200
Total			**21**	**6**	**24**	**210**	**440**

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

I Year B. Tech EEE-I Sem **L T/P/D C**

2 - / - / - 2

(R17A0001) ENGLISH

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.

OBJECTIVES:

- To provide amateur engineers with the critical faculties necessary in an academic environment, using the theoretical and practical components of English syllabus.
- To upgrade the capability of analyzing of texts from different periods and genres.
- To improve the language proficiency of the students in English with emphasis on LSRW skills to face complex engineering activities at work place.
- To understand the basics of grammar to speak correct English and communicate effectively both formally and informally.

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 recognize them, to distinguish between them to mark stress and recognize 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 all the nine units of the prescribed text: Learning English: A Communicative Approach)
   - 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 the text
   - 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:

In order to improve the proficiency of the student in the acquisition of the four skills mentioned above, the following text and course content, is prescribed for this semester.

Textbook titled "Epitome of Wisdom", published by Maruthi Publications, Hyderabad.

Unit –I

Chapter entitled 'Mokshagundam Visvesvaraya' from *Epitome of Wisdom*

and

Listening – Conversations – introducing each other, talking about a course
Speaking – Jam sessions
Reading – The Palm Islands
Writing – Writing Paragraphs
Grammar – Conjunctions and Adverbs
Vocabulary – Prefixes and Suffixes

Unit – II

Chapter entitled "Three Days to See" from *Epitome of Wisdom*

and

Listening –Conversations-planning for an outing
Speaking –Telephone Etiquettes
Reading – Physically challenged athletes
Writing – Memo writing
Grammar –Modal Auxiliaries
Vocabulary – Synonyms & antonyms

Unit – III

Chapter entitled "The Road Not Taken" from *A Selection of Robert Frost's Poems (Owl Book)*, by Holt Paperbacks: 2 Revised Edition. 2002.

and

Listening – News items
Speaking – Public speaking
Reading – 'If' poem
Writing – Letter writing-formal/informal
Grammar – Knowing with questions (Wh –questions,) Question tags
Vocabulary –Similes and Metaphors

Unit – IV

Chapter entitled "The Last Leaf" from *Epitome of Wisdom*

and

Listening – Speech on environmental conservation
Speaking – Group discussion
Reading – Choose how to start your day
Writing – Writing a narrative
Grammar –Prepositions
Vocabulary – Idioms and one-word substitutes

Unit –V

5. Chapter entitled "The Convocation Speech" from *Epitome of Wisdom*

and

Listening – Speech on 'How do you make a teacher great'?
Speaking –Role plays
Reading – What is meant by entrepreneurship?
Writing – Essay writing
Grammar – Active voice and Passive voice
Vocabulary – Phrasal verbs

* Exercises apart from the text book shall also be used for classroom tasks.

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.

OUTCOMES:

- Acquire and apply the critical thought process effectively on complex engineering activities.
- Utilize the analytical capability to comprehend and design any text effortlessly.
- Imbibe the English proficiency to receive clear instructions, make notes and draft letters vividly.
- Identify the basic grammatical structures and its application accurately to communicate with society at large.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

I Year B. Tech EEE-I Sem

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(R17A0021) MATHEMATICS – I

Objectives:

To learn

- Concept of rank of a matrix and applying the concept of rank to know the consistency of linear equations and to find all possible solutions if exist and concept of eigen values and eigen vectors of a matrix
- The mean value theorems and to understand the concepts geometrically, functions of several variables and optimization of these functions.
- Methods of solving the differential equations of first and higher order, Newton's law of cooling, Natural growth and decay, bending of beams etc.
- In many engineering fields the physical quantities involved are vector valued functions. Hence the vector calculus aims at basic properties of vector-valued functions and their applications to line, surface and volume integrals.

UNIT - I: Matrix Theory

Introduction to matrices- Rank of a matrix - Finding rank of a matrix by reducing to Echelon and Normal forms-Consistency of system of linear equations (homogeneous and non-homogeneous) using the rank of a matrix-Cayley - Hamilton Theorem (without proof) – Verification- finding inverse of a matrix and powers of a matrix by Cayley-Hamilton theorem-Linear dependence and Independence of Vectors- Eigen values and eigen vectors of a matrix-Properties of eigen values and eigen vectors of real and complex matrices-Diagonalization of a matrix.

UNIT – II: Differential Calculus

Mean Value Theorms: Rolle's Theorem – Lagrange's Mean Value Theorem – Cauchy's mean value theorems with geometrical interpretations (all theorems without proof)- verification of the Theorems and testing the applicability of these theorems to the given function-Taylor's series -Maclaurin's series.

Functions of Several Variables: Jacobian-Functional dependence- Maxima and Minima of functions of two variables without constraints and with constraints - Method of Lagrange multipliers.

UNIT – III: Ordinary Differential Equations of First Order and Applications

Introduction to ordinary differential equation - Variable Separable form- Homogeneous-Non homogeneous- Exact-Non Exact-Linear and Bernoulli's equations-Applications of first order differential equations – Newton's Law of cooling- Law of natural growth and decay-Orthogonal trajectories.

UNIT - IV: Linear Differential Equations of Higher Order and Applications

Linear differential equations of second and higher order with constant coefficients- Non-homogeneous term of the type f(x) = e^{ax} , sinax, cosax, x^n , e^{ax} V and x^n V- Method of variation of parameters-Applications to bending of beams, Electrical circuits and simple harmonic motion.

UNIT – V : Vector Calculus

Introduction- Scalar point function and vector point function, Gradient- Divergence- Curl and their related properties - Laplacian operator, Line integral – work done – Surface integrals -Volume integral. Green's Theorem,Stoke's theorem and Gauss's Divergence Theorems (Statement & their Verification).

TEXT BOOKS:

1. "Mathematics – I", Special Edition – MRCET, Mc Graw Hill Publications, 2017
2. Engineering Mathematics – I by T.K.V Iyenger ,B.Krishna Gandhi and Others ,S Chand Publishers.

REFERENCES:

1. Engineering Mathematics by P. Sivaramakrishna Das, Pearson Publishers.
2. Advanced engineering Mathematics by Kreyszig, John Wiley & Sons Publishers.

Outcomes:

- After learning the contents the student is able to write the matrix representation of a set of linear equations and to analyze solutions of system of equations.
- The student will be able to understand the methods of differential calculus to optimize single and multivariable functions.
- The student is able to identify the type of differential equation and uses the right method to solve the differential equations. Also able to apply the theory of differential equations to the real world problems.
- The student will be able to evaluate multiple integrals(line, surface volume integrals) and convert line integrals to area integrals and surface integrals to volume integrals.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

I Year B. Tech EEE-I Sem

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(R17A0011) ENGINEERING PHYSICS – I

OBJECTIVES:

- The information in optics is required for engineering technology students to understand wave nature of light for applying accurate measurements by means of optical instruments.
- From the study of quantum and statistical aspects dual behavior of electron and solid state physics can be realized by the engineering students.
- The basic information regarding electrons and holes and their functioning in semiconductors is evident to the students. The semiconductor devices provide basic information for the present communication system

UNIT-I

OPTICS:

Interference-Coherence-Coherent sources, Constructive and destructive interference. Theory of interference fringes (Expression for band width). Interference in thin films by reflected light, Newton's rings Experiment. Diffraction-Types of diffraction, Difference between interference and diffraction, Fraunhofer's diffraction (Single Slit), Diffraction grating, Polarization, Types of polarization, Double Refraction, Nicol Prism.

UNIT-II

LASERS:

Characteristics of lasers, Spontaneous and Stimulated emissions, Einstein's Coefficients, Population inversion, Meta stable state, pumping, lasing action, Construction and working of Ruby Laser, Helium-Neon Laser, Semi conductor lasers, Applications of lasers.

FIBER OPTICS:

Construction and Working Principle of an optical fiber, Advantages of optical fibers, Numerical aperture and Acceptance angle, Types of Optical fibers - Mode and Propagation through step and graded index fibers, Optical Fiber Communication System, Attenuation, Applications of optical fibers.

UNIT-III

PRINCIPLES OF QUANTUM MECHANICS:

Wave nature and particle nature-de Broglie's Hypothesis, GP Thomson's Experiment, Davisson and Germer's experiment, Matter Waves, Heisenberg's uncertainty principle, physical significance of wave function, Schrodinger time-independent wave equation, Particle in One dimensional infinite potential box.

UNIT-IV

ELEMENTS OF STATISTICAL MECHANICS & BAND THEORY OF SOLIDS:

Micro and Macro states, Maxwell Boltzmann, Bose Einstein, Fermi Dirac Statistical distributions (Qualitative), Density of States, Fermi Energy, Introduction to electron theory of metals, Bloch Theorem (Qualitative), Kronig Penny model(Qualitative), EK curve (Brillouin Zone)-Effective mass of electron, Origin of energy bands in solids, Classification of solids-conductors, semi conductors and insulators.

UNIT-V

SEMICONDUCTOR PHYSICS:

Types of semi conductors**,** Carrier concentration and Fermi level of intrinsic and Extrinsic Semiconductors, Hall Effect and applications, Direct and indirect band gap of semiconductors.

SEMICONDUCTOR DEVICES:

Formation of PN junction diode, Energy level diagram of PN junction diode. V-I characteristics of PN junction diode- PN junction diode as LED and Solar cell.

TEXT BOOKS:

1. Engineering Physics - S Mani Naidu- Pearson Publishers.
2. A Text Book of Engineering Phyiscs- P.G. Kshirsagar, Avadhanulu – S.Chand

REFERENCES:

1. Solid State Physics, Kittel- Wiley International.
2. Solid State Physics – AJ DekKer-Macmillan Publishers.
3. Engineering Physics, P.K. Palaniswamy, Scitech Publishers

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

I Year B. Tech EEE-I Sem

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

(R17A0013)ENGINEERING CHEMISTRY

Objectives

- To impart the basic concepts and ideas in chemistry, to develop scientific attitudes and enable the students to correlate the concepts of chemistry with the core programmes.
- Electrochemistry unit give conceptual knowledge about spontaneous processes and how can they be harnessed for producing electrical energy and efficiency of systems. Fuel cells which are the alternate energy sources for generating electrical energy on spot and portable applications.
- Understand various techniques involved in polymerization and application of polymer technology in the area of various engineering fields and manufacturing process of important metallurgical materials.

UNIT I: Electrochemistry: Conductance - Specific, Equivalent, Molar conductance and their unit, Applications of Conductance-Conductometric titrations (Acid base and Precipitation titrations); EMF-electrode and electrode potentials; Nernst equation and its applications; Electrochemical cells-Galvanic cell (Daniel cell) and Concentration cell (electrolytic concentration cell); Types of Electrodes–(construction and functioning of Calomel, Quinhydrone and Glass electrodes); determination of P^H using glass electrode; Potentiometric titrations (Acid Base and Redox titrations); electrochemical series and its applications; Numerical problems on conductance.

Batteries: Primary (Lithium cells) and Secondary cells (Lead-Acid cell and Ni-Cd cell); **Fuel cells** - Hydrogen -Oxygen fuel cell and Methanol-Oxygen fuel cell - construction, functioning, advantages and applications.

Unit II: Corrosion and its Control: Causes and effects of corrosion; Theories of corrosion – Chemical corrosion (oxidation corrosion) & Electrochemical corrosion (mechanism of evolution of Hydrogen and Absorption of oxygen); Galvanic corrosion; Factors affecting rate of corrosion – Nature of metal (position of metal in galvanic series, overvoltage, relative areas of anodic and cathodic parts, purity of metal and passivity) and Nature of environment (temperature, humidity and pH effect)

Corrosion control methods: Cathodic protection (Sacrificial Anodic and Impressed Current Cathodic protection). Surface coatings: Metallic coatings & methods of application of metallic coatings - hot dipping (galvanization & tinning), cladding, electroplating (Cu plating) and Electroless plating (Ni plating) – advantages and applications of electroplating/electroless plating.

UNIT- III: Engineering Materials

Polymers: Classification of Polymers, Types of Polymerization (Chain growth, Step growth & Zeigler Natta) **Plastics:** Thermoplastic & Thermosetting resins, Preparation, properties, engineering applications of PVC, Teflon and Bakelite. **Fibers-** Characteristics of fibers – preparation, properties and uses of Nylon – 6,6 and Dacron – Fiber Reinforced Plastics (FRP) – applications. **Rubbers**–Natural rubber and its vulcanization; **Elastomers**–Buna-S and Butyl rubber; **Conducting polymers:** Polyacetylene-Mechanism of conduction, doping; applications of conducting polymers; **Bio-degradable Polymers:** preparation and applications of Poly vinylacetate and Poly lactic acid.

Lubricants: Characteristics of a good lubricant; Classification with examples; properties of lubricants: viscosity, cloud point, pour point, flash and fire point.

Refractories: Classification of refractories with examples, characteristics of a good refractory and applications of refractories.

Nanomaterials: Introduction and applications of nanomaterials.

UNIT IV: Water and its Treatment:

Hardness of Water: Causes of hardness, types of hardness, units of hardness; determination of hardness of water by EDTA method - numerical problems. Boiler troubles – Scales & Sludges, Priming, Foaming, and Caustic Embrittlement; Treatment of boiler feed water – Internal treatment (Phosphate, Colloidal and Calgon conditioning); External treatment– Zeolite process and Ion exchange process; **Potable Water**-Its Specifications–Disinfectation of water by ozonisation, chlorination (break point chlorination and its significance); Reverse Osmosis.

UNIT V: Fuels

Fuels – Characteristics of a good fuel, Classification – Solid fuels: Coal – analysis of coal - proximate and ultimate analysis and their significance, Liquid fuels – petroleum and its refining; Cracking – Fixed bed catalytic cracking. Knocking – octane and cetane rating, synthetic petrol- Fischer-Tropsch's process: Gaseous fuels - constituents, characteristics and applications of Natural gas, LPG and CNG; Calorific value of fuel – HCV, LCV; Determination of calorific value by Junker's gas calorimeter.

TEXT BOOKS:

1. Engineering Chemistry by P.C Jain & Monica Jain, Dhanpatrai Publishing Company 14th Edition (2013)
2. Engineering Chemistry by B. Rama Devi, Ch. Venkataramana Reddy and R.P. Mani, CENGAGE learning (2016)

REFERENCE BOOKS

1. Engineering Chemistry by M. Thirumala Chary and E. Laxminarayana, Scitech publications (2016).
2. Engineering Chemistry by Bharathi Kumari and Jyotsna Cherukuri, VGS Techno Series (2016).

Course Outcomes:

- Familiarize the student with the fundamentals of the treatment technologies and the considerations for its design and implementation in water treatment plants.
- Understand the operating principles of various types of electrochemical cells, including fuel cells and batteries.
- Analyze and develop a technically sound, economic and sustainable solution to corrosion problems related to engineering service.
- Be able to apply core concepts in Materials Science to solve engineering problems
- To learn about types of fuels and their characteristics, and combustion systems with emphasis on engineering applications.
- Recently modern materials synthesized find applications in industry and creating instruments for solving problems of electronics, telecommunications, health care, agriculture, and technology etc., In order to emphasize the above the topics like composite materials, polymers, conducting polymers and nanomaterials have been incorporated in the curriculum.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

I Year B. Tech EEE-I Sem

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

(R17A0501) COMPUTER PROGRAMMING WITH C

Objectives

- To understand the various steps in Program development.
- To understand the basic concepts in C Programming Language.
- To learn how to write modular and readable C Programs
- To learn to write programs (using structured programming approach) in C to solve problems.
- To introduce the students to basic data structures such as lists, stacks and queues.
- To make the student understand simple sorting and searching methods

UNIT - I

Introduction to Computing – Computer Systems, Computing Environments, Computer Languages, Creating and running programs, Software Development Life Cycle, Algorithm, Flowchart.

Introduction to C – History of C, Features Of C, Structure Of C Program, Character Set, C Tokens-keywords, Identifiers, Constants, Data types, Variables, Operators, Expressions, Precedence and Associativity, Expression Evaluation, Type conversion, Statements- Selection Statements(Decision Making) – if and switch statements, Repetition statements (loops)- while, for, do-while statements, other statements related to looping –break, continue, goto.

UNIT-II

Functions-Designing Structured Programs, Types of Functions- user defined functions, Standard Functions, Inter function communication, Categories of functions ,Parameter Passing techniques, Scope, Storage classes-auto, register, static, extern, Type qualifiers, Recursion- recursive functions, Preprocessor commands.

UNIT – III

Arrays – Declaration and Initialization, Arrays with functions , Array Applications, Two dimensional arrays, Multi dimensional arrays.

Strings – Declaration and Initialization, String Input / Output functions, Arrays of strings, String manipulation functions.

UNIT-IV

Pointers- Introduction, Definition and uses of pointers, address operator, Pointer variables, Pointer constants , void pointers, Pointer arithmetic, Pointers to Pointers, Pointers with Arrays, Pointers with Functions, Pointers to functions, Array of pointers, Pointers with Strings. Dynamic Memory Management functions: malloc(), calloc(), realloc() and free()

UNIT-V

Structures and Unions - **I**ntroduction, Declaration and Initialization, Structure within a structure, Operations on structures, Array of Structures, Pointer to Structures, Structures with Functions, Self referential structures, Typedef, enum, bitfields, Unions.

Files – Concept of a file, Streams, Text files and Binary files, Opening and Closing files, File input / output functions, File Status functions (Error handling), Positioning functions, Command line arguments.

TEXT BOOKS:

1. "Computer Programming with C", Special Edition – MRCET, McGraw Hill Publications, 2017.
2. Computer Science: A Structured Programming Approach Using C, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.

REFERENCE BOOKS:

1. The C Programming Language, B.W. Kernighan and Dennis M.Ritchie, PHI.
2. Computer Programming, E.Balagurusamy, First Edition, TMH.
3. C and Data structures – P. Padmanabham, Third Edition, B.S. Publications.
4. Programming in *C, Ashok Kamthane*. Pearson Education India.
5. Let us C ,Yashwanth Kanethkar, 13th Edition, BPB Publications.

Outcomes:

- Demonstrate the basic knowledge of computer hardware and Software.
- Ability to apply solving and logical skills to programming in C language and also in other languages.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

I Year B. Tech EEE-I Sem

L	T/P/D	C
4	-/-/3	4

(R17A0302) ENGINEERING DRAWING

UNIT – I

Introduction To Engineering Drawing: Principles of Engineering Drawing/Graphics – Various Drawing Instruments – Conventions in Drawing- Dimensioning – Lettering practice – BIS Conventions.

a) Polygons – Construction of regular polygons (General Method only)
b) Conic Sections (General Method only- Eccentricity Method)
c) Cycloid, Epicycloid and Hypocycloid
d) Scales-Plain, Diagonal and Vernier

UNIT – II

Orthographic Projection in First Angle only: Principles of Orthographic Projections – Conventions – First and Third Angle projections (Introduction).

Projections of Points. Points in all four quadrants.

Projections of Lines – Parallel and inclined to both planes.

UNIT – III

Projections of Planes: Projection of regular planes, Plane inclined to both reference planes (No conditional problems).

Projections of Solids: Projections of regular solids prism and pyramid inclined to both planes (No conditional problems).

UNIT – IV

Isometric Projections: Principles of Isometric Projection – Isometric Scale – Isometric Views– Conventions – Plane Figures, Simple and Compound Solids.

UNIT – V

Transformation of Projections: Conversion of Isometric Views to Orthographic Views. Conversion of orthographic views to isometric views – simple objects

Basic Principles of ACAD – Demo Only.

TEXT BOOKS

1. "Engineering Drawing", Special Edition – MRCET, McGraw Hill Publications, 2017.
Engineering Drawing, N.D. Bhatt
3. Engineering Drawing by K.Venu Gopal& V.Prabu Raja New Age Publications.

REFERENCES

1. Engineering drawing – P.J. Shah .S.Chand Publishers.
2. Engineering Drawing- Johle/Tata Macgraw Hill Book Publishers.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

I Year B. Tech EEE-I Sem

L	T/P/D	C
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(R17A0581) COMPUTER PROGRAMMING LAB

Objectives:

- Understand the basic concept of C Programming, and its different modules that includes conditional and looping expressions, Arrays, Strings, Functions, Pointers, Structures and File programming
- Acquire knowledge about the basic concept of writing a program.
- Role of constants, variables, identifiers, operators, type conversion and other building blocks of C Language.
- Use of conditional expressions and looping statements to solve problems associated with conditions and repetitions.
- Role of Functions involving the idea of modularity.
- Concept of Array and pointers dealing with memory management.
- Structures and unions through which derived data types can be formed
- File Handling for permanent storage of data or record.
- Programming using gcc compiler in Linux.

Week 1:

a) Write a C program to find sum and average of three numbers.

b) Write a C program to find the sum of individual digits of a given positive integer.

c) Write a C program to generate the first n terms of the Fibonacci sequence.

Week 2:

a) Write a C program to generate prime numbers between 1 to n.

b) Write a C program to Check whether given number is Armstrong Number or Not.

c) Write a C program to evaluate algebraic expression (ax+b)/(ax-b).

Week 3:

a) Write a C program to check whether given number is perfect number or Not.

b) Write a C program to check whether given number is strong number or not.

Week 4:

a) Write a C program to find the roots of a quadratic equation.

b) Write a C program perform arithmetic operations using switch statement.

Week 5:

a) Write a C program to find factorial of a given integer using non-recursive function.

b) Write a C program to find factorial of a given integer using recursive function.

Week 6:

a) Write C program to find GCD of two integers by using recursive function.

b) Write C program to find GCD of two integers using non-recursive function.

Week 7:

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

b) Write a C Program to Sort the Array in an Ascending Order

c) Write a C Program to find whether given matrix is symmetric or not.

Week 8:

Revision of programs

Week 9:

a) Write a C program to perform addition of two matrices.

b) Write a C program that uses functions to perform Multiplication of Two Matrices.

Week 10:

a) Write a C program to use function to insert a sub-string in to given main string from a given position.

b) Write a C program that uses functions to delete n Characters from a given position in a given string.

Week 11:

a) Write a C program using user defined functions to determine whether the given string is palindrome or not.

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

Week 12:

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

b) Write a C program to find the length of the string using Pointer.

Week 13:

a) Write a C program to Display array elements using calloc( ) function.

b) Write a C Program to Calculate Total and Percentage marks of a student using structure.

Week 14:

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

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

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

b) Write a C program to display the contents of a file.

Week 15:

a) Write a C program to copy the contents of one file to another.

b) Write a C program to merge two files into a third file.

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

Week 16:

Revision Of Programs

TEXT BOOKS

1. C Programming and Data Structures, P.Padmanabham, Third Edition, BS Publications
2. Computer programming in C.V.RAjaraman, PHI Publishers.
3. C Programming, E.Balagurusamy, 3rd edition, TMH Publishers.
4. C Programming, M.V.S.S.N Venkateswarlu and E.V.Prasad,S.Chand Publishers
5. Mastering C,K.R.Venugopal and S.R.Prasad, TMH Publishers.

Outcomes:

- Acquire knowledge about the basic concept of writing a program.
- Understand the Role of constants, variables, identifiers, operators, type conversion and other building blocks of C Language.
- Learn how to use of conditional expressions and looping statements to solve problems associated with conditions and repetitions.
- Understand the Role of Functions involving the idea of modularity.
- Understand the Concept of Array and pointers dealing with memory management.
- Learn Structures and unions through which derived data types can be formed
- Learn File Handling for permanent storage of data or record.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

I Year B. Tech EEE-I Sem **L T/P/D C**

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(R17A0083) ENGINEERING PHYSICS / ENGINEERING CHEMISTRY LAB

ENGINEERING PHYSICS LAB

(Any EIGHT experiments compulsory)

OBJECTIVES

- The students are exposed to various experimental skills which is very essential for an Engineering student.
- The experiments are selected from various areas of physics like physical optics, Lasers, Fiber optics, Sound, Mechanics, Electricity & Magnetism and Basic Electronics.
- The students are exposed to various tools like Screw gauge, Vernier calipers, and physics.

OUTCOMES

- The student learns the concept of error and its analysis and try formulate new solutions to problems related to engineering physical balance, Spectrometer and Microscope.
- The student develops experimental skills to design new experiments in Engineering that accelerates development of society considering the public health and safety of society.
- Comprehension power of the engineering student increases with exposure to these experiments that helps them to compare the theory and correlate with experiment.

This course on physics lab is designed with 12 experiments in an academic year. It is common to all branches of Engineering in B.Tech 1st year.

LIST OF EXPERIMENTS: (Any Eight experiments compulsory)

1. Dispersive power of the material of a prism - Spectrometer.
2. Wave length of light –Diffraction grating-using laser.
3. Newton's Rings –Radius of curvature of Plano convex lens.
4. Melde's experiment –Transverse and Longitudinal modes.
5. Time Constant of an R-C circuit.
6. L-C-R circuit.
7. Magnetic field along the axis of current carrying coil – Stewart and Gee's method.
8. Study the characteristics of LED.
9. Evaluation of numerical aperture of given fiber.
10. Energy gap of a material of p-n junction.
11. Rigidity modulus of given wire - Torsional pendulum.
12. Characteristics of a Solar cell.

ENGINEERING CHEMISTRY LAB

List of Experiments (Any Eight experiments compulsory)

OBJECTIVES

This course on chemistry lab is designed with 12 experiments in an academic year. It is common to all branches of Engineering in 1st B.Tech.

The objective of the course is that the student will have exposure to various experimental skills which is very essential for an Engineering student. At the end of the course the student is expected to

- Provide the students with a solid foundation in chemistry laboratory required to solve engineering problems.
- Practical implementation of fundamental concepts.

OUTCOMES

- Students are able to estimate the total hardness and alkalinity present in a sample of water.
- Ability to select lubricants for various purposes.
- Ability to determine the surface tension of a given liquid.
- Ability to prepare advanced polymer materials.
- Ability to know the strength of an acid by conductometric and potentiometric method.
- Ability to find the $Fe^{+2,}$ and Mn^{+2} present in unknown substances/ ores using titrimetric and instrumental methods.

List of Experiments

Titrimetry:

1. Estimation of hardness of water by EDTA method.
2. Estimation of alkalinity of water.

Mineral analysis:

3. Estimation of manganese dioxide in pyrolusite.

Instrumental Methods:

Colorimetry:

4. Determination of ferrous iron in cement by colorimetric method

Conductometry:

5. Conductometric titration of strong acid vs strong base.
6. Conductometric titration of mixture of acids vs strong base.

Potentiometry:

7. Titration of strong acid vs strong base by Potentiometry.
8. Titration of weak acid vs strong base by Potentiometry.

Preparation:

9. Preparation of Phenol Formaldehyde Resin(Bakelite)-Demonstration
10. Preparation of Aspirin.

Physical properties:

11. Determination of Viscosity of sample oil by Redwood Viscometer.
12. Determination of Surface Tension of a given liquid by Stalagmometer

TEXT BOOKS:

1. Practical Engineering Chemistry by K. Mukkanti, etal, B.S. Publications, Hyderabad.
2. Inorganic quantitative analysis, Vogel.

REFERENCE BOOKS:

1. Text Book of engineering chemistry by R. N. Goyal and HarrmendraGoel, Ane Books
2. Private Ltd.,
3. A text book on experiments and calculation Engg. S.S. Dara.
4. Instrumental methods of chemical analysis, Chatwal, Anand, Himalaya Publications.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

I Year B. Tech EEE-I Sem **L T/ P/ D C**

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(R17A0081) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB - I

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

Objective:

- To facilitate computer-aided multi-media instruction enabling individualized and independent language learning
- To sensitize the students to the nuances of English speech sounds, word accent, intonation and rhythm
- To bring about a consistent accent and intelligibility in their pronunciation, ample speaking opportunities are provided.
- To improve the fluency in spoken English and neutralize mother tongue influence
- To train students to use language appropriately for interviews, group discussions and public speaking

Syllabus: English Language Communication Skills Lab has 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

UNIT –I

CALL Lab: Introduction to Phonetics –Speech Sounds –Vowels and Consonants Transcriptions

ICS Lab: Ice-Breaking activity - JAM session

UNIT –II

CALL Lab: Pronunciation: Past Tense Markers and Plural Markers, Mispronounced sounds, Silent letters

ICS Lab: Situational Dialogues/Role Plays – Informal

UNIT -III

CALL Lab: Syllable and Syllabification
ICS Lab: Situational Dialogues/Role Plays – Formal

WORKSHEETS FOR LETTER WRITING

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):

   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) HardDisk –80 GB

   ii) Headphones of High quality

2. **Interactive Communication Skills (ICS) 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.

DISTRIBUTION AND WEIGHTAGE OF MARKS

English Language Laboratory Practical Examination:

1. The practical examinations for the English Language Laboratory shall be conducted as per the University norms prescribed for the core engineering practical sessions.
2. For the Language lab sessions, there shall be a continuous evaluation during the year for 25 marks and 50 year-end Examination marks. Of the 25 marks, 15 marks shall be awarded for day-to-day work and 10 marks to be awarded by conducting Internal Lab Test(s). The year-end Examination shall be conducted by the teacher concerned with the help of another member of the staff of the same department of the other institution.

OUTCOMES:

- Learning with precision through computer-assisted individualized and independent language learning to work independently in engineering set up.
- Improved conversational reception and articulation techniques in the course of repetitive instruction thereby gaining confidence both in institutional and professional environment.
- Accuracy in pronunciation and restoring Standard English thereby crafting better command in English language so that the students have a cutting edge over others in society.
- Imbibing appropriate use of language in situations to work as an individual and as o leader in diverse teams

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

I Year B. Tech EEE-II SEM

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(R17A0002) PROFESSIONAL ENGLISH

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.

OBJECTIVES:

- Provide amateur engineers with the critical faculties necessary in an academic environment, using the theoretical and practical components of English syllabus.
- Upgrade the capability of analyzing of texts from different periods and genres.
- Improve the language proficiency of the students in English with emphasis on LSRW skills to face complex engineering activities at work place.
- Understand the basics of grammar to speak correct English and communicate effectively both formally and informally.

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 recognize them, to distinguish between them to mark stress and recognize 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 all the nine units of the prescribed text: Learning English: A Communicative Approach)
   - 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 the text
   - 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:
In order to improve the proficiency of the student in the acquisition of the four skills mentioned above, the following text and course content is prescribed.

Text book entitled "Skills Annexe: Functional English for Success", published by Orient Black Swan, Hyderabad.

UNIT-I

Chapter entitled "Of parents and children" from *"The essays of Francis Bacon"*, paperback-Import, 11 Oct 2008.

and

Listening – Listening for the theme and gist
Speaking – Describing situations and objects
Reading – Why pure science in India lags behind? – By P Rajendran
Writing – Note-taking and Note-making
Grammar – Nouns and Articles
Vocabulary – Homonyms, Homographs, Homophones

Unit –II

Chapter entitled "Sachin Tendulkar" from *Skills Annexe -Functional English for Success*,

and

Listening – listening for opinions
Speaking – Project Oral Presentations
Reading – Benefits of physical activity
Writing – Report writing
Grammar – Common Errors
Vocabulary –Technical Vocabulary

Unit –III

Job applications: Cover letter & Curriculum vitae

and

Listening – listening for main and sub-points
Speaking –Giving directions and instructions
Reading – Editorial letters from newspapers
Writing –Formal letter writing
Grammar – Tenses
Vocabulary – Collocations

Unit – IV

Chapter entitled "Human Values and Professional Ethics" from *Skills Annexe -Functional English for Success*

and

Listening – Listening for details
Speaking – Talking about hypothetical situations

Reading – What I Cherish Most
Writing – E-mail writing
Grammar – Types of verbs: Transitive, Intransitive, Ergative, finite and non – finite
Vocabulary – Commonly confused words

Unit – V

Chapter entitled "The fringe benefits of failure and the importance of imagination" a speech by J.K. Rowlings

and

Listening – listening for information
Speaking – Oral Presentations
Reading – The one thing every business executive must understand about social media
Writing –Picture composition
Grammar – Concord
Vocabulary –Commonly misspelt Words

* Exercises apart from the text book shall also be used for classroom tasks.

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.

OUTCOMES:

- Acquire and apply the critical thought process effectively on complex engineering activities.
- Utilize the analytical capability to comprehend and design any text effortlessly.
- Imbibe the English proficiency to receive clear instructions, make notes and draft letters vividly.
- Identify the basic grammatical structures and its application accurately to communicate with society at large.

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(R17A0022)MATHEMATICS-II

Objectives

- The objective of interpolation is to find an unknown function which approximates the given data points and the objective of curve fitting is to find the relation between the variables x and y from given data and such relationships which exactly pass through the data (or) approximately satisfy the data under the condition of sum of least squares of errors.
- The aim of numerical methods is to provide systematic methods for solving problems in a numerical form using the given initial data and also used to find the roots of an equation and to solve differential equations.
- In the diverse fields like electrical circuits, electronic communication, mechanical vibration and structural engineering, periodic functions naturally occur and hence their properties are very required. Indeed, any periodic and non periodic function can be best analyzed in one way by Fourier series method.
- PDE aims at forming a function with many variables and also their solution methods .Method of separation of variables technique is learnt to solve typical second order PDE.
- Properties of Laplace Transform, Inverse Laplace Transform and Convolution theorem

UNIT – I: Solution of Algebraic, Transcendental Equations and Interpolation

Solution of Algebraic and Transcendental Equations: Introduction – Graphical interpretation of solution of equations .The Bisection Method – Regula-Falsi Method – The Iteration Method – Newton-Raphson Method.

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

UNIT – II : Numerical techniques

Numerical integration: Generalized Quadrature-Trapezoidal rule, Simpson's $1/3^{rd}$ and $3/8^{th}$ Rule.

Numerical solution of Ordinary Differential equations: Solution by Taylor's series method – Picard's Method of successive Approximation- single step methods-Euler's Method-Euler's modified method, Runge-Kutta Methods.

Curve fitting: Fitting a straight line –Second degree curve-exponential curve-power curve by method of least squares.

UNIT – III: Fourier series

Definition of periodic function. Fourier expansion of periodic functions in a given interval of length 2π Determination of Fourier coefficients – Fourier series of even and odd functions – Half-range Fourier sine and cosine expansions-Fourier series in an arbitrary interval .

UNIT-IV: Partial differential equations

Introduction -Formation of partial differential equation by elimination of arbitrary constants and arbitrary functions, solutions of first order linear (Lagrange) equation and non-linear equations (Charpit's method), Method of separation of variables for second order equations and Applications of PDE to one dimensional (Heat equation).

UNIT – V Laplace Transforms and Applications

Definition of Laplace transform- Domain of the function and Kernel for the Laplace transforms- Existence of Laplace transform- Laplace transform of standard functions- first shifting Theorem,-Laplace transform of functions when they are multiplied or divided by "t"-Laplace transforms of derivatives and integrals of functions – Unit step function – second shifting theorem – Dirac's delta function- Periodic function – Inverse Laplace transform by Partial fractions-Inverse Laplace transforms of functions when they are multiplied or divided by "s", Inverse Laplace Transforms of derivatives and integrals of functions- Convolution theorem –Solving ordinary differential equations by Laplace transforms.

PRESCRIBED TEXT BOOKS:

1. "Mathematics-II", Special Edition – MRCET, McGraw Hill Publications, 2017
2. Mathematical Methods by T.K.V Iyenger ,B.Krishna Gandhi and Others ,S Chand.

REFERENCES:

1. Introductory Methods by Numerical Analysis by S.S. Sastry, PHI Learning Pvt. Ltd.
2. Advanced Engineering Mathematics by Kreyszig, John Wiley & Sons Publishers.

Outcomes:

- From a given discrete data, one will be able to predict the value of the data at an intermediate point and by curve fitting, one can find the most appropriate formula for a guesses relation of the data variables. This method of analysis data helps engineers to understand the system for better interpretation and decision making.
- The student will be able to find a root of a given equation and will be able to find a numerical solution for a given differential equation. Helps in describing the system by an ODE, if possible. Also, suggests to find the solution as a first approximation.
- One will be able to find the expansion of a given function by Fourier series.
- One will be able to find a corresponding Partial Differential Equation for an unknown function with many independent variables and to find their solution.
- The student is able to solve certain differential equations using Laplace Transform. Also able to transform functions on time domain to frequency domain using Laplace transforms

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(R17A0012) ENGINEERING PHYSICS-II

OBJECTIVES:

- To understand the basics of bonding in solids, crystal structures and characterization techniques.
- To make the students aware of X-ray diffraction and different techniques of it.
- To understand the behavior of dielectric materials, magnetic materials and nano materials.

UNIT-I

BONDING IN SOLIDS:

Types of bonds - Primary, Secondary, Forces between atoms, Expression for cohesive energy between two atoms**.**

CRYSTALLOGRAPHY:

Space lattice, Basis, Unit cell, lattice parameters, Crystal systems, Bravais lattices, Atomic number, coordination number, packing factor of SC,BCC,FCC crystals, Crystal planes and directions - Miller indices. Expression for inter planar distance in cubic crystal, Structure of NaCl and Diamond.

UNIT- II

X-RAY DIFFRACTION:

Bragg's law**,** Experimental techniques -Laue's method, powder method**,** Applications of x-ray diffraction.

DEFECTS IN CRYSTALS:

Classification of crystal defects**,** Point defects-Vacancies & Interstitials, Concentrations of Schottky and Frenkel defects, Line defects- edge dislocation and screw dislocation**,** Burger's vector.

UNIT-III

DIELECTRIC PROPERTIES:

Electric dipole, Dipole moment, Polarization vector (P), Displacement vector (D), Dielectric constant (K), Electric susceptibility (χ), Types of polarizations-Expression for Electronic and Ionic polarization, Internal fields in dielectrics, Classius Mosotti relation, Piezo electricity and Ferro electricity, Applications of dielectric materials.

UNIT-IV

MAGNETIC PROPERTIES:

Magnetic permeability, Field intensity, Magnetic field induction, Magnetization, Magnetic susceptibility, Origin of Magnetic moment - Bhor magneton**,** Classification of magnetic materials-Dia, Para and Ferro**,** Ferri and Anti ferro magnetic materials, Explanation of Hysteresis loop on the basis of domain theory of ferromagnetism. Soft and hard magnetic materials.

SUPER CONDUCTIVITY:

Super conductivity, Properties of super conductors, Meissner effect**,** Types –I Type-II super conductors**,** Applications of super conductors.

UNIT-V

NANO SCIENCE & NANO TECHNOLOGY:

Nano scale, Types of Nano materials, Surface to volume ratio and Quantum confinement, Bottom up Fabrication- Sol gel ,Top down Fabrication- Physical Vapour Deposition, Characterisation of Nano particles –TEM and SEM, Applications of Nano materials.

TEXT BOOKS:

1. Engineering Physics - S Mani Naidu- Pearson Publishers.
2. A Text Book of Engineering Phyiscs- P.G. Kshirsagar, Avadhanulu – S.Chand

REFERENCES:

1. Solid State Physics, Kittel- Wiley International.
2. Solid State Physics – AJ DekKer-Macmillan Publishers.
3. Engineering Physics, P.K. Palaniswamy, Scitech Publishers

OUTCOMES:

- The students would be able to learn the fundamental concepts on behavior of crystalline solids.
- The student will be able to think about the applications of dielectric, magnetic and nano materials.
- Finally Engineering physics course helps the student to develop problem solving skills and analytical skills.

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I Year B. Tech EEE-II SEM **L T/P/D C**

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(R17A0502)OBJECT ORIENTED PROGRAMMING THROUGH C++

Objectives

- To teach the student the concepts of object oriented and generic programming.
- To differentiate between object oriented programming andprocedural programming.
- To design applications using object oriented features
- To teach the student to implement object oriented concepts

Unit I

Concepts of Object Oriented programming: Object oriented paradigm - differences between Object Oriented Programming and Procedure oriented programming, Basic concepts of Object Oriented Programming , Encapsulation, Inheritance and Polymorphism. Benefits of OOP.Structure of a C++ program, namespace, Data types, identifiers, variables, constants, enum, operators, typecasting, control structures &loops.

Unit-II

Functions, Classes and Objects:

Introduction of Classes,Class Definition, Defining a Members,Objects,Access Control, Class Scope,Scope Resolution Operator,Inline functions,Memory Allocation for Objects, Static Data Members, Static Member Functions, Arrays of Objects, Objects as Function Arguments, Default Arguments,Friend Functions

Unit-III

Constructors, Destructors, Inheritance:

Introduction to Constructors, Parameterized Constructors, Multiple Constructors in a Class, Constructors with Default Arguments, Dynamic initialization of Objects, Copy Constructors, Dynamic Constructors, Destructors.

Inheritance : Introduction to inheritance, Defining Derived Classes, Single Inheritance, Multiple Inheritance, Multi-Level Inheritance, Hierarchical Inheritance, Hybrid Inheritance, Constructors in Derived Classes.

Unit-IV

Pointers, Virtual Functions and Polymorphism:

Introduction, Memory Management, new Operator and delete Operator, Pointers to Objects, this Pointer, Pointers to Derived Classes, Polymorphism, compile time polymorphism, Run time polymorphism, Virtual Functions, Pure Virtual Functions, Abstract Classes, Virtual Base Classes, Virtual Destructors. Function Overloading, Operator overloading, Rules for Operator overloading, overloading of binary and unary operators .

Unit-V.

Templates and Exception handling:

Introduction, Class Templates, Class Templates with Multiple Parameters, Function Templates, Function Templates with Multiple Parameters, Member Function Templates.

xception handling:

Basics of Exception Handling, Types of exceptions, Exception Handing Mechanism, Throwing and Catching Mechanism, Rethrowing an Exception, Specifying Exceptions

Text Books:

1. "Object Oriented Programming" Special Edition – MRCET, McGraw Hill Publications, 2017
2. Object Oriented Programming with C++ by Balagurusamy.

References:

1. C++ Primer, 3rd Edition, S.B.Lippman and J.Lajoie, Pearson Education.
2. The C++ Programming Language, 3rd Edition, B.Stroutstrup, Pearson Educ

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I Year B. Tech EEE-II SEM **L T/P/D C**
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(R17A0201) ELECTRICAL CIRCUITS

Objective:

1. This course introduces the basic concepts of Electrical Circuits & Networks and their analysis which is the foundation for all the subjects in the Electrical Engineering discipline.
2. The emphasis is laid on the basic elements in electrical circuits.
3. Analysis of circuits which includes network analysis & network theorems.
4. Analysis of Single phase ac circuits and magnetic circuits.

Unit –I:

Introduction to Electrical Circuits: Concept of Network and Circuit, Types of elements, Types of sources, Source transformation. R-L-C Parameters, Voltage–Current relationship for Passive Elements (for different input signals –Square, Ramp, Saw tooth and Triangular), Kirchhoff's Laws.

Unit –II:

Network Analysis: Network Reduction Techniques-Resistive networks, Inductive networks and capacitive networks- Series, Parallel, Series-Parallel combinations, Star–to-Delta and Delta-to-Star Transformation. Mesh Analysis and Super mesh, Nodal Analysis and Super node for DC Excitation. Network topology-Definitions, Graph, Tree, Basic Cut set and Basic Tie set Matrices for Planar Networks.

Unit-III:

Single Phase A.C. Circuits: Average value, R.M.S. value, form factor and peak factor for different periodic wave forms. J-notation, Complex and Polar forms of representation. Steady State Analysis of series R-L-C circuits. Concept of Reactance, Impedance, Susceptance, Admittance, Phase and Phase difference. Concept of Power Factor, Real, Reactive and Complex power.

Unit –IV:

Network Theorems (D.C&A.C): Thevenin's, Norton's, Maximum Power Transfer, Superposition, Reciprocity, Tellegen's, Substitution, Compensation and Milliman's theorems.

Unit –V:

MAGNETIC CIRCUITS: Faraday's laws of electromagnetic induction, concept of self and mutual inductance, dot convention, coefficient of coupling, composite magnetic circuit, analysis of series and parallel magnetic circuits.

TEXT BOOKS:

1. "Electrical Circuits", Special Edition – MRCET, McGraw Hill Publications, 2017
2. Electric Circuits - A.Chakrabarhty, Dhanpat Rai & Sons.
3. A Text book of Electrical Technology by B.L Theraja and A.K Theraja, S.Chand publications.

REFERENCE BOOKS:

1. Network analysis by M.E Van Valkenburg,PHI learning publications.
2. Network analysis - N.C Jagan and C. Lakhminarayana, BS publications.
3. Electrical Circuits by A Sudhakar ,Shyammohan and S Palli,Mc Graw Hill Companies.
4. Principles of Electrical Engineering by V.KMehta,RohitMehta,S.Chand publications.

Outcome:

At the end of this course the student would get

1. A thorough knowledge of the basic RLC circuit elements.
2. Understanding of the basic concepts of networks and circuits with RLC.
3. Concepts of single phase AC circuits.
4. Network theorems and their application to solve problems in Network analysis.
5. Principles of Magnetic circuits and their analogy with Electric circuits .

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I Year B. Tech EEE-II SEM

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3	-/-/-	3

(R17A0014)ENVIRONMENTAL STUDIES

Objectives:

1. Understanding the importance of ecological balance for sustainable development.
2. Understanding the impacts of developmental activities and mitigation measures.
3. Understanding the environmental policies and regulations

UNIT-I:

Introduction: Definition of Environment and multidisciplinary nature of environmental sciences.

Ecosystems: Definition, structure and function of an ecosystem, Food chains, food webs and ecological pyramids. Flow of energy, Biogeochemical cycles (Carbon, Nitrogen, Water cycle) Bioaccumulation and Biomagnification with examples.

UNIT-II:

Natural Resources: Classification of Resources: water resources:types: surface and ground water and over utilization effects of ground water. Dams: benefits and problems. Forest resources: functions, causes and effects of Deforestation, Energy resources: renewable and non-renewable energy sources, use of alternate energy resources.

UNIT-III:

Biodiversity and Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. Hot spots of biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation.

UNIT-IV:

Environmental Pollution and Control Technologies: Environmental Pollution: **Classification of pollution, Air Pollution**: Primary and secondary pollutants, sources, causes, effects and control measures**Water pollution**: Sources and types of pollution, causes and effects, water treatment methods. **Soil Pollution**: Sources and types, Impacts of modern agriculture. Solid waste management, e-Waste management.

Global Environmental Problems: Green house effect, Global warming, Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS).

UNIT-V:

Environmental Policy, Legislation & EIA: Environmental Protection act1986, Air act 1981, Forest conservation act 1980, Biomedical waste management and handling rules, International conventions / Protocols: Earth summit, Kyoto protocol and Montréal Protocol. EIA: EIA structure, methods of baseline data acquisition. Concepts of Environmental Management Plan (EMP).

Towards Sustainable Future: Concept, threats and strategies of Sustainable Development, Environmental Education.

SUGGESTED TEXT BOOKS:

1. Environmental Studies by Anubha Kaushik, 4th Edition, New age international Publishers.
2. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.
3. Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCE BOOKS:

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.
3. Environmental Science by Daniel B.Botkin& Edward A.Keller, Wiley INDIA edition.
4. Principles of Environmental Science by William . P. Cunnningham& Mary Inn Cunnningham Tata McGRAW –Hill Publishing Company Ltd.
5. Environmental Studies by S. Rama Lakshmi & Purnima Smarath Kalyani Publishers.

Outcomes:

Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of

Ecological principles and environmental regulations which in turn helps in sustainable development

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I Year B. Tech EEE-II SEM

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(R17A0582)OBJECT ORIENTED PROGRAMMING THROUGH C++ LAB

Objectives:

- To strengthen problem solving ability by using the characteristics of an object-oriented approach.
- To design applications using object oriented features
- To handle Exceptions in programs.
- To teach the student to implement object oriented concepts

Week 1:

Basic C++ Programs

Week2:

a) Write a C++ program to find the sum of individual digits of a positive integer.
b) Write a C++ program to generate the first n terms of the sequence.

Week 3:

a) Write a C++ program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
b) Write a C++ program to find both the largest and smallest number in a list of integers.

Week 4:

a) Write a C++ program to sort a list of numbers in ascending order.
b) Write aProgram to illustrate New and Delete Keywords for dynamic memory allocation

Week 5

a) Write a program Illustrating Class Declarations, Definition, and Accessing Class Members.
b) Program to illustrate default constructor, parameterized constructor and copy constructors
c) Write a Program to Implement a Class STUDENT having Following Members:

Member	Description
Data members	
Sname	Name of the student
Marks array	Marks of the student
Total	Total marks obtained
Tmax	Total maximum marks

Member functions	
Member	Description
assign()	Assign Initial Values
compute()	to Compute Total, Average
display()	to Display the Data.

Week 6:

a) Write a Program to Demonstrate the i)Operator Overloading.ii) Function Overloading.

b) Write a Program to Demonstrate Friend Function and Friend Class.

Week 7:

a) Write a Program to Access Members of a STUDENT Class Using Pointer to Object Members.

b) Write a Program to Generate Fibonacci Series use Constructor to Initialize the Data Members.

Week 8:

Revision laboratory

Week 9

Write a C++ program to implement the matrix ADT using a class. The operations supported by this ADT are:

a) Reading a matrix. b) Addition of matrices. c) Printing a matrix.

d) Subtraction of matrices. e) Multiplication of matrices

Week 10

Write C++ programs that illustrate how the following forms of inheritance are supported:

a)Single inheritance b)Multiple inheritance

c)Multi level inheritance d)Hierarchical inheritance

Week 11

a.)Write a C++ program that illustrates the order of execution of constructors and destructors when new class is derived from more than one base class.

b) Write a Program to Invoking Derived Class Member Through Base Class Pointer.

Week 12

a) Write a Template Based Program to Sort the Given List of Elements.

b) Write a C++ program that uses function templates to find the largest and smallest number in a list of integers and to sort a list of numbers in ascending order.

Week 13

a) Write a Program Containing a Possible Exception. Use a Try Block to Throw it and a Catch Block to Handle it Properly.

b) Write a Program to Demonstrate the Catching of All Exceptions.

Week 14

Revision

Text Books:

1. Object Oriented Programming with C++ by Balagurusamy
2. C++, the Complete Reference, 4th Edition, Herbert Schildt, TMH.

References:

1. C++ Primer, 3rd Edition, S.B.Lippman and J.Lajoie, Pearson Education.
2. The C++ Programming Language, 3rd Edition, B.Stroutstrup, Pearson Education.

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I Year B. Tech EEE-II SEM **L T/ P/ D C**

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(R17A0084) IT WORKSHOP / ENGINEERING WORKSHOP

OBJECTIVES:

The IT Workshop for engineers is a training lab course spread over 54 hours. The modules include training on PC Hardware, Internet & World Wide Web and Productivity tools including Word, Excel and Power Point.

PC HARDWARE

Week 1:

Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral

Week 2:

i. Every student should individually install MS windows on the personal computer.
ii. Basic DOS Commands

Week 3:

a) Hardware Troubleshooting: Students have to be given a PC which does not boot due to improper assembly or defective peripherals
b) Software Troubleshooting: Students have to be given a malfunctioning CPU due to system software problems. They should identify the problem and fix it to get the computer back to working condition.

INTERNET & WEB BROWSERS

Week 4:

Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers And How to access the websites and email& Search Engines & various threats on the internet and would be asked to configure their computer to be safe on the internet, Antivirus downloads to avoid viruses and/or worms.

MS OFFICE

Week 5:

a) Word Orientation: an overview of Microsoft (MS) office 2007/ 10: Importance of MS office 2007/10, overview of toolbars, saving files, Using help and resources, rulers, format painter. Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

b) Using Word 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, Using Date and Time option in Word &Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

ENGINEERING WORKSHOP

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. Black Smithy
5. House-wiring

1. TRADES FOR DEMONSTRATION & EXPOSURE:

1. Plumbing
2. Machine Shop
3. Welding
4. Foundry
5. Metal Cutting (Water Plasma)

TEXT BOOKS:

1. Work shop Manual - P.Kannaiah/ K.L.Narayana/ Scitech Publishers.
2. Workshop Manual / Venkat Reddy/ BS Publications/Sixth Edition

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I Year B. Tech EEE-II SEM **L T/ P/ D C**

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(R17A0082) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB- II

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

Objectives:

- To make students acquire language skills at their own pace with the usage of authentic learning environment through different media, e-materials and language lab.
- To make learners acquire listening and speaking skills in both formal and informal contexts through diverse interactive sessions and computer aided multi-media training.
- To impart nuances of linguistics to help novices to resolve mother tongue interference by ensuring precision in pronunciation to befit Standard English.
- To help develop the students communication skills by familiarizing them with different strategies to suit academic as well as workplace contexts.

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 –IV

CALL Lab: Word Accent – Rules of Stress and Stress shift
ICS Lab: Describing Object, Places, Persons, Events and Experiences.

Exercise –V

CALL Lab: Intonation
ICS Lab: Etiquette – Professional and telephone

Exercise –VI

CALL Lab: Neutralization of Mother Tongue Influence
ICS Lab: Oral Presentations (Team or Individual)

PROJECTS

PROJECTS

Students have to choose one of the following projects for their External Examinations, and submit before the end of the semester. This project carries 10 marks in the Lab External Examinations.

1. **Conduct interview using interrogative sentences.**

   Students should interview any teacher, or HOD, or Principal, record their responses and submit the project with those questions and answers. The questions asked should not be less than ten.

2. **Project on differences between group discussion and debate.**

   Students are supposed to do research on the differences between GD and debate and submit a project on it. There should a minimum of ten points with detailed explanation. Students can use pictures as well.

3. **Book Review**

   Choose any fiction of your choice and write a book review on the following parameters.

   - Characterization, plot, theme, message

   Please note that the review is not the summary of the story. The project should not be less than 250 words.

4. **Idioms and Phrasal Verbs**

   Collect at least ten idioms and ten phrasal verbs and concoct a story using those expressions. Word limit is 250.

5. **Project on Kinesics**

   Students are expected to read and research on body language and their implications. You have to make a list of at least ten body movements with pictures and explain them properly.

6. **UK and US vocabulary**

   Find words that are used differently in UK and US English. Make separate lists for different spellings and different pronunciations. The project can answer one or more of the following questions:

   - Which pronunciation do you think are Indians following?
   - Which one is your choice? Which one do you feel comfortable in speaking?
   - Are we Indians influenced by both UK and US English? How can you prove it?

7. Magazine Article Review

Pick a magazine article with a social relevance, which has around 2500 words. Write a review of 250 words as a project. Make sure you voice your opinion in the review.

8. Career Guidance Project

Browse the net and gather information on any professional competitive exam of your choice, like UPSC or GRE. Prepare and present a paper on the scope and relevance of the exam of your choice. The paper should have a minimum of 300-400 words. Students are expected to answer the questions asked by the audience after the paper presentation.

9. Mother Tongue Influence

Choose a particular paragraph of 250 words and ask five of your friends, from different states, to read that. One has to record their accent and pronunciation to check the difference. Make a list of ten words that each one pronounces differently. Find out the reasons behind the differences in pronunciations.

Also, mention the correct pronunciation in your project with transcription.

10. Correction of Letter Writing: Language, Sentences, Spelling, Tone and Format

Teacher will distribute a set of five letters with errors in spelling, tone, grammar and sentence construction. Give the correct form of the letters as the project

ELCS LAB:

3. 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):

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) HardDisk –80 GB
ii) Headphones of High quality

4. Interactive Communication Skills (ICS) 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.

REFERENCES:

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. Speaking English Effectively 2ndEdition by Krishna Mohan and N. P. Singh, 2011. Macmillan Publishers India Ltd. Delhi.
3. Sasi Kumar, V & Dhamija, P.V. How to Prepare for Group Discussion and Interviews. Tata McGraw Hill
4. Hancock, M. 2009. English Pronunciation in Use. Intermediate. Cambridge: CUP
5. Spoken English: A Manual of Speech and Phonetics by R. K. Bansal & J. B. Harrison. 2013.Orient Blackswan. Hyderabad.
6. Hewings, M. 2009. English Pronunciation in Use. Advanced. Cambridge: CUP
7. Marks, J. 2009. English Pronunciation in Use. Elementary. Cambridge: CUP
8. Nambiar, K.C. 2011. Speaking Accurately. A Course in International Communication. New Delhi: Foundation
9. Soundararaj, Francis. 2012. Basics of Communication in English. New Delhi: Macmillan
10. Spoken English(CIEFL) in 3 volumes with 6 cassettes, OUP.
11. English Pronouncing DictionaryDaniel Jones Current Edition with CD.
12. A textbook of English Phonetics for Indian Studentsby T.Balasubramanian (Macmillan)

DISTRIBUTION AND WEIGHTAGE OF MARKS

English Language Laboratory Practical Examination:

1. The practical examinations for the English Language Laboratory shall be conducted as per the University norms prescribed for the core engineering practical sessions.
2. For the Language lab sessions, there shall be a continuous evaluation during the year for 25 marks and 50 year-end Examination marks. Of the 25 marks, 15 marks shall be awarded for day-to-day work and 10 marks to be awarded by conducting Internal Lab Test(s). The year-end Examination shall be conducted by the teacher concerned with the help of another member of the staff of the same department of the other institution.

OUTCOMES:

- Learning with precision through computer-assisted individualized and independent language learning to work independently in engineering set up.
- Improved conversational reception and articulation techniques in the course of repetitive instruction thereby gaining confidence both in institutional and professional environment.
- Accuracy in pronunciation and restoring Standard English thereby crafting better command in English language so that the students have a cutting edge over others in society.
- Imbibing appropriate use of language in situations to work as an individual and as o leader in diverse teams

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

I Year B. Tech EEE-II SEM

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(R17A0003) HUMAN VALUES AND SOCIETAL PERSPECTIVES
(MANDATORY COURSE)

Objective: This introductory course input is intended

- To help the students appreciate the essential complementarity between 'VALUES' and skills' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
- To facilitate the development of a Holistic perspective among students towards life, profession and happiness, based on a correct understanding of the Human reality and the rest of Existence. Such a holistic perspective form the basis of value based living in a natural way.
- To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually satisfying human behavior and mutually enriching interaction with Nature.

Unit-I

Course Introduction–Need, Basic Guidelines, Content and Process of Value Education: Understanding the need, basic guidelines, content and process for value Education. Animal consciousness vs Human consciousness, Self Exploration -What is it? Its content and process; Continuous Happiness and Prosperity-A look at basic Human Aspirations. Right understanding, Relationship and physical Facilities –the basic requirements for fulfillment of aspirations of every human being with their correct priority. Understanding Happiness and prosperity correctly –A critical appraisal of the current scenario. Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

Unit-II

Understand Harmony in the Human Being –Harmony in Myself: Understanding human being as a co-existence of the sentient 'I' and the material 'Body', understanding the needs of self ('I') and 'Body'-Sukh and Suvidha. Understanding the body as an instrument of 'I' (I being the does, seer and enjoyer). Understanding the characteristics and activities of 'I' and harmony in 'I' . Understanding the harmony of I with the Body: Sanyam and Swasthya: correct appraisal of physical needs, meaning of prosperity in detail. Programs to ensure Sanyam and Swasthya.

Unit-III

Understanding Harmony in the Family and Society-Harmony in Human-Human Relationship: Understanding harmony in the Family –the basic unit of human interaction. Understanding values in human-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti: Trust (Vishwas) and Respect (Samman) as the foundational values of relationship. Understanding the meaning of Vishwas: Difference between intention and competence. Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship. Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals.

Visualizing a universal harmonious order in society –Undivided society (Akhand Samaj), Universal Order (Sarvabhaum Vyawastha) –from family to world family!

Unit-IV

Understanding Harmony in the Nature and Existence –Whole existence as Co-existence: Understanding the harmony in the Nature. Interconnectedness and mutual fulfillment among the four orders of nature, Recyclability and Self-regulation in nature. Understanding Existence as Co-existence (Sah-astiva) of mutually interacting units in all –pervasive space. Holistic perception of harmony at all levels of existence.

Unit-V

Implications of the above Holistic Understanding of Harmony on Societal Perspectives: Natural acceptance of human values. Definitiveness of Ethical Human Conduct. Basis of Humanistic Education, Humanistic Constitution and Humanistic Universal Order.

TEXT BOOKS

1. R R Gaur, R Sangal, G P BAgaria, 2009 A Foundation Course in Human Values and Professional Ethics.
2. Prof.KV Subba Raju, 2013, Success secrets for Engineering students , Smart student Publications, 3rd Edition.

REFERENCE BOOKS

1. Ivan llich, 1974, Energy & Equity, The Trinity press, Worcester and Harpercollins, USA.
2. E.F. Schumacher, 1973, small is Beautiful: a study of economics as if people mattered, Blond, Briggs, & Britain.
3. A Nagraj, 1998, Jeevan Vidya ek Parichay, Divya path Sansathan Amarkantak.
4. Sussan George, 1976, How the other Half Dies, Penguin press Reprin ted 1986, 1991
5. PL Dhar, RR Gaur, 1990 Science and Humanism Commonwealth Publishers.
6. A.N.Tripathy, 2003, Human Values, New Age International Publishers.
7. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen (Vaidik) Krishi Tantra Shodh, Amravati.
8. Done lla H.Meadows, Dennis L. Meadows, Jorgen Randers, Willian A. Behrens lll, 1972, Limits to Growth – Club of Rome's report Universe Books.
9. E.G Seebauer & Robert L. Beery, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press.
10. M Govindrajran , S Natrajan & V.S Senthil kuma, Engineering Ethichs (including Human Values), Eastern Economy Edition, prentice Hall of India Ltd.

Relevant CDs, Movies, Documentaries & other Literature:

1. Value Education website http://www.uptu.ac.in
2. Story of stuff, http://www.storyofstuff.com
3. Al Gore, An Inconvenient Truth, Paramount classics, USA
4. Charlie Chaplin, Modern Times, United Artists, USA
5. IIT Delhi, Modern Technology - the Untold Story

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(R17A0023) MATHEMATICS – III

OBJECTIVES

The main objectives of the course are:

1. The evaluation of improper integrals, Beta and Gamma functions.
2. Series solutions for Legendre and Bessel differential equations, analyzing the properties of Legendre and Bessel polynomials.
3. Differentiation and Integration of complex valued functions. Evaluation of integrals using Cahchy's integral formula.
4. Taylor's series, Maclaurin's series and Laurent's series expansions of complex functions Evaluation of integrals using residue theorem.
5. Transform a given function from z - plane to w – plane. Identify the transformations like translation, magnification, rotation and reflection and inversion , Properties of bilinear transformations

UNIT – I

Improper Integrals: Beta and Gamma functions – Relation between them, their properties – Evaluation of Improper Integrals using Beta and Gamma functions.

Unit – II

Special Functions: Legendre's Differential equation, General solution of Legendre's equation, Legendre polynomials Properties: Rodrigue's formula – Recurrence relations, Generating function of Legendre's polynomials – Orthogonality. Bessel's Differential equation, Bessel functions properties: – Recurrence relations, Orthogonality, Generating function , Trigonometric expansions involving Bessel functions.

UNIT – III

Complex Functions –Differentiation and Integration: Complex functions and its representation on Argand plane, Concepts of limit Continuity, Differentiability, Analyticity, Cauchy-Riemann conditions, Harmonic functions – Milne – Thompson method. Line integral – Evaluation along a path and by indefinite integration – Cauchy's integral theorem(singly and multiply connected regions) – Cauchy's integral formula – Generalized integral formula.

UNIT – IV

Power series expansions of complex functions and contour Integration: Radius of convergence – Expansion in Taylor's series, Laurent series. Singular point –Isolated singular point – pole of order m – essential singularity. 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) $\int_{c}^{c+2\pi} f(cos\Theta, sin\Theta)d\Theta$

UNIT – V

Conformal mapping: Transformation of z-plane to w-plane by a function, Conformal transformation. Standard transformations- Translation; Magnification and rotation; inversion and reflection,Transformations like e^z , log z, z^2, and Bilinear transformation. Properties of Bilinear transformation, determination of bilinear transformation when mappings of 3 points are given (cross ratio).

TEXT BOOKS:

1. Mathematics-III, Special Edition-MRCET, Mc Graw Hill Publishers 2017.

REFERENCES:

1. Advanced Engineering Mathematics by Kreyszig, John Wiley & Sons
2. Engineering Mathematics –III by T.K.V Iyenger ,B.Krishna Gandhi and Others ,S Chand Publishers.
3. Complex Variables and Applications by James W Brown and Ruel Vance Churchill
4. Engineering Mathematics- By P Sivaramakrishna Das, Pearson Publishers.

OUTCOMES:

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

1. 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.
2. Analyze the complex functions with reference to their analyticity, Integration using Cauchy's integral theorem,
3. Find the Taylor's and Laurent series expansion of complex functions
4. The conformal transformations of complex functions can be dealt with ease.

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(R17A0401) ELECTRONIC DEVICES AND CIRCUITS

OBJECTIVES

The main objectives of the course are:

1. To familiarize the student with the principal of operation, analysis and design of junction diode, BJT and FET transistors and amplifier circuits.
2. To understand diode as a rectifier.
3. To study basic principal of filter of circuits and various types

UNIT-I

P-N Junction diode: Qualitative Theory of P-N Junction, P-N Junction as a diode , diode equation, volt-ampere characteristics temperature dependence of V-I characteristic , ideal versus practical, Resistance levels(static and dynamic), transition and diffusion capacitances, diode equivalent circuits, load line analysis, breakdown mechanisms in semiconductor diodes , Zener diode characteristics.

Special purpose electronic devices: Principal of operation and Characteristics of Tunnel Diode with the help of energy band diagrams, Varactar Diode, SCR and photo diode.

UNIT-II

RECTIFIERS, FILTERS: P-N Junction as a rectifier ,Half wave rectifier, Full wave rectifier, Bridge rectifier , Harmonic components in a rectifier circuit, Inductor filter, Capacitor filter, L- section filter, π- section filter and comparison of various filters, Voltage regulation using Zener diode.

UNIT-III

BIPOLAR JUNCTION TRANSISTOR: The Junction transistor, Transistor construction ,Transistor current components, Transistor as an amplifier, Input and Output characteristics of transistor in Common Base, Common Emitter, and Common collector configurations. α and β Parameters and the relation between them, BJT Specifications.

BJT Hybrid Model: h-parameter representation of a transistor, Analysis of single stage transistor amplifier using h-parameters: voltage gain, current gain, Input impedance and Output impedance. Comparison of transistor configurations in terms of A_i, R_i ,A_v,and R_o

UNIT-IV

TRANSISTOR BIASING AND STABILISATION: Operating point , the D.C and A.C Load lines, Need for biasing , criteria for fixing operating point, B.J.T biasing, Fixed bias, Collector to base bias ,Self bias techniques for stabilization, Stabilization factors(s, s^I, s^{II}), Bias Compensation using diode and transistor(Compensation against variation in V_{BE}, I_{CO}) Thermal run away, Condition for Thermal stability.

UNIT-V

FIELD EFFECT TRANSISTOR AND FET AMPLIFIER

JFET (Construction, principal of Operation and Volt –Ampere characteristics)-Pinch- off voltage, Small signal model of JFET. FET as Voltage Variable Resistor, Comparison of BJT and FET. MOSFET (Construction, Principle of Operation and symbol), MOSFET characteristics in Enhancement and Depletion modes.

FET Amplifiers: FET biasing, Generalized FET Amplifier, FET Common source Amplifier, Common Drain Amplifier.

TEXT BOOKS:

1. "Electronic Devices & Circuits", Special Edition – MRCET, McGraw Hill Publications, 2017.
2. Integrated Electronics Analog Digital Circuits, Jacob Millman and D. Halkias, McGraw Hill.
3. Electronic Devices and Circuits Theory, Boylsted, Prentice Hall Publications.
4. Electronic Devices and Circuits, S.Salivahanan,N.Suresh kumar, McGraw Hill.
5. Electronic Devices and Circuits,Balbir kumar ,shail b.jain, PHI Privated Limted, Delhi.

REFERENCE BOOKS:

1. Electronic Devices and Circuits,K.Lal Kishore B.S Publications
2. Electronic Devices and Circuits, G.S.N. Raju, I.K. International Publications, New Delhi, 2006.
3. Electronic Devices and Circuits,A.P Godse, U.A Bakshi , Technical Publications
4. Electronic Devices and Circuits K.S. Srinivasan Anurdha Agencies

OUTCOMES:

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

1. Understand and Analyse the different types of diodes, operation and its characteristics
2. Design and analyse the DC bias circuitry of BJT and FET
3. Design biasing circuits using diodes and transistors.
4. To analyze and design diode application circuits, amplifier circuits and oscillators employing BJT, FET devices.

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II Year B.Tech EEE-I Sem	L	T/P/D	C
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(R17A0381) Basics of Mechanical Engineering

Objectives:

1. To expose the students to the fundamental thrust areas in Mechanical Engineering that are relevant to other core branches of engineering
2. To introduce the key concepts of Thermodynamics essential for the study of IC engines , Air-conditioning ,Refrigeration etc.
3. To understand the working principle of different types turbines, pumps and motors that work on the principle of steam hydraulic and pneumatic means
4. Study and develop basic understanding of important mechanisms, drives and materials used in the engineering and consumer industry in conjunction with other electrical, electronics, computers and control systems

UNIT-I:

Thermodynamics: Laws of Thermodynamics, significance and applications of laws of thermodynamics; entropy, available energy; Clausius inequality; principle of increase of entropy; Ideal and real gas equations; Analysis of Carnot cycle, Otto cycle , Diesel cycle and Brayton cycle; Efficiency of these cycles.

UNIT-II: Energy conversion devices: Boilers, Steam turbines, Gas turbines and Hydraulic turbines; Working principle of two stroke and four stroke I.C. Engines (Diesel and Petrol), Reciprocating and centrifugal pumps, rotary pumps, reciprocating and centrifugal compressors, fans, blowers, rotary compressors; Hydraulic & Air motor.

UNIT-III: Refrigeration and Air Conditioning: Vapour compression and absorption refrigeration systems, COP, Study of household refrigerator, Energy Efficiency Rating, Psychrometry, Psychrometric processes, window air conditioner, split air conditioner. Ratings and selection criteria of above devices. Refrigerants and their impact on environment.

UNIT-IV:

Engines and Power Transmission Devices in Automobiles, Different types of engines used in automobiles, major components and their functions (Description only); Fuels; Recent developments: CRDI, MPFI, Hybrid engines. Belts and belt drives and simple mechanisms, Chain drive; Rope drive; Gears & gear trains; friction clutch (cone and single plate), brakes and bearings (types and applications only); Applications of these devices.

UNIT-V: Materials and manufacturing processes: Engineering materials, Classification, properties, Alloys and their Applications; Casting, Sheet metal forming, Sheet metal cutting, Forging, Rolling, Extrusion, Metal joining processes - Powder metallurgy.

Text Book:

1. Fundamentals Of Mechanical Engineering – G S Sawhney– Phi
2. Basic Mechanical Engineering – Balachandran Owl Books
3. Basic Mechanical Engineering – J Benjamin Pentex Books

References:

1. An Introduction To Mechanical Engineering Part I – Michael Clifford, Kathy Simmons And Philip Shipway. Crc Press
2. Basic And Applied Thermodynamics – P. K Nag – Tata Mcgraw-Hill
3. Basic Mechanical Engineering - Pravin Kumar
4. Fundamentals Of Ic Engines- Gill, Smith And Zuirys - Oxford And Ibh Publishing Company Pvt. Ltd. New Delhi. Crouse, Automobile Engineering, Tata Mc-Graw-Hill, New Delhi.
5. Roy And Choudhary, Elements Of Mechanical Engineering, Media Promoters & Publishers Pvt. Ltd., Mumbai.
6. Automobile Engineering, Crouse- Tata Mc-Graw-Hill, New Delhi

Outcomes:

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

1. Understand the inter dependence of the thrust areas in Mechanical Engineering with other core engineering subjects in today's engineering Industry.
2. Get a basic knowledge of Thermodynamics and understand it's application in IC engines, Air conditioning and refrigeration.
3. Be conversant with all basic mechanisms, drives, brakes, bearings etc that are essential parts in today's engineering products and consumer systems
4. Be familiar with all the important materials and their technical characteristics that find use in all industrial and consumer products.

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(R17A0202) ELECTRICAL MACHINES – I

Objectives:

1. To introduce 'Electrical machines' which is is one of the important Subjects of the Electrical Engineering course.
2. To understand the basic working principle, constructional details, operational features & characteristics and testing of different types of DC generators and Motors which are widely used in industry
3. To expose the students to the concepts of various types of electrical machines and their applications.

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 & Armature Reaction : D.C. Generators – Principle of operation – Action of commutator – constructional features – armature windings – lap and wave windings – simplex and multiplex windings – use of laminated armature – E. M.F Equation – Problems Armature reaction – Cross magnetizing and de-magnetizing AT/pole – compensating winding – commutation – reactance voltage – methods of improving commutation.

UNIT – III:

Types of D.C Generators & Load Characteristics : Methods of Excitation – separately excited and self excited generators – build-up of E.M.F - critical field resistance and critical speed - causes for failure to self excited and remedial measures. Load characteristics of shunt, series and compound generators – parallel operation of d.c series generators – use of equalizer bar and cross connection of field windings – load sharing.

UNIT – IV:

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

UNIT – V:

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 DC motor test.

TEXT BOOKS:

1. Electrical Machines, P.S. Bimbra, Khanna Publishers.
2. Principles of Electrical Machines, V. K. Mehta, Rohit Mehta, S. Chand Publishing.
3. Electric Machines by I.J. Nagrath & D.P. Kothari, Tata Mc Graw – Hill Publishers.

REFERENCE BOOKS:

1. Electric Machines, Mulukutla S. Sarma, Mukesh K. Pathak, Cengage Learning.
2. Fundamentals of Electric Machines, B. R. Gupta, Vandana Singhal, New Age International Publishers.
3. Electrical Machines, M. V. Deshpande, PHI Learning Private Limited.
4. Electrical Machines, R. K. Srivastava, Cengage Learning.

Outcomes:

At the end of this course the student would get

1. Basic knowledge on principles of electromechanical energy conversion
2. Knowledge on the Constructional features of DC Generators and DC motors
3. Full understanding of the basic principle of operation of these machines
4. Clear understanding of Operational characteristics and speed control methods of these machines.
5. Testing of different types of DC Generators and DC motors

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(R17A0205)ELECTRO MAGNETIC FIELDS

Objectives:

1. To introduce the concepts of electric field, magnetic field.
2. Applications of electric and magnetic fields in the development of the theory for power transmission lines and electrical machines.

UNIT – I

Electrostatics: Electrostatic Fields – Coulomb's Law – Electric Field Intensity (EFI) – EFI due to a line and a surface charge – Work done in moving a point charge in an electrostatic field – Electric Potential – Properties of potential function – Potential gradient – Gauss's law – Application of Gauss's Law – Maxwell's first law, div (D)=ρv – Laplace's and Poison's equations – Solution of Laplace's equation in one variable. Electric dipole – Dipole moment – potential and EFI due to an electric dipole – Torque on an Electric dipole in an electric field – Behavior of conductors in an electric field – Conductors and Insulators

UNIT – II

Dielectrics & Capacitance: Behavior of conductors in an electric field – Conductors and Insulators – Electric field inside a dielectric material – polarization – Dielectric – Conductor and Dielectric – Dielectric boundary conditions – Capacitance – Capacitance of parallel plates – spherical co-axial capacitors with composite dielectrics – Energy stored and energy density in a static electric field – Current density – conduction and Convection current densities – Ohm's law in point form – Equation of continuity

UNIT – III

Magneto Statics: Static magnetic fields – Biot-Savart's law – Magnetic field intensity (MFI) – MFI due to a straight current carrying filament – MFI due to circular, square and solenoid current Carrying wire – Relation between magnetic flux and magnetic flux density – Maxwell's second Equation, div(B)=0,

Ampere's Law & Applications: Ampere's circuital law and its applications viz. MFI due to an infinite sheet of current and a long current carrying filament – Point form of Ampere's circuital law – Maxwell's third equation, Curl (H)=Jc

UNIT – IV

Force in Magnetic fields and Magnetic Potential: Magnetic force Moving charges in a Magnetic field – Lorentz force equation – force on a current element in a magnetic field – Force on a straight and a long current carrying conductor in a magnetic field – Force between two straight long and parallel current carrying conductors – Magnetic dipole and dipole moment – a differential current loop as a magnetic dipole – Torque on a current loop placed in a magnetic field.Scalar Magnetic potential and its limitations – vector magnetic potential and its properties – vector magnetic potential due to simple configurations –

vector Poisson's equations. 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.

UNIT – V

Time Varying Fields: Time varying fields – Faraday's laws of electromagnetic induction – Its integral and point forms – Maxwell's fourth equation, Curl (E)=-dB/dt – Statically and Dynamically induced EMFs – Simple problems -Modification of Maxwell's equations for time varying fields – Displacement current

TEXT BOOKS:

1. "William H. Hayt& John. A. Buck", "Engineering Electromagnetics" ,Mc. Graw-Hill Companies, 7th Edition, 2009.
2. "Sadiku", "Electromagnetic Fields", Oxford Publications, 4th Edition, 2009.

REFERENCE BOOKS:

1. "CR Paul and S. A. Nasar", "Introduction to Electromagnetic", Mc-Graw Hill Publications, 3rd Edition, 1997.
2. "Nathan Ida", "Engineering Electromagnetic", Springer (India) Pvt. Ltd. 2nd Edition, 2015.
3. "D J Griffiths", "Introduction to Electro Dynamics", Prentice-Hall of India Pvt. Ltd, 3rd edition, 1999.
4. "J. D Kraus", "Electromagnetics", Mc Graw-Hill Inc. 4th edition, 1992.

Course Outcomes: upon completion of course, student will be able to Apply vector calculus to static electric – magnetic fields.

1. Compute the force, fields & Energy for different charge & current configurations & evaluate capacitance and inductance.
2. Analyze Maxwell's equation in different forms (Differential and integral) in Electrostatic, Magnetic time varying fields.
3. Ability to solve the problems in different EM fields.
4. Ability to Analyse moving charges on Magnetic fields.
5. Ability to Solve Electromagnetic Relation using Maxwell Formulae.

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(R17A0061) MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

OBJECTIVES:

The main objectives of the course are:

1. To enable the student to understand and appreciate, with a practical insight, the importance of certain basic issues governing the business operations that are needed for sound economic decision making.
2. The main purpose is to provide inputs on an overall analysis of an individual firm namely: demand and supply, production function, cost analysis, markets etc.
3. To understand and analyse the financial formats of the organisation for smooth running of the business.

Unit-I

Introduction to Managerial Economics: Definition, Nature and scope of Managerial economics, Micro and Macroeconomic concepts.

Demand Analysis: Demand Determinants, Law of Demand and exceptions. Elasticity Of Demand: Definition, Types, Measurement and Significance of elasticity of Demand. Demand Forecasting, Factors governing demand Forecasting, methods of demand Forecasting.

Unit-II

Production & Cost Analysis: Production Function- Isocost and Isoquants MRTS, Least Cost Combination of Inputs, Cobb-Douglas Production function, Laws of Returns, Internal and External Economies of Scale.

Cost Analysis: Cost concepts. Break-Even Analysis (BEA)-Determination of Break-Even Point (simple problems) - Managerial Significance.

Unit-III

Markets & New Economic Environment: Types of competition and Markets, Features of Perfect competition, Monopoly and Monopolistic Competition. Objectives and Policies of Pricing- Methods of Pricing.

Business: Features of different forms of Business Organisation, Changing Business Environment in Post-liberalization scenario.

Unit-IV

Introduction to Capital and Financial Accounting: Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements, Methods and sources of raising finance – Trading forecast, Capital Budget, Cash Budget.

Accounting Definition, Concepts and Conventions (GAAP); Formats for preparation of Trial Balance and Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet).

Unit-V

Investment Decision: Features of capital budgeting proposals, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value Method (simple problems). Financial Analysis: Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability ratios.

TEXTBOOKS:

1. ”Managerial Economics & Financial Analysis”, Special Edition – MRCET, McGraw Hill Publications, 2017.
2. Varsheney & Maheswari, Managerial Economics, Sultan Chand, 2009.
3. S.A. Siddiqui & A.S. Siddiqui, Managerial Economics and Financial Analysis, New Age International Publishers, Hyderabad 2013
4. M. Kasi Reddy & Sarawathi, Managerial Economics and Financial Analysis, PHI, New Delhi, 2010.

REFERENCES:

1. S.N.Maheswari & S. K. Maheswari, Financial Accounting, Vikas, 2012.
2. D.N. Dwivedi, Managerial Economics, Vikas, 2012.
3. Justin Paul, Leena, Sebastian, Managerial Economics, Cengage, 2012
4. A,R.Aryasri: Managerial Economics and Financial Analysis, McGraw-Hill, 2011.

OUTCOMES:

Students should be able

1. To understand the basic economic principles, forecast demand and supply.
2. Should be able to estimate cost and understand market structure, pricing practices.
3. Able to interpret the financial results of the organisation.

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

(R17A0481) ELECTRONIC DEVICES AND CIRCUITS LAB

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, Specifications and Testing of Active Devices, Diodes, BJT's, Low power JFET's, MOSFET's, Power Transistors, LED's, LCD's, SCR, UJT.
3. Study and operation of
   i. Multimeters (Analog and Digital)
   ii. Function Generator
   iii. Regulated Power Supplies
   iv. CRO.

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

1. P-N junction diode characteristics
2. Zener diode characteristics and Zener as voltage regulator
3. Half -Wave Rectifier with and without filter
4. Full - Wave Rectifier with and without filter
5. Input and output characteristics of transistor in CB configuration
6. Input and output characteristics of transistor in CE configuration
7. FET Characteristics
8. h-parameters of CE configuration
9. Frequency response of CE amplifier
10. Frequency response of CC amplifier
11. Frequency response of common source FET amplifier
12. UJT CHARACTERISITCS

PART C: Equipment required for Laboratories:

1. Regulated Power supplies (RPS)	0-30 V
2. CRO's	0-20 MHz
3. Function Generators	0-1 MHz
4. Multimeters	
5. Decade Resistance Boxes /	
6. Decade Capacitance Boxes	
7. Ammeters (Analog or Digital)	0-20 µA, 0-50µA, 0-100µA, 0-200µA, 0-10 mA
8. Voltmeters (Analog or Digital)	0-50V, 0-100V, 0-250V
9. Electronic Components	Resistors, Capacitors, BJT's, SCR's, UJTs, FET's,LED's, MOSFET's, Diodes- Ge & Si type, Transistors – NPN, PNP type

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

(R17A0395) MECHANICAL ENGINEERING LAB

Objectives:

1. To impart practical knowledge on the performance evaluation methods of various internal combustion engines, flow measuring equipment and hydraulic turbines and pumps.

SECTION A - THERMAL ENGINEERING LAB

1. I.C. Engines valve / port timing diagrams.
2. I.C. Engines performance test on 4 -stroke Diesel engine.
3. Determination of FHP by retardation and motoring test on IC engine
4. I.C. Engines heat balance on petrol / Diesel engines.
5. Study of boilers
6. I.C. Engines performance test on 2-stroke petrol engine

SECTION B – HYDRAULIC MACHINES LAB

1. Impact of jets on Vanes.
2. Performance Test on Pelton Wheel.
3. Performance Test on Francis Turbine.
4. Performance Test on Kaplan Turbine.
5. Performance Test on Single Stage Centrifugal Pump.
6. Performance Test on Reciprocating Pump.

NOTE: Conduct Any 10 Experiments From Above 12 Experiments

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II Year B.Tech EEE-I Sem	L	T/P/D	C
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MANDATORY COURSE – II
(R17A0004) FOREIGN LANGUAGE-FRENCH

INTRODUCTION:

In view of the growing importance of foreign languages as a tool for local communication in few countries French has been identified as one of the most required language after English. So the consequent emphasis on training students to acquire communicative competence in foreign language, the syllabus has been designed to develop linguistic and communicative competencies of engineering students. In the French classes, the focus is on the basic speaking skills.

OBJECTIVES:

1. To improve the basic speaking skills of the French language.
2. To hone the basic sentence constructions in day to day expressions for communication in their work place.

SYLLABUS

UNIT-I:

Pronunciation guidelines; Single vowels, Vowels and consonants combinations,; Numbers and Genders; articles verbs and their groups; present tense; adjectives from singular to plural

UNIT-II

Sentences Structures; Prepositions, affirmatives, Negative and, Interrogative Sentences, The Family, Conversation, Notes on Vocabulary, Grammar, Liaisons and mechanisms.

UNIT-III

D'où viens-tu (Where do you come from); Vocabulary, Conversation, Notes on Vocabulary, Liaisons Guidelines. Comparer (Comparing); Vocabulary, Conversation, Liaisons, Ordinal Number up to 100. Grammar.

UNIT-IV

Le temps (Time); Vocabulary, Grammar; Vocabulary related to - The Family, Vocabulary - Some more grammar.

UNIT-V

French Expressions and Idioms; Day-to-day Life, At Work, about Sports, Specia Events Other French Flavours; country of wine, pefumes and landscapes; - Québec and Accadie, , pass time in Suisse, people of france.

REFERENCE BOOKS:

1. Le Nouveau Sans Frontiere-1, Cle International 2003
2. Cahier d' activit'es ov Le Nouveau Sans Frontiere-1 Cle International 2003
3. Easy French Step-by-step by Myrna Bell Rochester
4. Ultimate French Beginner-Intermediate (Coursebook) By Livid Language
5. Ã L'Aventure: An Introduction to French Language and Francophone Cultures By by Evelyne Charvier-Berman, Anne C. Cummings.

OUTCOMES

1. The student will be in a position to speak in French, Which is the second most widely learned foreign language after English, and the ninth most widely spoken language in the world. French is also the only language, alongside English, that is taught in every country in the world.
2. The Student will get the ability to speak French is an advantage on the international job market.
3. Students with a good level of French are eligible for French government scholarships to enroll in postgraduate courses in France in any discipline and qualify for internationally recognized French degrees.

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II Year B.Tech EEE-I Sem	L	T/P/D	C
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MANDATORY COURSE – II

(R17A0005) FOREIGN LANGUAGES: GERMAN

OBJECTIVES

The main objectives of the course are:

1. To familiarize the students with a modern foreign language.
2. To familiarize the students with the sounds of German and their symbols.
3. To familiarize students with German for basic communication and functions in everyday situations.
4. To familiarize students with the basic of writing simple, direct sentences and short compositions.

SYLLABUS:

UNIT I

Current trends in German orthography, German grammar and lexical units, discourse models, oral and written.

UNIT- II

Communication patterns, prose passages, etc.

UNIT- III

Communication skills in everyday situations

UNIT-IV

Training in creative writing in German.

UNIT- V

Training in creative speaking in German.

TEXT BOOKS

Lernziel Deutsch

Reference books:

Themen
Tangram
Sprachkurs Deutsch
Schulz-Griesbach

Outcomes

1. Students familiarize with a modern foreign language – German
2. The students with German get acquainted for basic communication in everyday situations.

4. Students will know with the basics of writing simple direct sentences and short compositions.

4. Students get to know the basics of German language to communicate in the work place when they find the necessity.

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II Year B.Tech EEE-II Sem	L	T/P/D	C
	3	1/-/-	3

(R17A0206) CONTROL SYSTEMS

OBJECTIVES:

The main objectives of the course are:

1. Introduce the principles and applications of control systems in everyday life.
2. The basic concepts of block diagram reduction, transfer function representation, time response and 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: Concept of control system, Classification of control systems - Open loop and closed loop control systems, Differences, Examples of control systems- Effects of feedback, Feed Back Characteristics. Mathematical models for mechanical systems – Differential equations and transfer functions. Analogous systems-Force–Voltage and Force-Current analogy.

Transfer Function Representation: Block diagram algebra, Block diagram representation for mechanical and electrical systems, Representation by Signal flow graph - Reduction using Mason's gain formula.

UNIT - II:

Time 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.PID controllers, Effects of proportional derivative, proportional integral systems on steady state error.

UNIT - III:

Stability Analysis in S-Domain: The concept of stability – Routh-Hurwitz's stability criterion – qualitative stability and conditional stability – Limitations of Routh-Hurwitz's stability.

Root Locus Technique: Concept of root locus - Construction of root locus, Effects of adding poles and zeros to G(s) H(s) on the root loci.

UNIT - IV:

Frequency Response Analysis: Introduction, Frequency domain specifications, Bode plot diagrams-Determination of Phase margin and Gain margin, Stability analysis from Bode plots. Polar plots- Nyquist plots, Stability analysis. Compensation techniques – Lag, Lead, Lead-Lag and Lag-Lead Controllers design in frequency Domain.

UNIT - V:

State Space Analysis of Continuous Systems: Concepts of state, state variables and state model, Derivation of state models from block diagrams, Diagonalization, Solving the time invariant state equations, State Transition Matrix and it's properties, Concepts of Controllability and Observability.

TEXT BOOKS:

1. Control Systems Engineering - I. J. Nagrath and M. Gopal, New Age International (P) Limited, Publishers.
2. Control Systems - A. Anand Kumar, PHI.
3. Control Systems Engineering by A. Nagoor Kani, RBA Publications.

REFERENCE BOOKS:

1. Control Systems Theory and Applications - S. K. Bhattacharya, Pearson.
2. Control Systems Engineering - S. Palani, TMH.
3. Control Systems - N. K. Sinha, New Age International (P) Limited Publishers.
4. Control Systems by S.Hasan Saeed, KATSON BOOKS.
5. Solutions and Problems of Control Systems by A.K. Jairath, CBS Publishers.

OUTCOMES

After going through this course the student gets

1. A thorough knowledge on open loop and closed loop control systems, concept of feedback in control systems.
2. Transfer function representation through block diagram algebra and signal flow graphs.
3. Time response analysis of different ordered systems through their characteristic equation.
4. Time domain specifications, stability analysis of control systems in s-domain through R-H criteria.
5. Root locus techniques, frequency response analysis through Bode diagrams, Nyquist, Polar plots.

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II Year B.Tech EEE-II Sem	L	T/P/D	C
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(R17A0203) ELECTRICAL MACHINES – II

Objectives:

1. This subject is an extension of Electrical machines- I and deals with the basic working principle, constructional details, operational features & characteristics.

2. Discuss the testing of different types of Transformers and Induction motors which form major part of today's industrial drives and agricultural pump sets.

UNIT-I

Single Phase Transformers:

Single phase transformers-principle of operation-constructional details- types-emf equation-equivalent circuit – operation on no load and on load-phasor diagrams –losses- minimization of hysteresis and eddy current losses-efficiency-all day efficiency-regulation-effect of variations of frequency and supply voltage on iron losses.

UNIT-II

Testing of Single Phase Transformer and Autotransformer:

OC and SC tests – Sumpner's test – predetermination of efficiency and regulation-separation of losses test-parallel operation with equal and unequal voltage ratios – auto transformers-equivalent circuit –comparison with two winding transformers.

UNIT-III

Polyphase Transformers:

Poly phase transformers – Polyphase connections – Y/Y, Y/D, D/Y, D/D and open D, Third harmonics in phase voltages-three winding transformers-tertiary windings-determination of Zp, Zs and Zt transients in switching – off load and on load tap changing; Scott connection.

UNIT-IV

Polyphase Induction Motors:

Polyphase induction motors-construction details of cage and wound rotor machines-production of a rotating magnetic field – principle of operation – rotor emf and rotor frequency – rotor reactance, rotor current and Power factor at standstill and during operation. Rotor power input, rotor copper loss and mechanical power developed and their inter relation-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-V

Circle Diagram of Induction Motors& Speed control methods:

Circle diagram-no load and blocked rotor tests-predetermination of performance-methods of starting and starting current and torque calculations.

Speed control-change of frequency; change of poles and methods of consequent poles;

cascade connection. injection of an emf into rotor circuit (qualitative treatment only)- induction generator-principle of operation.

TEXTBOOKS:

1. Electric machinery – A.E. Fitzgerald, C.Kingsley and S.Umans, Mc Graw Hill Companies, 5th edition.
2. Electrical machines-PS Bhimbra, Khanna Publishers.
3. Electric Machines, I. J. Nagrath & D. P. Kothari, Tata Mc Graw Hill Publishers.

REFERENCEBOOKS:

1 Performance and Design of AC Machines by MG.Say, BPB Publishers.
2.Theory of Alternating Current Machinery- by Langsdorf, Tata McGraw-Hill Companies, 2ndedition.
3. Electromechanics-II (transformers and induction motors) S. Kamakashaiah Hitech publishers.
Textbook of Electrical Technology:volume 2 AC & DC Machines by B.L.THERAJA,A.K.THERAJA.

OUTCOMES:

At the end of this course the student would get

1. Basic knowledge on principles of electromechanical energy conversion
2. Knowledge on the Constructional features of Transformers and Induction motors
3. Full understanding of the basic principle of operation of these machines
4. Clear understanding of Operational characteristics and speed control methods of Induction motors.
5. Testing of different types of Transformers and Induction motors
6. Calculate motor currents, power, speed and torque using an equivalent circuit model.
7. Measure and calculate motor losses and efficiency.

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II Year B.Tech EEE-II Sem

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(R17A0207) ELECTRICAL POWER GENERATION, TRANSMISSION AND DISTRIBUTION-1

OBJECTIVES:

1. To introduce and describe the various methods of power generation like hydro, thermal, nuclear and gas generating stations.
2. To study and understand the various parameters concerning the design installation and operation of A. C. Transmission lines
3. . To illustrate the economic aspects of power generation and tariff methods.

UNIT- I

Thermal Power Stations: 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

Gas and Nuclear Power Stations: 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

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.

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.

UNIT III: 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 IV: PERFORMANCE OF SHORT, MEDIUM AND LONG 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, Incident, Reflected and Refracted Waves -Surge Impedance and SIL of Long Lines, Wave Length and Velocity of Propagation of Waves - Representation of Long Lines - Equivalent-T and Equivalent Pie network models (numerical problems).

UNIT-V: POWER SYSTEM TRANSIENTS AND VARIOUS FACTORS GOVERNING THE PERFORMANCE OF TRANSMISSION LINE

Types of System Transients - Travelling or Propagation of Surges - Attenuation, Distortion, Reflection and Refraction Coefficients - Termination of lines with different types of conditions - Open Circuited Line, Short- circuited Line, T-Junction, Lumped Reactive Junctions (Numerical Problems). Bewley's Lattice Diagrams (for all the cases mentioned with numerical examples). Skin and Proximity effects - Description and effect on Resistance of Solid Conductors -Ferranti effect - Charging Current - Effect on Regulation of the Transmission Line. Corona - Description of the phenomenon, factors affecting corona, critical voltages and power loss, Radio Interference.

TEXT BOOKS:

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

REFERENCE BOOKS:

1. "M.V. Deshpande", "Elements of Power Station design and practice" , Wheeler Publishing, 3rd Edition 1999.
2. "S. N. Singh", "Electrical Power Generation, Transmission and Distribution", PHI, 2003.
3. "V.K Mehta and Rohit Mehta", "Principles of Power Systems", S. Chand& Company Ltd, New Delhi, 2004.

OUTCOMES:

At the end of this course the student would

1. Get Basic understanding of different types power generation stations
2. Be able to draw the layout of different types of power plants like hydro power plant, thermal power station, Nuclear power plant and gas power plant
3. Get a clear understanding of different transmission line parameters, installation and their performance details.
4. Understand the various economic aspects of the power plant erection, operation and different tariff methods
5. **Evaluate** voltage drop and line loss calculations and design the capacitors and voltage regulating equipment to improve the power factor and voltage profile

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

II Year B.Tech EEE-II Sem

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(R17A0209) NETWORK THEORY

Objectives:

1. This course introduces the analysis of transients in electrical systems, to understand three phase circuits, to evaluate network parameters of given electrical network, to draw the locus diagrams and to know about the network functions

2. To prepare the students to have a basic knowledge in the analysis of Electric Networks

UNIT-I

D.C Transient Analysis: Transient response of R-L, R-C, R-L-C circuits (Series and parallel combinations) for D.C. excitations, Initial conditions, Solution using differential equation and Laplace transform method.

UNIT - II

A.C Transient Analysis: Transient response of R-L, R-C, R-L-C circuits (Series and parallel combinations) for sinusoidal excitations, Initial conditions, Solution using differential equation and Laplace transform method.

UNIT - III

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

UNIT – IV

Locus Diagrams: Series and Parallel combination of R-L, R-C and R-L-C circuits with variation of various parameters.

Resonance: Resonance for series and parallel circuits, concept of band width and Q factor.

UNIT - V

Network Parameters: Network functions driving point and transfer impedance function networks- poles and zeros –necessary conditions for driving point function and for transfer function Two port network parameters – Z, Y, ABCD and hybrid parameters and their relations– 2- port network parameters using transformed variables.

TEXT BOOKS:

1. William Hart Hayt, Jack Ellsworth Kemmerly, Steven M. Durbin (2007), Engineering Circuit Analysis, 7 th edition, McGraw-Hill Higher Education, New Delhi, India

2. Joseph A. Edminister (2002), Schaum's outline of Electrical Circuits, 4th edition, Tata McGraw Hill Publications, New Delhi, India.

3. A. Sudhakar, Shyammohan S. Palli (2003), Electrical Circuits, 2nd Edition, Tata McGraw Hill, New Delhi

REFERENCE BOOKS:

1. C. L. Wadhwa(2008), Electric Circuits Analysis, 2 nd edition, New Age International Publications, New Delhi.

2. A. Chakrabarthy(2010), Circuit Theory, 5th edition, DhanpatRai& Sons Publications, New Delhi.
3. Van Valkenburg, M. E. (1974), Network Analysis, 3rd Edition, Prentice Hall of India, New Delhi.
4. A Text Book On Electrical Technology. –B L THERAJA, Vol 1, S.Chand Publications.

Outcomes:

1. After going through this course the student gets a thorough knowledge on basic parameters of two port network.
2. Will able to articulate in working of various components of a circuit.
3. Will be familiar with ac and dc circuits solving.
4. Ability to measure Three phase voltages and current, active, reactive powers
5. Ability to convert Three phase Star to Three phase Delta circuits and Vice-Versa.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

II Year B.Tech EEE-II Sem	L	T/P/D	C
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(R17A0407) SWITCHING THEORY AND LOGIC DESIGN

OBJECTIVES

The main objectives of the course are:

1. To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
2. To understand common forms of number representation in digital electronic circuits and to be able to convert between different representations.
3. To implement simple logical operations using combinational logic circuits
4. To design combinational logic circuits, sequential logic circuits.
5. To impart to student the concepts of sequential circuits, enabling them to analyze sequential systems in terms of state machines.

UNIT -I:

Number System and Gates:

Number Systems, Base Conversion Methods, Complements of Numbers, Codes- Binary Codes, Binary Coded Decimal Code and its Properties, Excess-3 code, Unit Distance Code, Error Detecting and Correcting Codes, Hamming Code. Digital Logic Gates, Properties of XOR Gates, Universal Logic Gates.

UNIT -II:

Boolean Algebra and Minimization:

Basic Theorems and Properties, Switching Functions, Canonical and Standard Forms, Multilevel NAND/NOR realizations. K- Map Method, up to Five variable K- Maps, Don't Care Map Entries, Prime and Essential prime Implications, Quine Mc Cluskey Tabular Method

UNIT -III:

Combinational Circuits Design:

Combinational Design, Half adder,Full adder,Half subtractor,Full subtractor,Parallel binary adder/subtracor,BCD adder, Comparator, decoder, Encoder, Multiplexers, DeMultiplexers, Code Converters.

UNIT -IV:

Sequential Machines Fundamentals:

Introduction, Basic Architectural Distinctions between Combinational and Sequential circuits, classification of sequential circuits, The binary cell, The S-R-Latch Flip-Flop The D-Latch Flip-Flop, The "Clocked T" Flip-Flop, The " Clocked J-K" Flip-Flop, Design of a Clocked Flip-Flop, Conversion from one type of Flip-Flop to another, Timing and Triggering Consideration.

UNIT -V:

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-Flops.

Counters - Design of Asynchronous and Synchronous counters, Decade Counter,Register-Shift Register, Bidirectional Shift Register,universal shifteregister,shift registers using Ring Counter

.

TEXT BOOKS:

1. Digital Design- Morris Mano, PHI, 3rd Edition.
2. Switching Theory and Logic Design-A. Anand Kumar, PHI, 2nd Edition.
3. Switching and Finite Automata Theory- Zvi Kohavi & Niraj K. Jha, 3rd Edition, Cambridge.

REFERENCE BOOKS:

1. Introduction to Switching Theory and Logic Design – Fredriac J. Hill, Gerald R. Peterson, 3rd Ed,John Wiley & Sons Inc.
2. Digital Fundamentals – A Systems Approach – Thomas L. Floyd, Pearson, 2013.
3. Switching Theory and Logic Design – Bhanu Bhaskara –Tata McGraw Hill Publication, 2012
4. Fundamentals of Logic Design- Charles H. Roth, Cengage LEanring, 5th, Edition, 2004.
5. Digital Logic Applications and Design- John M. Yarbrough, Thomson Publications, 2006. 6. Digital Logic and State Machine Design – Comer, 3rd, Oxford, 2013.

OUTCOMES

Upon completion of the course, student should possess the following skills:

1. Be able to manipulate numeric information in different forms

2. Be able to manipulate simple Boolean expressions using the theorems and postulates of Boolean algebra and to minimize combinational functions.

3. Be able to design and analyze small combinational circuits and to use standard combinational functions to build larger more complex circuits.

Be able to design and analyze small sequential circuits and to use standard sequential functions to build larger more complex circuits

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

II Year B.Tech EEE-II Sem	L	T/P/D	C
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(R17A0281) ELECTRICAL MACHINES LAB - I

OBJECTIVES:

1. To expose the students to the operation of DC Generator to expose the students to the operation of DC Motor.
2. To examine the self excitation in DC generators.

(PART-A)

The following experiments are required to be conducted compulsory experiments:

1. Magnetization characteristics of DC shunt generator. Determination of critical field resistance and critical speed.
2. Load test on DC shunt generator. Determination of characteristics.
3. Load test on DC series generator. Determination of characteristics.
4. Load test on DC compound generator. Determination of characteristics.
5. Hopkinson's test on DC shunt machines. Predetermination of efficiency.
6. Fields test on DC series machines. Determination of efficiency.
7. Swinburne's test and speed control of DC shunt motor. Predetermination of efficiencies.
8. Brake test on DC compound motor. Determination of performance curves.

PART-B

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

9. Brake test on DC shunt motor. Determination of performance curves.
10. Retardation test on DC shunt motor. Determination of losses at rated speed.
11. Separation of losses in DC shunt motor.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

II Year B.Tech EEE-II Sem	L	T/P/D	C
	-	-/-3/-	2

(R17A0283) NETWORKS AND SIMULATION LAB

OBJECTIVES:

1. To design electrical systems.
2. To analyze a given network by applying various Network Theorems.
3. To measure three phase Active and Reactive power.
4. To understand the locus diagrams

PART-A: ELECTRICAL CIRCUITS

1) Thevenin's, Norton's and Maximum Power Transfer Theorems
2) Superposition theorem and RMS value of complex wave
3) Reciprocity , Millmann's Theorems
4) Locus Diagrams of RL and RC Series Circuits
5) Series and Parallel Resonance
6) Z and Y Parameters
7) Transmission and hybrid parameters
8) Measurement of Active Power for Star and Delta connected balanced loads
9) Measurement of Reactive Power for Star and Delta connected balanced loads

PART-B: PSPICE SIMULATION

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

Note: Any 6 Experiments from PART-A, PART-B Is Mandatory

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II Year B.Tech EEE-II Sem	L	T/P/D	C
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(R17A0006) GENDER SENSITIZATION
(An Activity-based Course)

Course Objectives:

The main objectives of the course are:

1. To develop students sensibility with regard to issues of gender in contemporary India.
2. To provide a critical perspective on the socialization of men and women.
3. To introduce students to information about some key biological aspects of genders.
4. To expose the students to debates on the politics and economics of work.
5. To help students reflect critically on gender violence.
6. To expose students to more egalitarian interactions between men and women.

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 /caste, Different Masculinities.
Just Relationships: Being Together as Equals (Towards a World of Equals:Unit-12)
Mary Kom and Onler, Love and Acid just do not Mix, Love Letters, Mothers and Fathers, Further Reading: Rosa Parks-The Brave Heart.

Unit-II:

GENDER AND BIOLOGY:

Missing Women: Sex Selection and its Consequences (Towards a World of Equals: Unit-4)
Declining 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 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 No! (Towards a World of Equals: Unit-6)

Sexual Harassment,not-eve-teasing-coping with everyday harassment-further Reading: " Chupulu".

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 : Unackowledged Women Artists of Telengana.

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 Tharu.

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 Review of Books 37.20(20 December 1990) Print ' We were Making History…' Life Stories of Women in Telangana Peoples Struggle , New Delhi: Kali for Women,1989.
2. Tripti Lahiri " By the Numbers: Where Indian Women Work " Womens 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/>
3. K. Satyanarayana and Susie Tharu(Ed) Steel Nibs are Sprouting: New Dalit Writing from South India, Dossier 2: Telugu And Kannada http://harpercollins.co.in/BookDetail.asp?Book Code-3732
4. Vimala 'Vantillu (The Kitchen)" Women Writing in India:600 BC to the Present Volume II: The 20th Century.Ed.Susie Tharu and K. Lalita Delhi: Oxford University Press,1995 559-601
5. Shatrughuna, Veena et al Womens Work and its Impact on child Health and Nutitution, Hydeabad, National Institute of Nutrition, India Council of Medical Research,1993.
6. Stree Shakti Sanghatana "We were making history…' Life Life Stories of Women in Telangana Peoples Struggle , New Delhi: Kali for Women,1989.
7. Menon, Nivedita Seeing like a feminist, New Delhi: Zubaan-Penguin Books,2012.

8. Jayaprabha, A. 'Chupulu(stares), Women Writing in India:600 BC to the Present Volume II: The 20th Century.Ed.Susie Tharu and K. Lalita Delhi: Oxford University Press,1995 596-697
9. Javeed, Shayan and Anupam Manuhaar " Women and Wage Discrimination in India: A Critical Analysis"International Journal of Humanities and social science Invention2.4(2013)
10. Gautam, Liela and Gita Ramaswamy " A Conversation between a Daughter and a mother" Broardsheet on Contemporary Politics, Special Issue on Sexuality and Harassment : Gender Politics on Campus Today Ed Madhumeeta Sinha and Asma Rasheed Hyderabad: Anveshi Research Center for Women's Studies 2014
11. Abdulali Sohaila " I fought for my life and Won" Available online at : http://www.thealterative.in/lifestyle/i-fought-for-my-lifeand-won-sohaila-abdulal/
12. Jeganathan Pradeep,Partha Chatterjee (ED) " Community, Gender and Violence Subaltern Studies Xf Permanent Black and Ravi Dayal Publishers, New Delhi,2000.
13. K. Kapadia, The Violence of Development: The Politics of Identity, Gender and Social Inequalities in India London: Zed Books,2002
14. S. Benhabib, Situating the Self: Gender, Community and Post modernism in contemporary Ethics, London: Routledge,1992
15. Virginia Woolf, A Room of One's own Oxford: Black Swan 1992
16. T. Banuri and M. Mahmood , Just Development: Beyond Adjustment with a Human Face, Karachi: Oxford University Press,1997.

Course Outcomes:

1. Students will have developed a better understanding of important issues related to gender in contemporary India.
2. 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 derived from research, facts, everyday life, literature and film.
3. Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
4. Students will acquire insight into the gendered division of labor and its relation to politics and economics.
5. Men and Women students and professionals will be better equipped to work and live together as equals.
6. Students will develop a sense of appreciation of women in all walks of life.
7. Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women the textbook will empower students to understand and respond to gender violence.

OPEN ELECTIVE - I

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

II Year B.Tech EEE-II Sem

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

OPEN ELECTIVE - I

(R17A0451) DIGITAL ELECTRONICS

OBJECTIVES:

The main objectives of the course are:

1. To introduce basic postulates of Boolean algebra and shows the correlation between Boolean expressions.
2. To introduce the methods for simplifying Boolean expressions.
3. To outline the formal procedures for the analysis and design of combinational and sequential circuits.
4. To introduce the concept of memories and programmable logic devices.
5. To illustrate the concept of synchronous and asynchronous sequential circuits.

UNIT I

BINARY SYSTEMS AND LOGIC GATES:

Binary Systems: The Advantage of Binary, Number Systems, The Use of Binary in Digital Systems,

AND, OR, NOT, NAND, NOR, Exclusive-OR, Exclusive-NOR and Exclusive-NAND implementations of Logic Functions using gates, NAND-NOR implementations.

UNIT II

MINIMIZATION TECHNIQUES:

Minimization Techniques: Boolean postulates and laws-De-Morgan's Theorem-Principle of Duality-Boolean expression-Minimization of Boolean expressions-Minterm-Maxterm-Sum of Products (SOP)-Product of Sums (POS)-Karnaugh map minimization-Don't care conditions-Quine Mc-Cluskey method of minimization.

UNIT III

COMBINATIONAL CIRCUITS:

Design Procedure-Half Adder-Full Adder-Half Subtractor-Full Subtractor-Parallel binary adder-Parallel Binary Subtractor-Multiplexer/ Demultiplexer-Decoder-Encoder.

UNIT IV

SEQUENTIAL CIRCUITS:

Latches, Flip-flops-SR, JK, D, T and Master-Slave-Characteristic table and equation-Application Table-Edge Triggering-Level Triggering-Realization of one flip-flop using other flip-flops-serial adder/subtractor-Asynchronous Counter-Asynchronous Up/Down Counter, Decade counter-Synchronous Counters-Synchronous Up/Down Counters, Decade Counters

UNIT V

MEMORY DEVICES:

Classification of Memories-ROM_ROM Organization, PROM-EPROM-EEPROM-EAPROM, RAM-RAM Organization-Write operation-Read Operation-Programmable Logic Devices-Programmable Logic Array (PLA), Programmable Array Logic (PAL)-Implementation of combinational logic circuits suing ROM, PLA, PAL.

OUTCOMES

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

1. Analyse different methods used for simplification of Boolean expressions
2. Design and implement Combinational and Sequential circuits.
3. Design and implement Synchronous and Asynchronous Sequential Circuits.

TEXT BOOK:

1. M Morris Mano, “Digital Design”, 4th Edition, Prentice Hall of India PVt., Ltd., 2008/Pearson Education (Singapore) Pvt., Ltd., New Delhi, 2003.
2. Donald P Leach and Albert Paul Malvino, “Digital Principles and Applications”, 6th Edition, TMH, 2006.

REFERENCES:

1. John F Wakerly. “Digital Design, Fourth Edition, Pearson/PHI, 2008
2. John M Yarbrough, “Digital Logic Applications and Design”, Thomson Learning, 2006
3. Charles H Roth, “Fundamentals of Logic Design”, 6th Edition, Thomson Learning, 2013
4. Thomas L Floyd, “Digital Fundamentals”, 10th Edition, Pearson Education Inc, 2011.
5. Donald D Givone, “Digital Principles and Design”, TMH, 2003.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

II Year B.Tech EEE-II Sem

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

OPEN ELECTIVE - I

(R17A0251) ELEMENTS OF ELECTRICAL ENGINEERING

OBJECTIVES:

1. To introduce the fundamental concepts of electromechanical energy conversion
2. To familiarize the students with the principle of operation, constructional features and operational characteristics of various types of Motors used in the engineering and consumer Industry

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 & Motors :

D.C. Generators – Principle of operation – Action of commutator – constructional features – armature windings –– simplex and multiplex windings – use of laminated armature – E. M.F Equation

D.C. Motors**:** Principle of operation – Back E.M.F. - Torque equation – characteristics and application of shunt, series and compound motors – Armature reaction and commutation. Speed control of DC Motors**:** Armature voltage and field flux control methods. Ward-Leonard system. – protective devices.

UNIT – III:

Single Phase Transformers:

Single phase transformers-principle of operation-constructional details- types-emf equation-equivalent circuit – operation on no load and on load-phasor diagrams –losses- minimization of hysteresis and eddy current losses-efficiency-all day efficiency-regulation-effect of variations of frequency and supply voltage on iron losses.

UNIT – IV:

Polyphase Induction Motors &Their Speed control

Polyphase induction motors:construction details of cage and wound rotor machines-production of a rotating magnetic field – principle of operation – rotor emf and rotor frequency –Rotor power input, rotor copper loss and mechanical power developed and their inter relation-torque equation – expressions for maximum torque and starting torque – torque slip characteristic – double cage and deep bar rotors

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

UNIT – V:

Single Phase Motors & Special Machines: Single phase Motors: Single phase induction motor – Constructional features-Double revolving field theory Equivalent circuit - split-phase motors - Capacitor start Capacitor run motors. Principles of A.C. Series motor-Universal motor, Stepper motor shaded pole motor, Reluctance Motors, Brushless DC motors (Qualitative Treatment only).

Text Books:

1. Electrical Machines, P.S. Bimbra, Khanna Publishers.
2. Principles of Electrical Machines, V. K. Mehta, Rohit Mehta, S. Chand Publishing.
3. Electric Machines by I.J. Nagrath & D.P. Kothari, Tata Mc Graw – Hill Publishers.

Reference Books:

1. Electric Machines, Mulukutla S. Sarma, Mukesh K. Pathak, Cengage Learning.
2. Fundamentals of Electric Machines, B. R. Gupta, Vandana Singhal, New Age International Publishers.
3. Electric machinery – A.E. Fitzgerald, C.Kingsley and S.Umans, Mc Graw Hill Companies, 5th edition.
4. Theory of Alternating Current Machinery- by Langsdorf, Tata McGraw-Hill Companies, 2nd edition

OUTCOMES:

At the end of the course the student will

1. Have a clear understanding of the materials used and features in the construction of the electrical machines like transformers, DC and AC motors and special purpose motors.
2. Acquire a basic knowledge on the principle of operation of all these machines
3. Have a basic knowledge on the Torque speed relations and the effect of load torque on their performance.
4. Will have fundamental concept on the speed control of the various types of motors.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

II Year B.Tech EEE-II Sem

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

OPEN ELECTIVE - I

(R17A0551) DATABASE SYSTEMS

OBJECTIVES

1. To understand the basic concepts and the applications of database systems
2. To Master the basics of SQL and construct queries using SQL
3. To understand the relational database design principles
4. To become familiar with the basic issues of transaction processing and concurrency control
5. To become familiar with database storage structures and access techniques

UNIT I: INTRODUCTION

Data- Database: File Processing System Vs DBMS, History, Characteristic-Three schema Architecture of a database, Functional components of a DBMS.DBMS Languages-Database users and DBA.

UNIT II: DATABASE DESIGN

ER Model: Objects, Attributes and its Type. Entity set and Relationship set-Design Issues of ER model-Constraints. Keys-primary key, Super key, candidate keys. Introduction to relational model-Tabular, Representation of Various ER Schemas. ER Diagram Notations-Goals of ER Diagram- Weak Entity Set- Views.

UNIT III: STRUCTURED QUERY LANGUAGE

SQL: Overview, The Form of Basic SQL Query -UNION, INTERSECT, and EXCEPT– join operations: equi join and non equi join-Nested queries - correlated and uncorrelated-Aggregate Functions-Null values.

UNIT IV - DEPENDENCIES AND NORMAL FORMS

Importance of a good schema design,:- Problems encountered with bad schema designs, Motivation for normal forms- functional dependencies, -Armstrong's axioms for FD's-Closure of a set of FD's,- Minimal covers-Definitions of 1NF,2NF, 3NF and BCNF-Decompositions and desirable properties -

UNIT V:

Transactions: Transaction concept, transaction state, System log, Commit point, Desirable Properties of a Transaction, concurrent executions, serializability, recoverability, implementation of isolation, transaction definition in SQL, Testing for serializability**,** Serializability by Locks-Locking Systems with Several Lock Modes-Concurrency Control by Timestamps, validation.

TEXT BOOK:

1. Abraham Silberschatz, Henry F. Korth, S. Sudarshan," Database System Concepts", McGraw-Hill, 6th Edition , 2010.
2. Fundamental of Database Systems, by Elmasri, Navathe, Somayajulu, and Gupta, Pearson Education.

REFERENCES:

1. Raghu Ramakrishnan, Johannes Gehrke, "Database Management System", McGraw Hill., 3rd Edition 2007.
2. Elmasri&Navathe,"Fundamentals of Database System," Addison-Wesley Publishing, 5th Edition, 2008.
3. Date.C.J, "An Introduction to Database", Addison-Wesley Pub Co, 8th Edition, 2006.
4. Peter rob, Carlos Coronel, "Database Systems – Design, Implementation, and Management", 9th Edition, Thomson Learning, 2009.

OUTCOMES

1. Demonstrate the basic elements of a relational database management system
2. Ability to identify the data models for relevant problems
3. Ability to design entity relationship and convert entity relationship diagrams into RDBMS and formulate SQL queries on the respect data

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

II Year B.Tech EEE-II Sem

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

OPEN ELECTIVE - I

(R17A0351) ELEMENTS OF MECHANICAL ENGINEERING

OBJECTIVES:

1. To give an insight to students about the behaviour of materials under external forces.
2. The concept of stress, strain, elasticity etc. as applied to various structures under loading are included.
3. The student able to learn about concept of fluids, turbines and engines.

UNIT - I

Stresses and strains: kinds of – stress-strains, elasticity and plasticity, Hooks law, stress – strain diagrams, modules of elasticity, Poisson's ratio, linear and volumetric strain, relation between E, N, and K, bars of uniform strength, compound bars and temperature stresses.

Shear force and bending moment: Types of supports – loads – Shear force and bending moment for cantilever and simply supported beams without overhanging for all types of loads.

UNIT - II

Theory of simple bending: simple bending formula, Distribution of Flexural and Shear stress in Beam section – Shear stress formula – Shear stress distribution for some standard sections.

Thin cylindrical shells: stress in cylindrical shells due to internal pressures, circumferential stress, longitudinal stress, design of thin cylindrical shells, spherical shells, change in dimension of the shell due to internal pressure, change in volume of the shell due to internal pressure

Thick Cylinders: Lame's equation- cylinders subjected to inside and outside pressures
Columns and Struts.

UNIT - III

Properties of Fluid : Stream line , streak line , path line , continuity equation pipes are in series, pipes are in parallel, HGL, TGL , Bernoullis equation .

Hydraulic pumps and turbines: working principles and velocity diagrams.

UNIT - IV

Internal combustion engines: classification of IC engines, basic engine components and nomenclature, working principle of engines, Four strokes and two stroke petrol and diesel engines, comparison of CI and SI engines, comparison of four stroke and two stroke engines, simple problems such as indicated power, brake power, friction power, specific fuel consumption, brake thermal efficiency, indicated thermal efficiency and mechanical efficiency.

UNIT – V

Belts - Ropes and chain: belt and rope drives, velocity ratio, slip, length of belt , open belt and cross belt drives, ratio of friction tensions, centrifugal tension in a belt, power transmitted by belts and ropes, initial tensions in the belt, simple problems.

Gear trains: classification of gears, gear trains velocity ratio, simple, compound –reverted and epicyclic gear trains.

TEXT BOOKS:

1. ”Strength of Materials and Mechanics of Structures”, B.C.Punmia, Standard Publications and distributions, 9 th ed.
2. Thermal Engineering, Ballaney,P.L., Khanna Publishers, 2003 .
3. Theory of Machines , S.S. Rattan , Tata McGraw Hill.
4. Fluid Mechanics and Hydraulic Machinery R.K. Bansal .

REFERENCE BOOKS:

1. Thermal Engineering, R.K. Rajput , Laxmi Publications .
2. Theory of Machines, R.S. Khurmi, S. Chand Publications.
3. Fluid Mechanics and Hydraulic Machinery, Modi & Seth.

OUTCOMES:

1. The student would be exposed to basic mechanical engineering machinery.
2. The student learned about mechanical components.
3. Student understand about engines and turbines .

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

II Year B.Tech EEE-II Sem	L	T/P/D	C
	3	-/-/-	3

OPEN ELECTIVE - I

(R17A0352) GREEN ENERGY SYSTEMS

OBJECTIVES:

1. The course aims to highlight the significance of alternative sources of energy.
2. Green energy systems and processes and provides the theory and working principles of probable sources of renewable and green energy systems that are environmental friendly.

UNIT-I

Introduction:

Solar Radiation: Role and potential of new and renewable sources, the solar energy option, Environmental impact of solar power, structure of the sun, the solar constant, sun-earth relationships, coordinate systems and coordinates of the sun, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data, numerical problems. Photo voltaic energy conversion – types of PV cells, I-V characteristics.

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, solar cookers, central power tower concept and solar chimney. **Wind Energy:** Sources and potentials, horizontal and vertical axis windmills, performance characteristics, betz criteria, types of winds, wind data measurement.

UNIT – III

Bio-Mass: Principles of bio-conversion, anaerobic/aerobic digestion, types of bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, bio fuels, I.C. engine operation and economic aspects.

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

Ocean Energy: OTEC, Principles of utilization, setting of OTEC plants,thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

UNIT –IV

Energy Efficient Systems: (A) Electrical Systems: Energy efficient motors, energy efficient lighting and control, selection of luminaire, variable voltage variable frequency drives (adjustable speed drives), controls for HVAC (heating, ventilation and air conditioning), demand site management.

(B) Mechanical Systems: Fuel cells- principle, thermodynamic aspects, selection of fuels & working of various types of fuel cells, Environmental friendly and Energy efficient compressors and pumps.

UNIT-V

Energy Efficient Processes: Environmental impact of the current manufacturing practices and systems, benefits of green manufacturing systems, selection of recyclable and environment friendly materials in manufacturing, design and implementation of efficient and sustainable green production systems with examples like environmental friendly machining, vegetable based cutting fluids, alternate casting and joining techniques, zero waste manufacturing.

Green Buildings: Definition, features and benefits. Sustainable site selection and planning of buildings for maximum comfort. Environmental friendly building materials like bamboo, timber, rammed earth, hollow blocks, lime & lime pozzolana cement, agro materials and industrial waste, Ferro cement and Ferro-concrete, alternate roofing systems, paints to reduce heat gain of the buildings. Energy management.

TEXT BOOKS:

1. Sukhatme S.P. and J.K.Nayak, Solar Energy – Principles of Thermal Collection and Storage, TMH.
2. Khan B.H., Non-Conventional Energy Resources, Tata McGraw Hill, New Delhi, 2006.
3. Green Manufacturing Processes and Systems, Edited by J. Paulo Davim, Springer 2013.

REFERENCES:

1. Alternative Building Materials and Technologies / K.S Jagadeesh, B.V Venkata Rama Reddy and K.S Nanjunda Ra.
2. Principles of Solar Energy / Frank Krieth & John F Kreider.
3. Non-Conventional Energy / Ashok V Desai /Wiley Eastern.
4. Renewable Energy Technologies /Ramesh & Kumar /Narosa
5. Renewable Energy Technologies/ G.D Roy

OUTCOMES:

1. The student shall understand the principles and working of solar, wind, biomass, geo-thermal, ocean energies.
2. Green energy systems and appreciate their significance in view of their importance in the current scenario and their potential future applications.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

II Year B.Tech EEE-II Sem

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

OPEN ELECTIVE - I

(R17A0051) INTELLECTUAL PROPERTY RIGHTS

OBJECTIVES:

1. The objective of this course is to provide the knowledge on International IPR's and to make students efficient to take decisions in Global Corporate.

Unit-I

Introduction: Intellectual property rights basics, the role and value of IP in international commerce, Issues affecting IP internationally. Agreement on trade related aspects of Intellectual Property Rights. (TRIPS) - Agreement on TRIPS and India.

Unit-II

Parties to IP Rights: Owner, customer, authorized user, licensee, attorney, protection of the weak and strong, finalizing ownership and use rights.

Unit-III

Ensuring the value of IP: Ensuring the value of IP at creation stage, after creation stage, precise contractual protection of IP rights. Key issues related to IP internationally. IP rights in international forums. Fundamentals in Country legal systems, generalities. Validity of IP rights locally: specifics.

Unit-IV

Managing IP Rights: Acquiring IP Rights: letters of instruction, joint collaboration agreement, work made for hire agreement - Protecting IP Rights: non disclosure agreement, cease and desist letter, settlement memorandum. Transferring IP Rights: assignment contract, license agreement, deed of assignment or license agreement, addendum to unrecorded assignment or license.

Unit-V

Remedies and IPR Evaluation - GATT - WTO - Role of WTO in solving IPR issues.

REFERENCES:

1. A short course in International Intellectual Property Rights – Karla C. Shippey, World Trade Press – 2nd Edition.
2. Intellectual Property Rights – Heritage, Science, & Society under international treaties – A. Subbian, - Deep & Deep Publications – New Delhi.
3. Intellectual Property Rights: N K Acharya: ISBN: 9381849309
4. Intellectual Property Rights: C B Raju : ISBN-8183870341
5. Intellectual Property : Examples and Explanation – Stephen M McJohn, 2/e, ISBN-13: 978-0735556652

OUTCOMES

1. It allows students how to prepare and protect the Inventions , start up ideas and rights of patents and copy rights etc.,
2. This subject brings awareness to the students the basic legal aspects at present following at Global level.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

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

(R17A0408) IC APPLICATIONS

COURSE OBJECTIVES:

The main objectives of the course are:

- To introduce the basic building blocks of linear integrated circuits.
- To teach the linear and non-linear applications of operational amplifiers.
- To teach the theory of ADC and DAC.
- To introduce the concepts of waveform generation and introduce some special function ICs.
- To understand and implement the working of basic digital circuits.

UNIT - I

OPERATIONAL AMPLIFIER: Ideal and Practical Op-Amp, Op-Amp Characteristics, DC and AC Characteristics, Features of 741 Op-Amp, Modes of Operation - Inverting, Non-Inverting, Differential, Instrumentation Amplifier, AC Amplifier, Differentiators and Integrators, Comparators, Schmitt Trigger, Introduction to Voltage Regulators, Features of 723 Regulator, Three Terminal Voltage Regulators.

UNIT - II

OP-AMP, IC-555 & IC 565 APPLICATIONS: Introduction to Active Filters, Characteristics of Band pass, Band reject and All Pass Filters, Analysis of 1st order LPF & HPF Butterworth Filters, waveform Generators - Triangular, Sawtooth, Square wave, IC555 Timer - Functional Diagram, Monostable and Astable Operations, Applications, IC565 PLL - Block Schematic, Description of Individual Blocks, Applications.

UNIT - III

DATA CONVERTERS: Introduction, Basic DAC techniques, Different types of DACs-Weighted resistor DAC, R-2R ladder DAC, Inverted R-2R DAC, Different Types of ADCs - Parallel Comparator Type ADC, Counter Type ADC, Successive Approximation ADC and Dual Slope ADC, DAC and ADC Specifications.

UNIT - IV

DIGITAL INTEGRATED CIRCUITS: Classification of Integrated Circuits, Combinational Logic ICs - Specifications and Applications of TTL-74XX & CMOS 40XX Series ICs - Code Converters, Decoders,Encoders,PriorityEncoders,Multiplexers,Demultiplexers,ParityGenerators/Checkers, Parallel Binary Adder/ Subtractor, Magnitude Comparators.

UNIT - V

SEQUENTIAL LOGIC IC'S AND MEMORIES: Familiarity with commonly available 74XX & CMOS 40XX Series ICs - All Types of Flip-flops, conversion of Flip flops, Synchronous Counters, Decade Counters, Shift Registers.

MEMORIES - ROM Architecture, Types of ROMS & Applications, RAM Architecture, Static & Dynamic RAMs.

TEXT BOOKS:

1. Linear Integrated Circuits – D. Roy Chowdhury, New Age International (p) Ltd, 2nd Edition,2003.
2. Op-Amps & Linear ICs - Ramakanth A. Gayakwad, PHI, 2003.
3. Digital fundamentals – Floyd and Jain, Pearson Education, 8th Edition, 2005.

REFERENCE BOOKS:

1. Op Amps & Linear Integrated circuits-Concepts and Applications James M.Fiore, Cengage Learning/Jaico, 2009.
2. Operational Amplifiers with linear integrated circuits by K.Lalkishore-Pearson, 2009.
3. Linear integrated circuits and applications-Salivahana, TMH.
4. Modern digital electronics-RPJain-4/e-TMH, 2010.
5. Digital design principles and practices-John.F.Wakerly3/e,2005.
6. Operational amplifiers with linear integrated cuircuits,4/e William D.Stanley,Pearson educationIndia,2009.

COURSE OUTCOMES:

After completion of this course, the students will have:

- A thorough understanding of operational amplifiers with linear integrated circuits.
- Understanding of the different families of digital integrated circuits and their characteristics.
- Also students will be able to design circuits using operational amplifiers for various applications.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

III B.Tech EEE I Sem

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(R17A0204) ELECTRICAL MACHINES – III

COURSE OBJECTIVES:

- To understand the detailed analysis of Synchronous generators and motorswhich are the prime source of electrical power generation and its utilities.
- To get knowledge on different types of single phase motors and stepper motors which are having significant applications in house hold appliances, industrial applications and control systems.

UNIT - I:

SYNCHRONOUS MACHINE & CHARACTERISTICS: 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. Armature reaction - leakage reactance – synchronous reactance and impedance – experimental determination - phasor diagram – load characteristics.

UNIT - II:

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

UNIT - III:

PARALLEL OPERATION OF SYNCHRONOUS GENERATOR: Synchronizing alternators with infinite bus bars – synchronizing power 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 reactance's.

UNIT - IV:

SYNCHRONOUS MOTORS: Theory of operation – phasor diagram – Variation of current and power factor with excitation – synchronous condenser – Mathematical analysis for power developed. Hunting and its suppression – Methods of starting – synchronous induction motor.

UNIT - V:

SINGLE PHASE MOTORS & SPECIAL MACHINES: Single phase Motors: Single phase induction motor – Constructional features-Double revolving field theory Equivalent circuit - split-phase motors - Capacitor start Capacitor run motors. Principles of A.C. Series motor-Universal motor, Stepper motor, shaded pole motor (Qualitative Treatment only).

TEXT BOOKS:

1. Electrical Machines – by P.S. Bimbra, Khanna Publishers.
2. Electrical Machines(Ac & Dc machines), by J B GUPTA, S K kataria and sons
3. Electric Machines, I. J. Nagrath & D. P. Kothari, Tata Mc Graw Hill Publishers.

REFERENCE BOOKS:

1. Electro mechanics - III (Synchronous and single phase machines), S. Kamakashiah, Right Publishers.
2. Performance and Design of AC Machines, MG. Say, BPB Publishers.
3. Theory of Alternating Current Machinery, Langsdorf, Tata McGraw-Hill Companies.
4. Electric machinery, A.E. Fitzerald, C. Kingsley and S. Umans, Mc Graw Hill Companies.

COURSE OUTCOMES:

After this course the student gets a thorough knowledge on:

- Construction, operation, characteristics, regulation, parallel-operation, starting & speed control methods of synchronous machines.
- Construction, operation and characteristics of single-phase motors & special machines.
- Ability to apply the above concepts to real-world electrical problems and applications.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

III B.Tech EEE I Sem	**L**	**T/P/D**	**C**
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(R17A0208) ELECTRICAL POWER GENERATION, TRANSMISSION AND DISTRIBUTION-II

COURSE OBJECTIVES:

- To design the insulators for overhead lines
- Understand the construction and grading of cables in power transmission.
- To examine A.C. and D.C distribution systems.
- To examine the traveling wave performance and sag of transmission lines.

UNIT-I:

OVERHEAD LINE INSULATORS, SAG AND TENSION CALCULATIONS: Types of Insulators, String efficiency and Methods for improvement, Numerical Problems - voltage distribution, calculation of string efficiency, Capacitance grading and Static Shielding Sag and Tension Calculations with equal and unequal heights of towers, Effect of Wind and Ice on weight of Conductor, Numerical Problems - Stringing chart and sag template and its applications.

UNIT-II:

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

UNIT-III:

D.C DISTRIBUTION SYSTEMS: Classification of Distribution Systems –Comparison of DC vs. AC and Underground vs Overhead 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.

UNIT– IV:

DISTRIBUTION SYSTEMS: 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. Industrial and commercial distribution systems – Energy losses in distribution system – system ground for safety and protection.

UNIT-V:

SUBSTATIONS: Classification of substations – Air insulated 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 busbar, sectionalized single busbar, main and transfer busbar system with relevant diagrams.

TEXT BOOKS:

1. A Text Book on Power System Engineering by M.L. Soni, P.V. Gupta, U.S. Bhatnagar,
2. Electrical power systems - by C.L Wadhwa, New Age International (P) Limited, Publishers, 1998.
3. "C. L. Wadhwa", "Generation and utilization of Electrical Energy", New age International (P) Limited, Publishers1997.

REFERENCE BOOKS:

1. Power system Analysis-by John J Grainger William D Stevenson, TMC Companies, 4th edition.
2. Power System Analysis and Design by B.R. Gupta, Wheeler Publishing
3. Power System Analysis by Hadi Sadat – TMH Edition.

COURSE OUTCOMES:

- Understand A.C. and D.C. distribution systems.
- Able to analyze the performance of distribution lines
- Able to analyze the performance of Sag and Tension Calculations
- Can understand transient's phenomenon of transmission lines.
- Able to understand overhead line insulators and underground cables.
- Able to distinguish between air and gas insulated substations.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

III B.Tech EEE I Sem

L	T/P/D	C
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(R17A0210) POWER ELECTRONICS

COURSE OBJECTIVES:

- To get an understanding of semiconductor devices and systems which have a large application in the power generation, transmission, distribution and utilization.
- To get an in depth understanding of the basic concepts of different types of power semiconductor devices and their applications in converters, inverters, choppers, cycloconverter, dual converters, etc.

UNIT - I

POWER SEMI CONDUCTOR DEVICES & COMMUTATION CIRCUITS: Thyristors – Silicon Controlled Rectifiers (SCR's) - Two transistor analogy - Static and Dynamic characteristics - Turn on and turn off methods- UJT firing circuit - Series and parallel connections of SCR's – Snubber circuit details – Line Commutation and Forced Commutation circuits – Power MOSFET, Power IGBT, their characteristics and other form of thyristors.

UNIT - II

AC - DC CONVERTERS (1-PHASE & 3-PHASE CONTROLLED RECTIFIERS): Phase control technique – Single phase Line commutated converters –Bridge connections – Half controlled converters with R, RL and RLE loads – Derivation of average load voltage and current – Numerical problems. Semi and Fully controlled converters, Bridge connections with R, RL loads – Derivation of average load voltage and current. Three phase converters – Three pulse and six pulse converters – 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 - III

DC - DC CONVERTERS (CHOPPERS): Choppers – Time ratio control and Current limit control strategies – Step down choppers Derivation of load voltage and currents with R, RL loads- Step up Chopper and other class of chopper – load voltage expression, Problems.

UNIT - IV

AC - AC CONVERTERS (AC VOLTAGE CONTROLLERS) & FREQUENCY CHANGERS (CYCLO-CONVERTERS): AC voltage controllers – Single phase two SCR's in anti-parallel – With R and RL loads – modes of operation – Derivation of RMS load voltage, current and power factor wave forms -Numerical problems - Cyclo converters – Types- R and RL loads (Principle of operation only) – Bridge configuration of single phase cyclo converter (Principle of operation only) – Waveforms.

UNIT - V:

DC - AC CONVERTERS (INVERTERS): Inverters – Single phase inverter – Basic series inverter - operation and waveforms - Three phase inverters (120, 180 degrees conduction modes of operation) - Voltage control techniques for inverters, Pulse width modulation techniques - Numerical problems.

TEXT BOOKS:

1. Power Electronics, Dr. P. S. Bimbhra, Khanna Publishers
2. Power Electronics, M. D. Singh & K. B. Kanchandhani, Tata Mc Graw - Hill Publishing Company.

REFERENCE BOOKS:

1. Power Electronics; Circuits, Devices and Applications, M. H. Rashid, Prentice Hall of India.
2. Power Electronics, Vedam Subramanyam, New Age International (P) Limited, Publishers.
3. Elements of Power Electronics, Philip T. Krein, Oxford University Press.
4. Power Electronics, P. C. Sen, Tata Mc Graw-Hill Publishing.

COURSE OUTCOMES:

At the end of the course the students get:

- A thorough knowledge on construction operation V-I characteristics commutation firing and protection of various power semiconductor devices, thyristors nature of the R, RL and RLE loads for different power inputs.
- AC-to-DC power conversion through 1-phase & 3-phase controlled rectifiers, DC-to-DC power conversion through step-up and step-down choppers.
- Different types of PWM (pulse-width modulation) techniques, steady-state and transient state analysis of all the power converters, which can be to applied to concepts of real-world electrical and electronics problems & applications.

CORE ELECTIVE - I

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

III B.Tech EEE I Sem **L T/P/D C**
3 -/ - / - 3

(CORE ELECTIVE – I)
(R17A0463) SYSTEMS AND SIGNAL PROCESSING

COURSE OBJECTIVES:

The main objectives of the course are:

- To understand the basic concepts of basic elementary signals and Fourier series representation.
- To Master the representation of signals in the frequency domain using Fourier transforms and Discrete Fourier transform
- To learn the Mathematical and computational skills needed to understand the principal of Linear System and digital signal processing fundamentals.
- To understand the implementation of the DFT in terms of the FFT.
- To learn the Realization of Digital Filters

UNIT I:
INTRODUCTION TO SIGNALS: Elementary Signals- Continuous Time (CT) signals, Discrete Time (DT) signals, Classification of Signals, Basic Operations on signals.
FOURIER SERIES: Representation of Fourier series: Exponential Fourier Series, Discrete Fourier Series.

UNIT II:
FOURIER TRANSFORMS: Fourier transform of arbitrary signal, Fourier transform of standard signals, Properties of Fourier Transform.
DISCRETE FOURIER TRANSFORMS: Properties of DFT. Linear Convolution of Sequences using DFT. Computation of DFT: Over-lap Add Method, Over-lap Save Method.

UNIT III:
FAST FOURIER TRANSFORMS: Fast Fourier Transforms (FFT) - Radix-2 Decimation-in-Time and Decimation-in-Frequency FFT Algorithms, Inverse FFT.

UNIT IV:
INTRODUCTION TO LINEAR SYSTEMS: Introduction to Systems, Classification of Systems, Impulse response, Transfer function of a LTI system.
INTRODUCTION TO DIGITAL SIGNAL PROCESSING: Introduction to Digital Signal Processing, Linear Shift Invariant Systems, Stability, and Causality of Discrete time systems

UNIT V:
Z–TRANSFORMS: Concept of Z- Transform of a discrete sequence. Region of convergence in Z-Transform, Inverse Z- Transform.
REALIZATION OF DIGITAL FILTERS: Solution of Difference Equations Using Z-Transform, Realization of Digital Filters – Direct and Canonic form.

TEXT BOOKS:

1. Signals, Systems & Communications - B.P. Lathi, BS Publications, 2003.
2. Signals and Systems – A. Anand Kumar, PHI Publications, 3rd edition.
3. Digital Signal Processing, Principles, Algorithms, and Applications: John G. Proakis, Dimitris G. Manolakis, Pearson Education / PHI, 2007.
4. Digital Signal ProcessingA. Anand Kumar, PHI Publications.

REFERENCE BOOKS:

1. Signals & Systems - Simon Haykin and Van Veen,Wiley, 2nd Edition.
2. Fundamentals of Signals and Systems Michel J. Robert, MGH International Edition, 2008.
3. Digital Signal Processing – S.Salivahanan, A.Vallavaraj and C.Gnanapriya, TMH, 2009.
4. Discrete Time Signal Processing – A. V. Oppenheim and R.W. Schaffer, PHI, 2009.

COURSE OUTCOMES:

After completion of the course, the student would be able to:

- Understand the basic elementary signals.
- Representsignals in the frequency domain using Fourier Series, Discrete Fourier series, Fourier transform and Discrete Fourier transform techniques.
- Understand the principle of Linear System and digital signal processing fundamentals.
- Implement DFT of any signalusing FFT algorithm.
- Realize Digital Filters

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

III B.Tech EEE I Sem **L T/P/D C**
3 - / - / - 3

(CORE ELECTIVE – I)
(R17A0211) HIGH VOLTAGE ENGINEERING

COURSE OBJECTIVES:
To understand:

- The detailed analysis of Breakdown in gaseous, liquids and solid dielectrics.
- Information about generation and measurement of High voltage and current.
- High voltage testing methods.

UNIT – I:
INTRODUCTION TO HIGH VOLTAGE TECHNOLOGY AND APPLICATIONS: Electric Field Stresses, Gas / Vacuum as Insulator, Liquid Dielectrics, Solids and Composites, Estimation and Control of Electric Stress, Numerical methods for electric field computation, Surge voltages, their distribution and control, Applications of insulating materials in transformers, rotating machines, circuit breakers, cable power capacitors and bushings.

UNIT – II:
BREAK DOWN IN GASEOUS, LIQUID DIELECTRICS AND SOLID DIELECTRICS: Gases as insulating media, collision process, Ionization process, Townsend's criteria of breakdown in gases, Paschen's law. Liquid as Insulator, pure and commercial liquids, breakdown in pure and commercial liquids. Intrinsic breakdown, electromechanical breakdown, thermal breakdown, breakdown of solid dielectrics in practice, Breakdown in composite dielectrics, solid dielectrics used in practice.

UNIT – III:
GENERATION OF HIGH VOLTAGES AND CURRENTS: Generation of High Direct Current Voltages, Generation of High alternating voltages, Generation of Impulse Voltages, Generation of Impulse currents, Tripping and control of impulse generators.
MEASUREMENT OF HIGH VOLTAGES AND CURRENTS: Measurement of High Direct Current voltages, Measurement of High Voltages alternating and impulse, Measurement of High Currents-direct, alternating and Impulse, Oscilloscope for impulse voltage and current measurements.

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-DISTRUCTIVE TESTING OF MATERIAL AND ELECTRICAL APPARATUS: Measurement of D.C Resistivity, Measurement of Dielectric Constant and loss factor, Partial discharge measurements.
HIGH VOLTAGE TESTING OF ELECTRICAL APPARATUS: Testing of Insulators and bushings, Testing of Isolators and circuit breakers, testing of cables, Testing of Transformers, Testing of Surge Arresters and Radio Interference measurements.

TEXT BOOKS:

1. M. S. Naidu, V. Kamaraju (2009), High Voltage Engineering, 4th edition, Tata McGraw Hill Publications, New Delhi.
2. E. Kuffel, W. S. Zaengl, J. Kuffel (2000), High Voltage Engineering: Fundamentals, 2nd edition, Elsevier Publishers, New York, USA.

REFERENCE BOOKS:

1. C. L. Wadhwa (2007), High Voltage Engineering, New Age Internationals (P) Limited, New Delhi.
2. Ravindra Arora Wolfgang Mosch (2011), High Voltage Insulation Engineering, 1st edition, New Age International (P) Ltd., New Delhi.

COURSE OUTCOMES:

After completing this course the student must demonstrate the knowledge and ability to:

- Explain the techniques for high voltage generation
- Measure high voltage in power systems and describe the electrostatic fields and its control, design insulators for high voltage applications,
- Capable to perform non-destructive insulation test techniques
- Describe the over-voltages, testing procedures and insulation coordination, learn how to design and do testing of external insulation

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

III B.Tech EEE I Sem **L T/P/D C**

3 - / - / - 3

(CORE ELECTIVE – I)

(R17A0212) DIGITAL CONTROL SYSTEMS

COURSE OBJECTIVES:

To have:

- Knowledge about principles and techniques of A/D and D/A conversions and basics of Z-transform
- Knowledge in stability analysis of digital control systems
- Knowledge about the design of digital control systems for different engineering model

UNIT – I:

SAMPLING AND RECONSTRUCTION:

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

Z – TRANSFORMS:

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

UNIT –II:

STATE SPACE ANALYSIS:

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

CONTROLLABILITY AND OBSERVABILITY:

Concepts of Controllability and Observability, Tests for controllability and observability. Duality between Controllability and Observability, Controllability and Observability conditions for Pulse Transfer Function.

UNIT – III:

STABILITY ANALYSIS:

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, Lead-Lag and Lag- Lead compensators and digital PIDcontrollers.

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.
2. Digital Control and State Variable Methods by M.Gopal,TMH.
3. Digital Control System Analysis and Design, 3rd Edition by Charles L.Phillips, H. Troy Nagle.

REFERENCE BOOKS:

1. Digital Control Systems, Kuo, OxfordUniversity Press, 2nd Edition, 2003.
2. Digital Control Engineering, M.Gopal New age internationalpublishers.
3. Advanced Control Theory by NAGOOR KANI, 2nd Edition, RBA Publications.
4. Digital Control Systems, Design, Identification and Implementation by Landau, Iona Dore, ZitoGianluca, Springer 1st edition.
5. Digital control systems by R.Isermann, Springer; 1stedition.

COURSE OUTCOMES:

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

- Learn the basics and digital control system for the real timeanalysis
- Design of controlsystems.
- Learn comprehensive knowledge of concepts of stabilityanalysis
- Understand the design of discrete timesystems
- Understand the concepts of optimal control for discretedomain.

OPEN ELECTIVES II

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

III Year B.Tech. I Sem	**L**	**T/P/D**	**C**
	3	**-/-/-**	**3**

(OPEN ELECTIVE – II)
(R17A0452) INDUSTRIAL ELECTRONICS

COURSE OBJECTIVES:

- To get an overview of semi-conductor devices (such as PN junction diode & Transistor) and their switching characteristics.
- To understand the characteristics of AC to DC converters.
- To understand about the practical applications Electronics in industries.

UNIT - I

Scope of industrial Electronics, Semiconductors, Merits of semiconductors, crystalline structure, Intrinsic semiconductors, Extrinsic semiconductors, current flow in semiconductor, Open-circuited p-n junction, Diode resistance, Zener diode, Photoconductors and junction photo diodes, Photo voltaic effect, Light emitting diodes (LED)

UNIT - II

Introduction, The junction transistor, Conventions for polarities of voltages and currents, Open circuited transistor, Transistor biased in the active region, Current components in transistors, Currents in a transistor, Emitter efficiency, Transport factor and transistor-α, Dynamic emitter resistance, Transistor as an amplifier, Transistor construction, Letter symbols for semiconductor Devices, Characteristic curves of junction transistor in common configuration, static characteristic curves of PNP junction transistor in common emitter configuration, The transistor in common collector Configuration.

UNIT- III

AC TO DC CONVERTERS- Introduction, Classification of Rectifiers, Half wave Rectifiers, Full wave Rectifiers, Comparison of Half wave and full wave rectifiers, Bridge Rectifiers, Bridge Rectifier meter, Voltage multiplying Rectifier circuits, Capacitor filter, LC Filter, Metal Rectifiers, Regulated Power Supplies, Classification of Voltage Regulators, Short period Accuracy of Regulators, Long period .Accuracy of Voltage Regulator, Principle of automatic voltage Regulator, Simple D.C. Voltage stabilizer using Zener diode, D.C. Voltage Regulators, Series Voltage Regulators, Complete series voltage regulator circuit, Simple series voltage regulator.

UNIT - IV

RESISTANCE WELDING CONTROLS: Introduction, Resistance welding process, Basic Circuit for A.C. resistance welding, Types of Resistance welding, Electronic welding control used in Resistance welding, Energy storage welding.

INDUCTION HEATING: Principle of induction heating, Theory of Induction heating merits of induction heating, Application of induction heating, High frequency power source of induction heating.

DIELECTRIC HEATING: Principle of dielectric heating, theory of dielectric heating, dielectric properties of typical materials, electrodes used in dielectric heating, method of coupling of electrodes to the R.F. generator, Thermal losses in Dielectric heating, Applications.

UNIT - V

ULTRASONICS: Introduction, Generation of Ultrasonic waves, Application of Ultrasonic waves, Ultrasonic stroboscope, ultrasonic as means of communication, ultrasonic flaw detection, Optical image on non-homogeneities, ultrasonic study of structure of matter, Dispersive study of structure of matter, Dispersive and colloidal effect of Ultrasonic, Coagulating action of Ultrasonic, separation of mixtures by ultrasoni8c waves, cutting and machining of hard materials by ultrasonic vibrations, Degassing of liquids by ultrasonic waves, Physico-chemical effects of ultrasonics, chemical effects of ultrasonics, Thermal effects of Ultrasonics, soldering and welding by ultrasonics, Ultrasonic Drying

TEXT BOOKS:

1. G. K. Mithal, "Industrial Electronics", Khanna Publishers, Delhi, 2000.
2. J.Gnanavadivel, R.Dhanasekaran, P.Maruthupandi, "Industrial Electronics", Anuradha Publications, 2011.

REFERENCE BOOKS:

1. F. D. Petruzulla, "Industrial Electronics", McGraw Hill, Singapore, 1996.
2. M. H. Rashid, "power Electronics Circuits, Devices and Application", PHI, 3rd edition, 2004.
3. G. M. Chute and R. D. Chute, "Electronics in Industry", McGraw Hill Ltd, Tokyo, 1995.

COURSE OUTCOMES:

After completion of the course the students will be able to

- Get an overview of semi-conductor devices (such as PN junction diode & Transistor) and their switching characteristics.
- Understand the characteristics of AC to DC converters.
- Understand about the practical applications Electronics in industries.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

III Year B.Tech. I Sem	**L**	**T/P/D**	**C**
	3	**-/-/-**	**3**

(OPEN ELECTIVE – II)
(R17A0453) COMMUNICATION NETWORKS

COURSE OBJECTIVES

- To understand the concept of computer communication.
- To learn about the networking concept, layered protocols.
- To understand various communications concepts.
- To get the knowledge of various networking equipment.

UNIT – I:

OVERVIEW OF COMPUTER COMMUNICATIONS AND NETWORKING:

Introduction to Computer Communications and Networking, Introduction to Computer Network, Types of Computer Networks, Network Addressing, Routing, Reliability, Interoperability and Security, Network Standards, the Telephone System and Data Communications.

UNIT – II:

ESSENTIAL TERMS AND CONCEPTS: Computer Applications and application protocols, Computer Communications and Networking models, Communication Service Methods and data transmission modes, analog and Digital Communications , Speed and capacity of a Communication Channel, Multiplexing and switching, Network architecture and the OSI reference model.

UNIT – III:

ANALOG AND DIGITAL COMMUNICATION CONCEPTS: Representing data as analog signals, representing data as digital signals, data rate and bandwidth reduction, Digital Carrier Systems.

UNIT – IV:

PHYSICAL AND DATA LINK LAYER CONCEPTS: The Physical and Electrical Characteristics of wire, copper media, fiber optic media and Wireless communications. Introduction to data link layer, logical link control and medium access control sub-layers.

UNIT – V:

NETWORK HARDWARE COMPONENTS: Introduction to Connectors, Transreceivers and media convertors, repeaters, network interference cards and PC cards, bridges, switches, Switches vs Routers.

TEXT BOOKS:

1. Computer Communications and Networking Technologies, Michel A.Gallo and William H.Hancock, Thomson Brooks/Cole.
2. Data Communications and Networking – Behrouz A Forouzan, Fourth Edition, McGraw Hill Education, 2006.

REFERENCE BOOKS:

1. Principles of Computer Networks and Communications, M Barry Dumas, Morris Schwartz, Pearson.
2. Computer Networking: A Top-Down Approach Featuring the Internet, James F.Kurose, K W Ross, 3rd Edition, Pearson Education.

COURSE OUTCOMES

- The student can get the knowledge of networking of computers, data transmission between computers.
- Will have the exposure about the various communication concepts.
- Will get awareness about the structure and equipment of computer network structures.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

III Year B.Tech. I Sem	**L**	**T/P/D**	**C**
	3	**-/-/-**	**3**

(OPEN ELECTIVE - II)

(R17A0552) INTRODUCTION TO JAVA PROGRAMMING

COURSE OBJECTIVES:

This subject aims to introduce students to the Java programming language. Students should be able

- To create Java programs that leverage the object-oriented features of the Java language, such as encapsulation, inheritance and polymorphism;
- Use data types, arrays and strings;
- Implement error-handling techniques using exception handling,
- Create and event-driven GUI using AWT components.

UNIT I:

OOPCONCEPTS: Dataabstraction, encapsulation, inheritance, Polymorphism, classes and objects, Procedural and object oriented programming paradigms.

JAVA BASICS History of Java, Java buzzwords, data types, variables, constants, scope and life time of variables, operators, expressions, control statements, type conversion and casting, simple java programs, concepts of classes, objects, arrays, strings, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, parameter passing, recursion, BufferedReader class, Scanner class, StringTokenizer class, inner class.

UNIT II:

INHERITANCE– Types of Inheritance, super keyword, and preventing inheritance: final classes and methods.

POLYMORPHISM: Dynamic binding, method overriding, abstract classes and methods.

INTERFACES- Interfaces Vs Abstract classes, defining an interface, implement interfaces, extending interface.

PACKAGES: Defining, creating and accessing a package, importing packages.

UNIT III:

EXCEPTION HANDLING: Concepts of exception handling, benefits of exception handling, exception hierarchy and usage of try, catch, throw, throws and finally, checked exceptions and unchecked exceptions, built in exceptions.

MULTI THREADING: Differences between multi-threading and multitasking, thread life cycle, creating threads, synchronizing threads, inter thread communication.

UNIT IV:

APPLETS: Concepts of Applets, differences between applets and applications, life cycle of an applet, types of applets, creating applets, passing parameters to applets.

EVENT HANDLING: Events, Handling mouse and keyboard events, Adapter classes.

Files- Streams- Byte streams, Character streams, Text input/output.

UNIT V:

GUI PROGRAMMING WITH JAVA: AWT class hierarchy, component, container, panel, Window, frame, graphics. AWT controls-Labels, button, text field, check box, and graphics. Layout manager types: border, grid and flow.Swing– Introduction, limitations of AWT, Swing vs AWT.

TEXT BOOKS:

1. Java- the complete reference, 7th editon, Herbert schildt, TMH.
2. Understanding OOP with Java, updated edition, T. Budd, pearson eduction.
3. Core Java an integrated approach, dreamtech publication, Dr. R.Nageswara Rao.

REFERENCE BOOKS:

1. Java for Programmers, P.J.Deitel and H.M.Deitel, PEA (or) Java: How to Program , P.J.Deitel and H.M.Deitel, PHI
2. Object Oriented Programming through Java, P. Radha Krishna, Universities Press.
3. Thinking in Java, Bruce Eckel, PE
4. Programming in Java, S. Malhotra and S. Choudhary, Oxford Universities Press.

COURSE OUTCOMES:

- An understanding of the principles and practice of object oriented programming and design in the construction of robust, maintainable programs which satisfy their requirements;
- A competence to design, write, compile, test and execute straightforward programs using a high level language;
- An appreciation of the principles of object oriented programming;
- An awareness of the need for a professional approach to design and the importance of good documentation to the finished programs.
- Be able to implement, compile, test and run Java programs comprising more than one class, to address a particular software problem.
- Be able to make use of members of classes found in the Java API.
- Demonstrate the ability to employ various types of selection constructs in a Java program. Be able to employ a hierarchy of Java classes to provide a solution to a given set of requirements.
- Able to develop applications using Applet, awt and GUI Programming.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

III Year B.Tech. I Sem	**L**	**T/P/D**	**C**
	3	**-/-/-**	**3**

(OPEN ELECTIVE – II)

(R17A01251) INTRODUCTION TO SCRIPTING LANGUAGES

COURSE OBJECTIVES:

- Learning the basics of scripting languages like PERL, JAVASCRIPT, PYTHON
- Understanding the requirements and uses of Scripting.
- In-depth knowledge of programming features of Perl and Python.
- Knowing the implementation model for scripting and design of applications.

UNIT I

INTRODUCTION to PERL and Scripting Scripts and Programs, Origin of Scripting, Scripting Today, Characteristics of Scripting Languages, Uses for Scripting Languages, Web Scripting, and the universe of Scripting Languages. PERL- Names and Values, Variables, Scalar Expressions, Control Structures, arrays, list, hashes, strings, pattern and regular expressions, subroutines.

UNIT II

HTML: HTML basics, Elements, Attributes and Tags, Basic Tags, Advanced Tags, Frames, Images.
Cascading Style Sheets - Adding CSS, CSS and page layout.
JAVASCRIPT: Introduction, Variables, Literals, Operators, Control structure, Conditional statements, Arrays, Functions, Objects, Predefined objects, Object hierarchy, Accessing objects.

UNIT III

JAVASCRIPT PROGRAMMING OF REACTIVE WEB PAGES ELEMENTS: Events, Event handlers, multiple windows and Frames, Form object and Element, Advanced JavaScript and HTML, Data entry and Validation, Tables and Forms.
INTRODUCTION TO PYTHON PROGRAMMING: History of Python, Need of Python Programming, Running Python Scripts, Variables, Assignment, Keywords, Input-Output, Indentation, Types - Integers, Strings, Booleans.

UNIT IV

OPERATORS AND EXPRESSIONS: Operators- Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Expressions and order of evaluations.
DATA STRUCTURES: Lists - Operations, Slicing, Methods; Tuples, Sets, Dictionaries, Sequences.

UNIT V

CONTROL FLOW: if, if-else, for, while, break, continue, pass. Functions - Defining Functions, Calling Functions, Passing Arguments, Default Arguments, Variable-length arguments, Fruitful Functions (Function Returning Values), Scope of the Variables in a Function - Global and Local Variables. Development of sample scripts and web applications.

TEXT BOOKS:

1. The World of Scripting Languages, David Barron, Wiley Publications.
2. Learning Python, Mark Lutz, Orielly
3. Web Programming, building internet applications, Chris Bates 2nd Edition, WILEY
4. Beginning JavaScript with Dom scripting and AJAX, Russ Ferguson, Christian Heilmann, A press.
5. Python Web Programming, Steve Holden and David Beazley, New Riders Publications.

REFERENCE BOOKS:

1. Open Source Web Development with LAMP using Linux, Apache, MySQL, Perl and PHP, J.Lee and B.Ware(Addison Wesley) Pearson Education.
2. Programming Python, M.Lutz, SPD.
3. Core Python Programming, Chun, Pearson Education.
4. Guide to Programming with Python, M.Dawson, Cengage Learning.
5. Perl by Example, E.Quigley, Pearson Education.
6. Programming Perl, Larry Wall, T.Christiansen and J.Orwant, O'Reilly, SPD.

COURSE OUTCOMES:

- Analyze the differences between typical scripting languages and application programming languages.
- Application of knowledge of scripting languages to design programs for simple applications.
- Create software systems using scripting languages, including Perl and Python.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

III Year B.Tech. I Sem	**L**	**T/P/D**	**C**
	3	**-/-/-**	**3**

(OPEN ELECTIVE – II)

(R17A01252) SOFTWARE PROJECT MANAGEMENT

COURSE OBJECTIVES:

The Objectives of the course can be characterized as follows:

- Understanding the specific roles within a software organization as related to project and process management
- Understanding the basic infrastructure competences (e.g., process modeling and measurement)
- Understanding the basic steps of project planning, project management, quality assurance, and process management and their relationships

UNIT-I

CONVENTIONAL SOFTWARE MANAGEMENT: The waterfall Model, Conventional Software Management Performance, evolution of Software Economics: software Economics. Pragmatic Software Cost Estimation. Improving Software Economics: Reducing Software Product Size, Improving Software Processes, Improving Team Effectiveness, Improving Automation, Achieving Required Quality, Peer Inspections.

UNIT-II

CONVENTIONAL AND MODERN SOFTWARE MANAGEMENT: Principles of Conventional Software Engineering, Principles of Modern Software Management, Transitioning to an interactive Process, Life Cycle Phases: Engineering and Production Stages Inception, Elaboration, Construction, Transition phases.

UNIT-III

ARTIFACTS OF THE PROCESS: The Artifact Sets. Management Artifacts, Engineering Artifacts, Programmatic Artifacts. Model Based Software Architectures: A Management Perspective and Technical Perspective.

UNIT-IV

FLOWS OF THE PROCESS: Software Process Workflows. Inter Trans Workflows. Checkpoints of the Process: Major Mile Stones, Minor Milestones, Periodic Status Assessments. Interactive Process Planning: Work Breakdown Structures, Planning Guidelines, Cost and Schedule Estimating. Interaction Planning Process, Pragmatic Planning.

UNIT-V

PROJECT ORGANIZATIONS AND RESPONSIBILITIES: Line-of-Business Organizations, Project Organizations, and Evolution of Organizations. Process Automation Building Blocks, the Project Environment. Project Control and Process Instrumentation: Server Care Metrics,

Management Indicators, Quality Indicators, Life Cycle Expectations Pragmatic Software Metrics Automation.

TEXT BOOKS:

1. Walker Royce, “Software Project Management”, 1998, PEA.
2. Henry, “Software Project Management”, Pearson.

REFERENCE BOOKS:

1. Richard H.Thayer.” Software Engineering Project Management”, 1997, IEEE Computer Society.
2. Shere K.D.: “Software Engineering and Management”, 1998, PHI.
3. S.A. Kelkar, “Software Project Management: A Concise Study”, PHI.
4. Hughes Cotterell, “Software Project Management”, 2e, TMH. 88 5. Kaeron Conway, “Software Project Management from Concept to D

COURSE OUTCOMES:

At the end of the course, the student shall be able to:

- Describe and determine the purpose and importance of project management from the perspectives of planning, tracking and completion of project
- Compare and differentiate organization structures and project structures.
- Implement a project to manage project schedule, expenses and resource with the application of suitable project management tools

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

III Year B.Tech. I Sem	**L**	**T/P/D**	**C**
	3	**-/-/-**	**3**

(OPEN ELECTIVE – II)

(R17A0353) ENTERPRISE RESOURCE PLANNING

COURSE OBJECTIVES

- To know the basics of ERP
- To understand the key implementation of ERP
- To know the business modules of ERP
- To evaluate the current and future trends in ERP

UNIT 1

INTRODUCTION: Overview and Benefits of ERP, ERP Related Technologies- Business Process Reengineering (BPR), Online Analytical Processing (OLAP), Supply chain Management (SCM). Applications of ERP.

UNIT II

ERP IMPLEMENTATION: Implementation and Product Lifecycle, Implementation Methodology, Planning Evaluation and selection of ERP systems, Organizing the Project Management and Monitoring. Case Study on Manufacturing.

UNIT III

ERP MODULES: Business modules in an ERP Package- Manufacturing, Human Resources, Plant Maintenance, Materials Management, Data Warehousing, Data Mining, Quality Management, Sales and Distribution. Case Study in Banking Sector.

UNIT IV

POST IMPLEMENTATION: Overview of ERP software solution. Maintenance of ERP-Organizational and Industrial impact; Success and Failure factors of ERP Implementation. Case Study of Success Story and Failure of Processing Sector.

UNIT V

EMERGING TRENDS IN ERP: Extended ERP system, ERP add–ons –Customer Relations Management (CRM), Customer satisfaction (CS). Business analytics etc- Future trends in ERP systems-web enabled, Wireless technologies. Case Study in Service Sector.

TEXT BOOKS:

1. Jagan Nathan Vaman, ERP in Practice, Tata McGraw-Hill, 2008
2. Alexis Leon, “ERP Demystified”, Tata McGraw Hill, New Delhi, 2000
3. Mahadeo Jaiswal and Ganesh Vanapalli, ERP Macmillan India, 2009.

REFERENCE BOOKS:

1. Alexis Leon, Enterprise Resource Planning, second edition, Tata McGraw-Hill, 2008.
2. Vinod Kumar Grag and N.K. Venkitakrishnan, ERP- Concepts and Practice, Prentice Hall of India,2 nd edition, 2006.
3. Joseph A Brady, Ellen F Monk, Bret Wagner, "Concepts in Enterprise Resource Planning", Thompson Course Technology, USA, 2001.

COURSE OUTCOMES:

- To know the strategic importance of Enterprise Resource Planning
- To Understand and implement ERP in various Sectors.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

III B.Tech EEE I Sem **L T / P/ D C**

- - / 3/ - 2

(R17A0282) ELECTRICAL MACHINES LAB – II

COURSE OBJECTIVES:

- To understand the operation of synchronous machines.
- To understand the analysis of power angle curve of a synchronous machine**.**
- To understand the equivalent circuit of a single phase transformer and single phase induction motor.
- To understand the circle diagram of an induction motor by conducting a blocked rotor test.

PART-A

The following experiments are required to be conducted as compulsory experiments

1. O.C. & S.C. Tests on Single phase Transformer
2. Sumpner's test on a pair of single phase transformers
3. No-load & Blocked rotor tests on three phase Induction motor
4. Regulation of a three –phase alternator by synchronous impedance &m.m.f. methods
5. V and Inverted V curves of a three—phase synchronous motor.
6. Equivalent Circuit of a single phase induction motor
7. Determination of Xd and Xq of a salient pole synchronous machine
8. Load test on three phase Induction Motor

PART-B

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

9. Regulation of three-phase alternator by Z.P.F.
10. Measurement of sequence impedance of a three-phase alternator.
11. Scott Connection of transformer
12. Efficiency of 3 phase alternator.

COURSE OUTCOMES:

After the completion of this laboratory course, the student will be able to

- Understand the performance of different machines using different testing methods to convert from three phase to two phase and vice versa.
- Compensate the changes in terminal voltages of synchronous generator after estimating the change by different methods.
- Control the active and reactive power flows in synchronous machines Start different machines and control the speed and power factor.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

III B.Tech EEE I Sem **L / T/ P/ C**
- / - / 3 / 2

(R17A0284) CONTROL SYSTEMS AND SIMULATION LAB

COURSE OBJECTIVES:

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

PART-A

The following experiments are required to be conducted compulsory experiments:

1. Time response of Second order system
2. Characteristics of Synchros
3. Programmable logic controller – Study and verification of truth tables of logic gates, Simple Boolean expressions and application of speed control of motor.
4. Effect of feedback on DC servo motor
5. Transfer function of DC motor
6. Transfer function of DC generator
7. Temperature controller using PID
8. Characteristics of AC servo motor

PART-B

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

9. Effect of P, PD, PI, PID Controller on a second order systems
10. Lag and lead compensation – Magnitude and phase plot
11. a) Simulation of P, PI, PID Controller.
    b) Linear system analysis (Time domain analysis, Error analysis) using suitable software
12. Stability analysis (Bode, Root Locus, Nyquist) of Linear Time Invariant system using Suitable software
13. State space model for classical transfer function using suitable software -Verification.
14. Design of Lead-Lag compensator for the given system and with specification using Suitable software

COURSE OUTCOMES:

After completion of this lab the student is able to

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

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

III Year B.Tech. EEE-I Sem	**L**	**T/P/D**	**C**
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(MANDATORY COURSE – III)

(R17A0007) TECHNICAL COMMUNICATION AND SOFT SKILLS

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.

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.

COURSE OBJECTIVES:

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

UNIT-I: Factors affecting information and document design, Principles of effective writing , Technical Writing, Grammar and Editing- Technical writing process, Writing drafts and revising, Collaborative writing, technical writing style and language.

UNIT-II: Basics of grammar, study of advanced grammar, editing strategies to achieve appropriate technical style. Introduction to Advanced Technical Communication.

UNIT-III: Communication and Technical Writing- Public speaking, Group discussion, Oral; presentation, Interviews, Graphic presentation, Presentation aids. Writing reports, Email writing, Official Notes, Business Letters, Memos, Progress Reports, Minutes of Meetings, Event Report.

UNIT-IV: Self Development and Assessment- Self assessment, Awareness, Perception and Attitudes, Values and belief, Personal goal setting, career planning, self esteem.

UNIT-V: Ethics- Business ethics, , Personality Development in social and office settings, netiquettes, Telephone Etiquettes, Engineering ethics, Managing time, Role and responsibility of engineer, Work culture in jobs, Rapid reading, Complex problem solving, Creativity, Leadership skills ,Cubicle Etiquettes, Team building.

TEXT BOOKS:

1. David F. Beer and David Mc Murrey, Guide to writing as an Engineer, John Willey. New York, 2004
2. Diane Hacker, Pocket Style Manual, Bedford Publication, New York, 2003. (ISBN 0312406843)

REFERENCE BOOKS:

1. Dale Jung k Applied Writing for Technicians, McGraw Hill, New York, 2004.(ISBN: 07828357-4)
2. Sharma.R and Mohan, K. Business Correspondence and Report Writing,TMH New Delhi 2002.
3. Xebec, Presentation Book, TMH New Delhi, 2000. (ISBN 0402213)

COURSE OUTCOMES:

- The student will become proficient in LSRW skills.
- They develop formal LSRW skills approach to different situations.
- They hone professional ethics and learn to be proficient formally.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

III B.Tech EEE II Sem

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

(R17A0213) ELECTRICAL MEASUREMENTS & INSTRUMENTATION

COURSE OBJECTIVES:

- To introduce the basic principles of all Electrical measuring instruments
- To deal with the measurement of voltage, current, Power factor, power, energy, etc.
- To understand the basic principle of Transducers.

UNIT – I

INTRODUCTION TO MEASURING INSTRUMENTS: Classification of Instrument – deflecting, controlling and damping torques – Ammeters and Voltmeters – PMMC, moving iron, Electrostatic, induction type instruments – expression for the deflecting torque and control torque – Errors and compensations, extension of range of instruments.

UNIT – II

MEASURMENT OF POWER & ENERGY: Single phase dynamometer wattmeter – Expression for deflecting and control torques. Measurement of active and reactive power in balanced and unbalanced systems, power factor meters, Single & Three phase induction type energy meter – driving and braking torques –errors and compensations - testing by phantom loading using R.S.S. meter

UNIT – III

DC & AC BRIDGES: Method of measuring low, medium and high resistance – sensitivity of wheat-stone's bridge –Kelvin's double bridge for measuring low resistance. Measurement of inductance-Maxwell's bridge, Hay's bridge, Anderson's bridge. Measurement of capacitance and loss angle – Desaunty's Bridge – Wien's bridge – Schering Bridge.

UNIT – IV

DC & AC POTENTIOMETERS, INSTRUMENT TRANSFORMER: Principle and operation of D.C. Crompton's potentiometer standardization – Measurement of unknown resistance, current, voltage. A.C. Potentiometers: polar and coordinate type's standardization – application. CT and PT – Ratio and phase angle errors.

UNIT – V

TRANSDUCERS: Definition of transducers, Classification of transducers, Advantages of Electrical transducers, Characteristics and choice of transducers; Principle operation of LVDT and capacitor transducers , LVDT Applications, Strain and its principle of operation, gauge factor, Thermistors, Thermocouples, Piezo electric transducers, photovoltaic, photo conductive cells, and photo diodes.

TEXT BOOKS:

1. A. K. Sawhney", "Electrical & Electronic Measurements", Dhanpat Rai & Co. Publications, 2005.
2. "G. K. Banerjee", "Electrical & Electronic Measurements", PHI Learning Pvt. Ltd., 2nd Edition, 2016
3. "S. C. Bhargava", "Electrical Measuring Instruments and Measurements ", BS Publications, 2012.

REFERENCE BOOKS:

1. "R. K. Rajput", "Electrical & Electronic Measurements & Instrumentation", S. Chand and Company Ltd., 2007.
2. "Buckingham and Price", "Electrical Measurements", Prentice – Hall. 1988.
3. "Reissland, M.U", "Electrical Measurements: Fundamentals, Concepts, Applications", New Age International (P) Limited Publishers, 1st Edition 2010.
4. "E. W. Golding and F. C. Widdis", "Electrical Measurements and measuring Instruments", fifth Edition, Wheeler Publishing, 2015.

COURSE OUTCOMES:

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

- Understand different types of measuring instrument, their construction, operation and characteristics
- Identify the instruments suitable for typical measurements
  Apply the knowledge about transducers and instrument transformer to use them practically and effectively.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

III B.Tech EEE II Sem **L T /P/D C**
3 1/ - / - 4

(R17A0414) MICROPROCESSORS AND MICROCONTROLLERS

COURSE OBJECTIVES:

- To understand the basics of microprocessors and microcontrollers architectures and its functionalities
- To develop an in-depth understanding of the operation of microprocessors and microcontrollers, machine language programming & interfacing techniques.
- To design and develop Microprocessor/ microcontroller based systems for real time applications using low level language like ALP.

UNIT -I:

8086 ARCHITECTURE: Architecture of 8086, Register Organization, Programming Model, Memory addresses, Memory Segmentation, Physical Memory Organization, Signal descriptions of 8086- Common Function Signals, Minimum and Maximum mode signals, Timing diagrams.

UNIT -II:

INSTRUCTION SET AND ASSEMBLY LANGUAGE PROGRAMMING OF 8086: Instruction formats, Addressing modes, Instruction Set, Assembler Directives, Procedures, Macros and Simple Programs involving Logical, Branch and Call Instructions, Sorting, Evaluating Arithmetic Expressions, String Manipulations.

UNIT -III:

I/O INTERFACE: 8255 PPI, Various Modes of Operation and Interfacing to 8086, D/A and A/D Converter. Stepper motor, Interfacing of DMA controller 8257

INTERFACING WITH ADVANCED DEVICES: Memory interfacing to 8086, Interrupt Structure of 8086, Vector Interrupt Table, Interrupt Service Routine, architecture of 8259 Communication Interface**:** Serial Communication Standards, Serial Data Transfer Schemes, 8251 USART Architecture and Interfacing.

UNIT -IV:

INTRODUCTION TO MICROCONTROLLERS: Overview of 8051 Microcontroller, Architecture, I/O Ports, Memory Organization, Addressing Modes and Instruction set of 8051, Simple Programs, memory interfacing to8051

UNIT -V:

8051 REAL TIME CONTROL: Programming Timer Interrupts, Programming External Hardware Interrupts, Programming the Serial Communication Interrupts, Programming 8051 Timers and Counters

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

TEXT BOOKS:

1. D. V. Hall, Microprocessors and Interfacing, TMGH, 2nd Edition2006.
   Kenneth. J. Ayala, The 8051 Microcontroller, 3rd Ed., CengageLearning.
2. ARM System Developer's Guide: Designing and Optimizing System Software- Andrew N. Sloss, Dominic Symes, Chris Wright, Elsevier Inc., 2007

REFERENCE BOOKS:

1. Advanced Microprocessors and Peripherals – A. K. Ray and K.M. Bhurchandani, TMH, 2nd Edition2006.
2. The 8051Microcontrollers, Architecture and Programming and Applications -K.Uma Rao, Andhe Pallavi, Pearson, 2009.
3. Micro Computer System 8086/8088 Family Architecture, Programming and Design - Liu and GA Gibson, PHI, 2ndEd.
4. Microcontrollers and Application - Ajay. V. Deshmukh, TMGH, 2005.

COURSE OUTCOMES:

After going through this course,

- The student will learn the internal organization of popular 8086/8051 microprocessors/microcontrollers.
- The student will learn hardware and software interaction andintegration.
- The students will learn the design of microprocessors/microcontrollers-basedsystems

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

III B.Tech EEE II Sem

L	T/P/D	C
3	1 / - / -	4

(R17A0214) POWER SEMICONDUCTOR DRIVES

COURSE OBJECTIVES:

- To get an understanding of Power Electronics applications in AC and DC drives. Control of DC motor drives with single phase &three phase converters and choppers.
- To learn about AC motor drives using variable frequency converters VSI, CSI etc..

UNIT – I:

CONTROL OF DC MOTORS BY SINGLE PHASE CONVERTERS

Introduction to Thyristor controlled Drives, Single Phase semi and Fully controlled converters connected to 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.

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-II:

FOUR QUADRANT OPERATION OF DC DRIVES

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

UNIT – III:

CONTROL OF DC MOTORS BY CHOPPERS

Single quadrant, Two –quadrant and four quadrant chopper fed dc separately excited and series excited motors – Continuous current operation – Output voltage and current wave forms – Speed torque expressions – speed torque characteristics – Problems on Chopper fed D.C Motors – Closed Loop operation (Block Diagram Only)

UNIT-IV:

CONTROL OF INDUCTION MOTOR THROUGH STATOR VOLTAGE AND STATOR FREQUENCY

Variable voltage characteristics - Control of Induction Motor by AC Voltage Controllers – Waveforms – speed torque characteristics. Variable frequency characteristics-Variable frequency control of induction motor by Voltage source and current source inverter and Cyclo converters- PWM control – Comparison of VSI and CSI operations – Speed torque characteristics – numerical problems on induction motor drives – Closed loop operation of induction motor drives (Block Diagram Only)

UNIT –V:

CONTROL OF INDUCTION MOTOR OF ROTOR SIDE AND SYNCHRONOUS MOTORS

Static rotor resistance control – Slip power recovery – Static Scherbius drive – Static Kramer Drive – their performance and speed torque characteristics – advantages applications – problems. Separate control & self-control of synchronous motors – Operation of self-controlled synchronous motors by VSI and CSI Cyclo converters. Load commutated CSI fed Synchronous Motor – Operation – Waveforms – speed torque characteristics – Applications – Advantages and Numerical Problems – Closed Loop control operation of synchronous motor drives (Block Diagram Only), variable frequency control, Cyclo converter, PWM, VFI, CSI

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 Publilcations.
4. A First course on Electrical Drives – S K Pillai New Age International (P) Ltd. 2nd Editon.

COURSE OUTCOMES:

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

- Identify the choice of the electric drive system based on their applications.
- Explain the operation of single and multi-quadrant electric drives.
- Analyze single phase and three phase rectifiers fed DC motors as well as chopper fed DC motor.
- Explain the speed control methods for AC-AC & DC-AC converters fed to Induction motors and Synchronous motors with closed loop, and open loop operations.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

III B.Tech EEE II Sem

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

(R17A0215) POWER SYSTEM ANALYSIS

COURSE OBJECTIVES:

- To understand and develop Y bus and Z bus matrices
- To know the importance of load flow studies and its importance
- To understand and applications of short circuit studies
- To explain rotor angle stability of power systems

UNIT I:

POWER SYSTEM NETWORK MATRICES: 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 Matrix for addition element for the following cases: Addition of element from a new bus to reference, Addition of element from a new bus to an old bus, Addition of element between an old bus to reference and addition of element between two old buses (Derivations and Numerical Problems) - Modification of Z Bus for the changes in network (Numerical Problems).

UNIT II:

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

UNIT III:

POWER FLOW STUDIES - II: Newton Raphson Method: Load Flow Solution with or without PV Buses-Derivation of Jacobian Elements, Algorithm and Flowchart. Decoupled and Fast Decoupled Methods. Comparison of Different Methods – DC load Flow.

UNIT IV:

SHORT CIRCUIT ANALYSIS - I: Per-Unit system of representation**,** Per-unit equivalent reactance network of a three phase power system, Numerical Problems. Symmetrical Fault Analysis: Short Circuit Current and MVA Calculations, Fault levels. 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.

UNIT V:

SHORT CIRCUIT ANALYSIS -II: Unsymmetrical Fault Analysis: LG, LL, LLG faults with and without fault impedance, Numerical Problems.

STABILITY ANALYSIS: Derivation of Swing Equation, Determination of Transient Stability by Equal Area Criterion and its applications. Methods to improve transient Stability. **(Qualitative Treatment only)**

TEXT BOOKS:

1. Power system Analysis Operation and control, Abhijit Chakrabarthi, Sunita Haldar, 3rd edition, PHI,2010.
2. Modern Power system Analysis – by I.J.Nagrath & D.P.Kothari: Tata McGraw-Hill Publishing Company, 2nd edition.
3. Electrical power systems - by C.L Wadhwa, New Age International (P) Limited, Publishers, 1998.

REFERENCE BOOKS:

1. Computer Techniques in Power System Analysis by M.A.Pai, TMH Publications
2. Power System Analysis by Grainger and Stevenson, Tata McGraw Hill.
3. Computer techniques and models in power systems, By K.Uma rao, I.K.International
4. Power System Analysis by Hadi Saadat – TMH Edition.

COURSE OUTCOMES:

After this course, the student will be able to

- Develop the Y bus and Z bus matrices
- Develop load flow programs
- Understand the importance of short circuit studies
- Understand stability and instability power systems

CORE ELECTIVE - II

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

III B.Tech EEE II Sem

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

(CORE ELECTIVE – II)

(R17A0216) EHV AC & HVDC TRANSMISSION

COURSE OBJECTIVES:

- To understand the concept of extra high voltage AC and high voltage DC transmission.
- To study the behavior of line parameters for extra high voltages.
- To study the effect of corona, electrostatic field, voltage control at extra high voltage.
- To understand the basic concepts of HVDC, HVDC converters.
- To study the effect of harmonics and methods of suppression of harmonics by using filters.

UNIT – I:

INTRODUCTION: Necessity of EHV AC transmission – advantages and problems–power handling capacity and line losses- mechanical considerations – resistance of conductors – properties of bundled conductors – bundle spacing and bundle radius - Examples. Line and Ground Reactive Parameters: Line inductance and capacitance – sequence inductances and capacitances – modes of propagation – ground return - Examples.

UNIT-II:

CORONA EFFECTS: Power loss and audible noise (AN) – corona loss formulae – charge voltage diagram – generation, characteristics - limits and measurements of AN – relation between single phase and three phase AN levels – Examples. Radio interference (RI) Electrostatic Field: Calculation of electrostatic field of EHV AC lines – effect on humans, animals and plants – Electromagnetic interference.

UNIT – III:

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.

UNIT – IV:

HVDC - BASICS & ANALYSIS OF CONVERTERS: Necessity of HVDC Transmission**.** Economics & Terminal equipment of HVDC transmission systems: Types of HVDC Links -Apparatus required for HVDC Systems - Comparison of EHV AC &HVDC Transmission, Application of HVDC Transmission System. Choice of Converter configuration - analysis of Graetz - characteristics of six Pulse converters and twelve pulse converters.

UNIT –V:

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

TEXT BOOKS:

1. EHVAC Transmission Engineering by R. D. Begamudre, New Age International (p) Ltd.
2. K. R. Padiyar (2005), HVDC Power Transmission Systems: Technology and system Interactions, 1st edition, New Age International (P) Ltd, New Delhi.
3. EHV AC and HVDC Transmission and Distribution Engineering by S. Rao, Khanna Publishers, 3rd edition.
4. K. R. Padiyar (2009), FACTS Controllers in power Transmission and Distribution, 1st edition, New Age International (P), Ltd, New Delhi.

REFERENCE BOOKS:

1. E. W. Kimbark (2006), Direct Current Transmission, 2nd edition, John Wiley & Sons, NewDelhi.
2. N. G. Hingorani, L. Guygi (2001), Understanding FACTS, 1st edition, IEEE Press, USA.

COURSE OUTCOMES:

After going through this course, the student gets knowledge on

- The Concept of extra high voltage AC and high voltage DC transmission.
- The behavior of the line parameters for extra high voltages.
- The effect of corona, electrostatic field, voltage control for extra high voltages.
- The basic concepts of HVDC, HVDC converters.
- The effect of harmonics and suppression of harmonics by using filters.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

III B.Tech EEE II Sem **L T/P/D C**
3 - / - / - 3

(CORE ELECTIVE – II)
(R17A0217) ELECTRICAL ESTIMATION AND COSTING

COURSE OBJECTIVES:

- Emphasize the estimating and costing aspects of all electrical equipment, installation and designs to analyze the cost viability.
- Exposure to design and estimation of wiring, design of overhead and underground distribution lines, substations and illuminations design.
- These techniques should help the students to successfully estimate costing of the products/projects that are part of our everyday usage.

UNIT-I:

DESIGN CONSIDERATIONS OF ELECTRICAL INSTALLATIONS: Electric Supply System, Three phase four wiredistribution system, Protection of Electric Installation against over load, short circuit and Earth fault, Earthing, General requirements of Electrical Installations, testing of installations, Indian Electricity rules, Neutral and Earth wire, Types of loads, Systems of wiring, Service connections, Service Mains, Sub-Circuits, Location of Outlets, Location of Control Switches, Location of Main Board and Distribution Board, guide lines for Installation of Fittings, Load Assessment, Permissible voltage drops and sizes of wires, estimating and costing of Electric installations.

UNIT-II:

ELECTRICAL INSTALLATION FOR DIFFERENT TYPES OF BUILDINGS AND SMALL INDUSTRIES: Electricalinstallations for residential buildings – estimating and costing of material, Electrical installations for commercial buildings, Electrical installations for small industries.

UNIT-III:

OVERHEAD AND UNDERGROUND TRANSMISSION AND DISTRIBUTION LINES: Introduction, Supports forTransmission lines, Distribution lines – Materials used, Underground cables, Mechanical Design of overhead lines, Design of underground cables.

UNIT-IV:

SUBSTATIONS: Introduction, Types of substations, Outdoor substation – Pole mounted type, Indoorsubstation, Floor mounted type.

UNIT-V:

DESIGN OF ILLUMINATION SCHEMES: Introduction, Terminology in Illumination, laws of illumination, varioustypes of light sources, Practical lighting schemes.

TEXT BOOKS:

1. Electrical Design Estimating and Costing, K.B.Raina, S.K.Bhattacharya, New Age International Publisher.
2. Design of Electrical Installations, Dr. V.K. Jain, Dr. Amitabh Bajaj, University Science Press.
3. Electricity pricing Engineering Principles and Methodologies, Lawrence J. Vogt, P.E., CRC Press.

REFERENCE BOOKS:

1. Guide for Electrical Layout in residential buildings, Indian Standard Institution, IS:4648-1968
2. Electrical Installation buildings Indian Standard Institution, IS: 2032.

COURSE OUTCOMES:

After going through this course the student gets knowledge on:

- The estimating and costing aspectsof all electrical equipment, installation and designs to analyze the cost viability.
- Exposure to design and estimation of wiring, design of overhead and underground distribution lines, substations and illuminations design.
- These techniques should help the students to successfully estimate costing of the products/projects that are part of our everyday usage and apply the above concepts to real- world electrical and electronics problems and applications.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

III B.Tech EEE I Sem **L T/P/D C**

3 - / - / - 3

(CORE ELECTIVE – II)

(R17A0218) OPTIMIZATION TECHNIQUES

COURSE OBJECTIVES:

This course introduces various optimization techniques:

- To understand classical, linear programming, transportation problem, simplex algorithm, dynamic programming,
- Constrained and unconstrained optimization techniques for solving and optimizing an electrical and electronic engineering circuits design problems in real world situations.

UNIT-I

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

UNIT – III

TRANSPORTATION PROBLEM & UNCONSTRAINED OPTIMIZATION: 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, One dimensional minimization methods: Classification, Fibonacci method and Quadratic interpolation method. Univariate method, Powell's method and steepest descent method.

UNIT-IV

CONSTRAINED NONLINEAR PROGRAMMING: Characteristics of a constrained problem, Classification, Basic approach of Penalty FtIn method; Basic approaches of lnteñor 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.
2. Optimization Methods in Operations Research and systems Analysis, K.V. Mittal and C. Mohan, New Age International (P) Limited.

REFERENCE BOOKS

1. Operations Research, Dr. S.D.Shama. Introductory Operations Research, H.S. Kasene & K.D. Kumar, Springer (India), Pvt .LTc.
2. Operations Research: An Introduction, H.A.Taha, Pearson Pvt. Ltd.
3. Operations Research, Rk,hard Bronson, Govindasami Naadimuthu, Tata Mc Graw — Hill Company Limited.

COURSE OUTCOMES:

After going through this course the student gets a thorough knowledge on:

- Optimization of electrical and electronics engineering problems through classical optimization techniques, linear programming, simplex algorithm and transportation problem.
- Unconstrained optimization, constrained non-linear programming.
- Dynamic Programming applies the concepts to real world electrical and electronics problems and applications.

OPEN ELECTIVES III

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

III Year B.Tech. II Sem	**L**	**T/P/D**	**C**
	3	**-/-/-**	**3**

(OPEN ELECTIVE –III)
(R17A0454) ROBOTICS & AUTOMATION

COURSE OBJECTIVES:

- This introductory course is valuable for students who wish to learn about robotics through a study of industrial robot systems analysis and design.
- This course is suited to students from engineering and science backgrounds that wish to broaden their knowledge through working on a subject that integrates multi-disciplinary technologies.

UNIT -I

INTRODUCTION TO EMBEDDED SYSTEM DESIGN: Categories of ES, Overview of Embedded System Architecture, Recent Trends in Embedded Systems, Hardware Architecture of Embedded System, Real-time Embedded Systems and Robots, Robots and Robotics, Microprocessors and Microcontrollers, Microcontroller or Embedded Controller

UNIT - II

ROBOTICS: Classification of Robots, Degree of freedom, Kinematics; Multidisciplinary approach: Motors-DC motors, Stepper Motors, Servo Motors; Power Transmission-Type of Gears, Gear Assembly, CAM follower, Sensors, Open loop and Closed-loop Controls, Artificial Intelligence.

UNIT- III

THE AVR RISC MICROCONTROLLER ARCHITECTURE: Introduction , AVR family architecture, register file, the ALU, memory access and instruction execution, I/O memory ,EEPROM ,I/O ports, timers, UART, Interrupt structure.

UNIT- IV

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

UNIT V

AI IN ROBOTICS: Robotic perception, localization, mapping- configuring space, planning uncertain movements, dynamics and control of movement, Ethics and risks of artificial intelligence in robotics.

TEXT BOOKS:

1. Subrata Ghoshal, "Embedded Systems & Robots", Cengage Learning
2. Stuart Russell, Peter Norvig, “Artificial Intelligence: A modern approch”, Pearson Education, India2003.
3. ARM System Developer’s Guide: Designing and Optimizing System Software- Andrew N.Sloss, Dominic Symes, Chris Wright, Elsevier Inc., 2007

REFERENCE BOOKS:

1. M.A. Mazidi, J.G. Mazidi, R.D. Mckinlay, "8051 Microcontroller and Embedded Systems", Pearson.
2. Dr. K.V.K. Prasad, "Embedded/Real-Time Systems: Concepts Design & Programming", Dreamtech
3. Microcontrollers and applications, Ajay V Deshmukh , TMGH,2005

COURSE OUTCOMES:

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

- Understand the overview of Embedded Systems, Robots, Microprocessors & Microcontrollers.
- Understand in detail about Robotics and sensors.
- Understand AVR RISC Microcontroller architecture in detail.
- Understand about ARM Processor in detail.
- Understand about Artificial Intelligence in Robotics.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

III Year B.Tech. II Sem	**L**	**T/P/D**	**C**
	3	**-/-/-**	**3**

(OPEN ELECTIVE III)
(R17A1253) MANAGEMENT INFORMATION SYSTEMS

COURSE OBJECTIVES:

- To understand the competitive advantage of using information systems in the organization for the needful assistance in decision making and management.
- To learn how to plan for information systems &implementation
- To study about security aspects of information systems

UNIT-I

INTRODUCTION: MIS importance, definition, nature and scope of MIS, Structure and Classification of MIS, Information and Systems Concept, Types of Information, Information systems for competitive advantage.
Case Study: MIS at any business establishment.

UNIT-II

BUSINESS APPLICATIONS OF INFORMATION SYSTEMS: E-Commerce, ERP Systems, DSS, Business Intelligence and Knowledge Management System.
Case Study: Knowledge Management Systems at an Enterprise.

UNIT-III

MANAGEMENT OF IS: Information system planning, system acquisition, systems implementation, evaluation & maintenance of IS, IS Security and Control. Effectiveness of MIS: A Case Study.

UNIT-IV

BUILDING OF INFORMATION SYSTEMS: System Development Stages, System Development Approaches. Systems Analysis and Design- Requirement Determination, Strategies for Requirement Determination. Structured Analysis Tools, System Design – Design Objectives, Conceptual Design, Design Methods. Detailed system design.

UNIT-V

INTRODUCTION TO CYBER CRIME: Cyber Crime Defination and orgin of the word, cyber crime and information security, cyber criminals. Classification of cyber criminals-Legal Perspectives-Indian Perspectives-Cyber crimes and indian ITA 2000, Global perspective on cybercrime-Cybercrime era.

TEXT BOOKS

1) D P Goyal, Management Information Systems–Managerial Perspective, MacMillan, 3rd Edition, 2010.
2) A K Gupta, Sharma “Management of Systems” Macmillan, 2012.

REFERENCE BOOKS:

1. Nina Godbole & Sunit Belapure “Cyber Security” Wiley india 2012.
2. Jawadekar, MIS Text and Cases, TMH, 2012.

3. Dr Milind M Oka “Cases in Management Information system ‘Everest, 2012.
4. Sandra Senf “Information Technology Control and Audit” 3e, CRC Press, 2012.
5. Apache OFBiz for Ecommerce and ERP - https://ofbiz.apache.org/
6. Magneto for Ecommerce (B2B Commerce) - https://magento.com/
7. Adempiere – ERP : http://www.adempiere.net/web/guest/welcome
8. Analytica – DSS - http://www.lumina.com
9. OpenRules – Business Rules and Decision Management system - http://openrules.com/

COURSE OUTCOMES:

- Ability to apply Concepts & applications of Management Information Systems.
- Ability to perform Information Systems Planning & Implementations.
- Ability to adapt Cyber crime and information security procedures.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

III Year B.Tech. II Sem	**L**	**T/P/D**	**C**
	3	**-/-/-**	**3**

(OPEN ELECTIVE –III)
(R17A0519) WEB TECHNOLOGIES

COURSE OBJECTIVES:

- Giving the students the insights of the Internet programming and how to design and implement complete applications over the web.
- It covers the notions of Web servers and Web Application Servers, Design Methodologies with concentration on Object-Oriented concepts, Client-Side
- Programming, Server-Side Programming, Active Server Pages, Database Connectivity to web applications, Adding Dynamic content to web applications,
- Programming Common Gateway Interfaces, Programming the User Interface for the web applications.

UNIT I:

WEB BASICS AND OVERVIEW: Introduction to Internet, World Wide Web, Web Browsers, URL, MIME, HTTP, Web Programmers Tool box.

HTML COMMON TAGS: List, Tables, images, forms, frames, Cascading Style Sheets (CSS) & its Types. Introduction to Java Script, Declaring variables, functions, Event handlers (onclick, onsubmit, etc.,) and Form Validation.

UNIT II:

INTRODUCTION TO XML: Document type definition, XML Schemas, Presenting XML , Introduction to XHTML, Using XML Processors: DOM and SAX.

PHP: Declaring Variables, Data types, Operators, Control structures, Functions.

UNIT III:

WEB SERVERS AND SERVLETS: Introduction to Servlets, Lifecycle of a Servlet, JSDK, Deploying Servlet, The Servlet API, The javax. Servlet Package, Reading Servlet parameters, Reading Initialization parameters. The javax.servlet HTTP package, Handling Http Request & Responses, Cookies and Session Tracking.

UNIT IV:

DATABASE ACCESS: Database Programming using JDBC, JDBC drivers, Studying Javax.sql.* package, Connecting to database in PHP, Execute Simple Queries, Accessing a Database from a Servlet. Introduction to struts frame works.

UNIT V:

JSP APPLICATION DEVELOPMENT: The Anatomy of a JSP Page, JSP Processing. JSP Application Design and JSP Environment, JSP Declarations, Directives, Expressions, Scripting Elements, implicit objects. **Java Beans:** Introduction to Beans, Deploying java Beans in a JSP page.

TEXT BOOKS:

1. Web Programming, building internet applications, Chris Bates 2nd edition, WILEY Dreamtech (UNITs 1, 2)
2. Core SERVLETS ANDJAVASERVER PAGES VOLUME 1: CORE TECHNOLOGIES By Marty Hall and Larry Brown Pearson (UNITs 3, 4, 5)

REFERENCE BOOKS:

1. Programming world wide web-Sebesta, Pearson Education, 2007.
2. Internet and World Wide Web – How to program by Dietel and Nieto PHI/ Pearson Education Asia.
3. Jakarta Struts Cookbook, Bill Siggelkow, S P D O' Reilly for chap 8.
4. March's beginning JAVA JDK 5, Murach, SPD
5. An Introduction to WEB Design and Programming – Wang-Thomson
6. PHP: The Complete Reference Steven Holzner Tata McGraw-Hill.

COURSE OUTCOMES:

- Understand the insights of the Internet programming and how to design and implement complete applications over the web.
- Understands the notions of Web servers and Web Application Servers, Design Methodologies with concentration on Object-Oriented concepts, Client-Side
- Understand Programming, Server-Side Programming, Active Server Pages, Database Connectivity to web applications, Adding Dynamic content to web applications,
- Understand Programming Common Gateway Interfaces, Programming the User Interface for the web applications.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

III Year B.Tech. II Sem	**L**	**T/P/D**	**C**
	3	**-/-/-**	**3**

OPEN ELECTIVE III

(R17A0553) DATA STRUCTURES USING PYTHON

COURSE OBJECTIVES:

- To read and write simple Python programs.
- To develop Python programs with conditionals and loops.
- To define Python functions and call them.
- To use Python data structures –- lists, tuples, dictionaries.
- To do input/output with files in Python.

UNIT I

Introduction to Python, Installation and Working with Python, Understanding Python variables Python basic Operators, Understanding python blocks, Python Data Types: Declaring and using Numeric data types: int, float, complex, Using string data type and string operations.

UNIT II

Control Flow- if, if-elseif -else, loops ,For loop using ranges, string ,Use of while loops in python, Loop manipulation using pass, continue, break and else, Programming using Python conditional and loops block, Python arrays.

UNIT III

Functions -Calling Functions, Passing Arguments, Keyword Arguments, Default Arguments, Variable-length arguments, Anonymous Functions, Fruitful Functions (Function Returning Values), Scope of the Variables in a Function - Global and Local Variables. Powerful Lambda function in python.

UNIT IV

Data Structures-List Operations, Slicing, Methods, Tuples, Sets, Dictionaries, Sequences. Comprehensions, Dictionary manipulation, list and dictionary in build functions

UNIT V

Sorting: Bubble Sort, Selection Sort, Insertion Sort, Merge sort, Quick sort. Linked Lists, Stacks, Queues

TEXT BOOKS

1. Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist‘‘, 2nd edition, Updated for Python 3, Shroff/O‘Reilly Publishers, 2016.
2. R. Nageswara Rao, “Core Python Programming”, dream tech
3. Python Programming: A Modern Approach, Vamsi Kurama, Pearson

REFERENCE BOOKS:

1. Core Python Programming, W.Chun, Pearson.
2. Introduction to Python, Kenneth A. Lambert, Cengage
3. Learning Python, Mark Lutz, Orielly

COURSE OUTCOMES:

Upon completion of the course, students will be able to

- Read, write, execute by hand simple Python programs.
- Structure simple Python programs for solving problems.
- Decompose a Python program into functions.
- Represent compound data using Python lists, tuples, and dictionaries.
- Read and write data from/to files in Python Programs

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

III Year B.Tech. II Sem	**L**	**T/P/D**	**C**
	3	**-/-/-**	**3**

(OPEN ELECTIVE III)

(R17A0554) PYTHON PROGRAMMING

COURSE OBJECTIVES:

- To read and write simple Python programs.
- To develop Python programs with conditionals and loops.
- To define Python functions and call them.
- To use Python data structures –- lists, tuples, dictionaries.
- To do input/output with files in Python.

UNIT I

INTRODUCTION DATA, EXPRESSIONS, STATEMENTS: Introduction to Python and installation , data types: int, float, Boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; modules and functions, function definition and use, flow of execution, parameters and arguments.

UNIT II

CONTROL FLOW, LOOPS: Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue.

UNIT III

FUNCTIONS, ARRAYS: Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; python arrays, Access the Elements of an Array, array methods.

UNIT IV

LISTS, TUPLES, DICTIONARIES: Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension;

UNIT V

FILES, MODULES, PACKAGES: Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules.

TEXT BOOKS

1.Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist‘‘, 2nd edition, Updated for Python 3, Shroff/O‘Reilly Publishers, 2016.

2.R. Nageswara Rao, “Core Python Programming”, dreamtech

3. Python Programming: A Modern Approach, Vamsi Kurama, Pearson

REFERENCE BOOKS:

1. Core Python Programming, W.Chun, Pearson.
2. Introduction to Python, Kenneth A. Lambert, Cengage
3. Learning Python, Mark Lutz, Orielly

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

- Read, write, execute by hand simple Python programs.
- Structure simple Python programs for solving problems.
- Decompose a Python program into functions.
- Represent compound data using Python lists, tuples, dictionaries.
- Read and write data from/to files in Python Programs

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

III Year B. Tech II Sem	**L**	**T/P/D**	**C**
	3	**-/-/-**	**3**

(OPEN ELECTIVE – III)

(R17A0354) NANO TECHNOLOGY

COURSE OBJECTIVES:

- To learn about basis of Nano Materials.
- In this course we focus on synthetic aspects for the design of nano structured materials.
- We describe different approaches including both the bottom-up(includes both chemical and physical methods) and the top-down methods(mainly physical methods) for the synthesis of nanostructured materials.
- The course will then focus on different type of nanostructures with a special emphasis on carbon nanotubes(CNT), metal and metal oxide nanoparticles, core-shell nanostructures and self assembly of these nanostructures.
- The dependence of various properties (dielectric, magnetic and optical) with size will be discussed.

UNIT-I

GENERAL INTRODUCTION: Basics of Quantum Mechanics, Harmonic oscillator, magnetic Phenomena, band .structure in solids, Mossbauer and Spectroscopy, optical phenomena bonding in solids, Anisotropy.

SILICON CARBIDE: Application of Silicon carbide, nano materials preparation, Sintering of SiC, X-ray Diffraction data, electron microscopy sintering of nano-particles,nano particles of Alumina and Zirconia: Nano materials preparation, Characterization, Wear materials and nano-composites,

UNIT-II

MECHANICAL PROPERTIES: Strength of nano crystalline SiC, Preparation for strength measurements, Mechanical properties, Magnetic properties.

ELECTRICAL PROPERTIES: Switching glasses with nanoparticles, Electronic conduction with nano-particles.

OPTICAL PROPERTIES: Optical properties, special properties and the coloured glasses.

MAGNETIC PROPERTIES: Soft magnetic Nanocrystalline alloy, Permanent magnetic Nanocrystalline materials, Giant Magnetic Resonance, Electrical Properties, Optical Properties, Thermal Properties, and Mechanical Properties.

UNIT–III

SYNTHESIS ROUTES: Top &Bottom up approaches: Physical Vapor Deposition, Micromulsion, Laser Ablation, Chemical Vapor Deposition, Molecular Beam Epitaxy, Solgel method, Spray Pyrolysis, Template Based synthesis, Lithography.

UNIT–IV

TOOLS TO CHARACTERIZE NANOMATERIALS: X-Ray Diffraction (XRD), Small Angle X-ray scattering (SAXS), Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM), Atomic Force Microscopy (AFM), Scanning Tunneling Microscope (STM), Field Ion Microscope (FEM), Three-dimensional Atom Probe (3DAP), Nanoindentation

UNIT–V

APPLICATIONS OF NANOMATERIALS: Nano-electronics, Micro- and Nano-electromechanical systems (MEMS/NEMS), Nanosensors, Nanocatalysts, Cosmetic and Consumer Goods, Structure and Engineering, Automotive Industry, Water Treatment and the environment, Nano-medical applications, Textiles, Paints, Energy, Defence and Space Applications.

TEXT BOOKS:

1. Text Book of Nano Science and Nano Technology – B.S. Murthy, P. Shankar, Baldev Raj, B.B. Rath and James Munday, University Press-IIM.
2. Introduction to Nanotechnology – Charles P. Poole, Jr., and Frank J. Owens, Wiley India Edition, 2012.
3. Guozhong Cao, Nanostructures and Nano-materials:Synthesis, Properties and Applications, Imperial College Press 2004.

REFERENCES BOOKS:

1. Nano: The Essentials by T. Pradeep, McGraw- Hill Education.
2. Nanomaterials, Nanotechnologies and Design by Michael F. Ashby, Paulo J. Ferreira and Daniel L. Schodek.
3. Transport in Nano structures- David Ferry, Cambridge University press 2000
4. Nanofabrication towards biomedical application: Techniques, tools, Application and impact – Ed. Challa S.,S. R. Kumar, J. H. Carola.
5. Carbon Nanotubes: Properties and Applications- Michael J. O'Connell.
6. Electron Transport in Mesoscopic systems – S. Dutta, Cambridge University press.
7. Nanomaterials Synthesis, Properties and Applications Edited by A S Edelstein and R C Cammarata, IOP Publishing Ltd 1996.

COURSE OUTCOMES:

- Will familiarize about the science of Nano Technology.
- Will demonstrate the preparation of Nano Technology.
- Will develop knowledge in characteristic Nano Technology & Nano Materials.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

III Year B.Tech. II Sem	**L**	**T/P/D**	**C**
	3	**-/-/-**	**3**

(OPEN ELECTIVE –III)
(R17A0355) TOTAL QUALITY MANAGEMENT

COURSE OBJECTIVES:

- To facilitate the understanding of Quality Management principles and process.
- To understand Customer focus, Employee focus and their involvement and Supplier Management.

UNIT – I

INTRODUCTION: The concept of TQM, Quality and Business performance, attitude, and involvement of top management, communication, culture and management systems. Management of Process Quality: Definition of quality, Quality Control, a brief history, Product Inspection vs. Process Control, Statistical Quality Control, Control Charts and Acceptance Sampling.

UNIT -II

CUSTOMER FOCUS AND SATISFACTION: internal customer conflict, quality focus, Customer Satisfaction, role of Marketing and Sales, Buyer – Supplier relationships. Bench Marking: Evolution of Bench Marking, meaning of bench marking, benefits of bench marketing, the bench marking procedure, pitfalls of bench marketing.

UNIT- III

ORGANIZING FOR TQM: The systems approach, organizing for quality implementation, making the transition from a traditional to a TQM organization, Quality Circles, seven Tools of TQM: Stratification, check sheet, Scatter diagram, Kepner &Tregoe Methodology.

UNIT- IV

THE COST OF QUALITY: Definition of the Cost of Quality, Quality Costs, Measuring Quality Costs, use of Quality Cost information, Accounting Systems and Quality Management.

UNIT –V

ISO9000: Universal Standards of Quality: ISO around the world, The ISO9000 ANSI/ASQC Q- 90. Series Standards, benefits of ISO9000 certification, the third party audit, Documentation ISO9000 and services, the cost of certification implementing the system.

TEXT BOOKS:

1. Total Quality Management / Joel E. Ross/Taylor and Franscis Limited
2. Total Quality Management/P. N. Mukherjee/PHI

REFERENCE BOOKS:

1. Beyond TQM / Robert L.Flood
2. Total quality management by Paneer Selvam
3. Statistical Quality Control / E.L. Grant.
4. Total Quality Management:A Practical Approach/H. Lal
5. Quality Management/Kanishka Bedi/Oxford University Press/2011
6. Total Engineering Quality Management/Sunil Sharma/Macmillan

COURSE OUTCOMES:

- The student would be able to apply the tools and techniques of quality management to manufacturing and services processes.
- To give the students an overview of TQM, various Quality aspects and importance of Top Management Commitment in any organization for maintaining product / services quality.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

III B.Tech EEE II Sem

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(R17A0285) POWER ELECTRONICS AND SIMULATION LABORATORY

COURSE OBJECTIVES:

The student will understand:

- The characteristics of power electronic devices with gate firing circuits.
- The operation of single-phase voltage controller, converters and Inverters circuits with R and RL loads. Analyze the TPS7A4901, TPS7A8300 and TPS54160 buck regulators.

Part - A

The following experiments are required to be conducted compulsory experiments:

1. Study of Characteristics of SCR, MOSFET & IGBT
2. Single Phase Half controlled converter with R load
3. Single Phase fully controlled bridge converter with R and RL loads
4. Three Phase half controlled bridge converter with R-load
5. Single Phase AC Voltage Controller with R and RL Loads
6. Single Phase Cyclo converters with R and RL loads
7. Single Phase series inverter with R and RL loads
8. DC Jones chopper with R and RL Loads

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

Part - B

1. Single-phase full converter using RLE loads and single-phase AC voltage controller using RLE loads using PSPICE.
2. Resonant pulse commutation circuit and Buck chopper using PSPICE.
3. Single phase Inverter with PWM control using PSPICE
4. Single Phase dual converter with RL loads
5. Single Phase Mc-Murray converter with R and RL loads
6. Gate firing circuits for SCR's
7. Single Phase Parallel inverter with R and RL loads

COURSE OUTCOMES:

After completion of this course, the student is able to

- Understand the operating principles of various power electronic converters.
- Use power electronic simulation packages& hardware to develop the power converters.
- Analyze and choose the appropriate converters for various applications.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

III B.Tech EEE II Sem

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

(R17A0486) MICROPROCESSORS AND MICROCONTROLLERSLAB

COURSE OBJECTIVES:

- To develop and execute variety of assembly language programs of Intel 8086 including arithmetic and logical, sorting, searching, and string manipulation operations.
- To develop and execute the assembly language programs for interfacing Intel 8086 with peripheral devices.
- To develop and execute simple programs on 8051 microcontroller.

The Following programs/experiments are to be written for assembler and execute the same with 8086 and 8051 kits.

1. Programs for 16 bit arithmetic operations for 8086 (using Various Addressing Modes).
2. Program for sorting an array for8086.
3. Program for searching for a number or character in a string for 8086.
4. Program for string manipulations for8086.
5. Program for digital clock design using8086.
6. Interfacing ADC and DAC to8086.
7. Parallel communication between two microprocessors using8255.
8. Serial communication between two microprocessor kits using8251.
9. Interfacing to 8086 and programming to control stepper motor.
10. Programming using arithmetic, logical and bit manipulation instructions of8051.
11. Program and verify Timer/ Counter in8051.
12. Program and verify Interrupt handling in8051
13. UART Operation in8051.
14. Communication between 8051 kit and PC.
15. Interfacing LCD to8051.
16. Interfacing Matrix/ Keyboard to8051.
17. DataTransferfromPeripheraltoMemorythroughDMAcontroller8237/8257.

Note: - Minimum of 12 experiments to be conduct

COURSE OUTCOMES:

After going through this course the student will be able to

- Apply the concepts in the design of microprocessor/microcontroller based systems in real time applications
- Develop and execute the assembly language programs for interfacing Intel 8086 with peripheral devices.
- Develop and execute simple programs on 8051 microcontroller.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

IV B.Tech EEE I Sem **L T/P/D C**
3 1 / - / - 4

(R17A0219) SWITCHGEAR AND PROTECTION

COURSE OBJECTIVES:

- To introduce protection equipment like Circuit Breakers and Relays
- To introduce protection of Generators, Transformers and feeder bus bars from over voltages and other hazards.

UNIT - I:

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

UNIT –II:

ELECTROMAGNETIC AND STATIC RELAYS: Principle of Operation and construction of attracted armature, Balanced Beam, induction Disc and Induction Cup relays. Relays Classification: Instantaneous, DMT and IDMT types. Application of relays: Over current/Under voltage relays, Direction relays, Differential Relays and Percentage Differential Relays. Universal torque equation. Distance relays: Impedance, Reactance and Mho and Off-Set Mho relays, Characteristics of Distance Relays and Comparison, Static Relays.

UNIT - III:

GENERATOR & TRANSFORMER PROTECTION: Protection of generators against stator faults, Rotor faults, and Abnormal Conditions. Restricted Earth fault and Inter-turn fault Protection. Protection of transformers: Percentage Differential Protection, Buchholtz relay Protection.

UNIT-IV:

FEEDER AND BUS-BAR PROTECTION & GROUNDING: 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:

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

TEXT BOOKS:

1. Switchgear and Protection by Sunil S Rao, Khanna Publlishers
2. Power System Protection and Switchgear, Bhavesh Bhalaji, R.P.Mahesheari, Nilesh G.Chothani, Oxford University Press.

REFERENCE BOOKS:

1. Fundamentals of Power System Protection by Paithankar and S.R.Bhide., PHI, 2003. Art & Science of Protective Relaying by C R Mason, Wiley Eastern Ltd.
2. Electrical Power Systems by C.L.Wadhwa, New Age international (P) Limited, Publishers, 3rd editon
3. A Text book on Power System Engineering by B.L.Soni, Gupta, Bhatnagar, Chakrabarthy, Dhanpat Rai & Co Pvt.Ltd.

COURSE OUTCOMES:

After this course, the student

- Gets a thorough knowledge on, various types of protective devices (circuit breakers, relays etc.) and their co-ordination, protection of generators, transformers, feeders, bus-bars, through different types of protective devices, overvoltage protection, lightening.
- By applying the above concepts to real-world electrical and electronics problems andapplications.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

IV B.Tech EEE I Sem **L T/P/D C**
3 1 / - / - 4

(R17A0220) INDUSTRIAL AND ALLIED ELECTRICAL SYSTEMS

COURSE OBJECTIVES:

- To give a basic knowledge on residential, commercial and wiring systems.
- To understand the different applications like heating, welding and illumination.
- To gives a comprehensive idea on UPS, Electric Traction and industrial electrical systems.

UNIT - I

ILLUMINATION: Introduction, terms used in illumination, laws of illumination, polar curves, photometry. Sources of light Discharge lamps: Mercury Vapor and Sodium Vapor lamps – comparison between tungsten filament lamps and fluorescent lamps. Basic principles of light control, Types and design of lighting and flood lighting.

UNIT - II

RESIDENTIAL AND COMMERCIAL ELECTRICAL SYSTEMS: Types of residential and commercial wiring systems, general rules and guidelines for installation, load calculation and sizing of wire, rating of main switch, distribution board and protection devices, earthing system calculations, requirements of commercial installation, deciding lighting scheme and number of lamps, earthing for commercial installations. Selection and sizing of components.

UNIT - III

ELECTRIC HEATING AND WELDING: Electric Heating: 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 - IV

INDUSTRIAL ELECTRICAL SYSTEMS: Industrial loads, motors, starting of motors, Lightning Protection, methods of earthing, UPS System, Electrical Systems for the elevators, Battery banks, Selection of UPS and Battery Banks.

UNIT - V

ELECTRIC TRACTION: Traction Systems: types, overview of existing electric traction systems in India. Special features of traction motor. Speed-time curves for different services – trapezoidal and quadrilateral speed time curves.

TEXT BOOKS:

1. J.B. Gupta, “Utilization of Electric Power and Electric Traction”, Kataria & Sons publishers, Delhi, IX Edtion, 2004.
2. C.L. Wadhwa, “Generation, Distribution and Utilization of electrical Energy”, New Age International (P) Limited Publishers, 3rd Edition, 2010
3. S. L.Uppal and G.C.Garg,” Electrical wiring Estimating & costing” Khanna publishers,2008
4. Utilization of electric Energy by E. Openshaw Taylor, Orient Longman Private Limited,1971.

REFERENCE BOOKS:

1. N.V. Suryanarayana, “Utilization of Electrical Power including Electric drives and Electric traction”, New Age International (P) Limited Publishers, 1st Edition, 1994.
2. E. Open Shaw Taylor, “Utilization of Electric Energy”, Orient Longman,1st Edition,1937

COURSE OUTCOMES:

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

- Maintain/Troubleshoot various lamps and fittings in use.
- Understand various types of Heating, Welding and traction system.
- Design Illumination systems for various applications.
- Work in the areas of UPS systems and traction systems production, commissioning and maintenance.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

IV B.Tech EEE I Sem **L T/P/D C**
3 - / - / - 3

(R17A0221) POWER SYSTEM OPERATION AND CONTROL

COURSE OBJECTIVES:

- To understand real power control and operation
- To know the importance of frequency control
- To analyze different methods to control reactive power
- To understand unit commitment problem and importance of economic load dispatch
- To understand real time control of power systems.

UNIT – I:

LOAD FREQUENCY CONTROL: Basics of speed governing mechanism and modeling – speed - load characteristics – load sharing between two synchronous machines in parallel. Control area concept. Load Frequency Control of a single area system. Static and dynamic analysis of uncontrolled and controlled cases. Integration of economic dispatch control with LFC. Two - area system – modeling - static analysis of uncontrolled case - tie line with frequency bias control of two-area system - state variable model.

UNIT– II:

REACTIVE POWER VOLTAGE CONTROL: Basics of reactive power control, Excitation systems – modelling. Static and dynamic analysis: stability compensation generation and absorption of reactive power. Methods of voltage control – tap changing transformer. System level control using generator voltage magnitude setting. Tap setting of OLTC transformer. MVAR injection of switched capacitors to maintain acceptable voltage profile and to minimize transmission loss.

UNIT – III:

ECONOMIC OPERATION OF POWER SYSTEMS: Statement of economic dispatch problem – cost of generation – Incremental cost curve - co-ordination equations without loss and with loss, solution by direct method and λ-iteration method. Economic Aspects of Power Generation**:** Load curve, load duration and integrated load duration curves – load demand, diversity, capacity, utilization and plant use factors - Numerical Problems.

UNIT – IV

UNIT COMMITMENT: Statement of Unit Commitment problem – constraints, spinning reserve, thermal unit constraints, hydro constraints, fuel constraints and other constraints. Solution methods – Priority list methods - forward dynamic programming approach. Numerical problems on priority-list method using full-load average production cost and Forward DP method.

UNIT–V

COMPUTER CONTROL OF POWER SYSTEMS: Need for computer control of power systems. Concept of energy control centre (or) load dispatch centre and the functions – SCADA and EMS functions.

TEXT BOOKS:

1. D.P. Kothari and I.J. Nagrath, 'Modern Power System Analysis', Third Edition, Tata McGraw Hill Publishing Company Limited, New Delhi, 2003.
2. Olle. I. Elgerd, 'Electric Energy Systems Theory – An Introduction', Tata McGraw Hill Publishing Company Ltd, New Delhi, 30th reprint,2007.

REFERENCE BOOKS

1. Chakrabarti & Haldar, "Power System Analysis: Operation and Control", Prentice Hall of India, 2004 Edition.
2. C.L.Wadhwa, 'Power System Analysis', New Age International- 6th Edition, 2010,
3. Robert Miller, James Malinowski, 'Power System Operation', Tata McGraw Hill Publishing Company Ltd, New Delhi, 3E, JUN-09.
4. P. Kundur, Neal J. Balu, 'Power System Stability & Control', IEEE, 1998.
5. Power System Analysis by Hadi Saadat – TMH Edition.

COURSE OUTCOMES:

- Know importance of frequency and real power control
- Know the reactive power control methods and importance of reactive power
- Compare unit commitment and economic dispatch and their importance
- Understand real time control of power systems.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

IV B.Tech EEE I Sem

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

(R17A0462) PLC SYSTEMS

COURSE OBJECTIVES:

For programmable logic controllers, the course will enable the students

- To provide and ensure a comprehensive understanding of using advanced controllers in measurement and control instrumentation.
- To analyze Programmable Logic Controller (PLC), IO Modules and internal features, Programming in Ladder Logic.
- Understand the core of an embedded system
- To learn the design process of embedded system applications.
- To understands the RTOS and inter-process communication.
- To understand different communication interfaces.

UNIT-I

PLC BASICS: PLC system, I/O modules and interfacing, CPU processor, programming Equipment, programming formats, construction of PLC ladder diagrams, Devices connected to I/O modules. PLC Programming: Input instructions, outputs, operational procedures, programming examples using contacts and coils. Drill press operation.

UNIT-II

LADDER DIAGRAMS FOR PROCESS CONTROL: Ladder diagrams and sequence listings, ladder diagram construction and flowchart for spray process system.

PLC REGISTERS: Characteristics of Registers, module addressing, holding registers, Input Registers, Output Registers.

UNIT-III

INTRODUCTION TO EMBEDDED SYSTEMS: Complex systems and microprocessors-embedding computers, characteristics of embedded computing applications, challenges in embedded computing system design, performance in embedded computing; The embedded system design process-requirements, specification, architecture design, designing hardware and software, components, system integration.

UNIT-IV

TYPICAL EMBEDDED SYSTEM: Core of the embedded system-general purpose and domain specific processors, ASICs, PLDs, COTS; Memory-ROM, RAM, memory selection for embedded systems; Sensors and actuators , Onboard communication interfaces-I2C, SPI.

Embedded Firmware Design and Development: Embedded firmware design approaches-super loop based approach, operating system based approach; embedded firmware development languages-assembly language based development, high level language based development.

UNIT-V

RTOS BASED EMBEDDED SYSTEM DESIGN: Operating system basics, types of operating systems, tasks, process and threads, multiprocessing and multitasking, task scheduling: non-preemptive and pre-emptive scheduling, How to choose an RTOS.

TEXT BOOKS:

1. Programmable Logic Controllers- Principles and Applications by John W. Webb and Ronald A. Reiss, Fifth Edition, PHI.
2. Computers as Components –Wayne Wolf, Morgan Kaufmann (second edition).
3. Introduction to Embedded Systems - shibu k v, Mc Graw Hill Education.

REFERENCE BOOKS:

1. Programmable Logic Controllers- Programming Method and Applications by JR.Hackworth and F.D Hackworth Jr., Pearson, 2004.
2. Embedded Systems- An integrated approach - Lyla b das, Pearson education 2012.

COURSE OUTCOMES:

After going through this course the student will be able to

- Describe the main functional units in a PLC and be able to explain how they interact
- Develop ladder logic programming for simple process.
- Understand and design the embedded systems
- Understand Embedded Firmware design approaches
- Learn the basics of RTOS

CORE ELECTIVE - III

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

IV Year B.Tech EEE - I Sem	**L**	**T/P/D**	**C**
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(CORE ELECTIVE III)
(R17A0514) COMPUTER NETWORKS

COURSE OBJECTIVES:

- To introduce the fundamental types of computer networks.
- To demonstrate the TCP/IP & OSI model merits & demerits.
- To know the role of various protocols in Networking.

UNIT - I:

INTRODUCTION: Network, Uses of Networks, Types of Networks, Reference Models: TCP/IP Model, The OSI Model, Comparison of the OSI and TCP/IP reference model. Architecture of Internet. Physical Layer: Guided transmission media, Wireless transmission media, Switching

UNIT - II:

DATA LINK LAYER: Design issues, Error Detection & Correction, Elementary Data Link Layer Protocols, Sliding window protocols

MULTIPLE ACCESS PROTOCOLS - ALOHA, CSMA,CSMA/CD, CSMA/CA, Collision free protocols, Ethernet-Physical Layer, Ethernet Mac Sub layer, Data link layer switching: Use of bridges, learning bridges, spanning tree bridges, repeaters, hubs, bridges, switches, routers and gateways.

UNIT - III:

NETWORK LAYER: Network Layer Design issues, store and forward packet switching connection less and connection oriented networks-routing algorithms-optimality principle, shortest path, flooding, Distance Vector Routing, Count to Infinity Problem, Link State Routing, Path Vector Routing, Hierarchical Routing; Congestion control algorithms, IP addresses, CIDR, Sub netting, Super Netting, IPv4, Packet Fragmentation, IPv6 Protocol, Transition from IPv4 to IPv6, ARP and RARP.

UNIT - IV:

TRANSPORT LAYER: Services provided to the upper layers elements of transport protocol-addressing connection establishment, Connection release, Error Control & Flow Control, Crash Recovery.
The Internet Transport Protocols: UDP, Introduction to TCP, The TCP Service Model, The TCP Segment Header, The Connection Establishment, The TCP Connection Release, The TCP Sliding Window, The TCP Congestion Control Algorithm.

UNIT - V:

APPLICATION LAYER: Introduction, providing services, Applications layer paradigms: Client server model, HTTP, E-mail, WWW, TELNET, DNS; RSA algorithm,

TEXT BOOKS:

1. Computer Networks - Andrew S Tanenbaum, 4th Edition, Pearson Education.
2. Data Communications and Networking - Behrouz A. Forouzan, Fifth Edition TMH, 2013.

REFERENCES BOOKS:

1. An Engineering Approach to Computer Networks - S. Keshav, 2nd Edition, Pearson Education.
2. Understanding communications and Networks, 3rd Edition, W. A. Shay, Cengage Learning.
3. Computer Networking: A Top-Down Approach Featuring the Internet, James F. Kurose, K. W. Ross, 3rd Edition, Pearson Education.

COURSE OUTCOMES:

- To understand and explore the basics of Computer Networks and Various Protocols. Student will be in a position to understand the World Wide Web concepts.
- Able to administrate a network and flow of information further Student can understand easily the concepts of network security, Mobile, and ad hoc networks.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

IV B.Tech EEE I Sem

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

(CORE ELECTIVE III)
(R17A0222) ADVANCED POWER ELECTRONICS

COURSE OBJECTIVES:

- With the advent of semiconductor devices, revolution is taking place in the power transmission distribution and utilization.
- This course introduces the basic concepts of power semiconductor devices, converters and choppers and their analysis

UNIT-I:

ADVANCED SOLID STATE DEVICES: MOSFETs, IGBT, GTO, IGCT. Power modules, intelligent power modules, gating circuits Thermal design, protection. Digital signal processors used in their control. Non-isolated DC-DC converters: Buck, boost, buck-boost, Cuk SEPIC, Zeta in DCM and CCM Isolated dc-dc converters: Fly back, forward, Cuk, SEPIC, Zeta, half bridge, push-pull and bridge in DCM and CCM. Single-phase, single-stage converters (SSSSC), power factor correction at ac mains in these converters. Their application in SMPS, UPS, welding and lighting systems.

UNIT-II:

SINGLE-PHASE IMPROVED POWER QUALITY AC-DC CONVERTERS: Buck, boost, buck-boost, PWM VSC (Voltage source converters), multilevel VSCs, PWM CSC (Current voltage source converters).Three-phase improved power quality ac-dc converters: VSC, multilevel VSCs, multi pulse VSCs, PWM CSC (Current voltage source converters).Multi pulse ac-dc converters: Diode and thyristor based converters.

UNIT-III:

POWER QUALITY MITIGATION DEVICES: Passive filters, active filters, hybrid filters. FACTS devices: TCR (thyristor controlled reactor), TSC (thyristor switched capacitors). STATCOM (Static synchronous compensator). SSSC (Static series synchronous compensator). UPFC (Unified power flow controller), IPFC (Interline power flow controller).

UNIT-IV:

HVDC (HIGH VOLTAGE DIRECT CURRENT) SYSTEM: 12-pulseconverter based HVDC systems. HVDC light, HVDC PLUS (Power universal link). Multi pulse and multilevel VSC based flexible HVDC systems.

UNIT-V:

SOLID STATE CONTROLLERS FOR MOTOR DRIVES: Vector control and direct torque control of induction, synchronous, permanent magnet fed, synchronous reluctance motors. Permanent magnet brushless DC (PMLDC) and switched reluctance motors.LCI (load commutated inverter)fed large rating synchronous motor drives. Energy conservation and power quality improvements in these drives.

TEXT BOOKS

1. R.S. Ramshaw,"Power Electronics Semiconductor Switches", Champman& Hall, 1993.
2. N. Mohan, T. M. Undeland and W.P. Robbins,"Power Electronics, Converter,Application and Design", Third Edition, John Willey & Sons, 2004.
3. M. H. Rashid,"Power Electronics, circuits, Devices and Applications",Pearson, 2002, India.

REFERENCE BOOKS

1. K. Billings,"Switch Mode Power Supply Handbook", McGraw-Hill, 1999,Boston.
2. A. I.Pressman,"Switch Mode Power Supply Design", McGraw-Hill, 1999, New York.
3. B. K.Bose,"Power Electronics and Variable Frequency Drive", Standard Publishers Distributors, 2000.

COURSE OUTCOMES:

- Competency in function of various power electronics devices.
- Skill of analyzing power electronic devices, Know-how of advance Power electronics converter, Fitness in mitigating converter harmonics.
- Competency in developing Dynamic model of drive system, Fitness' in solving typical drive issues. Ability in control strategy of cyclo converter based Drives, Skill in Transient analysis of drive system.
- Competency in designing FACTS controllers, Capability in designing isolated converters.
- Ability to dynamic analysis of power Converters, Competency in operation of resonant converter.
- Capability in Control of Switched Reluctance Motor Drives, Competency in Control of BLDC Motor Drives. Proficiency in HVDC converter systems design. Know-how of operation of Power electronics in HVDC system.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

IV B.Tech EEE I Sem

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

(CORE ELECTIVE-III)

(R17A1261) ARTIFICIAL NEURAL NETWORKS

COURSE OBJECTIVES:

The objectives of this course are to:

- Understand the basic building blocks of artificial neural networks (ANNs)
- Understand the role of neural networks in engineering and artificial intelligence modeling
- Provide knowledge of supervised/unsupervised learning in neural networks
- Provide knowledge of single layer and multilayer perceptrons.
- To know about self-organizational maps and Hopfield models.

UNIT -I:

INTRODUCTION: A Neural Network, Human Brain, Models of a Neuron, Neural Networks viewed as Directed Graphs, Network Architectures, Knowledge Representation, Artificial Intelligence and Neural Networks Learning Process: Error Correction Learning, Memory Based Learning, Hebbian Learning, Competitive, Boltzmann Learning, Credit Assignment Problem, Memory, Adaption, Statistical Nature of the Learning Process

UNIT -II:

SINGLE LAYER PERCEPTRONS: Adaptive Filtering Problem, Unconstrained Organization Techniques, Linear Least Square Filters, Least Mean Square Algorithm, Learning Curves, Learning Rate Annealing Techniques, Perceptron –Convergence Theorem, Relation Between Perceptron and Bays Classifier for a Gaussian Environment Multilayer Perceptron: Back Propagation Algorithm XOR Problem, Heuristics, Output Representation and Decision Rule, Computer Experiment, Feature Detection

UNIT -III:

BACK PROPAGATION: Back Propagation and Differentiation, Hessian Matrix, Generalization, Cross Validation, Network Pruning Techniques, Virtues and Limitations of Back Propagation Learning, Accelerated Convergence, Supervised Learning

UNIT -IV:

SELF-ORGANIZATION MAPS (SOM): Two Basic Feature Mapping Models, Self Organization Map, SOM Algorithm, Properties of Feature Map, Computer 168 ELECTRONICS AND COMMUNICATION ENGINEERING 2013-14 Simulations, Learning Vector Quantization, Adaptive Patter Classification

UNIT -V:

NEURO DYNAMICS: Dynamical Systems, Stability of Equilibrium States, Attractors, Neuro Dynamical Models, Manipulation of Attractors as a Recurrent Network Paradigm Hopfield Models – Hopfield Models, Computer Experiment

TEXT BOOK:

1. Neural Networks a Comprehensive Foundations, Simon Haykin, PHI edition.

2. Introduction to Artificial Neural Systems Jacek M. Zurada, JAICO Publishing House Ed. 2006.

REFERENCE BOOKS:

1. Artificial Neural Networks - B. Vegnanarayana Prentice Hall of India P Ltd 2005
2. Neural Networks in Computer Inteligance, Li Min Fu TMH 2003
3. Neural Networks -James A Freeman David M S Kapura Pearson Education 2004.
4. Introduction to Artificial Neural Systems Jacek M. Zurada, JAICO Publishing House Ed. 2006.

COURSE OUTCOMES:

After the course the student should be able to:

- Explain the function of artificial neural networks of the Back-prop, Hopfield and SOM type
- Explain the difference between supervised and unsupervised learning
- Describe the assumptions behind, and the derivations of the ANN algorithms dealt with in the course
- Give example of design and implementation for small problems
- Implement ANN algorithms to achieve signal processing, optimization, classification and process modeling

CORE ELECTIVE - IV

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

IV B.Tech EEE I Sem **L T/P/D C**

3 - / - / - 3

(CORE ELECTIVE - IV)

(R17A0223) POWER PLANT ENGINEERING

COURSE OBJECTIVES:

- To study operation and maintenance of Power Stations.
- Able to learn about different power plants.
- To study about Non-Conventional Power Generation.

UNIT-I:

INTRODUCTION: Energy resources and their availability, types of power plants, selection of the plants, review of basic thermodynamic cycles used in power plants. Hydro Electric Power Plants : Rainfall and run-off measurements and plotting of various curves for estimating stream flow and size of reservoir, power plants design, construction and operation of different components of hydro-electric power plants, site selection, comparison with other types of power plants.

UNIT-II:

STEAM POWER PLANTS: Flow sheet and working of modern-thermal power plants, super critical pressure steam stations, site selection, coal storage, preparation, coal handling systems, feeding and burning of pulverized fuel, ash handling systems, dust collection-mechanical dust collector and electrostatic precipitator.

COMBINED CYCLES: Constant pressure gas turbine power plants, Arrangements of combined plants (steam & gas turbine power plants), re-powering systems with gas production from coal, using PFBC systems, with organic fluids, parameters affecting thermodynamic efficiency of combined cycles.

UNIT-III:

NUCLEAR POWER PLANTS: Principles of nuclear energy, basic nuclear reactions, nuclear reactors-PWR, BWR, CANDU, Sodium graphite, fast breeder, homogeneous; gas cooled. Advantages and limitations, nuclear power station, waste disposal. Power Plant Economics: load curve, different terms and definitions, cost of electrical energy, tariffs methods of electrical energy, performance & operating characteristics of power plants- incremental rate theory, input-output curves, efficiency, heat rate, economic load sharing.

UNIT-IV:

NON-CONVENTIONAL POWER GENERATION: Solar radiation estimation, solar energy collectors, low, medium & high temperature power plants, OTEC, wind power plants, tidal power plants, geothermal power plants.

UNIT-V:

DIRECT ENERGY CONVERSION SYSTEMS: Fuel cell, MHD power generation-principle, open & closed cycle's systems, thermoelectric power generation, thermionic power generation.

TEXTBOOKS:

1. Power station Engineering and Economy by Bernhardt G.A. skrotzki and William A. Vopat – Tata Mc Graw Hill Publishing Campany Ltd., New Delhi
2. Power Plant Engineering: P.K. Nag Tata McGraw Hill second Edition 2001.
3. A Course in Power Plant Engineering: / Arora and S. Domkundwar/ Dhanpat Rai Publisher
4. Power Plant Engineering / P.C.Sharma / S.K.Kataria Publisher
5. A Text Book of Power Plant Engineering / R.K.Rajput / Laxmi Publications

REFERENCE BOOKS:

1. Power Plant Engineering/ P.K.Nag II Edition /TMH Publishers
2. An Introduction to Power Plant Technology / G.D. Rai/Khanna Publishers
3. Power plant Engg /Elanchezhian/I.K. International Publishers

COURSE OUTCOMES:

At the end of the course the students will be able

- To Study various non-conventional sources in remote areas of the country.
- Students get the exposure of different power plants.
- To analyze the thermionic power generation.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

IV B.Tech EEE I Sem

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

(CORE ELECTIVE-IV)

(R17A0224) QUALITY AND RELIABILITY ENGINEERING

COUSRE OBJECTIVES:

- To introduce the basic concepts of reliability, various models of reliability
- To analyze reliability of various systems
- To introduce techniques of frequency and duration for reliability evaluation of repairable systems.

UNIT-I:

BASIC CONCEPTS: Definitions of quality and Reliability, Parameters and Characteristics, Quality control, statistical Quality Control, Reliability concepts. Concepts in Probability and Statistics : Events, Sample Space, Probability rules, Conditional probability, Dependent and Independent Events, Application of Probability concepts in Quality Control, Problems

UNIT-II:

INTRODUCTION TO PROBABILITY DISTRIBUTIONS: Normal, Poisson and Binomial distribution. Control Charts: Variable Chart – X Bar chart, R-chart and Sigma chart. Attribute Chart: P – Chart, nP Chart, C-Chart and U – Chart.Acceptance Sampling: Fundamentals of acceptance sampling, types of acceptance sampling, Curve, AQL, LTPD, AOQL.

UNIT-III:

FAILURE DATA ANALYSIS : Introduction, Failure Data, Quantitative measures, MTTF, MTBF, Bathtub Curve, Mean Life, Life Testing, Problems, Introduction to Failure Mode and Effect Analysis.

UNIT-IV:

SYSTEM RELIABILITY: Series, parallel and mixed configuration, Block diagram concept, r- out-of-n structure solving problems using mathematical models.Reliability Improvement and Allocation : Difficulty in achieving reliability, Methods for improving reliability during design, Different techniques available to improve reliability, Optimization, Reliability-Cost trade off, Prediction and Analysis, Problems.

UNIT-V:

MAINTAINABILITY AND AVAILABILITY: Introduction, Formulas, Techniques available to improve maintainability and availability trade-off among reliability, maintainability and availability, Simple problems

TEXT BOOKS:

1. Roy Billinton, Ronald. N. Allan (2009), *Reliability Evaluation of Engineering Systems*, 4th edition, Plenum Press, New York, USA.
2. Hoang Pham (2003), *Handbook of Reliability Engineering,* 1st edition, Springer Verlag, New York.
3. Charles E. Ebeling (2010), *An Introduction to Reliability and Maintainability Engineering*, 3rd edition, Tata McGraw Hill Edition, New Delhi.

REFERENCE BOOKS:

1. Quality Planning and Analysis - Tata McGraw - Juran, J.M and Gryna, F.M. - Hill publishing Coimpany Ltd., New Delhi, India – 1982.
2. Maintainability and Reliability Handbook of Reliability Engineering and Management - Editors – Ireson. W.G. and Cooms - C.F. McGraw - Hill Book Company Inc. – 1988.
3. Concepts in Reliability Engineering- Srinath L S - Affiliated East-West Press Private Limited, New Delhi, India. – 1985.
4. An Introduction to Reliability and Maintainability Engineering - TMH Charles Ebeling - Tata Mcgraw Hill – 2000.
5. Reliability Engineering - A K Govil - Prentice Hall – 1981.

COURSE OUTCOMES:

After completion of this course, the student will be able to

- Model various systems applying reliability networks
- Evaluate the reliability of simple and complex systems
- Estimate the limiting state probabilities of repairable systems
- Apply various mathematical models for evaluating reliability of irreparable systems

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

IV B.Tech EEE I Sem **L T/P/D C**

3 - / - / - 3

(CORE ELECTIVE - IV)

(R17A0225) SOLAR ELECTRICAL SYSTEMS

COURSE OBJECTIVES:

- To study and understand the basic concepts of solar energy and solar radiation.
- To study and understand the fundamentals of solar cells and PV systems.
- To learn about the different types of solar cells and the design of PV Electrical Systems.
- To study and understand the classification of PV systems and their subsystems.
- To learn the different types of Batteries and their operation in Solar Electrical Systems.

UNIT-I: SOLAR ENERGY BASIC CONCEPTS: Introduction to solar energy, Characteristics of solar radiation, Extra terrestrial solar radiation – Spectral distribution, Power density, Solar constant. Geometry of the Earth and Sun, Atmospheric effects on Solar radiation - Solar radiation measurement and instrumentation, Solar radiation data, Effect of collector tilt.

UNIT-II: SOLAR CELL FUNDAMENTALS: Photovoltaic effect - Principle of direct solar energy conversion into electricity in a solar cell - Solar cell - P-N junction - structure - Solar cell properties. I-V characteristics, output power maximum power point – Principles of maximum power point trackers. Cell efficiency - Fill factor - Effect of irradiation and temperature.

UNIT-III: TYPES OF PV CELLS & DESIGN OF PV SYSTEMS: Types of solar cells - Single crystalline silicon cells - Multi crystalline silicon cells –Thin film silicon cells. Block diagram of a basic solar power plant - Balance of systems. Design of solar PV systems and cost estimation. PV arrays and modules. Inverters, Batteries, Charge Controllers and Power Conditioners.

UNIT-IV: CLASSIFICATION OF PV SYSTEMS AND COMPONENTS: Classification - Central Power Station System - Distributed PV System – Stand alone PV system - Grid Interactive PV System - Small system for consumer applications - Hybrid solar PV system - Concentrator Solar Photovoltaic Systems.

UNIT-V: BATTERIES AND THEIR OPERATION IN PV SYSTEMS: Introduction – Classification – Types of Batteries – Electro chemical reaction in a Lead acid battery – Equivalent circuit - Battery Charging and Discharging Characteristics – Important terms - Charge Controller and its functions - Battery Management , Monitoring and Control - Battery storage capacity - Sizing

TEXT BOOKS:

1. G. M. Masters, "Renewable and Efficient Electric Power Systems**",** John Wiley and Sons, 2004.
2. Fundamentals of Photovoltaic Modules and Their Applications. G. N. Tiwari and Swapnil Dubey. RSC Publishing Cambridge CB4 0WF, UK .2010
3. Solar PV and Wind Energy Conversion Systems.An Introduction to Theory, Modeling with MATLAB/SIMULINK, and the Role of Soft Computing Techniques' S. Sumathi , L. Ashok Kumar & P. Surekha. Springer
4. Solar Cells from Basics to Advanced Systems, Chenming Hu and Richard M. White, Tata McGraw Hill Education Private Limited.

REFERENCE BOOKS:

1. Wind and Solar Power Systems- Mukund R. Patel. CRC Press Boca Raton-London-New York-Washington, D.C. 1999

2. Renewable Energy Resources, John Twidell & Tony Weir
3. Solar Cells – Operating Principles, Technology and System Applications, Martin A. Green, Prentice Hall Inc.

4. Fundamentals of Renewable Energy Systems, D.Mukherjee, S.Chakrabarti, New Age International.

5. Renewable Energy Sources and Emerging Technologies, D. P. Kothari, K. C. Singal, Rakesh Ranjan, PHI Learning Private Limited.

COURSE OUTCOMES:

After going through this course, the student will:

- Become thorough with the basic concepts of solar energy and solar radiation.
- Be completely conversant with the fundamentals of solar cells and PV systems.
- Be fully aware of the different types of Solar cells and PV systems.
- Have a full knowledge of the different types of Batteries and their operational details.
- Develop ability to select and size the different subsystems based on the load and design a complete PV Electrical system in both ON grid and OFF grid configurations.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

IV B.Tech EEE II Sem

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(R17A0286) POWER SYSTEMS LAB

COURSE OBJECTIVES:

- To perform testing of CT, PT's and Insulator strings.
- To find sequence impedances of 3-Φ synchronous machine and Transformer.
- To perform fault analysis on Transmission line models and Generators.

Part – A

1. Characteristics of IDMT over Current Relay.
2. Differential protection of 1-Φ transformer.
3. Characteristics of Micro Processor based Over Voltage/Under Voltage relay.
4. Testing of CT, PT's and Insulator strings.
5. Power circle diagrams of a 3-Φ transmission line model.
6. ABCD constants and Regulation of a 3-Φ transmission line model.

Part – B

In addition to the above six experiments, at least any four of the experiments from the following list are required to be conducted.

1. Load Flow Analysis using Gauss Seidal (GS) Method.
2. Load Flow Analysis using Newton's Raphson (NR) Method.
3. Load Flow Analysis using Fast Decoupled (FD) Method.
4. Formation of Z BUS.
5. Formation of Y BUS.
6. LG, LL and 3-Φ fault analysis of 3-Φ synchronous machine.
7. Finding the sequence impedances of 3-Φ synchronous machine.
7. Finding the sequence impedances of 3-Φ Transformer
8. Transient Stability Analysis for Single Machine connected to Infinite Bus by Point by Point method.

COURSE OUTCOMES:

After completion of this lab, the student will be able to

- Perform various load flow techniques
- Understand Different protection methods
- Analyze the experimental data and draw the conclusions.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

IV B.Tech EEE I Sem

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

(R17A0287) ELECTRICAL MEASUREMENTS LABORATORY

COURSE OBJECTIVES:

- To calibrate LPF Watt Meter, energy meter, P.F Meter using electro dynamo meter type instrument as the standard instrument.
- To determine unknown inductance, resistance, capacitance by performing experiments on D.C Bridges &A.C Bridges.
- To determine three phase active & reactive powers using single wattmeter method practically.
- To determine the ratio and phase angle errors of current transformer and potential transformer.

Part - A

The following experiments are required to be conducted compulsory experiments:

1. Calibration and Testing of single phase energy Meter
2. Measurement of tolerance of batch of low resistances by Kelvin's double bridge
3. Measurement of voltage, current and resistance using DC potentiometer
4. Schering Bridge and Anderson bridge.
5. Measurement of parameters of a choke coil using 3 voltmeter and 3 ammeter methods.
6. Calibration of LPF wattmeter by Phantom testing
7. Calibration of dynamometer type power factor meter.
8. Measurement of reactive power using single wattmeter in three-phase circuit.

PART – B

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

1. Measurement of Displacement with the help LVDT
2. Measurement of different ranges of temperatures using i) RTD ii) Thermo couple
3. Measurement of voltage, frequency &phase with the help of CRO
4. Measurement of load with the help of strain gauges
5. Measurement of Iron loss in a bar specimen using Epstein square.
6. Measurement of % ratio error and phase angle of given C.T. by Silsbee's method.
7. Dielectric testing of transformer oil

COURSE OUTCOMES:

After completion of this course the student is able to:

- Get the ability to choose instruments andcan test any instrument can find the accuracy of any instrument by performing experiment can calibrate PMMC instrument using D.C potentiometer.

CORE ELECTIVE - V

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

IV B.Tech EEE II Sem

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

(CORE ELECTIVE - V)
(R17A0226) WIND ELECTRICAL SYSTEMS

COURSE OBJECTIVES:

- To understand the fundamentals of wind turbines.
- To analyze the wind site selection.
- To understand the generation schemes with variable speed turbines.
- To study about the grid connected and self-excited induction generator.

UNIT-I:

FUNDAMENTALS OF WIND TURBINES: Power contained in wind - Thermodynamics of wind energy – Efficiency limit for wind energy conversion. Design of the wind turbine rotor: Diameter of the rotor – Choice of the number of blades – Choice of the pitch angle – The tower – The transmission system and gear box – Power speed characteristics – Torque speed characteristics. Wind turbine control systems: Pitch angle control – Stall control – Power electronic control – Yaw control – Control strategy.

UINIT-II:

WIND SITE ANALYSIS AND SELECTION: Wind speed measurements – Robinson cup anemometer – Pressure tube anemometer – Hot wire anemometer – Wind speed statistics – Statistical wind speed distributions – site and turbine selection.

UNIT-III:

GENERATION SCHEMES WITH VARIABLE SPEED TURBINES: Classification of schemes - Operating area. Induction generators: Cage rotor induction generator – Doubly fed induction generator – Wound field synchronous generator – The permanent magnet generator.

UNIT-IV:

GRID CONNECTED AND SELF EXCITED INDUCTION GENERATOR (PART-I): Constant voltage, constant frequency generation - single output system – Double output system with a current converter – Equivalent circuits – Reactive power and harmonics – Double output system with a voltage source inverter - Reactive power compensation.

UNIT-V:

GRID CONNECTED AND SELF EXCITED INDUCTION GENERATOR (PART-II): Variable voltage, variable frequency generation – The self excitation process – Circuit model for the self excited induction generator – Analysis of the steady state operation - The steady state characteristics - The excitation requirement - Effect of a wind generator on the network.

TEXT BOOKS:

1. Wind Electrical Systems, S.N. Bhardra, D.Kastha and S.Banerjee, Oxford University Press.
2. Wind Power Technology 2nd Edition, Kindle Edition, Joshua Earnest, PHI learning.

3. Wind Energy Systems and Applications, D.P. Kothari, S. Umashankar**,** Alpha Science International, 2014.

REFERENCE BOOKS:

1. Wind Energy Systems Control and Engineering Design, Mario Garcia-Sanz, Constantine H.Houpis, CRC Press.
2. Renewable Energy Systems, David M.Buchla, Thomas E. Kissell, Thomas L. Floyd, Pearson publications.
3. Renewable Energy Sources, Twidell &Weir, fourth Edition (2009), Tata McGraw Hill Education Private Limited, New Delhi.

COURSE OUTCOMES:

After going through this course, the student gets knowledge on

- The fundamentals of wind turbines.
- Wind site analysis and selection.
- The generation schemes with variable speed turbines.
- About the grid connected and self-excited induction generator.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

IV B.Tech EEE II Sem

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

(CORE ELECTIVE - V)

(R17A0227) POWER SYSTEM DYNAMICS AND STABILITY

COURSE OBJECTIVES:

- To remember the dynamic characteristics of power system equipment,
- To recognize dynamic performance of power systems
- To illustrate the system stability and controls.

UNIT –I:

INTRODUCTION: General basic concept of Power System Stability, States of operation & System Security, System Dynamics Problems, Review of Classical Model, System Model, Analysis of Steady State Stability & Transient Stability

UNIT –II:

MODELLING OF SYNCHRONOUS MACHINE: Synchronous Machine, Park's Transformation, Analysis of Steady State Performance, P. U. Quantities, Equivalent Circuit of Synchronous Machine

UNIT –III:

EXCITATION SYSTEMS & PRIME MOVER CONTROLLERS: Simplified Representation of Excitation Control, Excitation systems, Modeling, Block Diagram, State Equations, Prime Mover Control System, Transmission Line & Load Modeling

UNIT –IV:

DYNAMICS OF SYNCHRONOUS GENERATOR CONNECTED TO INFINITE BUS: System Model, Synchronous Machine Model, System Simulation, Consideration of other Machine Models including SVC Model

UNIT –V:

SMALL SIGNAL STABILITY: -Single and multi-machine system, Damping and Synchronizing torque Analysis, Power System Stabilizers Transient Stability and Voltage Stability controllers. Voltage Stability: Introduction, affecting factors, analysis, comparison with angle stability

TEXT BOOKS:

1. K. R. Padiyar, Power System Dynamics – Stability & Control, BS Publications
2. I.J. Nagrath and M. Gopal, Control system engineering, Wiley Eastern Ltd, 3rd edition, 2000.

REFERENCE BOOKS:

1. Benjamin C. Kuo, Automatic Control system, Prentice Hall of India Pvt Ltd. 2Prabha Kundur, Power System Stability and Control, Tata McGraw Hill
2. Power System Dynamics and Stability by Jan Machowski, Janusz Bialek, James Richard Bumby, Dr Jim Bumby

COURSE OUTCOMES:

Upon the completion of the subject, the student will be able to

- Choose the fundamental dynamic behavior and controls of power systems to perform basic stability analysis.
- Comprehend concepts in modeling and simulating the dynamic phenomena of power systems Interpret results of system stability studies
- Analyze theory and practice of modeling main power system components, such as synchronous machines, excitation systems and governors

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

IV B.Tech EEE II Sem

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

(CORE ELECTIVE - V)

(R17A0228) ELECTRICAL MACHINE DESIGN

COURSE OBJECTIVES:

- To understand basic design aspects of static and rotating electrical machines.
- To understand the design concepts, pertaining to dimensions, materials, winding configurations, cooling systems etc.
- To understand and appreciate the major design aspects pertaining to temperature ratings efficiency etc.

UNIT – I:

INTRODUCTION TO ELECTRICAL MACHINE DESIGN: Design concepts, factors, Material selection, manufacturing techniques, Review of basic principles, Heating, cooling techniques

UNIT – II:

CONSTRUCTIONAL DETAILS OF MACHINES (DC & AC): Constructional details – output equation – Choice of specific electric and magnetic loadings – Separation of D and L for rotating machines. Estimation of number of conductors / turns – coils – armature Slots – Conductor dimension, Slot dimension, Choice of number of poles – Length of air gap – Design of field system, Interpoles, Commutator and Brushes.

UNIT – III

TRANSFORMERS: Construction –Core and Yoke Design – cross section, cooling of transformers, Number of tubes ,Transformer windings, Coil design, output equation , determination of number of turns and length of mean turn of winding, Resistance, Leakage reactance no load current calculation, losses and efficiency.

UNIT – VI

INDUCTION MOTORS: Choice of specific electric and magnetic loadings, Stator design (Frames), output equation, choice of conductor rating, stator winding, and stator slots. Squirrel cage rotor design – air gap length, rotor slots and rotor bars. Design of wound rotor – rotor slots, windings, short circuit (blocked rotor currents)

UNIT – V

SYNCHRONOUS MACHINES: Constructional features – short circuit ratio – output equation – specific loadings – main dimensions – Stator design – design of Salient pole field coil.

TEXT BOOKS:

1. " Electrical machine design" – A.K Sawhney, Dhanpath Rao

REFERENCE BOOKS:

1. Performance and Design of DC machines, Clayton & Hancock, ELBS
2. Performance and Design of AC machines, M.G. Say, Pitman, ELBS

COURSE OUTCOMES:

Upon completing the course students will be able to:

- Understand the design aspects of various parts of DC machines and solve the problems of design
- Student should be able to understand the design concepts of transformers and know about how to design the parts.
- Student is able to understand the design concepts of synchronous machines and solve the problems related to design.
- Student understands the importance of design of machines based on their applications.

CORE ELECTIVE - VI

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

IV B.Tech EEE II Sem **L T/P/D C**
3 -/ - / - 3

(CORE ELECTIVE - VI)
(R17A0229) POWER QUALITY AND FACTS DEVICES

COURSE OBJECTIVES:
To study

- The various power quality issues in Distribution systems.
- The objectives of Shunt and Series Reactive Power compensation.
- The importance of controllable parameters and types of FACTS controllers & their benefits.
- STATCOM & SVC and their comparison. Regulation of STATCOM, Functioning and control of GCSC, TSSC and TCSC.

UNIT-I:
POWER QUALITY PROBLEMS IN DISTRIBUTION SYSTEMS: Transient and Steady state variations in voltage and frequency. Unbalance, Sags, Swells, Interruptions. Wave-form Distortions: Harmonics, noise, notching, dc-offsets, fluctuations. Flicker and its measurement.

UNIT-II:
TRANSMISSION LINES AND SERIES/SHUNT REACTIVE POWER COMPENSATION: Basics of AC Transmission. Analysis of uncompensated AC transmission lines. Passive Reactive Power Compensation. Shunt and series compensation at the mid-point of an AC line. Comparison of Series and Shunt Compensation.

UNIT-III:
STATIC SHUNT COMPENSATORS: Objectives of shunt compensation, Methods of controllable VAR generation, Static VAR Compensator-its characteristics, TCR, TSC, FC-TCR configurations, STATCOM - basic operating principle, control approaches and characteristics.

UNIT-IV:
STATIC SERIES COMPENSATORS: Objectives of series compensator, variable impedance type of series compensators, TCSC, TSSC- Operating principles and control schemes, SSSC, Power Angle characteristics, Control range and VAR rating, Capability to provide reactive power compensation, external control.

UNIT-V:
COMBINED COMPENSATORS: Introduction to Unified Power Flow Controller, Basic operating principles, Conventional controlCapabilities, Independent control of real and reactive power.

TEXT BOOKS:

1. Electrical Power Systems Quality, Dugan Roger C. Santoso Surya, Mc Granaghan, Marks F. Beaty and H. Wayre, Mc Graw Hill.
2. Power Systems Quality Assessment, J.Arillaga, N.R.Watson, S.Clon, John Wiley.
3. "Understanding FACTS –Concepts and Technology of Flexible AC Transmission Systems" Narain G. Hingorani, Laszlo Gyugyi.

REFERENCE BOOKS:

1. Power Quality, C. Sankaran, CRC Press 4. Understanding power quality problems, Math H. Bollen, IEEE press.
2. A.T.John, "Flexible AC Transmission System", Institution of Electrical and Electronic Engineers (IEEE), 1999.

COURSE OUTCOMES:

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

- Know the severity of power quality problems in distribution system andunderstand the concept of voltage sag transformation from up-stream (higher voltages) to downstream(lower voltage).
- Understand the Concept of improving the power quality to sensitive load by various mitigating custom power devices.
- Understand the control circuits of Shunt Controllers SVC & STATCOM for various functions viz. Transient stability Enhancement, voltage instability prevention and power oscillation damping.
- Understand the Power and control circuits of Series Controllers GCSC, TSSC and TCSC.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

IV B.Tech EEE II Sem

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

(CORE ELECTIVE - VI)

(R17A0230) POWER SYSTEM RELIABILITY

COURSE OBJECTIVES:

To study and understand:

- Concepts of probability theory
- Systems Modelling and Evaluation of Reliability with different methods
- Concepts of Time dependent probability and Discrete Markov Chains & Continuous Markov Processes
- Concepts of multi Component & Approximate System Reliability Evaluation

UNIT- I:

Basic Probability Theory: Basic concepts – Rules for combining Probabilities of events – Failure Density and Distribution functions – Bernoulli's trials – Binomial distribution – Expected value and standard deviation for binomial distribution – Examples.

UNIT-II:

Network Modeling and Reliability Evaluation: Basic concepts – Evaluation of network Reliability / Unreliability – Series systems, Parallel systems, Series - Parallel systems, partially redundant systems – Types of redundancies - Evaluation of network Reliability / Unreliability using conditional probability method – Paths based and Cut set based approach – complete event tree and reduced event tree methods -Examples.

UNIT-III:

Time Dependent Probability: Basic concepts – Reliability functions f(t), F(t), R(t), h(t) – Relationship between these functions – Baths tubs curve – Exponential failure density and distribution functions - Expected value and standard deviation of Exponential distribution – Measures of reliability – MTTF, MTTR, MTBF – Evaluation of network reliability / Unreliability of simple Series, Parallel, Series-Parallel systems - Partially redundant systems - Evaluation of reliability measure – MTTF for series and parallel systems – Examples.

UNIT-IV:

Discrete Markov Chains & Continuous Markov Processes: Basic concepts – Stochastic transitional Probability matrix – time dependent probability evaluation – Limiting State Probability evaluation – Absorbing states – Markov Processes-Modelling concepts – State space diagrams – time dependent reliability evaluation of single component repairable model – Evaluation of Limiting State Probabilities of one, two component repairable models – Frequency and duration concepts – Frequency balance approach - Examples.

UNIT-V:

Multi Component & Approximate System Reliability Evaluation: Recursive relation for evaluation of equivalent transitional rates, cumulative probability and cumulative frequency and 'n' component repairable model - Series systems, Parallel systems, Basic reliability indices – Cut set approach – Examples.

TEXT BOOK:

1. System Reliability Concepts by V. Sankar, Himalaya Publishing House, 2015.

REFERENCE BOOKS:

1. Reliability Evaluation of Engineering Systems by Roy Billinton and Ronald N. Allan Reprinted in India B. S. Publications, 2007.
2. Reliability Engineering by E. Balagurusamy, Tata McGraw Hill, 2003.
3. Reliability and Maintainability Engineering by Charles E. Ebeling, Tata McGraw Hill, 2000.
4. Probability concepts in Electric Power system – G.J.Anders- 1st edition –1990 – John wiley &sons.

COURSE OUTCOMES:

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

- Apply the Concepts of probability theory for Systems Modelling and Evaluation of Reliability in different methods
- Apply the Concepts of Time dependent probability and Discrete Markov Chains & Continuous Markov Processes in establishing the reliability figure of practical systems
- Carry out multi Component & Approximate System Reliability Evaluation

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

IV B.Tech EEE II Sem

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

(CORE ELECTIVE - VI)

(R17A0231) ELECTRICAL AND HYBRID VEHICLES

COURSE OBJECTIVES:

- To understand the models, describe hybrid vehicles and their performance.
- To understand the different possible ways of energy storage.
- To understand the different strategies related to hybrid vehicle operation & energy management.

UNIT 1:

INTRODUCTION: Conventional Vehicles: Basics of vehicle performance, vehicle power Source characterization, transmission characteristics, and mathematical models to describe vehicle performance.

UNIT 2:

INTRODUCTION TO HYBRID ELECTRIC VEHICLES: History of hybrid and electric vehicles, social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies. Hybrid Electric Drive-trains: Basic concept of hybrid traction, introduction to various hybrid drive-train topologies, power flow control in hybrid drive-train topologies, fuel efficiency analysis.

UNIT 3:

ELECTRIC TRAINS: Electric Drive-trains: Basic concept of electric traction, introduction to various electric drive train topologies, power flow control in electric drive-train topologies, fuel efficiency analysis. Electric Propulsion unit: Introduction to electric components used in hybrid and electric vehicles, Configuration and control of DC Motor drives, Configuration and control of Induction Motor drives, configuration and control of Permanent Magnet Motor drives, Configuration and control of Switch Reluctance Motor drives, drive system efficiency.

UNIT 4:

ENERGY STORAGE: Energy Storage: Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles, Battery based energy storage and its analysis, Fuel Cell based energy storage and its analysis, Super Capacitor based energy storage and its analysis, Flywheel based energy storage and its analysis, Hybridization of different energy storage devices. Sizing the drive system: Matching the electric machine and the internal combustion engine (ICE), Sizing the propulsion motor, sizing the power electronics, selecting the energy storage technology, Communications, supporting subsystems

UNIT 5:

ENERGY MANAGEMENT STRATEGIES: Energy Management Strategies: Introduction to energy management strategies used in hybrid and electric vehicles, classification of different energy management strategies, comparison of different energy management strategies and implementation issues of energy management strategies.

TEXT BOOKS:

1. C. Mi, M. A. Masrur and D. W. Gao, “Hybrid Electric Vehicles: Principles and Applications with Practical Perspectives”, John Wiley & Sons, 2011.
2. S. Onori, L. Serrao and G. Rizzoni, “Hybrid Electric Vehicles: Energy Management Strategies”, Springer, 2015.

REFERENCE BOOKS:

1. M. Ehsani, Y. Gao, S. E. Gay and A. Emadi, “Modern Electric, Hybrid Electric, and Fuel Cell Vehicles: Fundamentals, Theory, and Design”, CRC Press, 2004.
2. T. Denton, “Electric and Hybrid Vehicles”, Routl edge, 2016

COURSE OUTCOMES:

At the end of this course, students will demonstrate the ability to

- Study the models to describe hybrid vehicles and their performance.
- Implement the different possible ways of energy storage.
- Adopt the different strategies related to hybrid vehicle operation & energy management.