MARRI LAXMAN REDDY
INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AN AUTONOMOUS INSTITUTION)
(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)
Accredited by NBA and NAAC with 'A' Grade & Recognized Under Section2(f) & 12(B)of the UGC act,1956

MLRS-B.Tech –Electrical & Electronics Engineering
Course Structure (R22)

Category	Credits
Humanities and social sciences including management courses (HSMC)	10
Basic Sciences Courses (BS)	22.5
Engineering sciences courses including workshop, drawing basics of electrical/mechanical/computer etc. (ES)	18.5
Professional core courses (PC)	64
Professional Electives courses relevant to chosen specialization/branch (PE)	18
Open subjects- Electives from other technical and/or emerging subjects (OE)	9
Project work, seminar and internship in industry or elsewhere (PS)	18
Mandatory Courses	-
Total	160

I YEAR I SEMESTER

S. No.	Course Code	Course Title	Course Area	Hours Per Week			Credits	Scheme of Examination Maximum Marks		
				L	T	P		Internal (CIE)	External (SEE)	Total
1	2210001	Matrix Algebra and Calculus	BS	3	1	0	4	40	60	100
2	2210009	Engineering Chemistry	BS	3	1	0	4	40	60	100
3	2210501	Programming for Problem Solving	ES	3	0	0	3	40	60	100
4	2210221	Electrical Circuits Analysis-I	PC	3	0	0	3	40	60	100
5	2210371	Engineering Drawing Practice	ES	1	0	4	3	40	60	100
6	2210276	Elements of Electrical and Electronics and Engineering	PC	0	0	2	1	50	-	50
7	2210009	Engineering Chemistry Laboratory	BS	0	0	2	1	40	60	100
8	2210571	Programming for Problem Solving Laboratory	ES	0	0	2	1	40	60	100
		Induction Program	-	-	-	-	-	-	-	-
Total Credits				**13**	**2**	**10**	**20**	**330**	**420**	**750**

I YEAR II SEMESTER

S. No.	Course Code	Course Title	Course Area	Hours Per Week			Credits	Scheme of Examination Maximum Marks		
				L	T	P		Internal (CIE)	External (SEE)	Total
1	2220002	Differential Equations and Vector Calculus	BS	3	1	0	4	40	60	100
2	2220008	Applied Physics	BS	3	1	0	4	40	60	100
3	2220372	Engineering Workshop	ES	1	0	3	2.5	40	60	100
4	2220010	English for skill Enhancement	HSMC	2	0	0	2	40	60	100
5	2220222	Electrical Circuits Analysis-II	PC	2	0	0	2	40	60	100
6	2220572	Data Structures Laboratory	ES	0	1	2	2	40	60	100
7	2220071	Applied Physics Laboratory	BS	0	0	3	1.5	40	60	100
8	2220073	English Language and Communication Skills Laboratory	HSMC	0	0	2	1	40	60	100
9	2220277	Electrical Circuits Analysis Laboratory	PC	0	0	2	1	40	60	100
10	2220021	Environmental Science	*MC	3	0	0	0	-	-	-
Total Credits				**14**	**3**	**12**	**20**	**360**	**540**	**900**

***MC- Satisfactory/Unsatisfactory**

II YEAR I SEMESTER

S. No.	Course Code	Course Title	Course Area	Hours Per Week			Credits	Scheme of Examination Maximum Marks		
				L	T	P		Internal (CIE)	External (SEE)	Total
1	2230223	Power System-I	PC	3	0	0	3	40	60	100
2	2230301	Solid Mechanics & Hydraulic Machines	ES	3	1	0	4	40	60	100
3	2230402	Analog Electronics	PC	2	0	0	2	40	60	100
4	2230224	Electrical Machines-I	PC	3	0	0	3	40	60	100
5	2230225	Electro Magnetic Fields	PC	3	0	0	3	40	60	100
6	2230278	Electrical Machines Laboratory-I	PC	0	0	2	1	40	60	100
7	2230471	Analog Electronics Laboratory	PC	0	0	2	1	40	60	100
8	2230279	Electrical Simulation tools Laboratory	PC	0	0	2	1	40	60	100
9	2230586	Applied Python Programming Laboratory	ES	0	1	2	2	40	60	100
10	2230022	Gender Sensitization	MC *	2	0	0	0	-	-	-
Total Credits				**16**	**2**	**8**	**20**	**360**	**540**	**900**

II YEAR II SEMESTER

S. No.	Course Code	Course Title	Course Area	Hours Per Week			Credits	Scheme of Examination Maximum Marks		
				L	T	P		Internal (CIE)	External (SEE)	Total
1	2240003	Numerical Methods and Complex variables	BS	3	1	0	4	40	60	100
2	2240226	Measurements and Instrumentation	PC	3	0	0	3	40	60	100
3	2240227	Electrical Machines-II	PC	3	0	0	3	40	60	100
4	2240403	Digital Electronics and IC Applications	PC	2	0	0	2	40	60	100
5	2240228	Power System-II	PC	3	0	0	3	40	60	100
6	2240280	Electrical Machines Laboratory-II	PC	0	0	2	1	40	60	100
7	2240472	Digital Electronics and IC Applications Laboratory	PC	0	0	2	1	40	60	100
8	2240281	Measurements and Instrumentation Laboratory	PC	0	0	2	1	40	60	100
9	2240291	Field Based Project	PS	0	0	4	2	50	-	50
10	2240023	Constitution of India	*MC	2	0	0	0	-	-	-
Total Credits				**16**	**1**	**10**	**20**	**370**	**480**	**850**

***MC- Satisfactory/Unsatisfactory**

III YEAR I SEMESTER

S. No.	Course Code	Course Title	Course Area	Hours Per Week			Credits	Scheme of Examination Maximum Marks		
				L	T	P		Internal (CIE)	External (SEE)	Total
1	2250229	Power Electronics	PC	3	1	0	4	40	60	100
2	2250230	Control Systems	PC	3	0	0	3	40	60	100
3	2250404	Microprocessors & Microcontrollers	PC	3	0	0	3	40	60	100
4		Open Elective-I	OE	3	0	0	3	40	60	100
5	2250016	Business Economics and Financial Analysis	HSMC	3	0	0	3	40	60	100
6	2250282	Power Electronics Laboratory	PC	0	0	2	1	40	60	100
7	2250074	Advanced English Communications skills lab	HSMC	0	0	2	1	40	60	100
8	2250473	Microprocessors & Microcontrollers Laboratory	PC	0	0	2	1	40	60	100
9	22505xx	Java Programming Lab	ES	0	0	2	1	40	60	100
		Environmental Science	*MC	3	0	0	0	-	-	-
Total Credits				**18**	**1**	**8**	**20**	**360**	**540**	**900**

III YEAR II SEMESTER

S. No.	Course Code	Course Title	Course Area	Hours Per Week			Credits	Scheme of Examination Maximum Marks		
				L	T	P		Internal (CIE)	External (SEE)	Total
1		Open Elective-II	OE	3	0	0	3	40	60	100
2		Professional Elective-I	PE	3	0	0	3	40	60	100
3	2260405	Basics of Digital Signal Processing	PC	2	0	0	2	40	60	100
4	2260231	Power System Protection	PC	3	0	0	3	40	60	100
5	2260232	Power System Operation and Control	PC	3	1	0	4	40	60	100
6	2260284	Power System Laboratory	PC	0	0	2	1	40	60	100
7	2260474	Basics of Digital Signal Processing Lab	PC	0	0	2	1	40	60	100
8	2260283	Control Systems Laboratory	PC	0	0	2	1	40	60	100
9	2260293	Industry Oriented Mini Project	PS	0	0	4	2	-	100	100
10	2250024	Intellectual Property Rights	*MC	2	0	0	0	-	-	-
Total Credits				**16**	**1**	**10**	**20**	**320**	**580**	**900**

***MC- Satisfactory/Unsatisfactory**

***MC-Environmental Science- Should be registered by Lateral Entry students only**

IV YEAR I SEMESTER

S. No.	Course Code	Course Title	Course Area	Hours Per Week			Credits	Scheme of Examination Maximum Marks		
				L	T	P		Internal (CIE)	External (SEE)	Total
1	2270233	Power Electronic Applications to Renewable Energy Systems	PC	3	1	0	4	40	60	100
2		Open Elective-III	OE	3	0	0	3	40	60	100
3		Professional Elective-II	PE	3	0	0	3	40	60	100
4		Professional Elective-III	PE	3	0	0	3	40	60	100
5	2270017	Fundamentals of Management for Engineers	HSMC	3	0	0	3	40	60	100
6	2270285	Simulation of Renewable Energy Systems Laboratory	PC	0	0	2	1	40	60	100
9	2270294	Project Stage - I	PS	0	0	6	3	-	100	100
Total Credits				**15**	**1**	**8**	**20**	**240**	**460**	**700**

IV YEAR II SEMESTER

S. No.	Course Code	Course Title	Course Area	Hours Per Week			Credits	Scheme of Examination Maximum Marks		
				L	T	P		Internal (CIE)	External (SEE)	Total
1		Professional Elective-IV	PE	3	0	0	3	40	60	100
2		Professional Elective-V	PE	3	0	0	3	40	60	100
3		Professional Elective-VI	PE	3	0	0	3	40	60	100
4	2280295	Technical Seminar	PS	0	0	4	2	100	-	100
5	2280296	Project Stage - II	PS	0	0	18	9	40	60	100
Total Credits				**9**	**0**	**22**	**20**	**260**	**240**	**500**

PE I - Professional Elective I

S.No	Course Code	Course Title
1	2260234	IoT Applications in Electrical Engineering
2	2260235	High Voltage Engineering
3	2260236	Power System Analysis

PE II - Professional Elective II

S.No	Course Code	Course Title
1	2270237	Renewable Energy Systems
2	2270238	Power Semiconductor Drives
3	2270439	Power System Reliability

PE III – Professional Elective III

S.No	Course Code	Course Title
1	2270240	Industrial Electrical Systems
2	2270424	Signals and Systems
3	2270241	Electric and Hybrid Vehicles

PE IV - Professional Elective IV

S.No	Course Code	Course Title
1	2280242	HVDC Transmission
2	2280243	Utilization of Electrical Energy
3	2280244	Computer Aided Electrical Machine Design

PE V - Professional Elective V

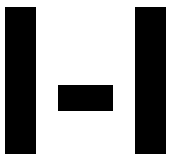
S.No	Course Code	Course Title
1	2280245	Power Quality & FACTS
2	2280246	Modern Control Theory
3	2280247	AI Techniques In Electrical Engineering

PE VI - Professional Elective VI

S.No	Course Code	Course Title
1	2280xxx	Cyber-Physical Systems
2	2280249	Electrical Distribution Systems
3	2280250	Machine Learning Applications in Electrical Engineering

EEE- Open Electives

S.No	Open Elective	Course Code	Course Title
1	O E - I	2250240	Industrial Electrical Systems
2	OE- II	2260204	IOT With Electrical Applications
3	O E - III	2270241	Electrical& Hybrid Vehicles



MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AUTONOMOUS)

2210001: MATRIX ALGEBRA AND CALCULUS (Common to all)

I Year B. Tech EEE – I Sem. **L T P C**

3 1 0 4

Course Prerequisites: Mathematical Knowledge at pre-university level

Course Objectives:

- Types of matrices and their properties, concept of a rank of the matrix and applying this concept to know the consistency and solving the system of linear equations.
- Concept of eigen values and eigen vectors and to reduce the quadratic form to canonical form
- Geometrical approach to the mean value theorems and their application to the mathematical problems. Evaluation of improper integrals using Beta and Gamma functions.
- Partial differentiation, concept of total derivative and Finding maxima and minima of function of two and three variables
- Evaluation of multiple integrals and their applications

Course outcomes: After learning the contents of this paper the student must be able to

UNIT-I: Matrices

- Write the matrix representation of a set of linear equations and to analyses the solution of the System of equations.
- Find the Eigen values and Eigen vectors and reduce the quadratic form to canonical form using orthogonal transformations.
- Solve the applications on the mean value theorems, and evaluate the improper integrals using Beta and Gamma functions
- Find the extreme values of functions of two variables with/ without constraints.
- Evaluate the multiple integrals and apply the concept to find areas, volumes

.

Rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss- Jordan method, System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations by Gauss elimination method, Gauss Seidel Iteration Method.

UNIT-II: Eigen values and Eigen vectors

Eigen values, Eigen vectors and their properties, Diagonalization of a matrix, Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem, Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

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UNIT-III: Calculus

Mean value theorems: Rolle's Theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem, Taylor's Series (without proofs). Definition of Improper Integral: Beta and Gamma functions and their applications

UNIT-IV: Multivariable Calculus (Partial Differentiation and applications)

Partial Differentiation: Euler's Theorem, Total derivative, Jacobian, Functional dependence-independence. Applications: Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.

UNIT-V: Multivariable Calculus (Integration)

Evaluation of Double Integrals (Cartesian and polar coordinates), change of order of integration (only Cartesian form), Evaluation of Triple Integrals: Change of variables (Cartesian to polar) for double and triple integrals (Cartesian to Spherical and Cylindrical polar coordinates).Applications: Areas (by double integrals) and volumes (by double integrals and triple integrals).

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition,2010.
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5thEditon,2016.

REFERENCE BOOKS:

1. Erwin kreyszig, Advanced Engineering Mathematics, 9thEdition, John Wiley & Sons,2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9thEdition, Pearson, Reprint, 2002.
3. H. K. Dassand Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and Company Limited, NewDelhi.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

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2210009: ENGINEERING CHEMISTRY

I Year B. Tech EEE – I Sem

L	T	P	C
3	1	0	4

Course Objectives:

- To bring adaptability to new developments in Engineering Chemistry and to acquire the skills required to become a perfect engineer.
- To include the importance of water in industrial usage, fundamental aspects of battery chemistry, significance of corrosion it's control to protect the structures.
- To imbibe the basic concepts of petroleum and its products.
- To acquire required knowledge about engineering materials like cement, smart materials and Lubricants.

Course Outcomes:

- Students will acquire the basic knowledge of electrochemical procedures related to corrosion and its control.
- The students are able to understand the basic properties of water and its usage in domestic and industrial purposes.
- They can learn the fundamentals and general properties of polymers and other engineering materials.
- They can predict potential applications of chemistry and practical utility in order to become good engineers and entrepreneurs.

UNIT - I: Water and its treatment:

Introduction to hardness of water – Estimation of hardness of water by complexometric method and related numerical problems. Potable water and its specifications - Steps involved in the treatment of potable water - Disinfection of potable water by chlorination and break - point chlorination. Defluoridation- Determination of F- ion by ion- selective electrode method. Boiler troubles: Sludges, Scales and Caustic embrittlement. Internal treatment of Boiler feed water - Calgon conditioning - Phosphate conditioning - Colloidal conditioning, External treatment methods - Softening of water by ion- exchange processes. Desalination of water – Reverse osmosis.

UNIT – II Battery Chemistry & Corrosion

Introduction - Classification of batteries- primary, secondary and reserve batteries with examples. Basic requirements for commercial batteries. Construction, working and applications of: Zn-air and Lithium ion battery, Applications of Li-ion battery to electrical vehicles. Fuel Cells- Differences between battery and a fuel cell, Construction and applications of Methanol Oxygen fuel cell and Solid oxide fuel cell. Solar cells - Introduction and applications of Solar cells.

Corrosion: Causes and effects of corrosion – theories of chemical and electrochemical corrosion – mechanism of electrochemical corrosion, Types of corrosion: Galvanic, water-line and pitting corrosion. Factors affecting rate of corrosion, Corrosion control methods- Cathodic protection – Sacrificial anode and impressed current methods.

UNIT - III: Polymeric materials:

Definition – Classification of polymers with examples – Types of polymerization –
addition (free radical addition) and condensation polymerization with examples – Nylon 6:6, Terylene
Plastics: Definition and characteristics- thermoplastic and thermosetting plastics, Preparation,

Properties and engineering applications of PVC and Bakelite, Teflon, Fiber reinforced plastics (FRP).
Rubbers: Natural rubber and its vulcanization.
Elastomers: Characteristics –preparation – properties and applications of Buna-S, Butyl and Thiokol rubber.
Conducting polymers: Characteristics and Classification with examples-mechanism of conduction in trans-polyacetylene and applications of conducting polymers.
Biodegradable polymers: Concept and advantages - Polylactic acid and poly vinyl alcohol and their applications.

UNIT - IV: Energy Sources:

Introduction, Calorific value of fuel – HCV, LCV- Dulongs formula. Classification- solid fuels: coal – analysis of coal – proximate and ultimate analysis and their significance. Liquid fuels – petroleum and its refining, cracking types – moving bed catalytic cracking. Knocking – octane and cetane rating, synthetic petrol - Fischer-Tropsch's process; Gaseous fuels – composition and uses of natural gas, LPG and CNG, Biodiesel – Transesterification, advantages**.**

UNIT - V: Engineering Materials:

Cement: Portland cement, its composition, setting and hardening.
Smart materials and their engineering applications
Shape memory materials- Poly L- Lactic acid. Thermoresponse materials- Polyacryl amides, Poly vinyl amides
Lubricants: Classification of lubricants with examples-characteristics of a good lubricants - mechanism of lubrication (thick film, thin film and extreme pressure)- properties of lubricants: viscosity, cloud point, pour point, flash point and fire point.

TEXT BOOKS:

1. Engineering Chemistry by P.C. Jain and M. Jain, Dhanpatrai Publishing Company, 2010
2. Engineering Chemistry by Rama Devi, Venkata Ramana Reddy and Rath, Cengage learning, 2016
3. A text book of Engineering Chemistry by M. Thirumala Chary, E. Laxminarayana and K. Shashikala, Pearson Publications, 2021.
4. Textbook of Engineering Chemistry by Jaya Shree Anireddy, Wiley Publications.

REFERENCE BOOKS:

1. Engineering Chemistry by Shikha Agarwal, Cambridge University Press, Delhi (2015)
2. Engineering Chemistry by Shashi Chawla, Dhanpatrai and Company (P) Ltd. Delhi (2011)

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2210501: PROGRAMMING FOR PROBLEM SOLVING

L	T	P	C
3	0	0	3

I Year B. Tech EEE – I Sem

Course Objectives:

- To learn the fundamentals of computers.
- To understand the various steps in program development.
- To learn the syntax and semantics of the C programming language.
- To learn the usage of structured programming approaches in solving problems.

Course Outcomes: The student will learn

- To write algorithms and to draw flowcharts for solving problems.
- To convert the algorithms/flowcharts to C programs.
- To code and test a given logic in the C programming language.
- To decompose a problem into functions and to develop modular reusable code.
- To use arrays, pointers, strings and structures to write C programs.
- Searching and sorting problems.

UNIT - I: Introduction to Programming

Compilers, compiling and executing a program.

Algorithm – Flowchart / Pseudocode withexamples, Program design and structured programming **Introduction to C Programming Language:** variables (with data types and space requirements),Syntax and Logical Errors in compilation, object and executable code, Operators, expressions andprecedence, Expression evaluation, Storage classes (auto, extern, static and register), type conversion,The main method and command line arguments Bitwise operations: Bitwise AND, OR, XOR and NOT operators

Conditional Branching and Loops: Writing and evaluation of conditionals and consequent branchingwith if, if-else, switch-case, ternary operator, goto, Iteration with for, while, do- while loops

I/O: Simple input and output with scanf and printf, formatted I/O, Introduction to stdin, stdout andstderr.Command line arguments

UNIT - II: Arrays, Strings, Structures and Pointers:

Arrays: one and two dimensional arrays, creating, accessing and manipulating elements of arrays Strings: Introduction to strings, handling strings as array of characters, basic string functions available in C (strlen, strcat, strcpy, strstr etc.), arrays of strings

Structures: Defining structures, initializing structures, unions, Array of structures

Pointers: Idea of pointers, Defining pointers, Pointers to Arrays and Structures, Use of Pointers in self- referential structures, usage of self referential structures in linked list (no implementation) Enumerationdata type

UNIT - III: Preprocessor and File handling in C:

Preprocessor: Commonly used Preprocessor commands like include, define, undef, if, ifdef, ifndef Files: Text and Binary files, Creating and Reading and writing text and binary files, Appending data to existing files, Writing and reading structures using binary files, Random access using fseek, ftell and rewind functions

UNIT - IV: Function and Dynamic Memory Allocation:

Functions: Designing structured programs, Declaring a function, Signature of a function, Parameters and return type of a function, passing parameters to functions, call by value, Passing arrays to functions, passing pointers to functions, idea of call by reference, Some C standard functions and libraries

Recursion: Simple programs, such as Finding Factorial, Fibonacci series etc., Limitations of Recursive functions Dynamic memory allocation: Allocating and freeing memory, Allocating memory for arrays ofdifferent data types

UNIT - V: Searching and Sorting:

Basic searching in an array of elements (linear and binary search techniques), Basic algorithms to sort array of elements (Bubble, Insertion and Selection sort algorithms), Basic concept of order of complexitythrough the example programs

TEXT BOOKS:

1. Jeri R. Hanly and Elliot B.Koffman, Problem solving and Program Design in C 7thEdition,Pearson
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rdEdition)

REFERENCE BOOKS:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice HallofIndia
2. E. Balagurusamy, Computer fundamentals and C, 2nd Edition, McGraw-Hill
3. Yashavant Kanetkar, Let Us C, 18th Edition, BPB
4. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
5. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
6. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition
7. Byron Gottfried, Schaum‘s Outline of Programming with C, McGraw-Hill

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

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2210221: ELECTRICAL CIRCUITS ANALYSIS –I

B.Tech. I Year – I Sem.

L	T	P	C
3	0	0	3

Prerequisites: Mathematics

Course Objectives:

- To analyse knowledge in circuits and to understand the fundamentals of derived circuit laws.
- To provide steady state and transient analysis of single phase and 3-phase circuits.
- To identify Theorems and concepts of coupled circuits
- To understand the topological description of Networks**.**

Course Outcomes

After completion of this course the student is able to

- Analyse the network analysis, techniques using mesh and node analysis.
- Comprehend steady state and transient behavior of circuits for DC and AC excitations.
- Identify the electric circuits using network theorems and concepts of coupled circuits.
- Comprehend the topological networks.

UNIT-I

Network Elements & Laws: Active elements, Independent and dependent sources. Passive elements – R, L and C, Energy stored in inductance and capacitance, Kirchhoff's laws, Source transformations, Star-delta transformations, Node voltage method, Mesh current method including super node and super mesh analysis.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the need of circuit elements. (L2)
- Analyse the resistive circuits with independent sources. (L4)
- Solve D.C. circuits by using KVL and KCL. (L3)

Unit-II

AC Circuits: Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power and power factor. Analysis of single-phase ac circuits consisting of R, L, C, and RL, RC, RLC combinations (series only). Resonance: Series and parallel circuits, Bandwidth and Q-factor.

Learning Outcomes:

At the end of this unit, the student will be able to

- Develop an understanding of the fundamental laws and elements of A.C circuits. (L3)
- Learn the properties of Resonance for series and parallel combinations. (L2)
- Explain the concept of steady state. (L2)

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UNIT-III

Network theorems: Superposition theorem, Thevinin's theorem, Norton's theorems, Maximum power.transfer theorem, Tellegen's theorem, Compensation theorem, Milliman's theorem and Reciprocity theorem. (AC & DC)

Learning Outcomes:

At the end of this unit, the student will be able to

- Demonstrate knowledge of Various theorems in DC and AC. (L3)
- Determine various circuits using different theorems. (L5)
- Identify the theorems for simple circuits solving (L3)
- Illustrate the performance characteristics of different theorems. (L3)

UNIT-IV:

Poly-phase Circuits: Analysis of balanced and unbalanced 3-phase circuits, Star and delta connections, Measurement of three-phase power for balanced and unbalanced loads.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the energy properties of electric elements and the techniques to measure voltage and current. (L2)
- Perform the star and delta combinational three phase loads. (L3)
- Explain different types of loads. (L2)

UNIT-V

Coupled circuits: Concept of self and mutual inductance, Dot convention, Coefficientof coupling, Analysis of circuits with mutual inductance.

Topological Description of Networks: Graph, tree, chord, cut-set, incident matrix, circuit matrix and cut-set matrix.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand principles of concepts of coupled circuits. (L2)
- Perform elementary explanation for Topological description of networks. (L3)

Text Books:

1. Van Valkenburg M.E, ¯Network Analysis‖, Prentice Hall of India, 3 rd Edition, 2000
2. Ravish R Singh, ¯Network Analysis and Synthesis‖, McGrawHill, 2 nd Edition, 2019

Reference Books:

1. B. Subramanyam, ¯Electric Circuit Analysis‖, Dreamtech Press & Wiley, 2021.
2. James W.Nilsson, Susan A.Riedel, ¯Electric Circuits‖, Pearson, 11th Edition, 2020
3. Jagan N.C, Lakshrninarayana C., ¯Network Analysis‖, B.S. Publications, 3 rd Edition, 2014.
4. A Sudhakar, Shyammohan S Palli, ¯Circuits and Networks: Analysis and Synthesis‖, McGraw Hill, 5 th Edition, 2017.

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2210371: ENGINEERING DRAWING PRACTICE

	L	T	P	C
B.Tech. I Year – I Sem.	**1**	**0**	**4**	**3**

Pre-requisites: Knowledge in dimensions and units, Usage of geometrical instruments and analyticalability

Course objectives:

- To provide basic concepts in engineering drawing.
- To impart knowledge about standard principles of orthographic projection of objects.
- To draw sectional views and pictorial views of solids.

Course outcomes: After completion of the course the student is able to

- Familiarize with BIS standards and conventions used in engineering graphics. (L3)
- Draw various engineering curves e.g., ellipse, parabola, cycloids and involutes etc. andconstruct variousreduced scales e.g., plain and diagonal scale. (L2)
- Ability to draw orthographic projections and isometric projections of given engineering components.(L3)
- Visualize different views like elevation and plan for a given line, plane figures or solidobjects. (L2)
- Develop the lateral surfaces of simple solids. (L5)

Unit-I

Introduction To Engineering Drawing

Principles of Engineering Graphics and their Significance-Drawing Instruments and their Uses-Conventions in Drawing-BIS-Lettering and Dimensioning.

Geometrical Constructions: BisectingaLine, Arc.Dividing AL ineinto_ N‘ Equal Parts, Construction of Polygons, Division of Circleinto Equal Parts (8And12)

Construction of Scales: Plain and Diagonal Scale.

Conic Sections: Ellipse,Parabola,HyperbolaandRectangularHyperbola-GeneralMethodsonly.

Engineering Curves: Cycloid, Epicycloid, Hypocycloid.

Involutes: For Circle, Triangle, Square, Pentagon and Hexagon

LEARNING OUTCOME:

- To understand the basic standards, conventions of engineering drawing and how to use the instruments in drawing. (L1)
- Learn and draw the various types of curves used in engineering application. (L2)

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UNIT – 2

Orthographic Projections

Principles- Assumptions- Different Angles of Projection.
Projections of Points- Located in all the quadrants
Projections of Lines- Parallel, Perpendicular, inclined to one plane and inclined to bothplanes.
Projections of Planes: Simple and auxiliary position of a plane.

LEARNING OUTCOME:

- Knowledge in various planes of projections. (L1)
- To draw the front view, top view and side views of the given geometrical elements. (L2)

UNIT – 3

Projections Of Solids

Classification of solids- simple and inclined to one plane position of Prisms, Pyramids, Cylinder and Cone

LEARNING OUTCOME:

- To understand the various solid types. (L2)
- To draw all the views of the given solid in all possible orientations. (L3)

UNIT – 4

Section Of Solids

Types of Section Planes, Sectioning of Prisms, Pyramids, Cylinders and Cones.

Development Of surfaces

Development of surfaces of right Regular Solids- Parallel Line Method, Radial Line Method

LEARNING OUTCOME:

- Toidentifythecutsurfacesandrepresentthesectionalviewsgraphically when thesolidis sectioned. (L4)
- To develop the surfaces of solid using various methods. (L5)

UNIT – 5

Isometric Projections

Principles, Isometric Views of Planes, Solids- Box Method, Offset Method, Compound solids, Sectioned

Solids. Conversion of Isometric to Multi view projection. And vice versa

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LEARNING OUTCOME:

- Knowledge in principles of isometric projection. (L2)
- Conversion of isometric to orthographic and vice-versa. (L2)

TEXT BOOKS:

1. N.D.Bhatt, Elementary Engineering Drawing, Charotar Publishers,2012.
2. K.Veenugopal, -Engineering Drawing and Graphics + AutoCAD New Age International Pvt. Ltd, 2011.

REFERENCE BOOKS:

1. Engineering graphics with Auto CAD- R.B. Choudary/Anuradha Publishers Engineering Drawing- Johle/Tata Macgraw Hill.
2 Basanth Agrawal and C M Agrawal -Engineering Drawing 2nd Edition -McGraw-Hill Education (India) Pvt.Ltd.

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2210276: Elements of Electrical and Electronics Engineering Laboratory

B.Tech. I Year – I Sem.

L	T	P	C
0	0	2	1

Course Objectives:

To analyze a given network by applying various electrical laws and network theorems

- To know the response of electrical circuits for different excitations
- To calculate, measure and know the relation between basic electrical parameters.
- To analyze the performance characteristics of DC and AC electrical machines

Course Outcomes:

- Get an exposure to basic electrical laws.
- Understand the response of different types of electrical circuits to different excitations.
- Understand the measurement, calculation and relation between the basic electrical parameters
- Understand the basic characteristics of transformers and electrical machines.

List of experiments/demonstrations:

1. Verification of Ohms Law
2. Verification of KVL and KCL
3. Verification of superposition theorem.
4. Verification of Thevenin's and Norton's theorem.
5. Calculations and Verification of Impedance and Current of RL, RC and RLC series circuits.
6. Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single PhaseTransformer
7. Performance Characteristics of a Separately/Self Excited DC Shunt/Compound Motor.
8. Open Circuit and Short Circuit Tests on 1-phase Transformer

Any two experiments from the given list

9. Load Test on Single Phase Transformer (Calculate Efficiency and Regulation)
10. Verification of Reciprocity and Milliman's Theorem.
11. Verification of Maximum Power Transfer Theorem.
12. Determination of form factor for non-sinusoidal waveform
13. Transient Response of Series RL and RC circuits for DC excitation

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TEXTBOOKS:

1. D.P. Kothari and I. J. Nagrath, Basic Electrical Engineering, Tata McGraw Hill, 4th Edition, 2019.
2. MS Naidu and S Kamakshaiah, Basic Electrical Engineering, Tata McGraw Hill, 2nd Edition, 2008.

REFERENCE BOOKS:

1. P.Ramana, M.Suryakalavathi, G.T.Chandrasheker,Basic Electrical Engineering, S.Chand, 2nd Edition, 2019.

2. D. C. Kulshreshtha, Basic Electrical Engineering, McGraw Hill, 2009

3. M.S.Sukhija, T.K.Nagsarkar, ¯Basic Electrical and Electronics Engineering‖, Oxford, 1st Edition, 2012.

4. Abhijit Chakrabarthi, Sudipta Debnath, Chandan Kumar Chanda, ¯Basic Electrical Engineering‖, 2nd Edition, McGraw Hill, 2021.

5. L.S. Bobrow, Fundamentals of Electrical Engineering‖, Oxford University Press, 2011.
6. E.Hughes, Electrical and Electronics Technology‖, Pearson, 2010. 7. V. D. Toro, ¯Electrical Engineering Fundamentals‖, Prentice Hall India, 1989

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(AUTONOMOUS)

2210009: ENGINEERING CHEMISTRY LAB

B.Tech. I Year - I Semester **L T P C**
0 0 2 1

Course Objectives: The course consists of experiments related to the principles of chemistry requiredfor engineering student. The student will learn:

- Estimation of hardness of water to check its suitability for drinking purpose.
- Students are able to perform estimations of acids and bases using conductometry, potentiometry andpH metry methods.
- Students will learn to prepare polymers such as Bakelite and nylon-6 in the laboratory.
- Students will learn skills related to the lubricant properties such as saponification value, surfacetension and viscosity of oils.

Course Outcomes: The experiments will make the student gain skills on:

- Determination of parameters like hardness of water and rate of corrosion of mild steel in variousconditions.
- Able to perform methods such as conductometry, potentiometry and pH metry in order to find outthe concentrations or equivalence points of acids and bases.
- Students are able to prepare polymers like bakelite and nylon-6.
- Estimations saponification value, surface tension and viscosity of lubricant oils.

List of Experiments:

I. Volumetric Analysis: Estimation of Hardness of water by EDTA Complexometry method.
II. Conductometry: Estimation of the concentration of an acid by Conductometry.
III. Potentiometry: Estimation of the amount of Fe+2 by Potentiomentry.
IV. pH Metry: Determination of an acid concentration using pH meter.
V. Preparations:
1. Preparation of Bakelite.
2. Preparation Nylon – 6.

II. Lubricants:
1. Estimation of acid value of given lubricant oil.
2. Estimation of Viscosity of lubricant oil using Ostwald‘s Viscometer.

III. Corrosion: Determination of rate of corrosion of mild steel in the presence and absence of inhibitor.

IV. Virtual lab experiments
1. Construction of Fuel cell and its working.
2. Smart materials for Biomedical applications
3. Batteries for electrical vehicles.
4. Functioning of solar cell and its applications.

REFERENCE BOOKS:

1. Lab manual for Engineering chemistry by B. Ramadevi and P. Aparna, S Chand Publications, New Delhi (2022)
2. Vogel's text book of practical organic chemistry 5th edition
3. Inorganic Quantitative analysis by A.I. Vogel, ELBS Publications.
4. College Practical Chemistry by V.K. Ahluwalia, Narosa Publications Ltd. New Delhi (2007).

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2210571: PROGRAMMING FOR PROBLEM SOLVING LABORATORY

B.Tech. I Year - I Sem.

L	T	P	C
0	0	2	1

Course Objectives: The students will learn the following:

- To work with an IDE to create, edit, compile, run and debug programs
- To analyze the various steps in program development.
- To develop programs to solve basic problems by understanding basic concepts in C like operators, control statements etc.
- To develop modular, reusable and readable C Programs using the concepts like functions, arrays etc.
- To create, read from and write to text and binary files

Course Outcomes: The candidate is expected to be able to:

- Formulate the algorithms for simple problems
- Able to develop programs based on condition checking
- Implement pyramid programs
- Able to perform matrix applications
- Modularize the code with functions so that they can be reused

Course Objectives: The students will learn the following:

- To work with an IDE to create, edit, compile, run and debug programs
- To analyze the various steps in program development.
- To develop programs to solve basic problems by understanding basic concepts in C likeoperators, control statements etc.
- To develop modular, reusable and readable C Programs using the concepts like functions,arrays etc.
- To create, read from and write to text and binary files

Course Outcomes: The candidate is expected to be able to:

- Formulate the algorithms for simple problems
- Able to develop programs based on condition checking
- Implement pyramid programs
- Able to perform matrix applications
- Modularize the code with functions so that they can be reused
- Create, read and write to and from simple text and binary files

Simple numeric problems:

a. Write a program for the simple, compound interest.
b. Write a program to implement bit-wise operators.
c. Write a program for converting Fahrenheit to Celsius.
d. Write a simple program that converts one given data type to another using auto conversionand casting. Take the values from standard input.
e. Writeasimpleprogramtofindlargestoftwoandthreenumbersusingconditionaloperator.
f. Writeaprogramforswappingtwonumberswithandwithoutusingthirdvariableandusingbitwise operators

.

Condition branching and statements:

a. Write a program for finding larges of three numbers.
b. Write a program that declares Class awarded for a given percentage of marks, wheremarks<40%=Failed, 40% to<60% = Second class, 60% to<70%=First class, >=70%=Distinction. Read percentage from standard input.
c. Write a C program to find the roots of a Quadratic equation.
d. Write a C program, which takes two integer operands and one operator from the user, performs theoperation and then prints the result. (Consider the operators +,-,*, /, %and use Switch Statement)

Condition branching and loops:

a. Write a program to find whether the given number is a prime or not.
b. Write a C program to find the sum of individual digits of a positive integer and test given number is palindrome.
c. Write a program that prints a multiplication table for a given number and the number of rows in the table. For example, number=5 and no. of rows = 3, the output should be:

   5x1=5
   5x2=10
   5x3=15

d. Write a program that shows the binary equivalent of a given positive number between0to255.
e. A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.
f. Write a C program to generate all the prime numbers between 1 and n, where n is a value suppliedby the user.
g. Write a C program to calculate the following ,where x is a fractional value.$1-x/2+x^2/4-x^3/6$
h. Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression:$1+x+x^2+x^3+….+x^n$. For example: if n=3 and x=5, then the program compute1+5+25+125.
i. Write a C program to construct a pyramid of numbers as follows:

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1	*	1	1	*
12	**	23	22	**
123	***	456	333	***
			4444	**
				*

j. Write a C program to find given number is Armstrong number or not.
k. Write a C program to find given number is Perfect number or not.

Arrays, Strings, Pointers and Structures:

a. Write a C program to find the minimum, maximum and average in an array of integers.

b. Write a program to compute Mean, Variance, Standard Deviation, Sorting of n elements insingle dimension array.

c. Write a C program that perform the following:
   i. Addition of Two Matrices
   ii. Multiplication of Two Matrices
   iii. Transpose of a matrix with memory dynamically allocated for the new matrix as row andcolumn counts may not be same.

d. Write a C program that sorts a given array of names.

e. Write a C program that perform the following operations:
   i. To insert a sub-string into a given main string from a given position.
   ii. To delete n Characters from a given position in a given string.

f. Write a program for reading elements using pointer in to array and display the values using array.
g. Write a program for display values reverse order from array using pointer.
h. Write a program through pointer variable to sum of n elements from array.
i. Write a program to implement student information by using structure to function.
j. Write a program to sort student id or name using structures.

Functions:

a. Write a C program to find factorial of a given number using functions.
b. Write a C program to perform swapping using functions.
c. Write a C program to find LCM, GCD of two numbers using functions.
d. Write a C program to implement sorting using functions.
e. Write a C program to create and print two dimensional array using functions.
f. Write a C program to find factorial of a given number using recursion.
g. Write a C program to find Fibonacci series using recursion
h. Write a C program to implement Towers of Hanoi problem using recursion.

Files:

a. Write a C program to display the contents of a file to standard out put device.
b. Write a C program which copies one file to another, replacing all lower case characters with theirupper case equivalents.
c. Write a C program to count the occurrence of a character in a text file. The file name and thecharacter are supplied as command line arguments.
d. Write a C program to merge two files in to a third file (i.e. ,the contents of the first file followed bythose of these cond are put in the third file).

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CASE STUDY I: Develop Sample Student Data base

Create a structure to specify data on students given below: Roll number, Name, Department, Course, Yearof joining

Assume that there are not more than 15 students in the collage.

(a) Write a function to print names of all students who joined in a particular year.
(b) Write a function to print the data of a student whose roll number is given.

CASE STUDY 2: Perform simple Bank Transactions

Create a structure to specify data of customers in a bank. The data to be stored is: Account number,Name, Balance in account. Assume maximum of 20 customers in the bank.

(a) Write a function to print the Account number and name of each customer with balance below Rs.100.

(b) If a customer request for withdrawal or deposit, it is given in the form: Acct. no, amount, code (1for deposit, 0 for withdrawal)

Write a program to give a message, ¯The balance is insufficient for the specified with drawal‖.

CASE STUDY 3: Provide Serial Numbers for Engine parts

An automobile company has serial number for engine parts starting from AA0 to FF9. The other characteristics of parts to be specified in a structure are: Year of manufacture, material and quantity manufactured.

(a) Specify a structure to store information corresponding to a part.
(b) Retrieve information on parts with serial numbers between BB1 and CC6.

Reference Books

1. Byron Gottfried, Schaum"s Outline of Programming with C, Mc Graw-Hill
2. Let us C by YashavantKanetkar BPB publications(16thEdition)
3. B.A.ForouzanandR.F.GilbergCProgrammingandDataStructures,CengageLearning,(3rdEditi on)
4. BrianW.KernighanandDennisM.Ritchie,TheCProgrammingLanguage,PrenticeHallofIndia
5. R. G. Dromey, How to solve It by Computer, Pearson(16thImpression)
6. Programming in C, Stephen G.Kochan, Fourth Edition, and Pearson Education.
7. Herbert Schildt, C:TheCompleteReference, McGrawHill,4thEdition.

I–II

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AUTONOMOUS)

2220002: DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS(Common to all)

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

3 1 0 4

Pre-requisites: Mathematical Knowledge at pre-university level

Course Objectives: To learn

- Methods of solving the differential equations of first order and first degree.
- Concept of higher order liner differential equations.
- Concept, properties of Laplace transforms, solving ordinary differential equations by usingLaplace transforms techniques.
- The physical quantities involved in engineering field related to vector valued functions.
- The basic properties of vector valued functions and their applications to line, surfaceand volume integrals.

Course outcomes: After learning the contents of this paper the student able to

- Identify whether the given first order differential equation is exact
- Solve higher differential equation and apply the concept of differential equationto real world problems.
- Use the Laplace transforms techniques for solving ODE's.
- Apply the Del operator to scalar and vector point functions.
- Evaluate the line, surface and volume integrals and converting them from one to another.

UNIT-I: First Order ODE

Exact differential equations, Equations reducible to exact differential equations, linear and Bernoulli's equations, Orthogonal Trajectories (only in Cartesian Coordinates). Applications: Newton's law of cooling, Law of natural growth and decay.

UNIT-II: Ordinary Differential Equations of Higher Order

Second order linear differential equations with constant coefficients: Non-Homogeneous terms of the type eax, sin ax , cos ax, polynomials in x, eax V(x) and x V(x), method of variation of parameters, Equations reducible to linear ODE with constant coefficients: Legendre's equation, Cauchy-Euler equation.

UNIT-III: Laplace transforms

Laplace Transforms: Laplace Transform of standard functions, First shifting theorem, Second shifting theorem, Unit step function, Dirac delta function, Laplace transforms of functions when they are multiplied and divided by _t', Laplace transforms of derivatives and integrals of function, Evaluation of integrals by Laplace transforms, Laplace transform of periodic functions, Inverse Laplace transform by different methods, convolution theorem (without proof). Applications: solving Initial value problems by Laplace Transform method.

UNIT-IV: Vector Differentiation

Vector point functions and scalar point functions, Gradient, Divergence and Curl, Directional derivatives, Vector Identities, Scalar potential functions, Solenoidal and Irrotational vectors.

UNIT-V:Vector Integration

Line, Surface and Volume Integrals, Theorems of Green, Gauss and Stokes (without proofs) and their applications.

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition,2010
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5th Edition,2016.

REFERENCE BOOKS:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9thEdition, John Wiley & Sons, 2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
3. H. K. Dassand Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and Company Limited, NewDelhi.

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(AUTONOMOUS)

2220008: APPLIED PHYSICS

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

3 1 0 4

Prerequisites: 10 + 2 Physics

Course Objectives: The objectives of this course for the student are to:

- Understand the basic principles of quantum physics and band theory of solids.
- Understand the underlying mechanism involved in construction and working principles ofvarious semiconductor devices.
- Study the fundamental concepts related to the dielectric, magnetic and energy materials.
- Identify the importance of nanoscale, quantum confinement and various fabricationstechniques.
- Study the characteristics of lasers and optical fibres.
-

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

- Understand physical world from fundamental point of view by the concepts of Quantum
- mechanics and visualize the difference between conductor, semiconductor, and an insulator byclassification of solids.
- Identify the role of semiconductor devices in science and engineering Applications.
- Explore the fundamental properties of dielectric, magnetic materials and energy for theirapplications.
- Appreciate the features and applications of Nanomaterials.
- Understand various aspects of Lasers and Optical fiber and their applications in diverse fields.

UNIT - I: QUANTUM PHYSICS AND SOLIDS

Quantum Mechanics: Introduction to quantum physics, Blackbody radiation, Photoelectric effect, de-Broglie Hypothesis, Matter waves, Davisson and Germer experiment, Heisenberg uncertainty principle, Born interpretation of the wave function, Time independent Schrodinger‘s wave equation, Particle in one dimensional potential box.
Solids: Free electron theory (Drude & Lorentz, Sommerfeld) (qualitative), Bloch‘s theorem -Kronig-Penney model, Effective mass of an electron, Origin of energy bands, Classification of solids

UNIT - II: SEMICONDUCTORS AND DEVICES

Intrinsic and Extrinsic semiconductors, Hall effect, Direct and Indirect band gap semiconductors, Construction, Principle of operation and characteristics of P-N Junction diode, Zener diode and bipolar junction transistor (BJT) - LED, PIN diode, Avalanche photo diode (APD) and solar cells, their structure, Materials, Working principle and characteristics.

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UNIT - III: DIELECTRIC, MAGNETIC AND ENERGY MATERIALS

Dielectric Materials: Basic definitions, Types of polarizations (qualitative), Ferroelectric, Piezoelectric, and Pyroelectric materials, Applications.
Magnetic Materials: Domain theory of ferromagnetism, Soft and Hard magnetic materials, Magnetostriction, Magnetoresistance, Applications.
Energy Materials: Conductivity of liquid and solid electrolytes, Superionic conductors, Materials and electrolytes for super capacitors.

UNIT - IV: NANOTECHNOLOGY

Nanoscale, Quantum confinement, Surface to volume ratio, Bottom-up fabrication: Sol-gel, precipitation methods, Top-down fabrication: Ball milling, Physical vapor deposition (PVD), Characterization techniques: XRD, SEM and TEM, Applications of nano materials.

UNIT - V: LASER AND FIBER OPTICS

Lasers: Laser beam characteristics, Three quantum processes, Einstein coefficients and their relations, Lasing action, Population inversion, Pumping methods, Ruby laser, He-Ne laser, Nd:YAG laser, Applications of laser.
Fiber Optics: Introduction to optical fibers, Total internal reflection, Construction of optical fiber, Classification of optical fibers, Acceptance angle - Numerical aperture, Losses in optical fibers, Optical fiber for communication system, Applications of optical fibers.

TEXT BOOKS:

1. M. N. Avadhanulu, P.G. Kshirsagar & TVS Arun Murthy‖ A Text book of EngineeringPhysics‖, S. Chand Publications, 11th Edition 2019.
2. Engineering Physics by Shatendra Sharma and Jyotsna Sharma, Pearson Publication,2019
3. Semiconductor Physics and Devices- Basic Principle – Donald A, Neamen, Mc Graw Hill,4th Edition, 2021.
4. B.K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning, 2nd Edition,2022.
5. Essentials of Nanoscience & Nanotechnology by Narasimha Reddy Katta, TypicalCreatives NANO DIGEST, 1st Edition, 2021.

REFERENCE BOOKS:

1. Quantum Physics, H.C. Verma, TBS Publication, 2nd Edition 2012.
2. Fundamentals of Physics – Halliday, Resnick and Walker, John Wiley &Sons,11th Edition,2018.
3. Introduction to Solid State Physics, Charles Kittel, Wiley Eastern, 2019.
4. Elementary Solid State Physics, S.L. Gupta and V. Kumar, Pragathi Prakashan, 2019.
5. A.K. Bhandhopadhya - Nano Materials, New Age International, 1stEdition, 2007.
6. Energy Materials a Short Introduction to Functional Materials for Energy Conversion and Storage Aliaksandr S. Bandarenka, CRC Press Taylor & Francis Group
7. Energy Materials, Taylor & Francis Group, 1st Edition, 2022.

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(AUTONOMOUS)

2220372: ENGINEERING WORK SHOP

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

1 0 3 2.5

Course Objectives:

- To Study of different hand operated power tools, uses and their demonstration.
- To gain a good basic working knowledge required for the production of various engineeringproducts.
- To provide hands on experience about use of different engineering materials, tools,equipments and processes those are common in the engineering field.
- To develop a right attitude, team working, precision and safety at work place.
- It explains the construction, function, use and application of different working tools,Equipment and machines

Course Outcomes:

- Explain the design and model different prototypes in the carpentry trade such as Cross lapjoint, Dove tail joint. (L4)
- Demonstrate the design and model various basic prototypes in the trade of fitting such asStraight fit, V- fit. (L4)
- Understand to make various basic prototypes in the trade of Tin smithy such as rectangulartray, and open Cylinder. (L4)
- Demonstrate the design and model various basic prototypes in the trade of Welding. (L4)
- Explain to make various basic prototypes in the trade of Black smithy such as J shape, and S shape. (L4)
- Understand to perform various basic House Wiring techniques such as connecting one lamp with one switch, connecting two lamps with one switch, connecting a fluorescent tube, Series wiring, Go down wiring. (L4)

UNIT I - CARPENTRY & FITTING

- **Carpentry** – Introduction, Carpentry tools, sequence of operations and applications (T-LapJoint, Dovetail Joint, Mortise & Tenon Joint)
- **Fitting** – Introduction, fitting tools, sequence of operations and applications (V-Fit, DovetailFit & Semi-circular fit)

Learning Outcomes**:** Students should be able to,

- Understand the trade of carpentry and fitting. (L2)
- Explain the tools involved in manufacturing operations. (L3)
- Evaluate the applications of carpentry and fitting. (L4)

UNIT II - TIN SMITHY AND BLACKSMITHY

- **Tin-Smithy** – Introduction, Tin smithy tools, sequence of operations and applications (SquareTin, Rectangular Tray & Conical Funnel).
- **Blacksmithy-** Introduction, Blacksmithy tools, sequence of operations and applications (Roundto Square, Fan Hook and S-Hook)

Learning Outcomes**:**Students should be able to,

- Understand the oldest manufacturing methods. (L2)
- Describe the sequence of operations involved. (L3)
- Explain the safety precautions and tools usage. (L4)

UNITIII - HOUSE WIRING AND WELDING

- **House-wiring** – Introduction, Electrical wiring tools, sequence of operations and applications(Parallel & Series, Two-way Switch and Tube Light)
- **Welding Practice** – Introduction, electrode, welding tools, and sequence of operations.Advantages and applications (Arc Welding)

Learning Outcomes:

- Students should be able to,
- Discuss the topic of Heat engines.(L3)
- Identify types of Heat engines cycles.(L5)
- Evaluate the Factors affecting routing procedure, Route Sheet.(L4)

Text Books:

1. Workshop Practice /B. L. Juneja / Cengage
2. Workshop Manual / K. Venugopal / Anuradha.

References:

1. Work shop Manual – P. Kannaiah/ K. L. Narayana/ SciTech
2. Workshop Manual / Venkat Reddy/ BSP

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(AUTONOMOUS)

2220010: English for Skill Enhancement

B.Tech. I Year-II Sem

L	T	P	C
2	0	0	2

Course Objectives: This course will enable the students to:

- Improve the language proficiency of students in English with an emphasis on Vocabulary,Grammar, Reading and Writing skills.
- Develop study skills and communication skills in various professional situations.
- Equip students to study engineering subjects more effectively and critically using thetheoretical and practical components of the syllabus.

Course Outcomes: Students will be able to:

- Understand the importance of vocabulary and sentence structures.
- Choose appropriate vocabulary and sentence structures for their oral andwrittencommunication.
- Demonstrate their understanding of the rules of functional grammar.
- Develop comprehension skills from the known and unknown passages.
- Take an active part in drafting paragraphs, letters, essays, abstracts, précis andreports invarious contexts.
- Acquire basic proficiency in reading and writing modules of English.

UNIT - I

Chapter entitled _***Toasted English*' by R.K.Narayan** from ***"English: Language, Context andCulture"*** published by Orient BlackSwan, Hyderabad.

Vocabulary: The Concept of Word Formation -The Use of Prefixes and Suffixes - Acquaintance with Prefixes and Suffixes from Foreign Languages to form Derivatives - Synonyms and Antonyms

Grammar: Identifying Common Errors in Writing with Reference to Articles and Prepositions.

Reading: Reading and Its Importance- Techniques for Effective Reading.

Writing: Sentence Structures -Use of Phrases and Clauses in Sentences- Importance of Proper Punctuation- Techniques for Writing precisely – Paragraph Writing – Types, Structures and Features of a Paragraph - Creating Coherence- Organizing Principles of Paragraphs in Documents.

UNIT - II

Chapter entitled **'Appro JRD' by Sudha Murthy** from ***"English: Language, Context and Culture"published*** by Orient BlackSwan, Hyderabad.

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Vocabulary: Words Often Misspelt - Homophones, Homonyms and Homographs

Grammar: Identifying Common Errors in Writing with Reference to Noun-pronounAgreementand Subject-verb Agreement.

Reading: Sub-Skills of Reading – Skimming and Scanning – Exercises for Practice

Writing: Nature and Style of Writing- Defining /Describing People, Objects, Places andEvents – Classifying- Providing Examples or Evidence.

UNIT - III

Chapter entitled **'Lessons from Online Learning' by F.Haider Alvi, Deborah Hurst et al** from ***"English: Language, Context and Culture"*** published by Orient BlackSwan, Hyderabad. **Vocabulary**: Words Often Confused - Words from Foreign Languages and their Use in English.**Grammar:** Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses.

Reading: Sub-Skills of Reading – Intensive Reading and Extensive Reading – Exercises forPractice.

Writing: Format of a Formal Letter-Writing Formal Letters E.g.., Letter of Complaint,Letter ofRequisition, Email Etiquette, Job Application with CV/Resume.

UNIT - IV

Chapter entitled **'Art and Literature' by Abdul Kalam** from ***"English: Language, Context andCulture"*** published by Orient BlackSwan, Hyderabad.

Vocabulary: Standard Abbreviations in English

Grammar: Redundancies and Clichés in Oral and Written Communication.

Reading: Survey, Question, Read, Recite and Review (SQ3R Method) - Exercises for Practice**Writing:** Writing Practices- Essay Writing-Writing Introduction and Conclusion -Précis Writing.

UNIT - V

Chapter entitled **'Go, Kiss the World' by Subroto Bagchi** from ***"English: Language, Context andCulture"*** published by Orient BlackSwan, Hyderabad.

Vocabulary: Technical Vocabulary and their Usage

Grammar: Common Errors in English (*Covering all the other aspects of grammar which werenotcovered in the previous units*)

Reading: Reading Comprehension-Exercises for Practice

Writing: Technical Reports- Introduction – Characteristics of a Report – Categories of Reports Formats- Structure of Reports (Manuscript Format) -Types of Reports - Writing a Report.

Note: *Listening and Speaking Skills which are given under Unit-6 in AICTE Model Curriculum arecovered in the syllabus of ELCS Lab Course.*

- **Note: 1**. As the syllabus of English given in AICTE *Model Curriculum-2018 for B.Tech FirstYear is* ***Open-ended,*** besides following the prescribed textbook, it is required to prepare teaching/learning materials **by the teachers collectively** in the form of handouts based on theneeds of the students in their respective colleges for effective teaching/learning in the class.

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- **Note**: **2**.Based on the recommendations of NEP2020, teachers are requested to be flexible to adopt Blended Learning in dealing with the course contents .They are advised to teach 40 percent of each topic from the syllabus in blended mode.

TEXT BOOK:

1. English: Language, Context and Culture‖ by Orient BlackSwan Pvt. Ltd, Hyderabad. 2022. Print.

REFERENCE BOOKS:

1. Effective Academic Writing by Liss and Davis (OUP)
2. Richards, Jack C. (2022) Interchange Series. Introduction, 1,2,3. Cambridge University Press
3. Wood, F.T. (2007). Remedial English Grammar. Macmillan.
4. Chaudhuri, Santanu Sinha. (2018). Learn English: A Fun Book of Functional Language,Grammar and Vocabulary. (2nd ed.,). Sage Publications India Pvt. Ltd.
5. (2019). Technical Communication. Wiley India Pvt. Ltd.
6. Vishwamohan, Aysha. (2013). English for Technical Communication for EngineeringStudents. Mc Graw-Hill Education India Pvt. Ltd.
7. Swan, Michael. (2016). Practical English Usage. Oxford University Press. Fourth Edition

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AUTONOMOUS)

2220222: ELECTRICAL CIRCUIT ANALYSIS – II

B.Tech. I Year-II-Sem

L	T	P	C
2	0	0	2

Course Prerequisite: Mathematics

Course Objectives:

- To understand transient analysis of various R, L and C circuits for different inputs.
- To analyze transients in the Fourier series and Laplace transformation.
- To learn about two-port networks and concept of filters

Course Outcomes: At the end of this course, students will demonstrate the ability to

- Observe the response of various R, L and C circuits for different excitations.
- Obtain the transient and steady-state response of electrical circuits.
- Examine the behavior of circuits using Fourier, Laplace transforms and transfer function of singleport network.
- Obtain two port network parameters and applications and design of various filters.

UNIT - I

Transient analysis: Transient response of R, L & C circuits, Formulation of integral differential equations, Initial conditions, Transient Response of RL, RC and RLC (series and parallel) networks subjected to internal energy, Response to impulse, step, and ramp, exponential and sinusoidal excitations.

Learning Outcomes:

At the end of this unit, the student will be able to

- Determine the Transient Response of RL, RC and RLC.
- Apply transient response w.r.t various excitations to find the response of a network.
- Analyze the concept of initial conditions.

UNIT - II

Electrical circuit Analysis using Laplace Transforms: Application of Laplace Transforms to RL, RC and RLC (series and parallel) Networks for impulse, step, and ramp, exponential and sinusoidal excitations.

Learning Outcomes:

At the end of this unit, the student will be able to

- Evaluate the response of Laplace transforms for various excitations.
- Illustrate the analysis response of different electrical circuits.

UNIT - III

Two port network parameters: Open circuit impedance, short-circuit admittance, Transmission, Hybrid parameters & inter-relationships, Series, parallel and cascade connection of two port networks, System function, and Impedance and admittance functions.

Learning Outcomes:

At the end of this unit, the student will be able to

- Analyze AC circuits using series, parallel cascade connections.
- Illustrate two port networks.

Understand impedance combinations

UNIT - IV

Fourier Series and Integral: Fourier series representation of periodic functions, Symmetry conditions, Exponential Fourier series, Discrete spectrum, Fourier integral and its properties, Continuous spectrum, Application to simple networks.

Learning Outcomes:

At the end of this unit, the student will be able to

- Find the response using Fourier series method.
- Analyse thediscrete spectrum and integral functions.
- Evaluate the analysis of continuous spectrum.

UNIT - V

Filters: Classification of filters – Low pass, High pass, Band pass and Band Elimination, Constant-k and M-derived filters-Low pass and High pass Filters and Band pass and Band elimination filters (Elementary treatment only).

Learning Outcomes:

At the end of this unit, the student will be able to

- Analyze the classification of filters.
- Understand the different types of filters.

TEXT BOOKS:

1. Van Valkenburg M.E, ―Network Analysis‖, Prentice Hall of India, 3 rd Edition, 2000.

2. Ravish R Singh, ―Network Analysis and Synthesis‖, McGrawHill, 2 nd Edition, 2019.

REFERENCE BOOKS:

1. B. Subramanyam, ―Electric Circuit Analysis‖, Dreamtech Press & Wiley, 2021.

2. James W. Nilsson, Susan A.Riedel, ―Electric Circuits‖, Pearson, 11th Edition, 2020

3. A Sudhakar, Shyammohan S Palli,―Circuits and Networks: Analysis and Synthesis‖, McGraw Hill, 5 th Edition, 2017

4. Jagan N.C, Lakshrninarayana C.,―Network Analysis‖, B.S. Publications, 3 rd Edition, 2014.

5. William Hayt H,Kimmerly Jack E. and Steven Durbin M, ―Engineering Circuit Analysis‖, McGraw Hill, 6 th Edition, 2002.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AUTONOMOUS)

2220572: DATA STRUCTURES LABORATORY

I Year B.Tech. II – Sem.

L	T	P	C
0	1	2	2

.**Prerequisites:** A Course on ¯Programming for problem solving.

Course Objectives:

- It covers various concepts of C programming language
- It introduces searching and sorting algorithms
- It provides an understanding of data structures such as stacks and queues.

Course Outcomes:

- Ability to develop C programs for computing and real life applications using basic
- elements like control statements, arrays, functions, pointers and strings, and data
- structures like stacks, queues and linked lists.
- Ability to Implement searching and sorting algorithms

List of Experiments

1. Write a program that uses functions to perform the following operations on singly linked list.: i)Creation ii) Insertion iii) Deletion iv) Traversal
2. Write a program that uses functions to perform the following operations on doubly linked list.: i)Creation ii) Insertion iii) Deletion
3. Write a program that uses functions to perform the following operations on circularlinked list: i) Creation ii) Insertion iii) Deletion
4. Write a program that implement stack operations using i) Arrays ii) Pointers
5. Write a c program to implement infix to postfix conversion using stack.
6. Write a c program to implement postfix evaluation.
7. Write a program that implement Queue operations using i) Arrays ii) Pointers
8. Write a program that implements the following sorting methods to sort a given list ofIntegers in ascending order i) Bubble sort ii) Selection sort iii) Insertion sort
9. Write a program that implements the following sorting methods to sort a given list ofIntegers in ascending order i) Merge sort ii) Quick sort
10. Write a program that use both recursive and non-recursive functions to perform theFollowing searching operations for a Key value in a given list of integers:
    i) Linear search ii).Binary search
11. Write a program to implement the tree traversal methods
12. Write a program to implement the graph traversal methods.

CASE STUDY-1 Balanced Brackets

A bracket is considered to be any one of the following characters: (,), {, }, [, or].

Two brackets are considered to be a matched pair if the an opening bracket (i.e., (, [, or {) occurs to the left of a closing bracket (i.e.,),], or }) of the exact same type. There are three types of matched pairs of brackets: [], {}, and ().

A matching pair of brackets is not balanced if the set of brackets it encloses are not matched. For example, {[(])} is not balanced because the contents in between { and } are not balanced. The pair of square brackets encloses a single, unbalanced opening bracket, (, and the pair of parentheses encloses a single, unbalanced closing square bracket,].

By this logic, we say a sequence of brackets is balanced if the following conditions are met:

- It contains no unmatched brackets.
- The subset of brackets enclosed within the confines of a matched pair of brackets is also a matched pair of brackets**.**

Given strings of brackets, determine whether each sequence of brackets is balanced. If a string is balanced, return YES. Otherwise, return NO.

CASE STUDY-2 Minimum Average Waiting Time

Mr. Raju owns a pizza restaurant and he manages it in his own way. While in a normal restaurant, a customer is served by following the first-come, first-served rule, Raju simply minimizes the average waiting time of his customers. So he gets to decide who is served first, regardless of how sooner or later a person comes.

Different kinds of pizzas take different amounts of time to cook. Also, once he starts cooking a pizza, he cannot cook another pizza until the first pizza is completely cooked. Let's say we have three customers who come at time t=0, t=1, & t=2 respectively, and the time needed to cook their pizzas is 3, 9, & 6 respectively. If Raju applies first-come, first-served rule, then the waiting time of three customers is 3, 11, & 16 respectively. The average waiting time in this case is (3 + 11 + 16) / 3 = 10. This is not an optimized solution. After serving the first customer at time t=3, Raju can choose to serve the third customer. In that case, the waiting time will be 3, 7, & 17 respectively. Hence the average waiting time is (3 + 7 + 17) / 3 = 9.

Help Raju achieve the minimum average waiting time. For the sake of simplicity, just find the integer part of the minimum average waiting time.

Note:

- The waiting time is calculated as the difference between the time a customer orders pizza (the time at which they enter the shop) and the time she is served.
- Cook does not know about the future orders.

TEXT BOOKS:

1. Fundamentals of data structures in C, E.Horowitz, S.Sahni and Susan Anderson Freed, 2nd Edition, Universities Press.
2. Data structures using C, A.S.Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/pearson education.

REFERENCES:

1. Data structures: A Pseudocode Approach with C, R.F.GilbergAndB.A.Forouzan, 2nd Edition, Cengage Learning.
2. Introduction to data structures in C, Ashok Kamthane, 1st Edition, PEARSON

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

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2220071: APPLIED PHYSICS LABORATORY

B.Tech. I Year-II-Sem

L	T	P	C
0	0	3	1.5

Course Objectives: The objectives of this course for the student to

- Capable of handling instruments related to the Hall effect and photoelectric effect Experiments and their measurements.
- Understand the characteristics of various devices such as PN junction diode, Zener diode, BJT, LED, solar cell, lasers and optical fiber and measurement of energy gap and Resistivity of semiconductor materials.
- Able to measure the characteristics of dielectric constant of a given material.
- Study the behavior of B-H curve of ferromagnetic materials.
- Understanding the method of least squares fitting.

Course Outcomes: The students will be able to:

- Know the determination of the Planck's constant using Photo electric effect and identify the material whether it is n-type or p-type by Hall experiment.
- Appreciate quantum physics in semiconductor devices and optoelectronics.
- Gain the knowledge of applications of dielectric constant.
- Understand the variation of magnetic field and behavior of hysteresis curve.
- Carried out data analysis.

LIST OF EXPERIMENTS:

1. Determination of work function and Planck's constant using photoelectric effect.
2. Determination of Hall co-efficient and carrier concentration of a given semiconductor.
3. Characteristics of series and parallel LCR circuits.
4. V-I characteristics of a p-n junction diode and Zener diode.
5. Input and output characteristics of BJT (CE, CB & CC configurations).
6. V-I and L-I characteristics of light emitting diode (LED) and LASER.
7. V-I Characteristics of solar cell.
8. Determination of Energy gap of a semiconductor.
9. To determine the time constant of R-C circuit.
10. Determination of Acceptance Angle and Numerical Aperture of an optical fiber.
11. Understanding the method of least squares – Torsional pendulum as an example.
12. Determination of magnetic field induction along the axis of a current carrying coil.

REFERENCE BOOK:

1. S. Balasubramanian, M.N. Srinivasan ―A Text book of Practical Physics‖- S Chand Publishers, 2017.

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2220073: English Language and Communication Skills Laboratory

B.Tech. I Year-II-Sem

L	T	P	C
0	0	2	1

Course Objective

- To facilitate computer-assisted multi-media instruction enabling individualize 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 students‘ pronunciation ofEnglish by providing an opportunity for practice in speaking
- To improve the fluency of students in spoken English and neutralize the impact ofdialects.
- To train students to use language appropriately for public speaking, group discussions and interviews

Course Outcomes: Students will be able to:

- Understand the nuances of English language through audio- visual experience and group activities
- Neutralise their accent for intelligibility
- Speak with clarity and confidence which in turn enhances their employability skills

Syllabus: English Language and Communication Skills Lab (ELCS) shall have two parts:

a. Computer Assisted Language Learning (CALL) Lab
b. Interactive Communication Skills (ICS) Lab

Listening Skills:

Objectives

1. To enable students develop their listening skills so that they may appreciate the 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 and find the distinction between different sounds, to be able 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 involve students in speaking activities in various contexts
2. To enable students express themselves fluently and appropriately in social and professionalcontexts

- Oral practice
- Describing objects/situations/people
- Role play – Individual/Group activities
- Just A Minute (JAM) Sessions

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

Exercise – ICALL Lab:
Understand: Listening Skill- Its importance – Purpose- Process- Types- Barriers- Effective Listening.
Practice: Introduction to Phonetics – Speech Sounds – Vowels and Consonants – Minimal Pairs- Consonant Clusters- Past Tense Marker and Plural Marker- Testing Exercises
ICS Lab:
Understand: Spoken vs. Written language- Formal and Informal English.
Practice: Ice-Breaking Activity and JAM Session- Situational Dialogues – Greetings – Taking Leave – Introducing Oneself and Others.

Exercise – IICALL Lab:
Understand: Structure of Syllables – Word Stress– Weak Forms and Strong Forms – Stress pattern in sentences – Intonation.
Practice: Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms- Stress patternin sentences – Intonation - Testing Exercises
ICS Lab:
Understand: Features of Good Conversation – Strategies for Effective Communication. Practice: Situational Dialogues – Role Play- Expressions in Various Situations –Making Requestsand Seeking Permissions - Telephone Etiquette.

Exercise - IIICALL Lab:
Understand: Errors in Pronunciation-Neutralising Mother Tongue Interference (MTI).
Practice: Common Indian Variants in Pronunciation – Differences between British and AmericanPronunciation –Testing Exercises
ICS Lab:
Understand: Descriptions- Narrations- Giving Directions and Guidelines – Blog Writing
Practice: Giving Instructions – Seeking Clarifications – Asking for and Giving Directions – Thankingand Responding – Agreeing and Disagreeing – Seeking and Giving Advice – Making Suggestions.

Exercise – IVCALL Lab:
Understand: Listening for General Details.
Practice: Listening Comprehension Tests - Testing Exercises

ICS Lab:
Understand: Public Speaking – Exposure to Structured Talks - Non-verbal Communication- Presentation Skills.
Practice: Making a Short Speech – Extempore- Making a Presentation.

Exercise – VCALL Lab:

Understand: Listening for Specific Details.
Practice: Listening Comprehension Tests -Testing Exercises

ICS Lab:
Understand: Group Discussion
Practice: Group Discussion

Minimum Requirement of infrastructural facilities for ELCS Lab:

1. Computer Assisted Language Learning (CALL) Lab:

The Computer Assisted Language Learning Lab has to accommodate 40 students with 40 systems, with one Master Console, LAN facility and English language learning software for self- study by students.
System Requirement (Hardware component):
Computer network with LAN facility (minimum 40 systems with multimedia) with the followingspecifications:
i) Computers with Suitable Configuration
ii) High Fidelity Headphones

2. Interactive Communication Skills (ICS) Lab :

The Interactive Communication Skills Lab: A Spacious room with movable chairs and audio- visual aids with a Public Address System, a T. V. or LCD, a digital stereo –audio & video system and camcorder etc.
Source of Material (Master Copy):
- Exercises in Spoken English. Part 1,2,3. CIEFL and Oxford University Press

Note: Teachers are requested to make use of the master copy and get it tailor-made to suit the contents of the syllabus.

Suggested Software:
- Cambridge Advanced Learners' English Dictionary with CD.
- Grammar Made Easy by Darling Kindersley.
- Punctuation Made Easy by Darling Kindersley.
- Oxford Advanced Learner's Compass, 10th Edition.
- English in Mind (Series 1-4), Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
- English Pronunciation in Use (Elementary, Intermediate, Advanced) Cambridge UniversityPress.
- English Vocabulary in Use (Elementary, Intermediate, Advanced) Cambridge UniversityPress.
- TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS).
- Digital All
- Orell Digital Language Lab (Licensed Version)

REFERENCE BOOKS:

1. (2022). English Language Communication Skills – Lab Manual cum Workbook.
CengageLearning India Pvt. Ltd.
2. Shobha, KN & Rayen, J. Lourdes. (2019). Communicative English – A workbook.
CambridgeUniversity Press
3. Kumar, Sanjay & Lata, Pushp. (2019). Communication Skills: A Workbook. Oxford UniversityPress

4. Board of Editors. (2016). ELCS Lab Manual: A Workbook for CALL and ICS Lab Activities. Orient Black Swan Pvt. Ltd.
5. Mishra, Veerendra et al. (2020). English Language Skills: A Practical Approach. CambridgeUniversity Press

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AUTONOMOUS)

2220277: ELECTRICAL CIRCUIT ANALYSIS LAB

B.Tech. I Year – II Sem **L T P C**
0 0 2 1

Prerequisite: Elements of Electrical Engineering & Electrical Circuit Analysis

Course Objectives:
- To design electrical systems
- To analyze a given network by applying various Network Theorems
- To measure three phase Active and Reactive power.
- To understand the locus diagrams

Course Outcomes: After Completion of this lab the student is able to
- Analyze complex DC and AC linear circuits
- Apply concepts of electrical circuits across engineering
- Evaluate response in a given network by using theorems

The following experiments are required to be conducted as compulsory experiments
1. Locus Diagrams of RL and RC Series Circuits
2. Verification of Series and Parallel Resonance
3. Time response of first order RC / RL network for periodic non – sinusoidal inputs – Time constant
4. Two port network parameters – Z – Y parameters, Analytical verification.
5. Two port network parameters – A, B, C, D & Hybrid parameters, Analytical verification
6. Determination of Self and Mutual inductance in a Coupled Circuit, Co-efficient of Coupling.
7. Frequency domain analysis of Low-pass filter
8. Frequency domain analysis of Band-pass filter

Any two of the experiments from the following list are required to be conducted

9. Harmonic Analysis of non-sinusoidal waveform signals using Harmonic Analyzer and plotting frequency spectrum.
11. Determination of Two port network parameters -Hybrid parameters.
12. To draw the locus Diagrams of RL (L-Varying) and RC (C-Varying) Series Circuits.
13. Determination of Time response of first order RLC circuit for periodic non – sinusoidal inputs – Time Constant and Steady state error

TEXT BOOKS:

1. M. E. Van Valkenburg, ¯Network Analysis‖, Prentice Hall, 2006.
2. D. Roy Choudhury, ¯Networks and Systems‖, New Age International Publications, 1998.

REFERENCES:

1. W. H. Hayt and J. E. Kemmerly, ¯Engineering Circuit Analysis‖, McGraw Hill Education, 2013.
2. C. K. Alexander and M. N. O. Sadiku, ¯Electric Circuits‖, McGraw Hill Education, 2004.
3. K. V. V. Murthy and M. S. Kamath, ¯Basic Circuit Analysis‖, Jaico Publishers, 1999.

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2220021: ENVIRONMENTAL SCIENCE

B.Tech. I Year - II Sem

L	T	P	C
3	0	0	0

Course Objectives:

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

Course 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

UNIT - I

Ecosystems: Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity, Field visits.

UNIT - II

Natural Resources: Classification of Resources: Living and Non-Living resources, water resources: use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources, Land resources: Forest resources, Energy resources: growing energy needs, renewable and non-renewable energy sources, use of alternate energy source, case studies.

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. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In- Situ and Ex-situ conservation. National Biodiversity act.

UNIT - IV

Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, Air Pollution: Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. Water pollution: Sources and types of pollution, drinking water quality standards. Soil Pollution: Sources and types, Impacts of modern agriculture, degradation of soil.

Noise Pollution: Sources and Health hazards, standards, Solid waste: Municipal Solid Waste management, composition and characteristics of e-Waste and its management. Pollution control technologies: Wastewater Treatment methods: Primary, secondary and Tertiary. Overview of air pollution control technologies, Concepts of bioremediation. Global Environmental Issues and Global Efforts: Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol. NAPCC-GoI Initiatives.

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UNIT – V

Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water,R22 B.Tech. ECE Syllabus JNTU HYDERABAD biological and Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP).

Towards Sustainable Future: Concept of Sustainable Development Goals, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

TEXT BOOKS:

1 Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
2 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. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.
6. Introduction to Environmental Science by Y. Anjaneyulu, BS. Publications

II-I

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AUTONOMOUS)

2230223: POWER SYSTEMS-I

B.Tech. II Year - I Sem

L	T	P	C
3	0	0	3

Prerequisite: Electrical Circuit Analysis-1 & Electrical Circuit Analysis-2 Electrical Machines-I & Electrical Machines-II

Course Objectives:

- To understand the different types of power generating stations.
- To examine A.C. and D.C. distribution systems.
- To understand and compare overhead line insulators and Insulated cables
- To illustrate the economic aspects of power generation and tariff methods.
- To evaluate the transmission line parameters calculations
- To understand the concept of corona

Course Outcomes

After completion of this course the student is able to

- Understand the concepts of power systems
- Understand the operation of conventional generating stations and renewable sources of electrical power
- Evaluate the power tariff methods.
- Determine the electrical circuit parameters of transmission lines
- Understand the layout of substation and underground cables and Corona

UNIT-I Generation of Electric Power:

Conventional Sources (Qualitative): Hydro station, steam power plant, Nuclear Power Plant and gas turbine Plant. Non-Conventional sources (Qualitative): ocean Energy, tidal Energy, Wave Energy, wind Energy, fuel cells, and solar energy, cogeneration and energy conservation and storage.

Learning Outcomes:

At the end of this unit, the student will be able to

- Acquire the Knowledge of generating stations
- Analyze the different types of energies
- Find the response energy storage

UNIT-II Economics of Generation:

Introduction, definitions of connected load, maximum demand, demand factor, load factor, diversity factor, Load duration curve, number and size of generator units. Base load and peak load plants. Cost of electrical energy-fixed cost, running cost, tariff on charge to customer.

Learning Outcomes:

At the end of this unit, the student will be able to

- Evaluate the different factors
- Analyze the different types of curves
- Utilization of tariff,

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UNIT-III

Over Head Transmission Lines:

Line conductors, inductance and capacitance of single phase and three phase lines with symmetrical and unsymmetrical spacing, Composite conductors-transposition, bundled conductors, and effect of earth on capacitance, skin and proximity effect.
Overhead Line Insulators: Introduction, types of insulators, Potential distribution over a string of suspension insulator, methods of equalizing the potential, testing of insulators, Sag and tension calculations

Learning Outcomes:
At the end of this unit, the student will be able to

- Analyze interference between power and communication lines
- Evaluate inductance and capacitance single phase and three phase transmission lines
- Learn about composite conductors –transposition.

UNIT-IV

SUBSTATIONS:

Air Insulated Substations (AIS): Indoor & Outdoor substations: Substations layout showing the location of all the substation equipment. Bus bar arrangements in the Sub-Stations: Simple arrangements like single bus bar, sectionalized single bus bar, main and transfer bus bar system with relevant diagrams.

GAS INSULATED SUBSTATIONS (GIS): Advantages of Gas insulated substations, different types of gas insulated substations, single line diagram of gas insulated substations, bus bar, construction aspects of GIS, Installation and maintenance of GIS, Comparison of Air insulated substations and Gas insulated substations.
Learning Outcomes:
At the end of this unit, the student will be able to

- Analyze function of different types of substations.
- Obtain functions insulating materials
- Learn the description of different types of substations.

UNIT-V

A.C. Distribution:

DC Distribution: Classification of distribution Systems. - Comparison of dc vs. ac and Under- ground vs over- head distribution systems. -Requirements and design features of Distribution Systems. - Voltage Drop Calculations (Numerical Problems) in D.C Distributors for the following cases: Radial D.C Distributor fed one end and at the both the ends (equal/unequal Voltages) and Ring Main Distributor

DC Distribution: Introduction, ac distribution, single phase,3-phase 4 wire system, bus bar arrangement, selection of site for substation. Voltage Drop Calculations (Numerical Problems) in ac distributors for the following cases: Power factors referred to receiving end voltage and with respect to respective load voltage

Learning Outcomes:
At the end of this unit, the student will be able to

- Analyze distribution of 3-phase 4 wire system
- Evaluate the different types distribution (ac& dc distribution)
- Learn about selection of site for substation.

TEXT BOOKS:

1. Generation and utilization of Electrical Energy – C.L.Wadhawa, New age International (P) Limited, Publishers1997.
2. Electrical Power Systems by C.L.Wadhawa New age International (P) Limited, Publishers 1997.
3. A Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, U.S.Bhatnagar and A.Chakraborti, Dhanpat Rai and Co. Pvt. Ltd, 1999.

REFERENCES:

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

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AUTONOMOUS)

2230301: SOLID MECHANICS AND HYDRAULIC MACHINES

B.Tech. II Year I Sem. **L T P C**
3 1 0 4

COURSE OBJECTIVES:

- To identify an appropriate structural system
- To work comfortably with basic engineering mechanics and types of loading & support conditions thatact on structural systems.
- To understand the meaning of centers of gravity, centroids.
- To understand moments of Inertia and rigid body dynamics.
- To Study the characteristics of hydroelectric power plant and Design of hydraulic machinery

COURSE OUTCOMES : After learning the contents of this paper the student must be able to

- Solve problems dealing with forces, beam and cable problems
- Understand distributedforce systems
- Solve friction problems and determine moments of Inertia and centroid of practical shapes.
- Apply knowledge of mechanics in addressing problems in hydraulic machinery its principles that will be utilized in Hydropower development and for other practical usages.

UNIT – 1

INTRODUCTION OF ENGINEERING MECHANICS: Basic concepts of System of Forces-Coplanar Forces-Components in Space-Resultant- Moment of Forces and its Application – Couples and Resultant of Force System-Equilibrium of System of Forces-Free body diagrams-Direction of Force Equations of Equilibrium of Coplanar Systems and Spatial Systems – Vector cross product- Support reactions different beams for different types of loading – concentrated, uniformly distributed and uniformly varying loading. Types of friction – Limiting friction – Laws of Friction – static and Dynamic Frictions – Angle of Friction – Cone of limiting friction

LEARING OUTCOME:

- To identify an appropriate structural system and work comfortably with basic engineering mechanics.
- To understand types of forces and system of forces

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UNIT – 2

CENTROID AND CENTER OF GRAVITY: Centroids – Theorem of Pappus- Centroids of Composite figures – Centre of Gravity of Bodies – Area moment of Inertia:-polar Moment of Inertia- Transfer- Theorems - Moments of Inertia of Composite Figures.

SIMPLE STRESSES AND STRAINS ANALYSIS: Concept of stress and strain- St. Venant's Principle-Stress and Strain Diagram - Elasticity and plasticity – Types of stresses and strains-Hooke's law – stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio and volumetric strain – Pure shear and Complementary shear - Elastic modulii, Elastic constants and the relationship between them

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LEARNING OUTCOME:

- To Understand the meaning of centers of gravity, centroids, moments of Inertia and rigid body dynamics Practical application of flow measuring instruments.
- To understand the simple stress and stress analysis

UNIT – 3

KINEMATICS & KINETICS: Introduction – Rectilinear motion – Motion with uniform and variable acceleration-Curvilinear motion- Components of motion- Circular motion Kinetics of a particle – D'Alembert's principle – Motion in a curved path – work, energy and power. Principle of conservationof energy – Kinetics of a rigid body in translation, rotation – work done – Principle of work-energy – Impulse-momentum

LEARNING OUTCOME:

- To understand kinematics, different types of motions
- To understand work, energy, power and principle of work energy

UNIT – 4

BASICS OF HYDRAULIC MACHINERY: Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes, Jet striking centrally and at tip, Velocity triangles at inlet and outlet, expressions for work done and efficiency Elements of a typical Hydropower installation – Heads and Efficiencies

LEARNING OUTCOME:

- Importance of each and every element of the hydraulic machine.
- How to correlate the results obtained in model and prototype

Learning Outcomes: At the end of this unit, the student will be able to

- Analyze function of different types of insulators.
- Obtain functions insulating materials
- Learn the description of different types of cables.

UNIT –5

TURBINES & PUMPS: Classification of turbines – Pelton wheel – Francis turbine – Kaplan turbine – working, working proportions, velocity diagram, work done and efficiency, hydraulic design. Draft tube – Classification, functions and efficiency. Governing of turbines, Performance of turbines Pump installation details – classification – work done – Manometric head – minimum starting speed –losses and efficiencies – specific speed. Multistage pumps – pumps in parallel

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LEARNING OUTCOME:

1. Importance of each and every element of the roto dynamic and positive displacement pumps.
2. Comparison and identifying the suitable pump for a particular application.

TEXT BOOKS:

1. M.V. Seshagirirao and Durgaih, “Engineering Mechanics”,University Press.
2. P.N Modi and Seth, “ Fluid Mechanics and Hydraulic Machinery”, standard Book House

REFERENCE BOOKS:

1. B. Bhattacharya, “Engineering Mechanics”, Oxford University Publications.
2. A.K.Tayal, “Engineering Mechanics” , Umesh Publication.
3. D.S.Kumar, “Fluid Mechanic & Fluid Power Engineering”, Kataria & Sons Publications Pvt. Ltd. Banga & Sharma, “Hydraulic Machines” Khanna Publishers

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AUTONOMOUS)

2230402: ANALOG ELECTRONICS

II Year B.Tech. EEE I – Sem

L	T	P	C
2	0	0	2

Course Objectives:

- To introduce components such as diodes, BJTs and FETs their switching characteristics, applications
- Learn the concepts of high frequency analysis of transistors
- To give understanding of various types of basic and feedback amplifier circuits such as small signal, cascaded, large signal and tuned amplifiers
- To design the basic linear integrated circuits
- To understand the concepts of waveform generation and introduce some special function ICs.

Course Outcomes:

At the end of this course, students will demonstrate the ability to

- Know the characteristics, utilization of various components.
- Understand the biasing techniques
- Design and analyze various rectifiers, small signal amplifier circuits.
- Design sinusoidal and non-sinusoidal oscillators.
- Understand the functioning of OP-AMP, designs OP-AMP based circuits with linear integrated circuits**.**

UNIT - I Diode Circuits:

P-N junction diode, I-V characteristics of a diode; Half-wave and Full-wave rectifiers, clamping and Clipping circuits. Input output characteristics of BJT in CB, CE, CC configurations, biasing circuits, Load line analysis, Common-emitter, Common-base and Common collector amplifiers; Small signal equivalent circuits.

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

- Understand construction of P-N junction diode
- Under the lamping and clipping circuits
- Draw the Input output characteristics of BJT in CB, CE, CC configurations

UNIT - II MOSFET Circuits:

MOSFET structure and V-I characteristics. MOSFET as a switch. small signal equivalent circuits - gain, input and output impedances, small-signal model and common-source, common-gate and common-drain amplifiers, trans conductance, high frequency equivalent circuit.

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

- Understand structure and plot the I-V characteristics MOSFET
- Know the common-source, common-gate and common-drain amplifiers
- Draw the high frequency equivalent circuit

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UNIT - III Multi-Stage and Power Amplifiers:

Direct coupled and RC Coupled multi-stage amplifiers; Differential Amplifiers, Power amplifiers - Class A, Class B, Class C.
Learning Outcomes: At the end of the unit, the student will be able to

- Know the Different types of Amplifiers
- Draw the Characteristics of different types of amplifiers
- Understand the Class A, Class B, Class C amplifiers

UNIT - IV Feedback Amplifiers:

Concepts of feedback – Classification of feedback amplifiers – General characteristics of Negative feedback amplifiers – Effect of Feedback on Amplifier characteristics – Voltage series, Voltage shunt, Current series and Current shunt Feedback configurations – Simple problems.
Oscillators: Condition for Oscillations, RC type Oscillators-RC phase shift and Wien-bridge Oscillators, LC type Oscillators -Generalized analysis of LC Oscillators, Hartley and Colpitts Oscillators - Applications.

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

- Understand the Concepts and Classification of feedback amplifiers
- Draw the Characteristics of different types of feedback amplifiers
- Know the Different types Oscillators and their Characteristics

UNIT - V Operational Amplifiers:

Ideal op-amp, output offset voltage, input bias current, input offset current, slew rate, gain bandwidth product, Inverting and non-inverting amplifier, Differentiator, integrator, Square-wave and triangular-wave generators.
Learning Outcomes: At the end of the unit, the student will be able to

- Understand the concept of op-amps
- Classify the different types of op-amps
- Know the Square-wave and triangular-wave generators

TEXT BOOKS:

1. Jacob Millman, Christos C Halkias, “Integrated Electronics,” McGraw Hill Education, 2nd Edition 2010.
2. Ramakanth A. Gayakwad, “Op-Amps & Linear ICs,” 3rd Edition, PHI, 2003.

REFERENCE BOOKS:

1. Thomas L. Floyd, “Electronic Devices,” 1st Edition, 2015, Pearson.
2. J. Millman and A. Grabel, “Microelectronics”, McGraw Hill Education, 4th Edition, 1988.
3. P. Horowitz and W. Hill, “The Art of Electronics,” Cambridge University Press, 3rd Edition, 1989.

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(AUTONOMOUS)

2230224- ELECTRICAL MACHINES - I

II Year B.Tech. EEE I – Sem

L	T	P	C
3	0	0	3

Prerequisite: Electrical Circuit Analysis-1 & Electrical Circuit Analysis-2

Course Objectives:

- To study and understand different types of DC generators, Motors and Transformers, their construction, operation and applications.
- To analyze performance aspects of various testing methods.

Course Outcomes:

At the end of this course, students will demonstrate the ability to

- Identify different parts of a DC machine & understand its operation
- Carry out different testing methods to predetermine the efficiency of DC machines
- Understand different excitation and starting methods of DC machines
- Control the voltage and speed of a DC machines
- Analyze single phase and three phase transformers circuits.

UNIT – I

D.C. Generators: Principle of operation – Action of commutator – constructional features – armature windings – lap and wave windings -E.M. F Equation. Armature reaction – Cross magnetizing and de-magnetizing AT/pole – compensating winding – commutation – reactance voltage – methods of improving commutation. Methods of Excitation – separately excited and self-excited generators – build-up of E.M.F - critical field resistance and critical speed - causes for failure to self-excite and remedial measures. Load characteristics of shunt, series and compound generators.

Learning Outcomes:
At the end of this unit, student will able to

- Analyze the concepts of D.C. Generator.
- Select the different types of armature winding depending on the requirement and need.
- Recognize the importance of Commutator, Compensation winding and building Emf.

UNIT – II

DC 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 D.C. Motors - Armature voltage and field flux control methods. Motor starters (3-point and 4-point starters), numerical problems, Testing of D.C. machines - Losses – Types of losses – calculation of efficiency – condition for maximum efficiency.

Learning Outcomes:
At the end of this unit, student will able to
- Illustrate the effect of Armature Reaction on Dc-Machine.
- Identify different types of losses occurring in a Dc-machine.
- Demonstrate different Speed Control Methods of Dc-Machine.

UNIT – III

Testing of DC Machines: Methods of testing – direct, indirect, and regenerative testing – Brake test - Swinburne's test
– Hopkinson's test – Field's test - separation of stray losses in a d.c. motor test.
Learning Outcomes:
At the end of this unit, student will able to
- Understand different types of tests that are conducted on a Dc-machine.
- Analyze the types of Motor necessary for a specific application by knowing its characteristics.
- Distinguish the difference between Direct and In-Direct test.

UNIT – IV

Single Phase Transformers: Types - constructional details-minimization of hysteresis and eddy current losses- EMF equation - operation on no load and on load - phasor diagrams
Equivalent circuit - losses and efficiency – regulation - All day efficiency - effect of variations of frequency & supply voltage on iron losses
Learning Outcomes:
At the end of this unit, student will able to
- Understand the concept of transformer construction and principle.
- Analyze the different types of losses in a transformer.
- Distinguish the importance of Equivalent circuit with its phasor diagrams.

UNIT – V

Testing of Transformers and Poly-Phase Transformers: OC and SC tests - Sumpner's test - predetermination of efficiency and regulation-separation of losses test-parallel operation with equal and unequal voltage ratios - auto transformers-equivalent circuit - comparison with two winding transformers. Poly-phase transformers – Poly-phase connections - Y/Y, Y/Δ, Δ/Y, Δ/Δ and open Δ, Scott connections and Applications
Learning Outcomes:
At the end of this unit, student will able to
- Pre determine the performance of transformer by conducting suitable tests.
- Outline the necessary & satisfactory conditions for parallel operation.
- Identify the Importance of Poly Phase Connections of3-phase transformers and Auto Transformers.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

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TEXT BOOKS:

1. A. E. Fitzgerald and C. Kingsley, "Electric Machinery", New York, McGraw Hill Education, 2013.
2. A. E. Clayton and N. N. Hancock, "Performance and design of DC machines", CBS Publishers, 2004.
3. Principles of Electric Machines and Power Electronics P C SEN Second Edition.
4. P. S. Bimbhra, "Electrical Machinery", Khanna Publishers, 2011.

REFERENCE BOOKS:

1. M. G. Say, "Performance and design of AC machines", CBS Publishers, 2002.
2. I. J. Nagrath and D. P. Kothari, "Electric Machines", McGraw Hill Education, 2010

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2230225 ELECTROMAGNETIC FIELDS

II Year B.Tech EEE – I Sem

L	T	P	C
3	0	0	3

Course Prerequisites: Mathematics & Applied Physics.

Course Objectives:

- Inculcate the knowledge of different basic laws in static electric field for various applications.
- Impart the applications of static electric field such as boundary conditions across different media.
- Understand the laws in magnetic field at static conditions and its application.
- Concept of various Maxwell's equations in different forms and different media.
- Understand the concept of Electromagnetic waves and its application in Power transmission lines.

Course Outcomes:

After completion of this course the student is able to

- Demonstrate the concept of electrostatic field intensity and electric potential.
- Illustrate polarization of dielectrics and the behavior of conductors and dielectrics in an electric field.
- Understand the concept of field intensity and flux density in magnetic fields.
- Discuss forces in magnetic fields and laws of electromagnetic induction.
- Evaluate the Maxwell's equation in different forms and different media.

UNIT-I

Static Electric Field: Review of conversion of a vector from one coordinate system to another coordinate system, Coulomb's law, Electric field intensity, Electrical field due to point charges. Line, Surface and Volume charge distributions. Gauss law and its applications. Absolute Electric potential, potential difference, Calculation of potential differences for different configurations. Electric dipole, Electrostatic Energy and Energy density

Learning Outcomes:

At the end of this unit, the student will be able to

- Illustrate the application of vector analysis. (L4)
- Recognise the importance of electric field intensity in electrostatics. (L5)
- Demonstrate the use of Gauss Law and its application. (L4)

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UNIT-II

Conductors, Dielectrics and Capacitance: Current and current density, Ohms Law in Point form, Continuity equation, Boundary conditions of conductors and dielectric materials. Capacitance, Capacitance of a two-wire line, Poisson's equation, Laplace's equation, Solution of Laplace and Poisson's equation.

Learning Outcomes:

At the end of this unit, the student will be able to

- Outline the necessary and essential boundary conditions in electrostatic field for dielectrics and conductors. (L6)
- Judge the importance of capacitance in electrostatics. (L1)
- Demonstrate the use of Laplace and Poisson's Equation. (L5)

UNIT-III

Static Magnetic Fields and Magnetic Forces: Biot-Savart Law, Ampere Law, Magnetic flux and magnetic flux density, scalar and Vector Magnetic potentials. Steady magnetic fields produced by current carrying conductors. Force on a moving charge, Force on a differential current element, Force between differential current elements, Magnetic boundary conditions, Magnetic circuits, Self-inductances and mutual inductances.

Learning Outcomes:

At the end of this unit, the student will be able to

- Compute magnetic field intensity by using Bio-Savart's law and Amperes law. (L4)
- Evaluate the force in magneto statics and current configurations. (L1)
- Interpret the equations for self and mutual inductance due to magneto statics. (L4)

UNIT-IV

Time Varying Fields and Maxwell's Equations: Faraday's law for Electromagnetic induction, Displacement current, Point form of Maxwell's equation, Integral form of Maxwell's equations, Motional Electro motive forces.

Learning Outcomes:

At the end of this unit, the student will be able to

- Classify the Maxwell's equations for time varying fields. (L5)
- Select the Maxwell's equations for different applications. (L6)
- Judge the importance of displacement current in time varying fields. (L1)

UNIT-V

Electromagnetic Waves: Derivation of Wave Equation, Uniform Plane Waves, Maxwell's equation in Phasor form, Wave equation in Phasor form, Plane wave in free space and in a homogenous material. Wave equation for a conducting medium, Plane waves in lossy dielectrics, Propagation in good conductors. Poynting theorem.

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Learning Outcomes:
At the end of this unit, the student will be able to

- Evaluate the Wave equations in different forms. (L1)
- Compute the Maxwell's equation in phasor form. (L4)
- Illustrate the plane waves in lossy dielectrics and pointing theorem. (L4)

TEXT BOOKS:

1. M. N. O. Sadiku, "Elements of Electromagnetics", Oxford University Publication, 2014.
2. W. Hayt, "Engineering Electromagnetics", McGraw Hill Education, 2012.

REFERENCE BOOKS:

1. A. Pramanik, "Electromagnetism-Problems with solution", Prentice Hall India, 2012.
2. G. W. Carter, "The electromagnetic field in its engineering aspects", Longmans, 1954.
3. W. J. Duffin, "Electricity and Magnetism", McGraw Hill Publication, 1980.
4. W. J. Duffin, "Advanced Electricity and Magnetism", McGraw Hill, 1968.
5. E. G. Cullwick, "The Fundamentals of Electromagnetism", Cambridge University Press, 1966.
6. B. D. Popovic, "Introductory Engineering Electromagnetics", Addison-Wesley Educational Publishers, International Edition, 1971.
7. A. Pramanik, "Electromagnetism - Theory and applications", PHI Learning Pvt. Ltd, New Delhi, 2009

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AUTONOMOUS)

2230278: ELECTRICAL MACHINES LABORATORY – I

B.Tech. II Year I Sem. **L T P C**
0 0 2 1

Course Objectives:

- To expose the students to the operation of DC Generators.
- To know the operation of various types of DC Motors.
- To examine the performance of Single and Three Phase Transformers.

Course Outcomes: After learning the contents of this paper the student must be able to

- Start and control the Different DC Machines.
- Assess the performance of different machines using different testing methods
- Evaluate the performance of different Transformers using different testing methods

LAB EXPERIMENTS

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).
9. Speed control of DC Shunt Motor.

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

1. Brake test on DC shunt motor (Determination of performance curves)
2. Retardation test on DC shunt motor (Determination of losses at rated speed)
3. Separation of losses in DC shunt motor.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

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TEXT BOOKS:

1. P. S. Bimbhra, “Electrical Machinery”, Khanna Publishers, 2011.

2. I.J. Nagrath and D. P. Kothari, “Electric Machines”, McGraw Hill Education, 2010.

REFERENCE BOOKS:

1. Prithwiraj Purkait, Indrayudh Bandyopadhyay, “Electrical Machines”, Oxford, 2017.

2. M. G. Say, “Performance and design of AC machines”, CBS Publishers, 2002.

3. A. E. Fitzgerald and C. Kingsley, "Electric Machinery”, New York, McGraw Hill Education, 2013.

4. A. E. Clayton and N. N. Hancock, “Performance and design of DC machines”, CBS Publishers, 2004.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AUTONOMOUS)

2230471: ANALOG ELECTRONICS LABORATORY (For EEE)

II Year B.Tech. EEE I - Sem. **L T P C**
0 0 2 1

Pre-requisite: Analog Electronics

Course Objectives:

- To introduce components such as diodes, BJTs and FETs their switching characteristics, applications
- Learn the concepts of high frequency analysis of transistors
- To give understanding of various types of basic and feedback amplifier circuits such as small signal, cascaded, large signal and tuned amplifiers
- To introduce the basic building blocks of linear integrated circuits
- To introduce the concepts of waveform generation and introduce some special function ICs

Course Outcomes:

At the end of this course, students will demonstrate the ability to

- Know the characteristics, utilization of various components.
- Understand the biasing techniques
- Design and analyze various rectifiers, small signal amplifier circuits.
- Design sinusoidal and non-sinusoidal oscillators.
- Understanding the functioning of OP-AMP, designs OP-AMP based circuits with linear integrated circuits.

List of Experiments

1. PN Junction diode characteristics:
A) Forward bias B) Reverse bias.
2. Full Wave Rectifier with & without filters
3. Common Emitter amplifier characteristics
4. Common Base amplifier characteristics
5. Common Source amplifier characteristics
6. Measurement of h-parameters of transistor in CB, CE, CC configurations
7. Inverting and Non-inverting Amplifiers using Op Amps.
8. Adder and Subtractor using Op Amp.
9. Integrator Circuit using IC 741.
10. Differentiator circuit using Op Amp.
11. Current Shunt Feedback amplifier

12. RC Phase shift Oscillator
13. Hartley and Colpitt's Oscillators
14. Class A power amplifier

NOTE: Minimum of 12 experiments to be conducted.

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(AUTONOMOUS)

2230279 ELECTRICAL SIMULATION TOOLS LABORATORY

B.Tech. II Year I Sem

L	T	P	C
0	0	2	1

Course Objectives:

- To understand basic block sets of different simulation platform used in electrical/electronic circuit design.
- To understand use and coding in different software tools used in electrical/ electronic circuit design.
- To understand the simulation of electric machines/circuits for performance analysis.

Course Outcomes:

After learning the contents of this paper the student must be able to

- Develop knowledge of software packages to model and program electrical and electronics systems.
- Model different electrical and electronic systems and analyze the results.
- Articulate importance of software packages used for simulation in laboratory experimentation by analyzing the simulation results.

Suggested List of Laboratory Experiments:

The following experiments need to be performed from various subject domains.

1. Introduction to basic block sets of simulation platforms. Basic matrix operations, Generation of standard test signals
2. Solving the linear and nonlinear differential equations
3. Measurement of Voltage, Current and Power in DC circuits.
4. Verification of different network theorems with dependent and independent sources using suitable simulation tools.
5. Verification of performance characteristics of basic Electronic Devices using suitable simulation tools.
6. Analysis of series and parallel resonance circuits using suitable simulation tools
7. Obtaining the response of electrical network for standard test signals using suitable simulation tools.
8. Modeling and Analysis of Low pass and High pass Filters using suitable simulation tools
9. Performance analysis of DC motor using suitable simulation tools
10. Modeling and analysis of Equivalent circuit of transformer using suitable simulation tools.
11. Analysis of single-phase bridge rectifier with and without filter using suitable Simulation tools.
12. Modeling and Verification of Voltage Regulator using suitable simulation tools.
13. Modeling of transmission line using simulation tools.
14. Performance analysis of Solar PV model using suitable simulation tools

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(AUTONOMOUS)

2230586 Applied Python Programming Laboratory

B.Tech. II Year I Sem

L	T	P	C
0	1	2	2

Prerequisites: Nil

Course Objectives:

- Handle Strings and Files in Python.
- Understand Lists, Dictionaries and Regular expressions in Python.
- Understand FILES, Multithread programming in Python.
- Understand GUI in python.

Course Outcomes: The students should be able to

- Examine Python syntax and semantics and be fluent in the use of Python flow controland functions.
- Demonstrate proficiency in handling Strings and File Systems.
- Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries.
- Develop programs using Graphical user interface.

Exercise 1 –Python Numbers

a) Write a program to determine whether a given year is a leap year, using the following formula: a leap year is one that is divisible by four, but not by one hundred, unless it is also divisible by four hundred. Forexample, 1992, 1996, and 2000 are leap years, but 1967 and 1900 are not. The next leap year falling ona century is 2400.

b) Write a program to determine the greatest common divisor and least common multiple ofa pair ofintegers.

c) Create a calculator application. Write code that will take two numbers and an operator in the format: N1 OP N2, where N1 and N2 are floating point or integer values, and OP is one of the following: +, -, *, /, %,

**, representing addition, subtraction, multiplication, division, modulus/remainder, and exponentiation, respectively, and displays the result of carrying out that operation on the input operands.

Hint: You may use the string split() method, but you cannot use the exal () built-in function.

Exercise –2 Control Flow

a) Write a Program for checking whether the given number is a prime number or not.
b) Write a program to print Fibonacci series upto given n value.
c) Write a program to calculate factorial of given integer number.

Exercise 3 Control Flow -Continued

a) Write a program to calculate value of the following series 1+x-x2+x3-x4+xn.
b) Write a program to print pascal triangle.

Exercise 4 – Python Sequences

a) Write a program to sort the numbers in ascending order and strings in reverse alphabetical order.

b) Given an integer value, return a string with the equivalent English text of each digit. For example, an input of 89 results in "eight-nine" being returned. Write a program to implement it.

Exercise 5- Python Sequences

a) Write a program to create a function that will return another string similar to the input string, but with its case inverted. For example, input of "Mr. Ed" will result in "mR.eD" as the output string.

b) Write a program to take a string and append a backward copy of that string, making a palindrome.

Exercise 6- Python Dictionaries

a) Write a program to create a dictionary and display its keys alphabetically.

b) Write a program to take a dictionary as input and return one as output, but the values are now the keys and vice versa.

Exercise - 7 Files

a) Write a program to compare two text files. If they are different, give the line and column numbers in the files where the first difference occurs.

b) Write a program to compute the number of characters, words and lines in a file.

Exercise - 8 Functions

a) Write a function ball collide that takes two balls as parameters and computes if they are colliding. Your function should return a Boolean representing whether or not the balls are colliding.

b) Hint: Represent a ball on a plane as a tuple of (x, y, r), r being the radius

c) If (distance between two balls centers) <= (sum of their radii) then (they are colliding)

d) Find mean, median, mode for the given set of numbers in a list.

e) Write simple functions max2() and min2() that take two items and return the larger and

smaller item, respectively. They should work on arbitrary Python objects. For example, max2(4, 8) and min2(4, 8) would each return 8 and 4, respectively.

Exercise - 9 Functions – Continued

a) Write a function nearly equal to test whether two strings are nearly equal. Two strings a and b are nearly equal when a can be generated by a single mutation on b.

b) Write a function dups to find all duplicates in the list.

c) Write a function unique to find all the unique elements of a list.

Exercise - 10 - Functions - Problem Solving

a) Write a function cumulative_ product to compute cumulative product of a list of numbers.

b) Write a function reverse to reverse a list. Without using the reverse function.

c) Write function to compute GCD, LCM of two numbers. Each function shouldn‟t exceed one

Line.

Exercise - 11 GUI, Graphics

a) Write a GUI for an Expression Calculator usingtk
b) Write a program to implement the following figures using turtle

TEXT BOOKS:

1. Core Python Programming, Wesley J. Chun, Second Edition, Pearson.

REFERENCE BOOKS:

1. Think Python, Allen Downey, Green Tea Press
2. Introduction to Python, Kenneth A. Lambert, Cengage
3. Python Programming: A Modern Approach, VamsiKurama, Pearson Learning Python, Mark Lutz, O"Really.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AUTONOMOUS)

2230022: GENDER SENSITIZATION

B.Tech. II Year I Sem. **L T P C**
2 0 0 0

Objectives of the Course:

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

Learning Outcomes:

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

UNIT - I: UNDERSTANDING GENDER

Introduction: Definition of Gender-Basic Gender Concepts and Terminology-Exploring Attitudes towardsGender-Construction of Gender-Socialization: Making Women, Making Men - Preparing for Womanhood. Growing up Male. First lessons in Caste.

UNIT – II: GENDER ROLES AND RELATIONS

Two or Many? -Struggles with Discrimination-Gender Roles and Relations-Types of Gender Roles-Gender Roles and Relationships Matrix-Missing Women-Sex Selection and Its Consequences-Declining Sex Ratio. Demographic Consequences-Gender Spectrum: Beyond the Binary

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UNIT – III: GENDER AND LABOUR

Division and Valuation of Labour-Housework: The Invisible Labor- "My Mother doesn't Work." "Share the Load."-Work: Its Politics and Economics -Fact and Fiction. Unrecognized and Unaccounted work. -Gender Development Issues-Gender, Governance and Sustainable Development-Gender and HumanRights-Gender and Mainstreaming

UNIT – IV: GENDER - BASED VIOLENCE

The Concept of Violence- Types of Gender-based Violence-Gender-based Violence from a Human Rights Perspective-Sexual Harassment: Say No! -Sexual Harassment, not Eve- teasing- Coping with Everyday Harassment- Further Reading: "Chupulu".
Domestic Violence: Speaking OutIs Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives.Thinking about Sexual Violence Blaming the Victim-"I Fought for my Life

UNIT – V: GENDER AND CULTURE

Gender and Film-Gender and Electronic Media-Gender and Advertisement-Gender and Popular Literature-Gender Development Issues-Gender Issues-Gender Sensitive Language-Gender and Popular Literature - Just Relationships: Being Together as Equals Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Rosa Parks- The Brave Heart.

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 from engineering departments.

Classes will consist of a combination of activities: dialogue-based lectures, discussions, collaborative learning activities, group work and in-class assignments. Apart from the above prescribed book, Teachers can make use of any authentic materials related to the topics given in the syllabus on "Gender".

ESSENTIAL READING: The Textbook, "Towards a World of Equals: A Bilingual Textbook on Gender" written by A.Suneetha, Uma Bhrugubanda,

II-II

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AUTONOMOUS)

2240003 NUMERICAL METHODS AND COMPLEX VARIABLES

B.Tech. II Year II Sem

L	T	P	C
3	1	0	4

Pre-requisites: Mathematics courses of first year of study.

Course Objectives: To learn

- Various numerical methods to find roots of polynomial and transcendental equations.
- Concept of finite differences and to estimate the value for the given data using interpolation.
- Evaluation of integrals using numerical techniques
- Solving ordinary differential equations of first order using numerical techniques.
- Expressing periodic function by Fourier series and a non-periodic function by Fourier transforms
- Differentiation and integration of complex valued functions.
- Evaluation of integrals using Cauchy's integral formula and Cauchy's residue theorem.
- Expansion of complex functions using Taylor's and Laurent's series**.**

Course outcomes: After learning the contents of this paper the student must be able to

- Find the root of a given polynomial and transcendental equations.
- Estimate the value for the given data using interpolation
- Find the numerical solutions for a given first order ODE's
- Express any periodic function in terms of sine and cosine
- Analyze the complex function with reference to their analyticity, integration using Cauchy's integral and residue theorems
- Taylor's and Laurent's series expansion sin complex function

UNIT-I: Numerical Methods-I

Solution of polynomial and transcendental equations: Bisection method, Iteration Method, Newton-Raphson method and Regula-Falsi method. Methods for solving linear systems of equations (Gauss Jacobi method).
Finite differences: forward differences, backward differences, central differences, symbolic relations and separation of symbols, Interpolation using Newton's forward and backward difference formulae. Central difference interpolation: Gauss's forward and backward formulae, Lagrange's method of interpolation.

UNIT-II: Numerical Methods-II

Numerical integration: Trapezoidal rule and Simpson's 1/3rd and 3/8th rules. Ordinary differential equations: Taylor's series, Picard's method, Euler and modified Euler's methods, Runge-Kutta method of fourth order for first order ODE.

UNIT-III Fourier series & Fourier Transforms

Fourier series - Dirichlet's Conditions - Half-range Fourier series - Fourier Transforms: Fourier Sine and cosine transforms-Inverse Fourier transforms

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UNIT-IV: Complex Differentiation

Limit, Continuity and Differentiation of Complex functions. Cauchy-Riemann equations (without proof), Milne Thomson methods, analytic functions, harmonic functions, finding harmonic conjugate, Conformal mappings, Mobius transformations.

UNIT-V: Complex Integration

Line integrals, Cauchy's theorem, Cauchy's Integral formula, zeros of analytic functions, singularities, Taylor's series, Laurent's series, Residues, Cauchy Residue theorem and their properties,(all theorems without Proofs).

TEXTBOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition,2010.
2. S. S. Sastry, Introductory methods of Numerical analysis, PHI, 4thEdition,2005.

REFERENCEBOOKS:

1. M. K. Jain, S.R.K. Iyengar, R.K. Jain, Numerical methods for Scientific and Engineering Computations, New Age International publishers.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley& Sons,2006.
3. J. W. Brown and R.V. Churchill, Complex Variables and Applications,7th Edition, Mc-GrawHill,2004.

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(AUTONOMOUS)

2240226 MEASUREMENTS AND INSTRUMENTATION

B.Tech. II Year II Sem

L	T	P	C
3	0	0	3

Pre-requisite: Electrical Circuit Analysis-1 & Electrical Circuit Analysis-2, Analog Electronics.

Course objectives:

- To introduce the basic principles of all measuring instruments
- To deal with the measurement of voltage, current, Power factor, power, energy and magnetic measurements.
- To understand the basic concepts of smart and digital metering.

Course Outcomes:

After completion of this course, the student able to

- Understand different types of measuring instruments, their construction, operation and characteristics
- Identify the instruments suitable for typical measurements
- Apply the knowledge about transducers and instrument transformers to use them effectively.
- Apply the knowledge of smart and digital metering for industrial applications

UNIT- I:

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

Learning Outcomes:
At the end of this unit, the student will be able to

- Determine the construction and operation of various measuring instruments.
- Apply the characteristics of measuring instruments in finding response.
- Analyze the concept of extension range of meters.

UNIT- II:

Potentiometers & Instrument Transformers
Principle and operation of D.C. Crompton's potentiometer – standardization-Measurement of unknown resistance, current, voltage. A.C. Potentiometers: polar and coordinate type's standardization – applications. CT and PT – Ratio and phase angle errors
Learning Outcomes:
At the end of this unit, the student will be able to

- Identify appropriate instruments to measure given sets of parameters
- Illustrate different types of errors that may occur in instruments during measurements.

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UNIT- III:

Measurement of Power & Energy

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

– driving and braking torques – errors and compensations. Three phase energy meter, maximum demand meters.

UNIT- IV:

DC & AC Bridges

Method of measuring low, medium and high resistance – sensitivity of Wheat-stone's bridge – Carey Foster's bridge, Kelvin's double bridge for measuring low resistance, measurement of high resistance loss of charge method. Measurement of inductance- Maxwell's bridge, Hay's bridge, Anderson's bridge - Owen's bridge. Measurement of capacitance and loss angle –Desaunty's Bridge - Wien's bridge – Schering Bridge.

Learning Outcomes:

At the end of this unit, the student will be able to

- Compare the bridge circuits to select appropriate bridge for the measurement of electrical quantities.
- Apply the knowledge of measuring inductance and capacitance using various bridge circuits.

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 gauge and its principle of operation, gauge factor, Thermistors, Thermocouples, Piezo electric transducers, photovoltaic, photo conductive cells, and photo diodes. Introduction to Smart and Digital Metering: Digital Multi-meter, True RMS meters, Clamp-on meters, Digital Energy meter, cathode ray oscilloscope, Digital Storage Oscilloscope.

Learning Outcomes:

At the end of this unit, the student will be able to

- Apply the knowledge of transducers in energy conversions.
- Identify the transducer for different applications.
- Analyze digital meters usage.

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TEXT BOOKS:

1. G. K. Banerjee, “Electrical and Electronic Measurements”, PHI Learning Pvt. Ltd., 2nd Edition, 2016
2. S. C. Bhargava, “Electrical Measuring Instruments and Measurements”, BS Publications, 2012.

REFERENCES:

1. A. K. Sawhney, “Electrical & Electronic Measurement & Instruments”, Dhanat Rai & Co. Publications, 2005.
2. R. K. Rajput, “Electrical & Electronic Measurement & Instrumentation”, S. Chand and Company Ltd., 2007.
3. Buckingham and Price, “Electrical Measurements”, Prentice – Hall, 1988.
4. Reissland, M. U, “Electrical Measurements: Fundamentals, Concepts, Applications”, New Age International (P) Limited Publishers, 1st Edition2010.
5. E.W. Golding and F. C. Widdis, “Electrical Measurements and measuring Instruments”, fifth Edition, Wheeler Publishing, 2011.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AUTONOMOUS)

2240227: ELECTRICAL MACHINES – II

II Year B. Tech EEE – II Sem

L	T	P	C
3	0	0	3

Prerequisite: Electrical Circuit Analysis-1 & Electrical Circuit Analysis-2 & Electrical Machines-I

Course Objectives:

- To deal with the detailed analysis of poly-phase induction motors & Alternators
- To understand operation, construction and types of single phase motors and their applications in house hold appliances and control systems.
- To introduce the concept of parallel operation of alternators
- To introduce the concept of regulation and its calculations.
-

Course Outcomes: At the end of this course, students will demonstrate the ability to

- Understand the concepts of rotating magnetic fields.
- Understand the operation of ac machines.
- Analyze performance characteristics of ac machines

UNIT – I

Poly-Phase Induction Machines: Constructional 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

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

- Understand the construction and operation of different types of Induction motors. (L4)
- Calculate emf value along with the calculations of losses. (L3)
- Obtain the performance characteristics of different induction motors. (L2)
- Identify the effects of loading of induction motors. (L1)

UNIT – II

Characteristics of Induction Machines: Rotor power input, rotor copper loss and mechanical power developed and their inter relation-torque equation-deduction from torque equation - expressions for maximum torque and starting torque - torque slip characteristic - equivalent circuit - phasor diagram -crawling and cogging -No-load Test and Blocked rotor test – Predetermination of performance-Methods of starting and starting current and Torque calculations.Applications
Speed Control Methods: Change of voltage, change of frequency, voltage/frequency, injection of an EMF into rotor circuit (qualitative treatment only)-induction generator-principle of operation.

Learning Outcomes:

At the end of the unit, the student will be able to

- Predetermine the performance of Poly phase Induction Motor Understandability of starting and stopping techniques of Induction motor. (L5)
- Control the speed of Induction Motor Understandability of working of an induction generator. (L3)

UNIT – III

Synchronous Generator: Constructional Features of round rotor and salient pole machines – Armature windings – Integral slot and fractional slot windings; Distributed and concentrated windings– distribution, pitch and winding factors – E.M.F Equation. Harmonics in generated e.m.f. –suppression of harmonics – armature reaction - leakage reactance – synchronous reactance and impedance – experimental determination - phasor diagram – load characteristics. 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 Xd and Xq (Slip test) Phasor diagrams – Regulation of salient pole alternators.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand the construction and operation of Synchronous motor. (L4)
- Understand the effect of harmonics in Synchronous machines. (L3)
- Analysis of Regulation methods of Synchronous machines. (L2)

UNIT – IV

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.

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.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand the excitation of mechanical power input in alternators. (L4)
- Determination of sub-transient, transient and steady state reactance's. (L3)
- Obtain the methods for prevent hunting Synchronous motors. (L2)

UNIT – V:

Single Phase Machines: Single phase induction motor – Constructional Features-Double revolving field theory – split- phase motors – AC series motor- Universal Motor- -Shaded pole motor and Applications.

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

- Understand the construction and operation single phase motors. (L4)
- Obtain the performance of shaded pole motor.(L2)
- Analysis of different special machines. (L3)

TEXT BOOKS:

1. A. E. Fitzgerald and C. Kingsley, "Electric Machinery", McGraw Hill Education, 2013.
2. M. G. Say, "Performance and design of AC machines", CBS Publishers, 2002.

REFERENCE BOOKS:

1. P. S. Bimbhra, "Electrical Machinery", Khanna Publishers, 2011.
2. I. J. Nagrath and D. P. Kothari, "Electric Machines", McGraw Hill Education, 2010.
3. A. S. Langsdorf, "Alternating current machines", McGraw Hill Education, 1984.
4. P. C. Sen, "Principles of Electric Machines and Power Electronics", John Wiley & Sons,

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AUTONOMOUS)

2240403: DIGITAL ELECTRONICS and IC APPLICATIONS

II Year B.Tech. EEE II - Sem. **L T P C**

2 0 0 2

Pre-requisite: Analog Electronics

Course Objectives:

- To learn about Number System and Boolean Algebra and Switching Functions
- To Learn the concepts of Design of Combinational Circuits
- To understand the various types of Registers and Counters
- To know the concepts of ADC and DAC converters
- To introduce the concepts Filters & IC-555 and its applications Course Outcomes:

At the end of the laboratory work, students will be able to

- Understand of Number System and Boolean algebra
- Design of Combinational Circuits
- Acquire the knowledge about the Data converters
- Design the Sequential Logic Circuits
- Know the Filters & IC-555 Applications

UNIT – I

Number System and Boolean algebra and Switching Functions: Review of number systems, Complements of Numbers, Codes- Binary Codes, Binary Coded Decimal Code and its Properties, Distance Codes, Error Detecting and Correcting Codes.

Boolean Algebra: Basic Theorems and Properties, Switching Functions, Canonical and Standard Form, Algebraic Simplification of Digital Logic Gates, Properties of XOR Gates, Universal Gates, Multilevel NAND/NOR realizations.

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

- Understand the concept of Number System and Boolean algebra
- Understand the properties of Binary Codes, Binary Coded Decimal Code
- Know the different types of Logic Gates

UNIT - II

Minimization and Design of Combinational Circuits: Introduction, The Minimization of switching function using theorem, The Karnaugh Map Method-Up to Five Variable Maps, Don't Care Map Entries, Tabular Method, Design of Combinational Logic: Adders, Subtractors, comparators, Multiplexers, De-multiplexers.

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

- Understand the concepts related to Combinational Circuits.
- Develop the Karnaugh Map Method-Up to Five Variable Maps
- Know the Design of Combinational Logic circuits.

UNIT - III

Sequential Logic Circuits: Introduction: Basic Architectural Distinctions between Combinational and Sequential circuits, Latches, Flip Flops: SR, JK, JK Master Slave, D and T Type Flip Flops, Timing and Triggering Consideration, Conversion from one type of Flip-Flop to another.

Registers and Counters: Shift Registers, Operation of Shift Registers, Shift Register Configuration, Bidirectional Shift Registers, Applications of Shift Registers, Design and Operation of Ring and Twisted Ring Counter, Operation of Asynchronous And Synchronous Counters.

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

- Understand the concept of Sequential Logic Circuits.
- Know the Classification of Flip Flops.
- Understand the Registers and Counters.

UNIT - IV

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.

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

- Acquire the knowledge on Data converters
- Understand the Different Types of Analog to Digital converters
- Know the DAC and ADC Specifications

UNIT – V

Filters & IC-555 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 Multivibrators – Operations and its Applications.

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

- Understand the concept and classification of Filters
- Know the Waveform Generators – Triangular, Sawtooth, Square Wave
- Understand the concept IC555 Timer and its Functional Diagram

TEXT BOOKS:

1. William Gothmann H, “Digital Electronics: An Introduction to Theory and Practice,” PHI, 1982.
2. John Morris, “Digital Electronics,” Pearson Education Limited, 2013

REFERENCE BOOKS:

1. D. Roy Chowdhury, “Linear Integrated Circuits,” New Age International (p) Ltd, 2nd Ed., 2003.
2. RP Jain, Modern Digital Electronics,” 4th Edition TMH, 2010.
3. Floyd and Jain, “Digital Fundamentals,” Pearson Education, 8th Edition, 2005.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AUTONOMOUS)

2240228 POWER SYSTEM – II

II Year B.Tech. EEE II-Sem **L T P C**

3 0 0 3

Prerequisite: Power System -I and Electro Magnetic Fields

Course Objectives:

- To analyze the performance of transmission lines.
- To understand the voltage control and compensation methods.
- To understand the per unit representation of power systems.
- To examine the performance of travelling waves.
- To know the methods of overvoltage protection and Insulation coordination of transmission lines
- To know the symmetrical components and fault calculation analysis

Course Outcomes:

- Analyze transmission line performance.
- Apply load compensation techniques to control reactive power
- Understand the application of per unit quantities.
- Design over voltage protection and insulation coordination
- Determine the fault currents for symmetrical and unbalanced faults

UNIT- I: PERFORMANCE OF TRANSMISSION LINES:

Representation of lines, short transmission lines, medium length lines, nominal T and PI representations, long transmission lines, equivalent circuit representation of a long Line, A, B, C, D constants, Ferranti Effect Corona: Introduction, disruptive critical voltage, corona loss, Factors affecting corona loss and methods of reducing corona loss, Disadvantages of corona, interference between power and communication lines.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand the types of different types of transmission lines and its representation. (L2)
- Analyze the Equivalent circuit representation of Long transmission lines. (L4)
- Determine the A BCD Constants of transmission lines. (L3)
- Understand the concept of Ferranti effect (L2).

UNIT- II: VOLTAGE CONTROL:

Introduction of voltage control – methods of voltage control, shunt and series capacitors / Inductors, tap changing transformers, synchronous phase modifiers. Power factor improvement methods,

Compensation in Power Systems: Introduction - Concepts of Load compensation – Load ability characteristics of overhead lines – Uncompensated transmission line – Symmetrical line – Radial line with asynchronous load – Compensation of lines.

Learning Outcomes:
At the end of the unit, the student will be able to
- Understand the different methods of voltage control. (L2)
- Apply the Concepts of Load compensation techniques to control reactive power. (L4)
- Determine the A BCD Constants of a transmission lines. (L3)

UNIT- III: PER UNIT REPRESENTATION OF POWER SYSTEMS:
Per Unit Representation of Power Systems, one-line diagram, impedance and reactance diagrams, per unit quantities, change the base of per unit quantities, advantages of per unit system.
Travelling Waves on Transmission Lines: Production of travelling waves, open circuited line, short circuited line, line terminated through a resistance, line connected to a cable, reflection and refraction at T- junction line terminated through a capacitance, capacitor connection at a T-junction, Attenuation of travelling waves.
Learning Outcomes:
At the end of the unit, the student will be able to
- Understand the concept of per unit representation of a transmission lines. (L2)
- Understand the concept of Travelling Waves on Transmission Lines and Production of travelling waves. (L2)

UNIT- IV: OVERVOLTAGE PROTECTION AND INSULATION COORDINATION:
Over voltage due to arcing ground and Peterson coil, lightning, horn gaps, surge diverters, rod gaps, expulsion type lightning arrester, valve type lightning arrester, ground wires, ground rods, counter poise, surge absorbers, insulation coordination, volt-time curves.
Learning Outcomes:
At the end of the unit, the student will be able to
- Understand the methods of overvoltage protection and Insulation coordination of transmission lines (L2)
- To know the different types of Lightening arresters used in power systems(L4)
- To know the insulation coordination of transmission lines. (L4)

UNIT - V: SYMMETRICAL COMPONENTS AND FAULT CALCULATIONS:
Significance of positive, negative and zero sequence components, Average 3-phase power in terms of symmetrical components, sequence impedances and sequence networks, : Short Circuit Current and MVA Calculations, Fault levels, Application of Series Reactors, Numerical Problems fault calculations, sequence network equations, single line to ground fault, line to line fault, double line to ground fault, three phase fault, faults on power systems, faults with fault impedance, reactors and their location, short circuit capacity of a bus.

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

- Determine the fault currents for symmetrical and unbalanced faults (L3)
- Understand the representation of sequence impedances and sequence networks(L2)
- Determine the short circuit capacity of a bus. (L3)

TEXT BOOKS:

1. C. L. Wadhwa, Electrical Power Systems, 3rd Edn, New Age International Publishing Co., 2001.
2. D. P. Kothari and I. J. Nagrath, Modern Power System Analysis, 4th Edn, Tata McGraw Hill Education Private Limited 2011.

REFERENCES:

1. D. P. Kothari: Modern Power System Analysis-Tata Mc Graw Hill Pub. Co. 2003.
2. Hadi Sadat: Power System Analysis -Tata Mc Graw Hill Pub. Co. 2002.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AUTONOMOUS)

2240280-ELECTRICAL MACHINES LABORATORY – II

II Year B.Tech. EEE II - Sem.

L	T	P	C
0	0	2	1

Prerequisites: Electrical Machines-I & Electrical Machines-II

Course Objectives:

- To understand the operation of Induction, Synchronous machines and Transformers.
- To study the performance analysis of Induction and Synchronous Machines through various testing methods.
- To analyze the performance of single and 3-phase phase transformer with experiments

Course Outcomes: After learning the contents of this paper the student must be able to

- Assess the performance of different types of AC machines using different testing methods.
- Analyze the suitability of AC machines and Transformers for real word applications.
- Design the machine models based on the application requirements.

LAB EXPERIMENTS

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

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

1. Separation of core losses of a single-phase transformer
2. Efficiency of a three-phase alternator
3. Parallel operation of Single-phase Transformers
4. Regulation of three-phase alternator by Z.P.F. and A.S.A methods
5. Heat run test on a bank of 3 Nos. of single-phase Delta connected transformers
6. Measurement of sequence impedance of a three-phase alternator.
7. Vector grouping of Three Transformer
8. Scott Connection of transformer

TEXT BOOKS:

1. P. S. Bimbhra, “Electrical Machinery”, Khanna Publishers, 2011.
2. I.J. Nagrath and D. P. Kothari, “Electric Machines”, McGraw Hill Education, 2010.

REFERENCE BOOKS:

1. Prithwiraj Purkait, Indrayudh Bandyopadhyay, “Electrical Machines”, Oxford, 2017.
2. M. G. Say, “Performance and design of AC machines”, CBS Publishers, 2002.
3. A. E. Fitzgerald and C. Kingsley, "Electric Machinery”, New York, McGraw Hill Education, 2013.
4. A. E. Clayton and N. N. Hancock, “Performance and design of DC machines”, CBS Publishers, 2004

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AUTONOMOUS)

2240472: DIGITAL ELECTRONICS and IC APPLICATIONS LABORATORY (For EEE)

II Year B.Tech. EEE II - Sem.	L	T	P	C
	0	0	2	1

Pre-requisite: Digital Electronics, Analog Electronics

Course Objectives:

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

Course Outcomes:

At the end of this course, students will demonstrate the ability to

- Understand working of logic families and logic gates.
- Design and implement Combinational and Sequential logic circuits.
- Understand the process of Analog to Digital conversion and Digital to Analog conversion.
- Be able to use PLDs to implement the given logical problem.
- Understand working of truth table and excitation table.

List of Experiments:

1. Realization of Boolean Expressions using Gates
2. Design and realization logic gates using universal gates
3. generation of clock using NAND / NOR gates
4. Design a 4 – bit Adder / Subtractor
5. Design and realization a 4 – bit gray to Binary and Binary to Gray Converter
6. Design and realization of a 4 bit pseudo random sequence generator using logic gates.
7. Design and realization of an 8 bit parallel load and serial out shift register using flip-flops.
8. Design and realization a Synchronous and Asynchronous counter using flip-flops
9. Design and realization of Asynchronous counters using flip-flops
10. Design and realization 8x1 using 2x1 mux
11. Design and realization 2 bit comparator
12. Verification of truth tables and excitation tables
13. Realization of logic gates using DTL, TTL, ECL, etc.,
14. State machines.

NOTE: Minimum of 12 experiments to be conducted.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AUTONOMOUS)

2240281 MEASUREMENTS AND INSTRUMENTATION LABORATORY

II Year B. Tech EEE – II Sem

L	T	P	C
0	0	2	1

Pre-requisite: Measurements and Instrumentation

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.

Course Outcomes:

After completion of this lab the student is able to

- To choose instruments
- Test any instrument
- Find the accuracy of any instrument by performing experiment
- Calibrate PMMC instrument using D.C potentiometer

The following experiments are required to be conducted as compulsory experiments

1. Calibration and Testing of single-phase energy Meter.
2. Calibration of dynamometer power factor meter.
3. Crompton D.C. Potentiometer – Calibration of PMMC ammeter and PMMC voltmeter.
4. Kelvin's double Bridge – Measurement of resistance – Determination of Tolerance.
5. Dielectric oil testing using H.T. testing Kit.
6. Schering Bridge & Anderson Bridge.
7. Measurement of 3 - Phase reactive power with single-phase wattmeter.
8. Measurement of displacement with the help of LVDT. In addition to the above eight experiments,

At least any two of the experiments from the following list are required to be conducted

9. Calibration LPF wattmeter – by Phantom testing.
10. Measurement of 3-phase power with single watt meter and two CTs.
11. C.T. testing using mutual Inductor – Measurement of % ratio error and phase angle of given CT by Null method.
12. PT testing by comparison – V. G. as Null detector – Measurement of % ratio error and phase angle of the given PT
13. Resistance strain gauge – strain measurements and Calibration.
14. Transformer turns ratio measurement using AC bridges.
15. Measurement of % ratio error and phase angle of given CT by comparison.

TEXT BOOKS:

1. "G. K. Banerjee", "Electrical and Electronic Measurements", PHI Learning Pvt. Ltd., 2nd Edition, 2016
2. "S. C. Bhargava", "Electrical Measuring Instruments and Measurements", BS Publications, 2012.

REFERENCES:

1. "A. K. Sawhney", "Electrical & Electronic Measurement & Instruments", Dhanpat Rai & Co. Publications, 2005

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(AUTONOMOUS)

2240023: Constitution of India

II Year B. Tech EEE – II Sem

L	T	P	C
2	0	0	0

Course content

1. Meaning of the constitution law and constitutionalism
2. Historical perspective of the Constitution of India
3. Salient features and characteristics of the Constitution of India
4. Scheme of the fundamental rights
5. The scheme of the Fundamental Duties and its legal status
6. The Directive Principles of State Policy – Its importance and implementation
7. Federal structure and distribution of legislative and financial powers between the Union and theStates
8. Parliamentary Form of Government in India – The constitution powers and status of thePresident of India
9. Amendment of the Constitutional Powers and Procedure
10. The historical perspectives of the constitutional amendments in India
11. Emergency Provisions: National Emergency, President Rule, Financial Emergency
12. Local Self Government – Constitutional Scheme in India
13. Scheme of the Fundamental Right to Equality
14. Scheme of the Fundamental Right to certain Freedom under Article 19
15. Scope of the Right to Life and Personal Liberty under Article 21

III-I

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AUTONOMOUS)

2250229: POWER ELECTRONICS

III Year B. Tech EEE – I Sem

L	T	P	C
3	1	0	4

Prerequisite: Analog Electronics

Course Objectives:

- To Design/develop suitable power converter for efficient control or conversion of power in drive applications
- To Design / develop suitable power converter for efficient transmission and utilization of power in power system applications.

Course Outcomes: After completion of this course the student is able to

- Choose the appropriate converter for various applications
- Design the power converters suitable for particular applications
- Design the voltage regulator for controlling purpose
- Analyse the operation of DC-DC choppers
- Develop the novel control methodologies for better performance of inverters

UNIT – I POWER DEVICES:

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

UNIT – II AC-DC CONVERTERS:

Phase control technique - Single phase Line commutated converters - Single phase Half controlled converters – Single Phase Full Controlled Midpoint and Bridge connections with R, RL loads and RLE load - Derivation of average load voltage and current Expressions of load voltage and current-Numerical problems. Three phase converters - Three pulse converters and bridge connections with R, RL load voltage and current with R and RL loads - Effect of Source inductance-Dual converters Waveforms - Effect of source inductance -Numerical Problems

UNIT – III AC-AC CONVERTERS:

AC voltage controllers – Single phase two SCR's in anti-parallel with R and RL loads, modes of operation of Triac – Triac with R and RL loads – Derivation of RMS load voltage, current and power factor- wave forms, Numerical problems- Single phase and three phase cycloconverters (principle of operation only).

UNIT – IV DC-DC CONVERTERS:

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

UNIT – V DC-AC CONVERTERS:

Inverters – Single phase inverter – Basic series inverter, parallel Capacitor inverter, bridge inverter-Waveforms. Simple bridge inverters, Voltage control techniques for inverters- Pulse width modulation techniques – Numerical problems.

TEXT BOOKS:

1. M. D. Singh & K. B. Kanchandhani, “Power Electronics”, Tata Mc Graw – HillPublishing Company, 1998.
2. “M. H. Rashid”, “Power Electronics: Circuits, Devices and Applications”, PrenticeHall of India, 2nd edition, 1998
3. “V. R. Murthy”, “Power Electronics”, Oxford University Press, 1st Edition 2005.

REFERENCE BOOKS:

1. Vedam Subramanyam, “Power Electronics”, New Age International (P) Limited,Publishers, 2nd Edition 2008.
2. M. S. Jamil Asghar, “Power Electronics”, PHI Private Limited, 2004.
3. P. C. Sen, “Power Electronics”, Tata Mc Graw-Hill Publishing, 2001.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AUTONOMOUS)

2250230: CONTROL SYSTEMS

III Year B. Tech EEE – I Sem.

L	T	P	C
3	0	0	3

Prerequisite: Linear Algebra and Calculus, Ordinary Differential Equations and Multivariable Calculus Laplace Transforms, Numerical Methods and Complex variables

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

Course Outcomes: At the end of this course, students will demonstrate the ability to

- Understand the modelling of linear-time-invariant systems using transfer function and state space representations.
- Understand the concept of stability and its assessment for linear-time invariant systems.
- Design simple feedback controllers.
- Able to calculate gain and phase margins from frequency response plots
- Identify the state variables and write state equations for various dynamic systems

UNIT - I Introduction to Control Systems:
Classification of control systems. Feedback characteristics, Effect of Feedback - Mathematical modelling of Electrical and Mechanical systems - Transfer function - Transfer function of Potentiometer, synchro, AC servo motor, DC servo motor - Block diagram reduction techniques, Signal flow graph, Mason's gain formula.

UNIT - II Time Domain Analysis
Standard test signals - Time response of first order systems – Transient response of second order system for unit step input, Time domain specifications – Steady state response – Steady sate errors and error constants – Effect of P, PD, PI and PID controllers.

UNIT - III Stability Analysis in S-Domain
The concept of stability - Routh's stability Criterion, Absolute stability and relative Stability– limitations of Routh's stability.
Root Locus Technique: The root locus concept - construction of root loci – Effect of adding poles and zeros on the root loci.

UNIT - IV Frequency-Response Analysis:
Introduction to frequency response - frequency domain specifications - Bode plot – Stability analysis from Bode plots – Determination of transfer function from Bode Diagram - Polar plots, Nyquist plots, Stability Analysis, Gain margin and phase margin. **Control System Design:** Introduction –Lag, Lead and Lag-Lead compensator design in frequency domain.

UNIT - V State Space Analysis:
Concepts of state, State variables and state model, Derivation of state models of linear time invariant systems – Controllable, Observable and Diagonal state models – State transition matrix – Solution of state equation - Concept of Controllability and Observability.

TEXT BOOKS:

1. M. Gopal, “Control Systems: Principles and Design”, McGraw Hill Education, 1997.
2. B. C. Kuo, “Automatic Control System”, Prentice Hall, 1995.

REFERENCE BOOKS:

1. K. Ogata, “Modern Control Engineering”, Prentice Hall, 1991.
2. J. Nagrath and M. Gopal, “Control Systems Engineering”, New Age International, 2009.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AUTONOMOUS)

2250404: MICROPROCESSORS AND MICROCONTROLLERS

B.Tech III Year I Sem.

L T P C
3 0 0 3

Course Objectives:

The students will try to learn

- Understanding the architecture of microprocessors
- Gain knowledge about the programming of microprocessors
- Study the architecture of microcontrollers and programming for various applications
- Learn about interfacing devices and interfacing techniques
- Understand the basic concepts of ARM architecture

Course Outcomes: After successful completion of the course, students shall be able to

- Acquire the knowledge about microcontrollers and microprocessors
- Understand the programming using assembly language instructions for processors applications
- Analyze and design practical applications and interface peripheral devices to the microprocessor
- Understand the architecture of a ARM processor
- Apply theoretical learning to practical real time problems for automation applications using them

Module–I:

Introduction of microprocessor, Review and evolution of advanced microprocessors.

Introduction to 8086 Processor: features of 8086, Register organization of 8086, Architecture of 8086, signal description of 8086, Memory Segmentation, Physical Memory Organization. Minimum mode and Maximum mode 8086 systems and timings diagram.

Module–II:

Instruction Set and Assembly Language Programming of 8086: Instruction formats, Addressing modes, Instruction set, Assembler Directives, Macros, and Simple Programs involving Logical, Branch and Call Instructions, Sorting, String Manipulations. Interrupts of 8086.

Module–III:

Introduction to Microcontrollers: Overview of 8051 Microcontroller, Architecture, I/O Ports, Memory Organization, Addressing Modes and Instruction set of 8051.

8051 Real Time Control: Programming Timer Interrupts, Programming External Hardware Interrupts, Programming the Serial Communication Interrupts, Programming 8051 Timers and Counters.

Module–IV:

Introduction to the various interfacings' chips like 8255, 8251, 8257, Interfacings key boards,LCD, Stepper motor, ADC, DAC and memory Interfacing.

Module–V:

ARM Architecture: ARM Processor fundamentals, ARM Architecture – Register, CPSR, Pipeline, exceptions and interrupts interrupt vector table.

ARM instruction set – Data processing, Branch instructions, load store instructions, Software interrupt instructions, Program status register instructions, loading constants, Conditional execution.

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TEXT BOOKS:

1. A. K. Ray and K.M. Bhurchandani, "Advanced Microprocessors and Peripherals," MHE, 3rd Edition 2017.
2. Kenneth. J. Ayala, "The 8051 Microcontroller," Delmar Cengage Learning, 3rd Edition, 2015.

REFERENCE BOOKS:

1. D. V. Hall, "Microprocessors and Interfacing," MGH, 3rd Edition 2017.
2. K. Uma Rao, Andhe Pallavi, "The 8051 Microcontrollers, Architecture and Programming and Applications," Pearson, 3rd Edition, 2019.
3. Andrew Sloss, Dominic Symes, Chris Wright, "ARM System Developers guide," Elsevier, 2nd Edition, 2012.

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(AUTONOMOUS)

2250510: OOPS Through JAVA Programming

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

Prerequisites: A course on Programming on problem solving

Course Outcomes: The students should be able to

1. Solve real world problems using OOP techniques.
2. Understand the use of abstract classes and Interfaces
3. Develop multithreaded applications with synchronization.
4. Solve problems using java collection framework
5. Develop applications using Event Handling

UNIT - I

Object Oriented Methodology: Introduction, Advantages and Disadvantages of Procedure Oriented Languages, what is Object Oriented? What is Object Oriented Development? Object Oriented Themes, Benefits and Application of OOPS. **Principles of OOPS:** OOPS Paradigm, Objects, Classes and Methods, Abstraction, Encapsulation, Inheritance, Polymorphism, Dynamic Binding, Message Passing.

Object oriented thinking: A way of viewing world – Agents, responsibility, messages, methods, Classes and instances, class hierarchies – inheritance, method binding, overriding and exceptions.

Introduction to JAVA: History of Java, Java buzzwords, data types, variables, scope and life time of variables, Type conversion and casting, arrays, operators, Operator Precedence, control statements.

UNIT - II

Classes: Class fundamentals, Declaring Objects, methods, Constructors, this keyword, garbage collection, Overloading methods and constructors, Recursion.

Inheritance, Packages and Interfaces – Inheritance basics, Using super, Creating a multilevel hierarchy, method overriding, Dynamic method dispatch, abstract classes, Using final with inheritance, Defining a package, Finding package and classpath, Access protection, importing packages, Defining an interface, implementing interface, applying interfaces, variables in interface and extending interfaces.

UNIT-III

Exception handling and Multithreading- Exception types, uncaught exceptions, using try and catch, Multiple catch classes, nested try statements, throw, throws and finally. Java's built-in exceptions, chained exceptions, creating own exception sub classes. Java thread model, thread priorities, synchronization, messaging, thread class and runnable interface, creating thread, creating multiple threads, thread priorities, synchronizing threads, interthread communication, thread life cycle.

UNIT-IV

Java String Handling: String Constructors, Special string operations, Character Extraction, String Comparisons, Modifying a string, String Buffer.

Collections Framework: Overview, Collection Interfaces, Collection Classes, Accessing a collection via Iterator, Working with Maps, Generics

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UNIT – V

Event Handling : Events, Event sources, Event Listeners, Event classes, Event listener interface, Handling mouse and keyboard events, Adapter classes, The AWT class hierarchy, AWT controls- labels, buttons, scrollbars, text field, check box, check box groups, choices, handling lists, dialogs, Menubar, layout manager- Flow, Border, Grid, Card

TEXT BOOKS:

1. Java The complete reference, 12th edition, Herbert Schildt, McGraw Hill Education (India) Pvt. Ltd.

REFERENCE BOOKS:

1. An Introduction to programming and OO design using Java, J. Nino and F.A. Hosch, John Wiley & sons
2. Introduction to Java programming, Y. Daniel Liang, Pearson Education.
3. Object Oriented Programming through Java, P. Radha Krishna, University Press.
4. Programming in Java, S. Malhotra, S. Chudhary, 2nd edition, Oxford Univ. Press.
5. Java Programming and Object-oriented Application Development, R. A. Johnson, Cengage Learning.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AUTONOMOUS)

2250016: Business Economics & Financial Analysis

B.Tech.III Year I Sem. L T P C

3 0 0 3

Course Objective:

To learn the basic Business types, impact of the Economy on Business and Firms specifically. To analyze the Business from the Financial Perspective.

Course Outcome:

The students will understand the various Forms of Business and the impact of economic variables on the Business. The Demand, Supply, Production, Cost, Market Structure, Pricing aspects are learnt. The Students can study the firm's financial position by analyzing the Financial Statements of a Company

UNIT-I: Introduction to Business and Economics

Business: Structure of Business Firm, Theory of Firm, Types of Business Entities, Limited Liability Companies, Sources of Capital for a Company, Non-Conventional Sources of Finance.

Economics: Significance of Economics, Micro and Macro Economic Concepts, Concepts and Importance of National Income, Inflation, Money Supply in Inflation, Business Cycle, Features and Phases of Business Cycle. Nature and Scope of Business Economics, Role of Business Economist, Multidisciplinary nature of Business Economics.

UNIT – II: Demand and Supply Analysis

Elasticity of Demand: Elasticity, Types of Elasticity, Law of Demand, Measurement and Significance of Elasticity of Demand, Factors affecting Elasticity of Demand, Elasticity of Demand in decision making, Demand Forecasting: Characteristics of Good Demand Forecasting, Steps in Demand Forecasting, Methods of Demand Forecasting.

Supply Analysis: Determinants of Supply, Supply Function & Law of Supply.

UNIT-III: Production, Cost, Market Structures & Pricing

Production Analysis: Factors of Production, Production Function, Production Function with one variable input, two variable inputs, Returns to Scale, Different Types of Production Functions.

Cost analysis: Types of Costs, Short run and Long run Cost Functions.

Market Structures: Nature of Competition, Features of Perfect competition, Monopoly, Oligopoly and Monopolistic Competition.

Pricing: Types of Pricing, Product Life Cycle based Pricing, Break Even Analysis, Cost Volume Profit Analysis.

UNIT - IV: Financial Accounting:

Accounting concepts and Conventions, Accounting Equation, Double-Entry system of Accounting. Rules for maintaining Books of Accounts, Journal, Posting to Ledger, Preparation of Trial Balance, Elements of Financial Statements, Preparation of Final Accounts.

UNIT- V: Financial Analysis through Ratios:

Concept of Ratio Analysis, Liquidity Ratios, Turnover Ratios, Profitability Ratios, Proprietary Ratios, Solvency, Leverage Ratios (simple problems).Introduction to Fund Flow and Cash Flow Analysis (simple problems).

TEXTBOOKS:

1. D. D. Chaturvedi, S. L. Gupta, Business Economics - Theory and Applications, International Book House Pvt. Ltd. 2013.
2. Dhanesh K Khatri, Financial Accounting, Tata McGrawHill,2011.
3. GeethikaGhosh, PiyaliGosh, PurbaRoyChoudhury, ManagerialEconomics, 2e, Tata McGrawHill Education Pvt. Ltd. 2012.

REFERENCE BOOKS:

1. Paresh Shah, FinancialAccountingforManagement2e, OxfordPress, 2015.
2. S.N.Maheshwari, Sunil K Maheshwari, SharadKMaheshwari, Financial Accounting, 5e, VikasPublications, 2013.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AUTONOMOUS)

2250282: POWER ELECTRONICS LAB

III Year B.Tech EEE – I Sem. **L T P C**

0 0 2 1

Prerequisite: Power Electronics

Course Objectives:

- Apply the concepts of power electronic converters for efficient conversion/control of power from source to load.
- Design the power converter with suitable switches meeting a specific load requirement.

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

1. Study of Characteristics of SCR, MOSFET & IGBT,
2. Gate firing circuits for SCR's
3. Single Phase AC Voltage Controller with R and RL Loads
4. Single Phase half controlled &fully controlled bridge converter with R and RL loads
5. Forced Commutation circuits (Class A, Class B, Class C, Class D & Class E)
6. Single Phase Cycloconverter with R and RL loads
7. Single Phase series& parallel inverter with R and RL loads
8. Single Phase Bridge inverter with R and RL loads

Any two experiments should be conducted

1. DC Jones chopper with R and RL Loads
2. Three Phase half-controlled bridge converter with R-load
3. Single Phase dual converter with RL loads
4. (a)Simulation of single-phase Half wave converter using R and RL loads

(b)Simulation of single-phase full converter using R, RL and RLE loads

(c)Simulation of single-phase Semi converter using R, RL and RLE loads

5. (a)Simulation of Single-phase AC voltage controller using R and RL loads

(b)Simulation of Single phase Cyclo-converter with R and RL-loads

6. Simulation of Buck chopper
7. Study of PWM techniques

Reference Books:

1. M. H. Rashid, Simulation of Electric and Electronic circuits using PSPICE – by M/s
2. PHI Publications.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AUTONOMOUS)

2250074: Advanced English Language Communication Skills (AELCS) Lab

III Year B.Tech EEE – I Sem. **L T P C**
0 0 2 1

Introduction

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

Learning Objectives:

This Lab focuses on using multi-media instruction for language development to meet the following targets:

- To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
- Further, they would be required to communicate their ideas relevantly and coherently in writing.
- To prepare all the students for their placements.

Course Outcomes:

- Recognize and recall English vocabulary through multimedia exercises to enhance fluency.
- Interpret spoken English at normal conversational speed by demonstrating active listening skills.
- Demonstrate appropriate responses in diverse socio-cultural and professional contexts, exhibiting situational awareness.
- Construct clear, coherent, and structured written communication to effectively convey ideas.
- Employ preparedness for placement opportunities by analysing and practicing interview techniques and professional communication strategies**.**

Syllabus: The following course activities will be conducted as part of the Advanced English Communication Skills (AECS) Lab:

1. **Inter-personal Communication and Building Vocabulary** - Starting a Conversation – Responding Appropriately and Relevantly – Using Appropriate Body Language – Role Play in Different Situations - Synonyms and Antonyms, One-word Substitutes, Prefixes and Suffixes, Idioms and Phrases and Collocations

2. **Reading Comprehension** –General Vs Local Comprehension, Reading for Facts, Guessing Meanings from Context, , Skimming, Scanning, Inferring Meaning.

3. **Writing Skills** – Structure and Presentation of Different Types of Writing – Letter Writing/Resume Writing/ e-correspondence/ Technical Report Writing

4. **Presentation Skills** – Oral Presentations (individual or group) through JAM Sessions/Seminars/PPTs and Written Presentations through Posters/Projects/Reports/ E e mails/Assignment etc.,

5. **Group Discussion and Interview Skills** – Dynamics of Group Discussion, Intervention, Summarizing, Modulation of Voice, Body Language, Relevance, Fluency and Organization of Ideas and Rubrics of Evaluation- Concept and Process, Pre-interview Planning, Opening Strategies, Answering Strategies, Interview through Tele-conference & Video-conference and Mock Interviews

Books Recommended:

1. Effective Technical Communication by M Ashraf Rizvi
2. Raman, M & Sharma, S. (2009). Technical Communication. Oxford University Press.
3. Rani. S. (2011). Advanced Communication Skills Laboratory Manual. Pearson Education.
4. Anderson, V. (2007). Technical Communication. Cengage Learning pvt. Ltd.
5. Sen. L. (2009). Communication Skills. PHI Learning Pvt Ltd.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AUTONOMOUS)

2250473: MICROPROCESSORS AND MICROCONTROLLERS LAB

III Year B.Tech EEE – I Sem. **L T P C**

0 0 2 1

Course Objectives:

Students will learn

- Know the arithmetic and string operations on 16 bit and 32-bit data
- Perform sorting and searching operation an array for 8086
- Study the bit level logical operations, rotate, shift, swap and branch operations
- Know the interfacing of 8051
- Understand the communication between 8051 to interfacing devices

Course Outcomes: After Completion of the Course, Students should be able to

- Implement and Debug Complex Operations in Assembly Language for 8086 Microprocessor.
- Apply Interfacing Techniques for External Devices with the 8051 Microcontroller.
- Analyze and Optimize the Performance of Triangular Wave Generation Using 8051 and DAC.
- Write a program for establishing Serial Communication Using 8051.
- Create Sequence Generation Using Serial Communication in 8051.

List of Experiments

1. Write a program for 16-bit arithmetic operations for 8086 (using Various Addressing Modes).
2. Write a program for sorting an array for 8086.
3. Write a program for searching for a number or character in a string for 8086.
4. Write a program for string manipulations for 8086.
5. Write a program for rotate, shift and branch instruction for 8086.
6. Parallel communication between two microprocessors.

   The following experiments are performed using 8051 Processor Kits and interfacing Kits
7. Write a program using arithmetic, logical and bit manipulation instructions of 8051.
8. Perform interfacing ADC to 8051.
9. Generate Triangular wave through DAC interfacing with 8051.
10. Program and verify interrupt handling in 8051.
11. Perform Time delay Generation Using Timers of 8051.
12. Perform interfacing to 8086 and programming to control stepper motor.
13. Perform interfacing matrix/keyboard to 8051.

NOTE: Minimum of 12 experiments to be conducted.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AUTONOMOUS)

2250570: JAVA PROGRAMMING LAB

Prerequisites: Programming for problem solving lab

Course Outcomes: The students should be able to

1. Solve real world problems using OOP techniques.
2. Understand the use of abstract classes and Interfaces
3. Develop multithreaded applications with synchronization.
4. Solve problems using java collection framework
5. Develop applications using Event Handling

List of Experiments

1. a) Use Eclipse or Net bean platform and acquaint with the various menus. Create a test project, add a test class, and run it. See how you can use auto suggestions, auto fill. Try code formatter and code refactoring like renaming variables, methods, and classes. Try debug step by step with a small program of about 10 to 15 lines which contains at least one if else condition and a for loop.
   b) Writeajavaprogramthatprintsallrealsolutionstothequadraticequation$ax^2+bx+c=0$.Read in a, b, c and use the quadratic formula.
   c) Write a java program to implement Fibonacci series.

2. a) Write a java program to implement method overloading and constructors overloading.
   b) Write a java program to implement method overriding.

3. a) Write a java program to check whether a given string is palindrome.
   b)Write a Java program to create an abstract class named Shape that contains two integers and an empty method named print Area (). Provide three classes named Rectangle, Triangle, and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.
4. a) Write a Java program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num 2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a Number Format Exception. If Num2 were Zero, the program would throw an Arithmetic Exception. Display the exception in a message dialog box.
   b).Write a java program to create user defined exception class and test this class.

5. a) Write a Java program to list all the files in a directory including the files present in all its subdirectories.
   b) Write a java program that displays the number of characters, lines and words in a text file.

6. a) Write a Java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.
   b) Write a Java program that correctly implements the producer – consumer problem using the concept of inter thread communication.

7. Write a Java program that loads names and phone numbers from a text file where the data is organized as one line per record and each field in a record are separated by a tab (\t). It takes a name or phone number as input and prints the corresponding other value from the hash table (hint: use hash tables).

8. Write Java Programs to perform following:
   a) To count occurrence of each character in a string.

b) To remove duplicate words from a string.
c) To print all permutations of a string.

9. Write programs to implement following using Collection Framework:
   a) to add, retrieve & remove element from Array List
   b) to Sort & reverse the Linked List elements
   c) to sort Array List using Comparable and Comparator
10. Write programs to implement following using Collection Framework:
   a) to copy elements from Hash Set to Array
   b) to remove duplicate key from hash table
   c) to iterate Tree Map
11. Suppose that a table named Table.txt is stored in a text file. The first line in the file is the header, and the remaining lines correspond to rows in the table. The elements are separated by commas. Write a java program to display the table using Labels in Grid Layout.
12. a) Write a Java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired (Use Adapter classes).
   b) Write a java program to demonstrate the key event handlers.

REFERENCE BOOKS:

1. Java for Programmers, P. J. Deitel and H. M. Deitel, 10th Edition Pearson education.
2. Thinking in Java, Bruce Eckel, Pearson Education.
3. Java Programming, D. S. Malik and P. S. Nair, Cengage Learning.
4. Core Java, Volume 1, 9th edition, Cay S. Horstmann and GCornell,

III-II

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AUTONOMOUS)

2260102 – REMOTE SENSING AND GIS

(Open Elective – II)

B.Tech. III Year II Sem **L T P C**

Prerequisites: Surveying **3 0 0 3**

Course Objectives: This course will make the student to understand about the principles of GIS, Remote Sensing, Spatial Systems, and its applications to Engineering Problems.

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

1. Retrieve the information content of remotely sensed data
2. Analyse the energy interactions in the atmosphere and earth surface features
3. Interpret the images for preparation of thematic maps and apply problem specific remote sensing data for engineering applications
4. Analyse spatial and attribute data for solving spatial problems
5. Create GIS and cartographic outputs for presentation

UNIT – I

Introduction to Photogrammetry: Principles& types of aerial photograph, geometry of vertical aerial photograph, Scale & Height measurement on single vertical aerial photograph, Height measurement based on relief displacement, Fundamentals of stereoscopy, fiducial points, parallax measurement using fiducial line.

Learning Outcomes:

At the end of the unit, students should able to

- Understand the photogrammetry and their terminologies
- Explain the principles and different types of photogrammetry

UNIT – II

Remote Sensing: Basic concept of remote sensing, Data and Information, Remote sensing data Collection, Remote sensing advantages & Limitations, Remote Sensing process.

Electro-magnetic Spectrum, Energy interactions with atmosphere and with earth surface features (soil, water, vegetation), Indian Satellites and Sensors characteristics, Resolution, Map and Image and False color composite, introduction to digital data, elements of visual interpretation techniques.

Learning Outcomes:

At the end of the unit, students should able to

- Understand the concepts of remote sensing and its advantage & disadvantage
- Explain the process of remote sensing
- Explain about electromagnetic spectrum
- Explain the satellite, sensor characteristics and elements of visual interpretation techniques

UNIT – III

Geographic Information Systems: Introduction to GIS; Components of a GIS; Geospatial Data: Spatial Data-Attribute data – Joining Spatial and Attribute data; GIS Operations: Spatial Data Input- Attribute data Management –Data display- Data Exploration- Data Analysis. COORDINATE SYSTEMS: Geographic Coordinate System: Approximation of the

Earth, Datum; Map Projections: Types of Map Projections-Map projection parameters- Commonly used Map Projections - Projected coordinate Systems

Learning Outcomes:

At the end of the unit, students should able to

- Understand the concepts and components of GIS
- Explain the processes and operations involved in GIS
- Explain the coordinate systems of GIS

UNIT – IV

Vector Data Model: Representation of simple features- Topology and its importance; coverage and its data structure, Shape file; Data models for composite features Object Based Vector Data Model; Classes and their Relationship; The geobase data model; Geometric representation of Spatial Feature and data structure, Topology rules

Learning Outcomes:

At the end of the unit, students should able to

- Understand the concepts of representation of model by vector data
- Explain their importance, features and how to create the model by analysis

UNIT – V

Raster Data Model: Elements of the Raster data model, Types of Raster Data, Raster Data Structure, Data Conversion, Integration of Raster and Vector data.

Data Input: Metadata, Conversion of Existing data, creating new data; Remote Sensing data, Field data, Text data, Digitizing, Scanning, on screen digitizing, importance of source map, Data Editing

Learning Outcomes:

At the end of the unit, students should able to

- Understand the concepts of representation of model by Raser data
- Explain their importance, features and how to create the model by analysis

TEXT BOOKS:

1. Remote Sensing and GIS Lillesand and Kiefer, John Willey 2008.
2. Remote Sensing and GIS B. Bhatta by Oxford Publishers 2015.
3. Introduction to Geographic Information System – Kang-Tsung Chang, McGraw-Hill 2015.

REFERENCES:

1. Concepts & Techniques of GIS by C. P. Lo Albert, K.W. Yonng, Prentice Hall (India) Publications.
2. Principals of Geo physical Information Systems – Peter A Burragh and Rachael A.Mc Donnell, Oxford Publishers, 2004.

3. Basics of Remote sensing & GIS by S. Kumar, Laxmi Publications.

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2260234: IOT APPLICATIONS IN ELECTRICAL ENGINEERING

(Professional Elective-I)

III Year B.Tech EEE – II Sem.

L	T	P	C
3	0	0	3

Course Objectives:

- To introduce the terminology, technology and its applications
- To introduce the concept of M2M (machine to machine) with necessary protocols
- To introduce the Python Scripting Language which is used in many IoT devices
- To introduce the Raspberry PI platform, that is widely used in IoT applications
- To introduce the implementation of web-based services on IoT devices.

Course Outcomes:

- Interpret the impact and challenges posed by IoT networks leading to new architectural models.
- Compare and contrast the deployment of smart objects and the technologies to connect them to network.
- Appraise the role of IoT protocols for efficient network communication.
- Elaborate the need for Data Analytics and Security in IoT.
- Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry.

UNIT - I Introduction to Internet of Things

Overview of Internet of Things- the Edge, Cloud and the Application Development, Anatomy of the Thing, Industrial Internet of Things (MOT - Industry 4.0), Quality Assurance, Predictive Maintenance, Real Time Diagnostics, Design and Development for IOT, Understanding System Design for IOT, Design Model for IOT.

UNIT - II System Design of Connected Devices

Embedded Devices, Embedded Hardware, Connected Sensors and Actuators, Controllers, Battery Life Conservation and designing with Energy Efficient Devices, SoCs, Single Chip Controllers with integrated Processing and Network Core with Hardware Crypto Engines.

UNIT - III Understanding Internet Protocols

Simplified OSI Model, Network Topologies, Standards, Types of Internet Networking - Ethernet, WiFi, Local Networking, Bluetooth, Bluetooth Low Energy (BLE), Zigbee, 6LoWPAN, Sub 1 GHz, RFID, NFC, Proprietary Protocols, Simplicity, Networking Design - Push, Pull and Polling, Network APIs.

UNIT - IV IoT Physical Devices and Endpoints

Introduction to Raspberry PI - Interfaces (serial, SPI, I2C). Programming – Python program with Raspberry PI with focus of interfacing external gadgets, controlling output, reading input from pins.

UNIT - V Domain specific IOT and their challenges

Illustrated domains-home automation, smart cities, environment, energy, retail, logistics, health and life style. Case Study of Rapid Internet Connectivity with Cloud Service Providers with CC3200 Controller.

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TEXT BOOKS:

1. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547.
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759.
3. Foundational Elements of an IOT Solution - The Edge, Cloud and Application Development, Joe Biron& Jonathan Follett, Oreilly, First Edition, March 2016.

REFERENCE BOOKS:

1. Designing Connected Products, Elizabeth Goodman, Alfred Lui, Martin Charlier, Ann Light, 1st Edition, 2016, Claire Rowland.
2. The Internet of Things (A Look at Real World Use Cases and Concerns), Kindle Edition, 2016, Lucas Darnell.

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(AUTONOMOUS)

2260235: HIGH VOLTAGE ENGINEERING
(Professional Elective-I)

III Year B. Tech EEE – II Sem.

L	T	P	C
3	0	0	3

Prerequisite: Power Systems – I, Electro Magnetic Fields

Course Objectives:

- To deal with the detailed analysis of Breakdown occurring in gaseous, liquids and solid dielectrics
- To inform about generation and measurement of High voltage and current
- To introduce various measurement methods
- To introduce over voltages in power systems
- To introduce High voltage testing methods

Course outcomes: At the end of the course, the student will demonstrate

- Understand the basic physics related to various breakdown processes in solid, liquid and gaseous insulating materials.
- Knowledge of generation and measurement of D. C., A.C., & Impulse voltages.
- Knowledge of various measurement methods of high voltages and currents
- Knowledge of how over-voltages arise in a power system, and protection against these over voltages
- Knowledge of tests on H. V. equipment and on insulating materials, as per the standards.

UNIT - I Breakdown in Gases

Ionization processes and de-ionization processes, Types of Discharge, Gases as insulating materials, Breakdown in Uniform gap, non-uniform gaps, Townsend's theory, Streamer mechanism, Corona discharge.

Breakdown in Liquid and Solid Insulating Materials

Breakdown in pure and commercial liquids, Solid dielectrics and composite dielectrics, intrinsic breakdown, electromechanical breakdown and thermal breakdown, Partial discharge, applications of insulating materials.

UNIT - II Generation of High Voltages

Generation of high voltages, generation of high D. C. and A.C. voltages, generation of impulse voltages, generation of impulse currents, tripping and control of impulse generators.

UNIT- III Measurements of High Voltages and Currents

Peak voltage, impulse voltage and high direct current measurement method, cathode ray oscillographs for impulse voltage and current measurement, measurement of dielectric constant

and loss factor, partial discharge measurements.

UNIT - IV LIGHTNING AND SWITCHING OVER-VOLTAGES

Charge formation in clouds, stepped leader, Dart leader, Lightning Surges. Switching over voltages, Protection against over-voltages, Surge diverters, Surge modifiers.

UNIT - V High Voltage Testing of Electrical Apparatus and High Voltage Laboratories

Various standards for HV Testing of electrical apparatus, IS, IEC standards, testing of insulators and bushings, testing of isolators and circuit breakers, testing of cables, power transformers and some high voltage equipment, High voltage laboratory layout, indoor and outdoor laboratories, testing facility requirements, safety precautions in H. V. Labs.

TEXT BOOKS:

1. M. S. Naidu and V. Kamaraju, “High Voltage Engineering”, McGraw Hill Education, 2013.
2. C. L. Wadhwa, “High Voltage Engineering”, New Age International Publishers, 2007.

REFERENCES:

1. D. V. Razevig (Translated by Dr. M. P. Chourasia), “High Voltage Engineering Fundamentals”, Khanna Publishers, 1993.
2. E. Kuffel, W. S. Zaengl and J. Kuffel, “High Voltage Engineering Fundamentals”, Newnes Publication, 2000.
3. R. Arora and W. Mosch “High Voltage and Electrical Insulation Engineering”, John Wiley & Sons, 2011.

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2260236: POWER SYSTEMS ANALYSIS
(Professional Elective-I)

III Year B. Tech EEE – II Sem.

L	T	P	C
3	0	0	3

Prerequisite: Power Systems-I & Power Systems –II

Course Objectives:

- To understand and develop Y bus and Z bus matrices
- To know the importance of load flow studies and its importance
- To analyse various types of short circuits
- To know rotor angle stability of power systems

Course outcomes: At the end of the course, the student will demonstrate

- Develop the Ybus and Zbus matrices
- Analyze load flow for various requirements with classical methods
- Analyze load flow for various requirements with advanced methods
- Analyze short circuit studies for the protection of power system
- Estimate stability and instability in power systems

UNIT - I Power System Network Matrices:

Graph Theory: Definitions and Relevant concepts in Graph Theory, Network Matrices. Transmission Network Representations: Bus Admittance frame and Bus Impedance frame. Formation of Ybus: Direct and Singular Transformation Methods, Numerical Problems. Formation of ZBus: Modification of existing ZBus Matrix for addition of a new branch, & complete ZBus building algorithm Numerical Problems

UNIT - II Power Flow Studies-I

Generation of Introduction: Necessity of Power Flow Studies, Bus classification and Notations, Convergence & Bus mismatch criteria. Load Flow Methods: Gauss-Seidal Method in complex form without & with voltage control buses, line flows and loss calculations, Newton Raphson method in Polar and Rectangular form, derivation of Jacobian elements, Numerical Problems for one or two iterations

UNIT- III Power Flow Studies - II:

Introduction to sensitivity & decoupled sub matrices of J-matrix, Decoupled load flow method and its assumptions, Fast Decoupled load method and its assumptions, Comparison of Different Methods – DC load Flow method, Numerical problems for one or two iterations

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UNIT - IV Short Circuit Analysis

Per-Unit Systems. Per-Unit equivalent reactance network of a three phase Power System, Numerical Problems. Symmetrical fault Analysis: Short Circuit Current and MVA Calculations, Fault levels, Application of Series Reactors, Numerical Problems. Symmetrical Components, sequence impedances and networks, Numerical Problems. Unsymmetrical Fault Analysis: Fault current calculations for LG, LL, LLG faults with and without fault impedance, Numerical Problems.

UNIT - V Power System Stability Analysis:

Introduction to Power System Stability issues. Rotor dynamics & Swing equation, Power angle equation with & without neglecting line resistance, Steady State Stability, Determination of Transient Stability through Equal Area Criterion for single machine infinite system, Critical clearing angle & time, Numerical problems. Multimachine transient analysis: Classical representation of system and its assumptions, Solution of Swing Equation by Point-by-Point Method, Methods to improve Stability.

TEXT BOOKS:

1. "I. J. Nagrath & D. P. Kothari", "Modern Power system Analysis", Tata McGraw-Hill Publishing Company, 4th Edition 2011
2. "Hadi Saadat", "Power System Analysis".TMH Edition,2002.

REFERENCES:

1. "M. A. Pai", "Computer Techniques in Power System Analysis", TMH Publications, 3 rd Edition 2014.
2. Grainger and Stevenson, "Power System Analysis", Tata McGraw Hill, 2003..
3. Abhijit Chakrabarthi and Sunita Haldar, "Power System Analysis Operation and Control", 3rd Edition, PHI, 2010.

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2260405: BASICS OF DIGITAL SIGNAL PROCESSING

III Year B. Tech EEE – II Sem.

L	T	P	C
2	0	0	2

Course Objectives:

The students will try to learn

- Understand the basic concepts related to the analysis and processing of digital signals
- Understand the fast computation of DFT and appreciate the FFT processing
- Study the designs of IIR digital filters and analyze and synthesize
- Designs of FIR digital filters and analyze and synthesize
- Realize the structures of digital filters and acquaint in multi-rate signal processing techniques

Course Outcomes: After successful completion of the course, students shall be able to

- Understand the LTI system characteristics and Multirate signal processing.
- Apply the knowledge of FFT Algorithms for computation of DFT
- Design a IIR digital filter using various techniques
- Design FIR filters using various methods
- Understand the significance of various filter structures and Apply decimation and interpolation concepts.

Module–I: Introduction: Introduction to digital signal processing. Classification of discrete time signals & systems, Conversion of continuous to discrete time signal. Linear constant coefficient difference equations, Solution of linear constant coefficient difference equation: Zero input response, Impulse response, and Step response. Frequency domain representation of discrete time signals and systems.

Module–II: Discrete Fourier series: DFS representation of periodic sequences, Properties of DFS.

Discrete Fourier Transforms: Properties of DFT, Linear convolution of sequences using DFT, Relation between DTFT, DFS, DFT and Z-Transform.

Fast Fourier Transforms: Fast Fourier Transforms (FFT) - Radix-2 Decimation-in-Time and Decimation-in-Frequency FFT Algorithms.

Module–III: IIR Digital Filters- Analog filter approximations- Butterworth and Chebyshev filters, Design of IIR Digital Filters from Analog Filters, Step and Impulse invariant techniques.

Module–IV: FIR Digital Filters - Characteristics of FIR digital filters, Frequency response. Design of FIR Filters: Fourier method, Frequency sampling technique, Comparison of IIR & FIR filters.

Module–V: Realization of Digital Filters: Applications of Z-transforms, Solution of difference equations of digital filters, System function, Stability criterion, Frequency response of stable systems.

Multirate Digital Signal Processing: Introduction, Decimation by a factor D, Spectrum of decimator, Interpolation by a factor I, Spectrum of interpolator

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TEXTBOOKS:

1. John G. Proakis, Dimitris G. Manolakis, "Digital signal processing, principles, algorithms and applications," Prentice Hall, 4th Edition, 2015.
2. A.V. Oppenheim, R.W. Schaffer, "Discrete time signal processing," PHI, 2nd Edition, 2015.

REFERENCE BOOKS:

1. S. Salivahanan, Vallavaraj, Gnanapriya, "Digital signal processing," Tata McGraw-Hill Education, 2nd Edition, 2009.
2. A. Nagoorkani, "Digital signal processing," Tata McGraw-Hill Education, 2nd Edition, 2012.
3. P. Ramesh Babu, "Digital signal processing," SCI Tech, 7th Edition, 20

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

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2260231: POWER SYSTEM PROTECTION

III Year B.Tech EEE – II Sem.

L	T	P	C
3	0	0	3

Course Prerequisites: Power Systems - I & Power Systems - II

Course Objectives:

To introduce all kinds of circuit breakers and relays for protection of Generators

- Transformers and feeder bus bars from Over voltages and other hazards.
- To describe neutral grounding for overall protection.
- To understand the phenomenon of Over Voltages and its classification.

Course Outcomes

After completion of this course the student is able to

- After Completion of this course student will be able to
- Understand the types of Circuit breakers and choice of Relays for appropriate protection of power system equipment.
- Understand various types of Protective devices in Electrical Power Systems
- Interpret the existing transmission voltage levels and various means to protect the system against over voltages.
- Understand the importance of Neutral Grounding, Effects of Ungrounded Neutral grounding on system performance, Methods and Practices.

UNIT-I Introduction to Circuit Breakers:

Circuit Breakers: Elementary principles of arc interruption, Recovery, Restriking Voltage and Recovery voltages. - Restriking Phenomenon, Average and Maximum RRRV, Numerical Problems - Current Chopping and Resistance Switching - CB ratings and Specifications: Types and Numerical Problems. – Autoreclosures. Description and Operation of following types of circuit breakers: Minimum Oil Circuit breakers, Air Blast Circuit Breakers, Vacuum, and SF_6 circuit breakers.

UNIT-II Electromagnetic Relays:

Principle of Operation and Construction of Attracted armature, Balanced Beam, induction Disc and Induction Cup relays. Types of Over Current Relays: 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.

UNIT-III Static Relays:

Static Relays verses Electromagnetic Relays Amplitude and Phase comparators, Duality between AC and PC, Static amplitude comparator, integrating and instantaneous comparators., static phase comparators, coincidence type of phase comparator, static over current relays, static directional

relay, static differential relay, static differential relay, static distance relays, Multi input comparators, concept of quadrilateral and elliptical relay characteristics.

UNIT-IV Protection of Power Equipment:

Protection of generators against Stator faults, Rotor faults, and Abnormal Conditions. Restricted Earth fault and Inter-turn fault Protection. Numerical Problems on % Winding Unprotected. Protection of transformers: Percentage Differential Protection, Numerical Problem on Design of CTs Ratio, Buchholtz relay Protection. Protection of Lines: Over Current, Carrier Current and Three-zone distance relay protection using Impedance relays. Translay Relay**.** Protection of Bus bars – Differential protection.

UNIT-V Neutral Grounding:

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

TEXT BOOKS:

1. "Badri Ram, D. N Viswakarma", "Power System Protection and Switchgear", TMH Publications, 2011
2. "Sunil S Rao", "Switchgear and Protection", Khanna Publishers, 2008.

REFERENCE BOOKS:

1. "Paithankar and S. R. Bhide", "Fundamentals of Power System Protection", PHI, 2003.
2. "C R Mason", Art & Science of Protective Relaying – Wiley Eastern Ltd, 1966.
3. "C. L. Wadhwa", "Electrical Power Systems", New Age international (P) Limited, Publishers, 6th Edition 2007.

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2260232: POWER SYSTEM OPERATION & CONTROL

III Year B.Tech EEE – II Sem.

L	T	P	C
3	1	0	4

Pre-requisites: Power System-I, Power System-II

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

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

- Understand operation and control of power systems.
- Analyze various functions of Energy Management System (EMS) functions.
- Analyze whether the machine is in stable or unstable position.
- Describe the methods to improve steady state and transient stability
- Understand power system deregulation and restructuring

UNIT - I Load Flow Studies

Graph Theory, Formation of Y bus using singular transformation method, Formation of Z bus by Building algorithm method, Bus classification - Nodal admittance matrix - Load flow equations - Iterative methods - Gauss Seidel Methods, Newton-Raphson Method - Fast Decoupled Method - Merits and demerits of the above methods - System data for load flow study.

UNIT - II Economic Load Dispatch:

Statement of economic dispatch problem – cost of generation – incremental cost curve, IFR curve, Heat rate curve - co-ordination equations without loss and with loss by using B-Coefficients, solution by direct method and λ-iteration method.

UNIT - III Load Frequency Control

Load –Frequency Control: Basics of speed governing mechanism and modeling – speed load characteristics – load sharing between two synchronous machines in parallel. Control area concept LFC 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 - IV Power System Stability

The stability problem-Steady state stability, transient stability and Dynamic Stability-Swing equation. Equal area criterion of stability-Applications of Equal area criterion, Step by step solution of swing equation-Factors affecting transient stability, Methods to improve steady state and Transient stability, Introduction to voltage stability.

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UNIT - V Computer Control of Power Systems

Need of computer control of power systems. Concept of energy control centre (or) load dispatch centre and the functions - system monitoring - data acquisition and control. System hardware configuration – SCADA and EMS functions. Network topology – Importance of Load Forecasting and simple techniques of forecasting.

TEXT BOOKS

1. C. L. Wadhwa, Electrical Power Systems, 3rd Edn, New Age International Publishing Co., 2001.
2. D. P. Kothari and I. J. Nagrath, Modern Power System Analysis, 4th Edn, Tata McGraw Hill Education Private Limited 2011.

REFERENCES:

1. D. P. Kothari: Modern Power System Analysis-Tata Mc Graw Hill Pub. Co. 2003. 2. Hadi Sadat: Power System Analysis –Tata Mc Graw Hill Pub. Co. 2002.

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2260284: POWER SYSTEM LAB

III Year B.Tech EEE – II Sem.

L	T	P	C
0	0	2	1

Prerequisite: Power System-I, Power System-II, Power System Protection, Power System Operation and Control, Electrical Machines

Course Objectives:

- 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.

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.

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

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. A, B, C, D constants of a Long Transmission line
5. Finding the sequence impedances of 3-Φ synchronous machine.
6. Finding the sequence impedances of 3-Φ Transformer.

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

Part - B

1. Formation of YBUS.
2. Load Flow Analysis using Gauss Seidal (GS) Method.
3. Load Flow Analysis using Fast Decoupled (FD) Method.
4. Formation of ZBUS.
5. Simulation of Compensated Line

TEXT BOOKS:

1. C.L. Wadhwa: Electrical Power Systems –Third Edition, New Age International Pub. Co., 2001.
2. Hadi Sadat: Power System Analysis –Tata Mc Graw Hill Pub. Co. 2002.

REFERENCES:

1. D. P. Kothari: Modern Power System Analysis-Tata Mc Graw Hill Pub. Co. 2003.

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2260474: BASICS OF DIGITAL SIGNAL PROCESSING LAB

III Year B.Tech EEE – II Sem.

L	T	P	C
0	0	2	1

Course Objectives:

Students will learn

- Implementation of Linear and Circular Convolution.
- Implementation of FIR and IIR filters
- Predict time and frequency response of discrete-time systems using various techniques like Z Transform, DFT, FFT
- Study the architecture of DSP processor
- Demonstration of Finite word length effects

Course Outcomes: After Completion of the Course, Students should be able to

- Understand the handling of discrete/digital signals using MATLAB
- Learn the basic operations of Signal processing
- Analyze the spectral parameter of window functions
- Design IIR, and FIR filters for band pass, band stop, low pass and high pass filters
- Design the signal processing algorithm using MATLAB

List of Experiments

1. Generate Sinusoidal Waveform / Signal based on Recursive Difference Equations.
2. Histogram of White Gaussian Noise and Uniformly Distributed Noise.
3. Find DFT/IDFT of a DT signal/Sequence.
4. Find Frequency Response of a given System given in Transfer Function/ Differential equation form.
5. Obtain Fourier series coefficients by formula and using FET and compare for half sine wave.
6. Implement FFT for a given Sequence.
7. Determine Power Spectrum of a given Signal (s).
8. Implement LP FIR Filter for a given Sequence/Signal.
9. Implement HP IIR Filter for a given Sequence/Signal.
10. Implement Decimation Process.
11. Implement Interpolation Process.
12. Implement of I/D Sampling Rate Converters.
13. Impulse Response of First order and Second Order Systems.

NOTE: Minimum of 12 experiments to be conducted

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2260283: CONTROL SYSTEMS LAB

III Year B. Tech EEE – II Sem.

L	T	P	C
0	0	2	1

Prerequisite: Control Systems

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

Course Outcomes: After completion of this lab the student is able to

- How 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 (example: Power systems, electrical drives etc)
- Test system controllability and observability using state space representation and applications of state space representation to various systems

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

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

1. Effect of P, PD, PI, PID Controller on a second order systems
2. Lag and lead compensation – Magnitude and phase plot
3. (a) Simulation of P, PI, PID Controller.
4. (b) Linear system analysis (Time domain analysis, Error analysis) using suitable software
5. Stability analysis (Bode, Root Locus, Nyquist) of Linear Time Invariant system using suitable software 6. State space model for classical transfer function using suitable software -Verification.
6. Design of Lead-Lag compensator for the given system and with specification using suitable software.

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TEXT BOOKS:

1. M. Gopal, “Control Systems: Principles and Design”, McGraw Hill Education, 1997.
2. B. C. Kuo, “Automatic Control System”, Prentice Hall, 1995.

REFERENCES:

1. K. Ogata, “Modern Control Engineering”, Prentice Hall, 1991.
2. I. J. Nagrath and M. Gopal, “Control Systems Engineering”, New Age,2007.

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B.Tech. III Year II Sem. **L T P C**
2 0 0 0

Course Objectives

1. **To introduce** students to the fundamental concepts, types, and importance of Intellectual Property Rights (IPR) at national and international levels.
2. **To develop understanding** of legal frameworks governing trademarks, copyrights, patents, trade secrets, and unfair competition.
3. **To familiarize** students with registration procedures, ownership rights, protection mechanisms, and enforcement of intellectual property.
4. **To analyze** international treaties and the role of global organizations in harmonizing intellectual property laws.
5. **To examine** recent developments and emerging trends in intellectual property law and their impact on global trade and innovation.

Course Outcomes: After successful completion of the course, students will be able to:

1. **Explain** the basic concepts, types, significance, and international framework of Intellectual Property Rights.
2. **Apply** legal principles related to trademarks, copyrights, and patents, including registration and protection processes.
3. **Analyze** issues concerning ownership, infringement, trade secrets, unfair competition, and liability in intellectual property law.
4. **Evaluate** international intellectual property treaties and their role in global trade and legal harmonization.
5. **Assess** recent developments and conduct basic intellectual property audits to protect and manage intellectual assets effectively.

UNIT – I

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

UNIT – II

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

UNIT – III

Law of copy rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.
Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

UNIT – IV

Trade Secrets: Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade secrete litigation.
Unfair competition: Misappropriation right of publicity, false advertising.

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UNIT – V

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

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

TEXT & REFERENCE BOOKS:

1. Intellectual property right, Deborah. E. Bouchoux, Cengage learning.
2. Intellectual property right – Unleashing the knowledge economy, prabuddha ganguli, TataMcGraw Hill Publishing company ltd.

IV-I

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AUTONOMOUS)

2270233: POWER ELECTRONICS APPLICATIONS TO RENEWABLE ENERGY SYSTEMS

IV Year B. Tech EEE – I Sem.

L	T	P	C
3	1	0	4

Prerequisite: Electronics, Renewable Energy Systems

Course Objectives:
- To learn the various types of renewable sources of energy.
- To learn the principles of power converters used in solar PV system.
- To study the principle of power converters used in Wind system.
- To study the power converter applications of wind energy system.
- To understand the need of Hybrid Renewable Energy systems.

Course Outcomes: After completion of this course the student is able to
- Understand the availability of renewable Energy sources.
- Apply power electronics for standalone photovoltaic systems.
- Analyse a Power Electronic Based grid connected wind energy system.
- Demonstrate the applications of power converters used for wind Energy systems.
- Examine the available hybrid renewable energy systems.

UNIT – I INTRODUCTION:

Classification of Energy Sources – Importance of Non-conventional energy sources – Advantages anddisadvantages of conventional energy sources - Environmental aspects of energy - Impacts of renewable energy generation on the environment- Emerging trends in electrical energy utility – Energy and environment.

UNIT – II POWER ELECTRONICS FOR PHOTOVOLTIC SYSTEMS:

Solar cell fundamentals – Conversion of sunlight to electricity – Cell performance – Basics of photovoltaic – Types of PV power systems – Standalone PV systems – Battery charging – PV charge controllers – Maximum Power Point Tracking (MPPT) for Solar Sytem

UNIT – III POWER ELECTRONICS FOR WIND POWER SYSTEM:

Basics of wind power – Types of wind turbines – Types of wind generators – Types of wind power systems – Stand alone wind diesel hybrid systems – Grid connected wind energy systems

Unit-IV POWER CONVERTERS FOR WIND SYSTEMS

Power Converters: Three-phase AC voltage controllers- AC-DC-AC converters: uncontrolled rectifiers, PWM Inverters, Grid-Interactive Inverters - Matrix converter

Unit V HYBRID RENEWABLE ENERGY SYSTEMS

Need for Hybrid Systems- Range and type of Hybrid systems- Case studies of Diesel-PV, Wind- PV, Micro hydel-PV, Biomass-Diesel systems

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TEXT BOOKS:

1. S.N.Bhadra, D. Kastha, & S. Banerjee “Wind Electrical Systems”, Oxford University Press, 2009, 7th impression.
2. Rashid .M. H “Power electronics Hand book”, Academic press,2nd Edition, 2006 4th Edition, 2017
3. Rai. G.D, “Non-conventional energy sources”, Khanna publishers, 6th Edition, 2017.
4. Rai. G.D,” Solar energy utilization”, Khanna publishers, 5th Edition, 2008.

REFERENCE BOOKS:

1. Gray, L. Johnson, “Wind energy system”, prentice hall of india, 2nd Edition, 2006.
2. H.Khan "Non-conventional Energy sources ",Tata McGraw-hill Publishing Company, New Delhi,2017, 3rd Edition

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AUTONOMOUS)

2270303: ELEMENTS OF ELECTRIC AND HYBRID VEHICLES (OPEN ELECTIVE-III)

IV Year B. Tech EEE – I Sem. **L T P C**

3 0 0 3

Prerequisite: Electrical Machines, Power electronics

Course Objectives: The students will try to learn

- To understand the basic performance of conventional Vehicles
- Describe the hybrid vehicles and their performance.
- To understand the concept of electric traction
- To understand the different possible ways of energy storage.
- To understand the different strategies related to hybrid vehicle operation & energy management.

Course Outcomes: After successful completion of the course, students should be able to

- Study the models to describe hybrid vehicles and their performance.
- Understand the importance of hybrid vehicles.
- Analyse the design of electric trains.
- Implement the different possible ways of energy storage.
- Adopt the different strategies related to hybrid vehicle operation & energy management.

UNIT – I

INTRODUCTION - Conventional Vehicles: Basics of vehicle performance, vehicle power Source characterization, transmission characteristics, and mathematical models to describe vehicle performance.

UNIT – II

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 – III

ELECTRIC TRAINS - Electric Drive Trains: Basic concept of electric traction. 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-IV

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 V 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", Routledge, 2016

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AUTONOMOUS)

2270237: RENEWABLE ENERGY SYSTEMS
(Professional Elective-II)

IV Year B. Tech EEE – I Sem.

L	T	P	C
3	0	0	3

Pre-requisites: Power System-I, Power System-II

Course Objectives:

- To recognize the awareness of energy conservation in students
- To identify the use of renewable energy sources for electrical power generation
- To collect different energy storage methods
- To detect about environmental effects of energy conversion

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

- Understand the principles of economics of generation and wind power plants
- Understand the solar photovoltaic power generation and fuel cells.
- Assess the cost of generation for conventional and renewable energy plants
- Design suitable power controller for wind and solar applications
- Analyze the issues involved in the integration of renewable energy sources to the grid

UNIT-I: INTRODUCTION

Renewable Sources of Energy-Grid-Supplied Electricity-Distributed Generation-Renewable Energy Economics Calculation of Electricity Generation Costs -Demand side Management Options – Supply side Management Options-Modern Electronic Controls of Power Systems. WIND POWER PLANTS: Appropriate Location -Evaluation of Wind Intensity -Topography -Purpose of the Energy Generated -General Classification of Wind Turbines-Rotor Turbines-Multiple-Blade Turbines Drag Turbines -Lifting Turbines Generators and Speed Control used in Wind Power Energy Analysis of Small Generating Systems.

UNIT-II: PHOTOVOLTAIC POWER PLANTS

Solar Energy-Generation of Electricity by Photovoltaic Effect -Dependence of a PV Cell Characteristic on Temperature-Solar cell Output Characteristics-Equivalent Models and Parameters for Photovoltaic Panels Photovoltaic Systems-Applications of Photovoltaic Solar Energy-Economical Analysis of Solar Energy.

FUEL CELLS:

The Fuel Cell-Low and High Temperature Fuel Cells-Commercial and Manufacturing Issues Constructional Features of Proton Exchange-Membrane Fuel Cells -Reformers-Electro-lyzer Systems and Related Precautions-Advantages and Disadvantages of Fuel Cells-Fuel Cell Equivalent Circuit-Practical Determination of the Equivalent Model Parameters -Aspects of Hydrogen as Fuel.

UNIT-III: INDUCTION GENERATORS

Principles of Operation-Representation of Steady-State Operation-Power and Losses Generated-Self-Excited Induction Generator-Magnetizing Curves and Self-Excitation Mathematical Description of the Self-Excitation Process-Interconnected and Stand-alone operation -Speed and Voltage Control -Economical Aspects.

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UNIT-IV: STORAGE SYSTEMS

Energy Storage Parameters-Lead-Acid Batteries-Ultra Capacitors-Flywheels -Superconducting Magnetic Storage System-Pumped Hydroelectric Energy Storage - Compressed Air Energy Storage -Storage Heat -Energy Storage as an Economic Resource.

UNIT-V: INTEGRATION OF ALTERNATIVE SOURCES OF ENERGY

Principles of Power Injection-Instantaneous Active and Reactive Power Control Approach Integration of Multiple Renewable Energy Sources-Islanding and Interconnection Control-DG Control and Power Injection.

INTERCONNECTION OF ALTERNATIVE ENERGY SOURCES WITH THE GRID:

Interconnection Technologies -Standards and Codes for Interconnection-Interconnection Considerations - Interconnection Examples for Alternative Energy Sources.

TEXT BOOKS:

1. Felix A. Farret, M. Godoy Simoes, “Integration of Alternative Sources of Energy”, John Wiley& Sons, 2006.
2. Solanki: Renewable Energy Technologies: Practical Guide for Beginneers, PHI Learning Pvt. Ltd., 2008.

REFERENCES:

1. D.Mukherjee: Fundamentals of Renewable Energy Systems, New Age International publishers, 2007.
2. Remus Teodorescu, Marco Liserre, Pedro Rodríguez: Grid Converters for Photovoltaic and Wind Power Systems, John Wiley & Sons, 2011.
3. Gilbert M. Masters: Renewable and Efficient Electric Power Systems, John Wiley & Sons, 2004.

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(AUTONOMOUS)

2270238: POWER SEMICONDUCTOR DRIVES (PE-II)

IV Year B.Tech EEE – I Sem.

L	T	P	C
3	0	0	3

Prerequisite: Power Electronics, Electrical Machines – I, Electrical Machines – II

Course Objectives:

- To introduce the drive system and operating modes of drive and its characteristics
- To understand Speed – Torque characteristics of different motor drives by various power converter topologies
- To appreciate the motoring and braking operations of drive
- To differentiate DC and AC drives

Course Outcomes: After completion of this course the student is able to

- Identify the drawbacks of speed control of motor by conventional methods.
- Differentiate Phase controlled and chopper-controlled DC drives speed-torque characteristics merits and demerits
- Understand Induction motor drive speed-torque characteristics using different control strategies its merits and demerits
- Describe Slip power recovery schemes
- Understand synchronous motors drive speed-torque characteristics using different control strategies its merits and demerits

UNIT - I Control of DC Motors

Introduction to Thyristor controlled Drives, Single Phase semi and fully controlled converters connected to D.C separately excited and D.C series motors - continuous current operation - output voltage and current waveforms – Speed and Torque expressions – Speed – Torque Characteristics- Problems on Converter fed D.C motors. Three phase semi and fully controlled converters connected to D.C separately excited and D.C series motors - output voltage and current waveforms – Speed and Torque expressions – Speed – Torque characteristics – Problems.

UNIT - II Four Quadrant Operation of DC Drives

Introduction to Four quadrant operation – Motoring operations, Electric Braking – Plugging, Dynamic, and Regenerative Braking operations. Four quadrant operation of D.C motors by single phase and three phase dual converters – Closed loop operation of DC motor (Block Diagram Only) Control of DC Motors by Choppers: Single quadrant, two quadrant and four quadrant chopper fed dc separately excited and series motors - Continuous current operation – Output voltage and current wave forms – Speed and torque expressions – speed-torque characteristics – Problems on Chopper fed D.C Motors – Closed Loop operation (Block Diagram Only).

UNIT - III Control of Induction Motor

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).

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UNIT - IV Rotor Side Control of Induction Motor

Static rotor resistance control - Slip power recovery - Static Scherbius drive - Static Kramer Drive - their performance and speed torque characteristics - advantages, applications, problems.

UNIT - V Control of Synchronous Motors

Separate control and self-control of synchronous motors – Operation of self-controlled synchronous motors by VSI, CSI and 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 based VSI & CSI.

TEXT BOOKS:

1. "G K Dubey", Fundamentals of Electric Drives, CRC Press, 2002.
2. "Vedam Subramanyam", Thyristor Control of Electric drives, Tata McGraw Hill Publications, 1987.

REFERENCES:

1. "S K Pillai", A First course on Electrical Drives, New Age International (P) Ltd. 2nd Edition. 1989
2. "P. C. Sen", Thyristor DC Drives, Wiley-Blackwell, 1981
3. "B. K. Bose", Modern Power Electronics, and AC Drives, Pearson 2015.
4. "R. Krishnan", Electric motor drives - modeling, Analysis and control, Prentice Hall PTR, 2001.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AUTONOMOUS)

2270439: POWER SYSTEM RELIABILITY (PE – II)

B.Tech. IV Year I Sem.

L	T	P	C
3	0	0	3

Prerequisite: Reliability Engineering, Power System-I, Power System-II, Power System Operation andControl

Course Objectives:

- To describe the generation system model and recursive relation for capacitive model building
- To explain the equivalent transitional rates, cumulative probability and cumulative frequency
- To develop the understanding of risk, system and load point reliability indices
- To explain the basic and performance reliability indices

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

- Knowledge of probability theory and reliability
- Analysis of generation systems model
- Describe merging generation and load models
- Apply various indices for distribution systems
- Evaluate reliability of interconnected systems

UNIT- I

Basic Probability Theory: Elements of probability, probability distributions, Random variables, Density and Distribution functions- Binomial distribution- Expected value and standard deviation - Binomial distribution, Poisson distribution, normal distribution, exponential distribution, Weibull distribution.

Definition of Reliability: Definition of terms used in reliability, Component reliability, Hazard rate, derivation of the reliability function in terms of the hazard rate. Hazard models - Bath tub curve, Effect of preventive maintenance. Measures of reliability: Mean Time to Failure and Mean Time between Failures.

UNIT - II

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

load representation - merging generation and load models – Examples.

UNIT- III

Operating Reserve Evaluation: Basic concepts - risk indices – PJM methods – security function approach – rapid start and hot reserve units – Modeling using STPM approach.

Bulk Power System Reliability Evaluation: Basic configuration – conditional probability approach – system and load point reliability indices – weather effects on transmission lines – Weighted average rate and Markov model – Common mode failures.

Inter Connected System Reliability Analysis: Probability array method – Two inter connected systems with independent loads – effects of limited and unlimited tie capacity - imperfect tie – Two connected Systems with correlated loads – Expression for cumulative probability and cumulative frequency.

UNIT- IV

Distribution System Reliability Analysis: Basic Techniques - Radial networks - Evaluation of Basic reliability indices, performance indices – load point and system reliability indices – customer oriented, loss and energy-oriented indices – Examples. Basic concepts of parallel distribution system reliability

UNIT- V

Substations and Switching Stations: Effects of short-circuits - breaker operation - Open and Short-circuit failures – Active and Passive failures – switching after faults - circuit breaker model – preventivemaintenance – exponential maintenance times.

TEXT BOOKS:

1. Reliability Evaluation of Power systems by R. Billinton, R.N. Allan, BS Publications, 2007.
2. Reliability Modeling in Electric Power Systems by J. Endrenyi, John Wiley and Sons, 1978

REFERENCE BOOKS:

1. An Introduction to Reliability and Maintainability Engineering by Charles Ebeling, TMHPublications,2014.
2. Reliability Engineering by E. Balaguruswamy, TMH Publications,1984
3. Reliability Engineering by Elsayed A. Elsayed, Prentice Hall Publications,1996.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AUTONOMOUS)

2270240: INDUSTRIAL ELECTRICAL SYSTEMS
(Professional Elective-III)

IV Year B.Tech EEE – I Sem.

L	T	P	C
3	0	0	3

Prerequisite: Utilization of Electric Energy

Course Objectives:

- To understand the various electrical system components
- To know the residential and commercial electrical systems
- To study the illumination systems
- To discuss about the industrial electrical systems

Course Outcomes: At the end of this course, students will demonstrate the ability to

- Understand the electrical wiring systems
- Understand residential, commercial and industrial consumers
- Understand and representing the systems with standard symbols and drawings.
- Understand various components of industrial electrical systems, SLD, power factor correction, panels and component
- Analyze and select the proper size of various electrical system components.

UNIT-I: ELECTRICAL SYSTEM COMPONENTS

LT system wiring components, selection of cables, wires, switches, distribution box, metering system, Tariff structure, protection components- Fuse, MCB, MCCB, ELCB, inverse current characteristics, symbols, single line diagram (SLD) of a wiring system, Contactor, Isolator, Relays, MPCB, Electric shock and Electrical safety practices

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 of commercial installation, selection and sizing of components.

UNIT-III: ILLUMINATION SYSTEMS

Understanding various terms regarding light, lumen, intensity, candle power, lamp efficiency, specific consumption, glare, space to height ratio, waste light factor, depreciation factor, various illumination schemes, Incandescent lamps and modern luminaries like CFL, LED and their operation, energy saving in illumination systems, design of a lighting scheme for a residential and commercial premise, flood lighting.

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UNIT-IV: INDUSTRIAL ELECTRICAL SYSTEMS I

HT connect ion, industrial substation, Transformer selection, Industrial loads, motors, starting of motors, SLD, Cable and Switchgear selection, Lightning Protection, Earthing design, Power factor correction – kVAR calculations, type of compensation, Introduction to PCC, MCC panels. Specifications of LT Breakers, MCB and other LT panel components.

UNIT-V: INDUSTRIAL ELECTRICAL SYSTEMS II

DG Systems, UPS System, Electrical Systems for the elevators, Battery banks, Sizing the DG, UPS and Battery Banks, Selection of UPS and Battery Banks

TEXT BOOKS:

1. S. L. Uppal and G. C. Garg, “Electrical Wiring, Estimating & costing”, Khanna publishers, 2008.
2. K. B. Raina, “Electrical Design, Estimating & Costing”, New age International, 2007.

REFERENCES:

1. S. Singh and R. D. Singh, “Electrical estimating and costing”, Dhanpat Rai and Co., 1997.
2. Web site for IS Standards. 3. H. Joshi, “Residential Commercial and Industrial Systems”, McGraw Hill Education, 2008.

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(AUTONOMOUS)

2270424: SIGNALS AND SYSTEMS

(Professional Elective-III)

IV Year B.Tech EEE – I Sem.

L	T	P	C
3	0	0	3

Prerequisite: Basics of Mathematics

Course Objectives:

- Acquire the knowledge of signals and systems
- Understand the behavior of signals in time and frequency domain
- Analyze the characteristics of LTI systems
- Study the concepts of Signals and Systems and its analysis using different Transform techniques
- Obtain the relation between two same signals and two different signals

Course Outcomes: After successful completion of the course, students shall be able to

- Classify and Perform Operations on Signals for Practical Applications
- Analyze and Represent Signals Using Fourier Series and Fourier Transforms
- Analyze Signal Transmission Through Linear Systems and their Characteristics
- Utilize Laplace and Z-Transforms for assessing continuous and discrete signals in time and frequency domains.

Understand the necessity of Sampling Theorem and Correlation Techniques in Signal Processing

UNIT–I:

Signal Analysis: Analogy between vectors and signals, Orthogonal signal space, Signal approximation using orthogonal functions, mean square error, Closed or complete set of orthogonal functions, Orthogonality in complex functions, Classification of signals and systems, operations on signals, Exponential and sinusoidal signals, Concepts of impulse function, Unit step function, Signum function.

UNIT–II:

Fourier Series: Representation of Fourier series, Continuous time periodic signals, Properties of Fourier Series, Dirichlet's conditions, Trigonometric Fourier series and exponential Fourier series, Complex Fourier spectrum.

Fourier Transforms: Deriving Fourier Transform from Fourier series, Fourier Transform of arbitrary signals, Fourier Transform of standard signals, Fourier Transform of periodic signals, Properties of Fourier Transform, Fourier Transforms involving impulse function and signum function, Introduction to Hilbert Transform.

UNIT–III:

Signal Transmission through Linear Systems: Linear system, Impulse response, Response of a linear system, Linear time invariant(LTI) system, Transfer function of a LTI system, Filter characteristics of linear system, Distortion less transmission through a system, Signal bandwidth, System bandwidth, Ideal LPF, HPF, and BPF

characteristics, Causality and paley-wiener criterion for physical realization, Relationship between bandwidth and rise time, Convolution and correlation of signals, Concept of convolution in time domain and frequency domain, Graphical representation of convolution

UNIT–IV:

Laplace Transforms: Laplace Transforms (L.T), Inverse Laplace Transform, Concept of region of convergence (ROC) for Laplace Transforms, Properties of L.T, Relation between L.T and F.T of a signal, Laplace Transform of certain signals using waveform synthesis, and it's Applications.

Z–Transforms: Concept of Z-Transform of a discrete sequence, Distinction between Laplace, Fourier and Z Transforms, Region of convergence in Z-Transform, Constraints on ROC for various classes of signals, Inverse Z-Transform, Properties of Z-Transforms, and it's Applications.

UNIT–V:

Sampling Theorem: Graphical and analytical proof for band limited signals, Impulse sampling, Natural and flat top sampling, Reconstruction of signal from its samples, Effect of under sampling – Aliasing, Introduction to band pass sampling.

Correlation: Cross correlation and auto correlation of functions, Properties of correlation functions, Energy density spectrum, Parsevals theorem, Power density spectrum, Relation between autocorrelation function and energy/power spectral density function, Relation between convolution and correlation, Detection of periodic signals in the presence of noise by correlation, Extraction of signal from noise by filtering.

TEXTBOOKS:

1. B.P. Lathi, "Signals, Systems & Communications," BSP, 2nd Edition 2001.
2. A.V. Oppenheim, A.S. Willsky and S.H. Nawabi, "Signals and Systems," Pearson India 2nd Edition, 1996.

REFERENCE BOOKS:

1. Simon Haykin and Van Veen, "Signals and Systems," John Wiley 2nd Edition, 2007.
2. A. Anand Kumar, "Signals and Systems," PHI, 3rd Edition, 2013.
3. Michel J. Robert, "Fundamentals of Signals and Systems," MGH International, 2nd Edition, 2008.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AUTONOMOUS)

2270241: ELECTRICAL AND HYBRID VEHICLES
(Professional Elective-III)

IV Year B.Tech EEE – I Sem.

L	T	P	C
3	0	0	3

Prerequisite: Power Semiconductor Drives, Utilization of Electric Power

Course Objectives:

- To understand the fundamental concepts, principles, analysis and design of hybrid and electric vehicles.
- To know the various aspects of hybrid and electric drive train such as their configuration, types of electric machines that can be used energy storage devices, etc.

Course Outcomes: At the end of this course, students will demonstrate the ability to

- Understand the models to describe hybrid vehicles
- Understand modern drive trains and their performance.
- Understand topologies, power flow in drive train and electric propulsion unit
- Understand the different possible ways of energy storage
- Understand the different strategies related to energy storage systems.

UNIT - I INTRODUCTION

Conventional Vehicles: Basics of vehicle performance, vehicle power source characterization, transmission characteristics, mathematical models to describe vehicle performance.

UNIT - II 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 - III 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 - IV 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-V: 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, implementation issues of energy management strategies. CASE STUDIES: Design of a Hybrid Electric Vehicle (HEV), Design of a Battery Electric Vehicle (BEV).

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.

REFERENCES:

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”, Routledge, 2016.

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(AUTONOMOUS)

3 0 0 3

Course Objectives: The students will try to learn:

- Understand the fundamental concepts of management and its evolution.
- Explore the key functions of management: planning, organizing, leading, and controlling.
- Analyze various management styles and their impact on organizational culture.
- Develop skills in decision-making, problem-solving, and strategic thinking.
- Examine contemporary issues in management, such as ethics, diversity, and globalization.

Course Outcomes: After successful completion of the course, students should be able to:

- Understand Management Principles Articulate key management concepts and their historical development.
- Apply Planning Techniques Develop strategic, tactical, and operational plans to achieve organizational goals.
- Analyze Organizational Structures Evaluate different organizational designs and their effectiveness in various contexts
- Implement Control Mechanisms Utilize performance measurement tools to assess and improve organizational effectiveness, leadership skills and
- Enhance Decision-Making Abilities Employ analytical and creative problem-solving techniques in decision-making scenarios and controlling Budgetary and Non Budgetary

UNIT - I: Introduction to Management: Definition, Nature and Scope, Functions, Managerial Roles, and Levels of Management, Managerial Skills, Challenges of Management; Evolution of Management-Classical Approach: Scientific and Administrative Management; The Behavioral approach; The Quantitative approach; The Systems Approach; Contingency Approach, IT Approache.

UNIT - II: Planning and Decision Making: General Framework for Planning - Planning Process, Types of Plans, and Management by Objectives (MBO); Production Planning and Control. Decision Making and problem solving - Programmed and Non-Programmed Decisions, Steps in Problem Solving and Decision Making; Bounded Rationality and Influences on Decision Making; Group Problem Solving and Decision Making, Creativity and Innovation in Managerial work.

UNIT - III: Organization and HRM: Principles of Organization: Organizational Design & Organizational Structures; Departmentalization, Delegation, and Empowerment, Centralization, Decentralization, Recentralization. Organizational Culture, Climate, and Organizational Change.
Human Resource Management & Business Strategy: Job Satisfaction, Jbo Enrichment, Job Enlargement, and Talent Management.
Strategic HR Planning; Recruitment, Selection, Training, and Development Performance Appraisal.

UNIT - IV: Leading and Motivation: Power and Authority Leadership Styles Behavioral Leadership, Situational Leadership, Leadership Skills, Leader as Mentor and Coach,

Leadership during adversity and Crisis, handling employee and customer complaints, Team Leadership.

Motivation: Types of Motivation; Relationship between Motivation, Performance and Engagement, Content Motivational Theories- Needs Hierarchy Theory, Two-Factor Theory, Theory X and Theory Y.

UNIT - V: Controlling: Control, types and Strategies for Control, Steps in the Control Process. Budgetary and Non-Budgetary Controls,
Characteristics of Effective Controls and establishing control systems, Control frequency and Methods.

Text books:

1. **Management Essentials**, Andrew DuBrin, 9e, Cengage Learning, 2012.
2. **Fundamentals of Management**, Stephen P. Robbins, Pearson Education, 2009.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AUTONOMOUS)

2270285: SIMULATION OF RENEWABLE ENERGY SYSTEMS LAB

IV Year B.Tech EEE – I Sem.

L	T	P	C
0	0	2	1

Prerequisites: Renewable Energy Systems

Course Objectives:

- To educate the students in Renewable Energy Sources and technologies.
- To provide adequate inputs on a variety of issues in harnessing Renewable Energy.
- To recognize current and possible future role of Renewable energy sources distinguish between transmission and distribution systems

Course Outcomes: After completion of this course, the student able to

- To understand and analyze Renewable energy systems.
- To educate the students in Renewable Energy Sources and technologies.
- To identify inputs on a variety of issues in harnessing Renewable Energy.

LISTOFEXPERIMENTS

1. Simulation study on Solar PV Energy System.
2. Simulation study on "VI-Characteristics and Efficiency of 1kWp Solar PV System".
3. Simulation study on the effect of partial shaded solar PV Cell and its Characteristics.
4. Simulation study on Performance assessment of Grid connected and Standalone1kWp Solar Power System.
5. Simulation study on Wind Energy Generator.
6. Simulation study on Performance assessment of micro Wind Energy Generator.
7. Simulation study on Hybrid (Solar-Wind) Power System.
8. Simulation study on Performance Assessment of Hybrid(Solar-Wind) Power System.

In addition to the above any two experiments should be conducted:

1. Simulation study on Solar PV Energy System.
2. Simulation study on Performance of Fuel cell.
3. Simulation study on Intelligent Controllers for Hybrid Systems

Text Books:

1. Simulation of Energy Systems by odeh and Yohanis
2. Modelling and simulation of Renewable Energy Systems by Jakob Salomon Sen.

IV-II

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AUTONOMOUS)

2280242: HVDC TRANSMISSION
(Professional Elective-IV)

IV Year B.Tech EEE – II Sem.

L	T	P	C
3	0	0	3

Prerequisite: Power Systems & Power Electronics

Course Objectives:

- To compare EHV AC and HVDC systems
- To analyze Graetz circuit and also explain 6 and 12 pulse converters
- To control HVDC systems with various methods and to perform power flow analysis in AC/DC systems
- To introduce converter faults and protection
- To describe various protection methods for HVDC systems and Harmonics

Course Outcomes: After completion of this course the student is able to

- Compare EHV AC and HVDC system and to describe various types of DC links Analyze Graetz circuit for rectifier and inverter mode of operation
- Describe various methods for the control of HVDC systems
- To describe power flow analysis in AC/DC systems
- Describe various protection methods for HVDC systems
- Describe Harmonics and design different types of filters

UNIT – I Basic Concepts:

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

Analysis of HVDC Converters: Choice of Converter Configuration, Analysis of Graetz circuit, Characteristics of 6 Pulse and 12 Pulse converters, Cases of two 3 phase converters in Y/Y mode – their performance.

UNIT – II Converter and HVDC System Control:

Principle of DC Link Control, Converters Control Characteristics, firing angle control, Current and extinction angle control, Effect of source inductance on the system, Starting and stopping of DC link, Power Control.

Reactive Power Control In HVDC: Introduction, Reactive Power Requirements in steady state, sources of reactive power- Static VAR Compensators, Reactive power control during transients.

UNIT – III Power Flow Analysis in AC/DC Systems:

Modelling of DC Links, DC Network, DC Converter, Controller Equations, Solution of DC load flow, P.U. System for DC quantities, solution of AC-DC Power Flow-

Simultaneous Method- Sequential method.

UNIT - IV Converter Faults and Protection:

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

UNIT – V Harmonics:

Generation of Harmonics, Characteristics harmonics, calculation of AC Harmonics, Non Characteristics harmonics, adverse effects of harmonics, Calculation of voltage and 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. "K. R. Padiyar", HVDC Power Transmission Systems: Technology and system Interactions, New Age International (P) Limited, and Publishers, 1990.
2. "S K Kamakshaiah, V Kamaraju", HVDC Transmission, TMH Publishers, 2011
3. "S. Rao", EHVAC and HVDC Transmission Engineering and Practice, Khanna publications, 3 rd Edition 1999.

REFERENCE BOOKS:

1. "Jos Arrillaga", HVDC Transmission, The institution of electrical engineers, IEE power & energy series 29, 2nd edition 1998.
2. "E. W. Kimbark", Direct Current Transmission, John Wiley and Sons, volume 1, 1971.
3. "E. Uhlmann", Power Transmission by Direct Current, B. S. Publications, 2009

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AUTONOMOUS)

2280243 UTILIZATION OF ELECTRICAL ENERGY

IV Year B. Tech – II Sem.	L	T	P	C
(Professional Elective-IV)	3	0	0	3

Prerequisite: Electrical Machines-I & Electrical Machines-II

Course Objectives:

- To understand the fundamentals of illumination and good lighting practices
- To understand the methods of electric heating and welding.
- To understand the fundamentals of illumination and good lighting practices
- To analyse methods of breaking of electric drives
- To understand the concepts of electric drives and their application to electrical traction systems.

Course Outcomes:

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

- Acquire knowledge on, electric drives characteristics and their applicability in industry based on the nature of different types of loads and their characteristics
- Understands the concepts and methods of electric heating, welding, illumination and electric traction
- Understand the illumination laws and various illumination methods
- Evaluate speed time curves for traction.
- Apply the above to tractive effort, specific energy consumption and adhesive weight

UNIT – I Electric Drives:

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

UNIT – II Electric Heating & Welding:

Advantages and methods of electric heating, resistance heating induction heating and dielectric heating. Electric Welding: Electric welding, resistance and arc welding, electric welding equipment, comparison between A.C. and D.C. Welding.

UNIT – III Illumination

Introduction, terms used in illumination, laws of illumination, polar curves, photometry, integrating sphere, sources of light. Various Illumination Methods: Discharge lamps, MV and SV lamps – comparison between tungsten filament lamps and fluorescent tubes, Basic principles of light control, Types and design of lighting and flood lighting.

UNIT – IV Electric Traction – I

System of electric traction and track electrification. Review of existing electric traction systems in India. Special features of traction motor, methods of electric braking-plugging rheostat braking and regenerative braking. Mechanics of train movement. Speed-time curves for different services – trapezoidal and quadrilateral speed time curves.

UNIT – V Electric Traction-II

Calculations of tractive effort, power, specific energy consumption for given run, effect of varying acceleration and braking retardation, adhesive weight and coefficient of adhesion.

TEXT BOOKS:

1. E. Openshaw Taylor, Utilisation of Electric Energy – by University press, 1961.
2. Partab, H., 'Art and Science of Utilisation of Electrical Energy', Dhanpat Rai and Sons, New Delhi, 1986.

REFERENCE BOOKS:

1. N. V. Suryanarayana, Utilization of Electrical Power including Electric drives and Electric traction, New Age International (P) Limited, Publishers, 1996.
2. C. L. Wadhwa, Generation, Distribution and Utilization of electrical Energy, New Age International (P) Limited, Publishers, 1997.
3. Tripathy, S.C., 'Electric Energy Utilisation and Conservation', Tata McGraw Hill Publishing Company Ltd. New Delhi, 1991

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AUTONOMOUS)

2280244: COMPUTER AIDED ELECTRICAL MACHINE DESIGN
(Professional Elective-IV)

IV Year B.Tech EEE–II Sem.

L	T	P	C
3	0	0	3

Prerequisite: Fundamental engineering courses such as electrical circuits, electromagnetics, and electric machines, Programming Skills, linear programming, Nonlinear programming, and optimization algorithms.

Course Objectives:

- To introduce mathematical programming techniques as a foundation for solving optimization problems in engineering design.
- To develop the ability to identify and select appropriate design variables that impact the performance and efficiency of DC machines.
- To define clear and meaningful objective functions that quantitatively represent the desired performance and efficiency objectives for power transformer design.
- Identify and formulate constraint functions that represent design limitations and constraints, such as size, cost, and operational requirements.
- To formulate design equations that accurately describe the behavior and characteristics of 3-phase induction motors, considering electromagnetic principles, material properties, and physical constraints.

Course Outcomes:

After completion of this course the student

- Deep understanding of the philosophy, economics, and significance of computer-aided design in engineering.
- Identify and propose optimal design solutions for DC machines that meet specified performance and efficiency criteria while satisfying constraints.
- Gain hands-on experience in applying a variety of optimization algorithms and techniques to find optimal design solutions for power transformers.
- Necessary to formulate design equations that accurately describe the behavior and characteristics of 3-phase alternators.
- Capable of identifying and formulating constraint functions that account for design limitations and ensure that the final design meets specified constraints.

UNIT –I

Introduction-Philosophy and economics of computer aided design, advantages limitations, analysis and synthesis methods, and selection of input data and design variables. Design problem-Mathematical programming methods, computer aided design- Mathematical formulation of the problem. Programming techniques (LP & NLP only), Methods of solution, Unconstrained optimization problems, constrained optimization problems. flow charts for design of induction motor and synchronous machine. Optimization of design constrained and unconstrained optimization problem

UNIT–II

Optimal design of DC Machine: -Design of armature, Windings and field systems, Selection of variables for optimal design, Formulation of design equations, Objective function, Constraint functions, Algorithms for optimal design.

UNIT –III

Optimal design of power transformer: -KVA Output for single phase and three phase transformers**,** Design of magnetic circuit, overall dimensions, Design of windings, Selection of variables for optimal design, Formulation of design equations, Objective function, Constraint functions, Algorithms for optimal design.

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UNIT –IV

Optimal design for 3-phase alternator: -Design of stator, windings, Design of Field systems for salient pole and non-salient pole machines, short circuit ratio, shape of pole face, armature parameters, Selection of variables for optimal design, Formulation of design equations, Objective function, Constraint functions, Algorithms for optimal design.

UNIT –V

Optimal design of 3-phase induction motor: -main dimensions, length of air gap, rules for selecting rotor slots of squirrel cage machines**,** Design of stator, Windings Design of squirrel cage rotor, Design of slip ring rotor, Selection of variables for optimal design, Formulation of design equations, Objective functions Constraint functions, Algorithms for optimal design.

TEXTBOOKS:

1. Design and Testing of Electrical Machines, MV Deshpandey PHI Learning
2. Computer- Aided Design of Electrical Equipment- by Dr. M. Ramamoorthy-Affiliated East-West press Pvt. Ltd. New Delhi
3. Electrical Machine Design- by A.K. Sawhney, Dhanpat Rai & Sons
4. Principles of Electrical Machine Design with Computer Programmes by- S.K. Sen, Oxford & IBH Publishing Co.

REFERENCEBOOKS:

1. Performance and Design of A.C. Machines-M.G. Say, Affiliated East West Press Pvt. Ltd., New Delhi

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AUTONOMOUS)

2280245: POWER QUALITY AND FACTS (PE - V)

B.Tech. IV Year II Sem.

L	T	P	C
3	0	0	3

Prerequisite: Power Electronics, Power System Operation and Control, HVDC Transmission

Course Objectives:

- Definition of power quality and different terms of power quality, short and long interruption, voltage sag magnitude and three phase unbalanced voltage sag.
- To understand the fundamentals of FACTS Controllers,
- To know the importance of controllable parameters and types of FACTS controllers & their benefits
- To understand the objectives of Shunt and Series compensation
- To Control STATCOM and SVC and their comparison and the regulation of STATCOM, Functioning and control of GCSC, TSSC and TCSC

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

- Know these verity of power quality, voltage sag problems in distribution system
- Concept of improving the power quality to sensitive load by various mitigating custom power devices
- Choose proper controller for the specific application based on system requirements
- 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

UNIT-I

Power Quality Problems in Distribution Systems: 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 it's 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, GTO thyristor controlled series capacitor GSC, TCSC, TSSC-operating principles and control schemes, SSSC Characteristics.

UNIT-V:

Combined Compensators: Introduction to Unified Power Flow Controller - Basic operating principles - Conventional control capabilities - Independent control of real and reactive power.

TEXTBOOKS:

1. Electrical Power Systems Quality, Dugan Roger C, Santoso Surya, McGranaghan, MarksF.Beaty and H.Wayre, McGrawHill
2. Power Systems Quality Assessment, J.Arillaga, N.R.Watson, S.Clon, JohnWiley.

REFERENCE BOOKS:

1. Power Quality, C.Sankaran, CRC Press 4.Understanding power quality problems, Math H.Bollen, IEEEpress.
2. “Understanding FACTS – Concepts and Technology of Flexible AC Transmission Systems” Narain G.Honorani, Laszlo Gyugyi

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AUTONOMOUS)

2280246: MODERN CONTROL THEORY
(Professional Elective-V)

IV Year B. Tech EEE – II Sem. **L T P C**

3 0 0 3

Prerequisite: Control Systems

Course Objectives:

- To provide fundamentals required to model a control system in state space and check its controllability and observability.
- To educate the students about non-linear systems behaviour and the methods to determine their stability.
- To make the students thorough with Liapunov stability analysis.
- To familiarise the students with the concept of optimal control and how to determine optimum for functional using calculus of variations.
- To introduce the concept of Adaptive control and explain how to design a Model reference Adaptive system.

Course outcomes:

- Able to model any control system in state space.
- Able to understand the behaviour of nonlinear system and methods of determining stability.
- Able to determine the stability of nonlinear system using Liapunov method.
- Able to formulate optimal control problem and determine optimum of functional.
- Able to understand and design adaptive control problem.

UNIT – I: Review of State Variable representation of system:

Controllability and Observability -Model control of single input – single output systems (SISO), Controllable and Observable companion forms – Effect of state feedback on Controllability and Observability, Pole placement by state feedback.

Polar Plots-Nyquist Plots-Stability Analysis. Lag, Lead, Lead-Lag Controllers design in frequency Domain to improve steady state and transient response. Feedback and Feed forward compensator design using bode diagram.

UNIT –II: Classification of Non-Linearities:

Phenomenon exhibited by the nonlinearities – Limit cycles – Jump resonance, Sub hormonic oscillations - Phase plane analysis - Singular points - Construction of phase plane trajectories - Isocline method - Delta method - Measurement of time on phase plane trajectories.

Describing Function Analysis:

Introduction to nonlinear systems, Types of nonlinearities, describing functions, describing function analysis of nonlinear control systems.

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UNIT –III: Concept of Stability:

Definitions of Stability, Lyapunov stability - Lyapunov's first and second methods – Stability of linear time invariant systems by Lyapunov's second method - Generation of Lyapunov functions- Variable gradient method - Krasooviski method.

UNIT – IV: Formulation of Optimal Control problems:

Calculus variations - Fundamental concepts -Functionals - Variation of functionals - Fundamental theorem of calculus of variations - Boundary conditions - Constrained minimization - Dynamic programming _ Hamilton Principle of optimality, Jacobi Bellman equation – Potryagins minimum principle.

UNIT – V: Introduction to Adaptive Control:

Types of adaptive control systems. Design of model reference adaptive control systems using M/T rule and Lyapunov stability theorem.

TEXT BOOKS:

1. Advanced Control Systems, B. N. Sarkar, PHI Learning Private Limited,1982.
2. Advanced Control Theory, Somanath Majhi, Cengage Learning,2009.

REFERENCE BOOKS:

1. Control Systems theory and applications, S.K Bhattacharya, Pearson,2013.
2. Control Systems, N.C.Jagan, BS Publications,2005.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AUTONOMOUS)

2280247; AI TECHNIQUES IN ELECTRICAL ENGINEERING
(Professional Elective-V)

IV Year B.Tech EEE – II Sem.

L	T	P	C
3	0	0	3

Pre-requisites: Nil

Course Objectives:

- To locate soft commanding methodologies, such as artificial neural networks, Fuzzy logic and genetic Algorithms.
- To observe the concepts of feed forward neural networks and about feedback neural networks.
- To practice the concept of fuzziness involved in various systems and comprehensive knowledge of fuzzy logic control and to design the fuzzy control
- To analyze genetic algorithm, genetic operations and genetic mutations.

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

- Understand feed forward neural networks.
- Understand the feedback neural networks and learning techniques.
- Understand fuzziness involved in various systems and fuzzy set theory.
- Develop fuzzy logic control for applications in electrical engineering
- Develop genetic algorithm for applications in electrical engineering.

UNIT-I: ARTIFICIAL NEURAL NETWORKS

Introduction, Models of Neuron Network-Architectures -Knowledge representation, Artificial Intelligence and Neural networks-Learning Process-Error correction learning, Hebbian learning -Competitive learning-Boltzman learning, supervised learning-Unsupervised learning-Reinforcement Learning-Learning tasks.

UNIT-II: ANN PARADIGMS

Multi-layer perceptron using Back propagation Algorithm (BPA), Self -Organizing Map (SOM), Radial Basis Function Network-Functional Link Network (FLN), Hopfield Network.

UNIT-III: FUZZY LOGIC

Introduction -Fuzzy versus crisp, Fuzzy Sets-Membership function -Basic Fuzzy set operations, Properties of Fuzzy sets -Fuzzy Cartesian Product, Operations on Fuzzy relations -Fuzzy logic-Fuzzy Quantifiers, Fuzzy Inference-Fuzzy Rule based system, Defuzzification methods.

UNIT-IV: GENETIC ALGORITHMS

Introduction-Encoding -Fitness Function-Reproduction operators, Genetic Modelling -Genetic Operators-Cross over-Single site cross over, two-point cross over -Multi point cross over Uniform cross over, Matrix cross over Cross over Rate-Inversion & Deletion, Mutation operator -Mutation -Mutation Rate-Bit-wise operators, Generational cycle-convergence of Genetic Algorithm.

UNIT-V: APPLICATIONS OF AI TECHNIQUES

Load forecasting, Load flow studies, Economic load dispatch, Load frequency control, Single area system and two area system, Reactive power control, Speed control of DC and AC Motors.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AUTONOMOUS)

TEXT BOOKS

1. S.Rajasekaran and G.A.V.Pai Neural Networks, Fuzzy Logic & Genetic Algorithms, PHI, New Delhi, 2003.
2. Rober J. Schalkoff, Artificial Neural Networks, Tata McGraw Hill Edition, 2011.

REFERENCES:

1. P.D.Wasserman; Neural Computing Theory & Practice, Van Nostrand Reinhold, New York, 1989.
2. Bart Kosko; Neural Network & Fuzzy System, Prentice Hall,1992
3. D.E.Goldberg, Genetic Algorithms, Addison-Wesley 1999.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AUTONOMOUS)

2280XXX : CYBER-PHYSICAL SYSTEMS
(Professional Elective-VI)

IV Year B.Tech EEE – II Sem. **L T P C**
3 0 0 3

Prerequisites: None

Course Objectives:

1. To provide knowledge of the design principles, validation methods and applications of Cyber-Physical Systems in Industry 4.0, IIoT and automation domains.
2. To introduce the hardware, networking and software components of CPS platforms, including processors, sensors, actuators, networks and real-time operating systems.
3. To introduce the fundamentals of dynamical systems, stability analysis and automated control design methods under different system conditions.
4. To provide knowledge on implementation aspects of CPS, including software mapping, scheduling, bus latency, fault handling and performance evaluation.
5. To impart knowledge of formal modeling, verification and secure deployment techniques for CPS, including case studies in automotive and smart grids.

Course Outcomes: After completion of the course, students will be able to:

1. Explain the principles and applications of Cyber-Physical Systems.
2. Identify the hardware, network and software components of CPS platforms.
3. Analyze automated control design techniques for dynamical systems and stability.
4. Assess the performance of CPS implementations under practical constraints.
5. Apply formal methods and security techniques for analysis and secure deployment of CPS.

UNIT–I: INTRODUCTION TO CYBER-PHYSICAL SYSTEMS (CPS)

Cyber-Physical Systems in the real world, Basic principles of design and validation of CPS, Industry 4.0 and its implications, Auto SAR and IIOT (Industrial Internet of Things), Applications in Building Automation and Medical CPS.

UNIT–II: CPS PLATFORM COMPONENTS: CPS HARDWARE PLATFORMS

Processors, Sensors, Actuators, CPS Network: Wireless Hart, CAN, Automotive Ethernet, CPS Software stack: Real-Time Operating Systems (RTOS), Scheduling, Overview of CPS Software components and their mapping to Electronic Control Units (ECUs).

UNIT–III: PRINCIPLES OF AUTOMATED CONTROL DESIGN

Dynamical Systems and Stability, Controller Design Techniques, Stability Analysis using Common Lyapunov Functions (CLFs) and Multiple Lyapunov Functions (MLFs), Performance analysis under Packet drop and Noise.

UNIT–IV: CPS IMPLEMENTATION AND PERFORMANCE ANALYSIS

Translating features into software components, Mapping software components to ECUs, Performance Analysis of CPS, considering scheduling, bus latency, and faults, Network

congestion and its impact on control performance.

UNIT–V: **FORMAL METHODS, SOFTWARE ANALYSIS, AND SECURE DEPLOYMENT**

Advanced Automata-based modeling and analysis, Timed and Hybrid Automata for CPS, Formal Analysis techniques: Flow pipe construction, reachability analysis, Analysis of CPS Software: Weakest Pre-conditions, Bounded Model Checking, Frama-C, CBMC, Secure Deployment of CPS: Attack models, Secure Task mapping, and Partitioning, State estimation for attack detection. Case Studies in CPS Automotive Case Study: Vehicle ABS hacking, Power Distribution Case Study: Attacks on Smart Grids.

TEXTBOOKS:

1. Raj Rajkumar, Dionisio De Niz, and Mark Klein, “Cyber-Physical Systems”, ddison- Wesley Professional.
2. Rajeev Alur, “Principles of Cyber-Physical Systems”, MIT Press, 2015.

REFERENCES:

1. André Platzer, “Logical Analysis of Hybrid Systems: Proving Theorems for Complex Dynamics”, Springer, 2010. 426 pages, ISBN 978-3-642-14508-7.
2. Jean J. Labrosse, “Embedded Systems Building Blocks: Complete and Ready-To-Use Modules in C”, The publisher, Paul Temme, 2011.
3. E. A. Lee and S. A Seshia, “Introduction to Embedded Systems - A Cyber-Physical Systems Approach”, 2014.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AUTONOMOUS)

2280249: ELECTRICAL DISTRIBUTION SYSTEMS
(Professional Elective-VI)

IV Year B.Tech EEE – II Sem.

L	T	P	C
3	0	0	3

Prerequisites: Power System – I, Power System - II

Course Objectives:

- To distinguish between transmission and distribution systems
- To understand design considerations of feeders
- To compute voltage drop and power loss in feeders
- To understand protection of distribution systems
- To examine the power factor improvement and voltage control

Course Outcomes: After completion of this course, the student able to

- Distinguish between transmission, and distribution line and design the feeders
- Compute power loss and voltage drop of the feeders
- Design protection of distribution systems
- Understand the importance protection and coordination
- Understand the importance of voltage control

UNIT-I: GENERAL CONCEPTS

Introduction to distribution system, Distribution system planning, Factors effecting the Distribution system planning, Load modelling and characteristics. Coincidence factor - contribution factor - Loss factor - Relationship between the load factor and loss factor. Load growth, Classification of loads (Residential, commercial, Agricultural and Industrial) and their characteristics.

DISTRIBUTION FEEDERS: Design Considerations of Distribution Feeders: Radial, loop and network types of primary feeders, Introduction to low voltage distribution systems (LVDS) and High voltage distribution systems (HVDS), voltage levels, Factors effecting the feeder voltage level, feeder loading, Application of general circuit constants (A, B, C, D) to radial feeders, basic design practice of the secondary distribution system, secondary banking, secondary network types, secondary mains.

UNIT-II: SUBSTATIONS

Location of Substations: Rating of distribution substation, service area with 'n' primary feeders. Benefits derived through optimal location of substations. Optimal location of Substations (Perpendicular bisector rule and X, Y co-ordinate method). System Analysis: Voltage drop and power-loss calculations: Derivation for voltage drop and power loss in lines, manual methods of solution for radial networks, three phase balanced primary lines, analysis of non-three phase systems, method to analyze the distribution feeder cost.

UNIT-III: PROTECTION

Objectives of distribution system protection, types of common faults and procedure for fault calculations, over current Protective Devices: Principle of operation of Fuses, Auto-Circuit Recloser - and Auto-line sectionalizes, and circuit breakers.

COORDINATION: Coordination of Protective Devices: Objectives of protection co-ordination, general coordination procedure, Types of protection coordination: Fuse to Fuse, Auto- Recloser to Fuse, Circuit breaker to Fuse, Circuit breaker to Auto-Recloser.

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(AUTONOMOUS)

UNIT-IV: COMPENSATION FOR POWER FACTOR IMPROVEMENT

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

UNIT-V: VOLTAGE CONTROL

Voltage Control: Importance of voltage control, methods of voltage control, Equipment for voltage control, effect of shunt capacitors, effect of series capacitors, effect of AVB/AVR on voltage control, line drop compensation, voltage fluctuations.

TEXT BOOKS:

1. Turan Gonen, Electric Power Distribution System Engineering, CRC Press, 3rd Edition 2014.
2. V. Kamaraju, Electrical Power Distribution Systems, Tata Mc Graw Hill Publishing Company, 2nd edition, 2010.

REFERENCES:

1. G. Ram Murthy, Electrical Power Distribution hand book, 2nd edition, University press2004.
2. A.S. Pabla, Electric Power Distribution, Tata McGraw Hill Publishing company, 6th edition,2013.

MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AUTONOMOUS)

2280250: MACHINE LEARNING APPLICATIONS IN ELECTRICAL ENGINEERING

(Professional Elective-VI)

IV Year B.Tech EEE – II Sem.

L	T	P	C
3	0	0	3

Prerequisites: Basic understanding of electrical engineering concepts, Course on Data Structures, Knowledge on statistical methods.

Course Objectives:

1. To introduce the fundamentals of concept learning, hypothesis evaluation and decision tree learning approaches in machine learning.
2. To explain neural network learning models and methods for evaluating hypotheses in machine learning.
3. To describe Bayesian learning approaches, computational learning theory and instance- based learning methods in machine learning.
4. To illustratenetic algorithms, rule-based learning approaches and reinforcement learning techniques for adaptive problem solving.
5. Toexplainanalyticallearningtechniquesandtheintegrationofinductiv eandanalytical approaches using prior knowledge.

Course Outcomes: After completion of this course the student will be able to:

1. Apply concept learning methods and decision tree algorithms for solve classification problems.
2. Implement artificial neural networks and hypothesis evaluation techniques for classification and prediction tasks.
3. Differentiate probabilistic, theoretical, and instance-based learning models for solving machine learning tasks.
4. Formulate solutions for complex learning tasks using evolution ary, rule-based and reinforcement learning methods.
5. Integrate inductive and analytical learning methods for effective knowledge-based problem solving

UNIT-I: Introduction-Well-posed learning problems, designing alearning system, Perspectives and issues in machine learning Concept learning and the general to specific ordering - introduction, a concept learning task, concept learning as search, find-S: finding a maximally specific hypothesis, version spaces and the candidate elimination algorithm, remarks on version spaces and candidate elimination, inductive bias. Decision Tree Learning - Introduction, decision tree representation, appropriate problems for decision tree learning, the basic decision tree learning algorithm, hypo thesis space search in decision tree learning, inductive bias in decision tree learning, issues in decision tree learning.

UNIT-II: Artificial Neural Networks: Introduction, neural network representation, appropriate problems for neural network learning, perceptions, multilayer networks and the back-propagation algorithm. Artificial Neural Networks-2- Remarks on the Back-Propagation algorithm, An illustrative example: face recognition, advanced topics in artificial neural networks. Evaluation Hypotheses –
Motivation, estimation hypothesis accuracy, basics of sampling theory, ageneral