ANNAMACHARYA UNIVERSITY

(ESTD UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

(UNIVERSITY LISTED IN UGC AS PER THE SECTION 2(f) OF THE UGC ACT, 1956)

RAJAMPET, Annamayya District, AP – 516126, INDIA

COURSE STRUCTURE FOR ELECTRICAL AND ELECTRONICS ENGINEERING

I YEAR I SEMESTER

S. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	BS	24AEEE11T	Basic Electrical and Electronics Engineering	3	0	0	3
2	BS	24ACHE11T	Chemistry	3	0	0	3
3	BS	24AMAT11T	Matrix Theory and Calculus	3	0	0	3
4	ES	24ACSE11T	Computational Problem Solving	3	0	0	3
5	ES	24AMEC11T	Engineering Drawing	1	0	4	3
6	BS	24AEEE11L	Basic Electrical and Electronics Engineering Lab	0	0	2	1
7	BS	24ACHE11L	Chemistry Lab	0	0	2	1
8	ES	24ACSE11L	Computational Problem-Solving Lab	0	0	2	1
9	HSM	24ALAN11T	Language Elective	1	0	0	1
						Total credits	**19**

Category	Credits
Basic Science Course (BS)	**11**
Humanities and Social Sciences and Management Course (HSM)	**01**
Engineering Science Course	**07**
Total Credits	**19**

I YEAR II SEMESTER

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	BS	24APHY21T	Applied Physics	3	0	0	3
2	BS	24AMAT21T	Differential Equations and Transform Techniques	3	0	0	3
3	HSM	24AENG21T	English for Engineers	3	0	0	3
4	ES	24AECE21T	Fundamentals of Electronic Devices & Circuits	3	0	3	3
5	ES	24AEEE22T	Electrical Circuits-I	3	0	0	3
6	ES	24AMEC22L	Engineering & IT Workshop	1	0	4	3
7	BS	24APHY21L	Applied Physics Lab	0	0	2	1
8	HSM	24AENG21L	English Language Communication Skills Lab	0	0	2	1
9	ES	24AECE21L	Fundamentals of Electronics Devices & Circuits Lab	0	0	2	1
						Total credits	**21**

Category	Credits
Engineering Science Course (ES)	**10**
Basic Science Course (BS)	**07**
Humanities and Social Sciences and management course (HSM)	**04**
Total Credits	**21**

II YEAR I SEMESTER

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	PC	24AEEE31T	DC Machines and Transformers	3	0	0	3
2	PC	24AEEE32T	Network Analysis and Synthesis	2	1	0	3
3	PC	24AEEE33T	Analog Electronics	3	0	0	3
4	HSM	24AUHV31T	Universal Human Values-II	3	0	0	3
5	HSM	24AMBA31T	Managerial Economics & Financial Analysis	3	0	0	3
6	MC	24AENS31T	Environmental Science	2	0	0	0
7	PC	24AEEE31L	DC Machines and Transformers Lab	0	0	3	1.5
8	PC	24AEEE32L	Electrical Circuits Lab	0	0	3	1.5
9	PC	24AEEE33L	Electrical and Electronics Simulation Lab	0	0	3	1.5
10	SEC	24AEEE34L	PCB Design and Fabrication	1	0	2	2
						Total credits	**21.5**

Category	Credits
Basic Science Courses (BS)	0
Program Core Courses (PC)	13.5
Engineering Science Courses (ES)	0
Humanities and Social Sciences and Management Courses (HSM)	6
Skill Enhancement Course (SEC)	2
Total Credits	**21.5**

II YEAR II SEMESTER

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	BS	24AMAT42T	Numerical Methods	3	0	0	3
2	PC	24AEEE41T	Digital Electronics	3	0	0	3
3	PC	24AEEE42T	Induction and Synchronous Machines	3	0	0	3
4	PC	24AEEE43T	Electrical & Electronics Measurements and Instrumentation	3	0	0	3
5	PC	24AEEE44T	Electromagnetic Field Theory	2	1	0	3
6	PC	24AEEE41L	Analog and Digital Electronics Lab	0	0	3	1.5
7	PC	24AEEE42L	Induction and Synchronous Machines Lab	0	0	3	1.5
8	PC	24AEEE43L	Measurements and Instrumentation Lab	0	0	3	1.5
9	SEC	24ACSE45L	JAVA Programming	1	0	2	2
						Total credits	**21.5**

Category	Credits
Basic Science Courses (BS)	3
Program Core Courses (PC)	16.5
Engineering Science Courses (ES)	0
Humanities and Social Sciences and Management Courses (HSM)	0
Skill Enhancement Course (SEC)	2
Total Credits	**21.5**

III YEAR I SEMESTER

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	PC	24AEEE51T	Linear Control Systems	3	0	0	3
2	PC	24AEEE52T	Power Electronics	3	0	0	3
3	PC	24AEEE53T	Electrical Power Transmission and Switch Gear	3	0	0	3
4	PE-I	24AEEE5AT	Distribution of Electrical Power	3	0	0	3
		24AEEE5BT	Electric & Hybrid Vehicle Technology				
		24AEEE5CT	Sensors and Instrumentation				
		24AEEE5DT	Renewable Energy Systems				
		24AEEE5ET	IoT Applications in Smart Energy Systems				
5	OE-I	24AEEE5FT	MOOC	3	0	0	3
Lab Courses							
6	PC	24AEEE51L	Control Systems & Simulation Lab	0	0	3	1.5
7	PC	24AEEE52L	Power Electronics & Simulation Lab	0	0	3	1.5
8	PC	24AEEE53L	Power Systems Lab	0	0	3	1.5
9	SEC	24ACSE5ES	Python Programming	1	0	2	2
10	MC	24AAUD51T	Gender Sensitization	2	0	0	0
11	Internship	24AEEE54I	Summer Internship 2 Months after second Year (to be evaluated during V Semester)	0	0	3	2
						Total credits	**23.5**

Category	Credits
Program Core Courses (PC)	13.5
Professional Elective Courses -1 (PEC1)	3
Open Elective Courses-1 (OEC1)	3
Skill Enhancement Courses (SEC)	2
Internship	2
Total Credits	**23.5**

III YEAR II SEMESTER

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	PC	24AEEE61T	Power System Analysis	3	0	0	3
2	PC	24AEEE62T	Microprocessors and Microcontrollers	3	0	0	3
3	PC	24AEEE63T	Power System Operation and Control	3	0	0	3
4	PE-II	24AEEE6AT	AC Micro Grid	3	0	0	3
		24AEEE6BT	Power Semiconductor Drives				
		24AEEE6CT	Modern Control Theory				
		24AEEE6DT	Battery Management System				
		24AEEE6ET	AI & ML in Electrical Engineering				
5	OE-II	24AEEE6FT	MOOC	3	0	0	3
6	MC	24AMBA61T	Technical Paper Writing and Intellectual Property Rights	2	0	0	0
Lab Courses							
7	PC	24AEEE61L	EV and RES Lab	0	0	3	1.5
8	PC	24AEEE62L	Microprocessors and Microcontrollers Lab	0	0	3	1.5
9	PC	24AEEE63L	Power System Simulation Lab	0	0	3	1.5
10	SEC	24AEEE64S	IoT with Arduino & Node MCU	1	0	2	2
						Total credits	**21.5**

Category	Credits
Program Core Courses (PC)	13.5
Professional Elective Courses -2 (PEC-2)	3
Open Elective Courses -2 (OEC-2)	3
Skill Enhancement Course (SEC)	2
Mandatory Courses (MC)	0
Total Credits	**21.5**

IV YEAR I SEMESTER

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	PC	24AEEE71T	Advanced Power System Protection	3	0	0	3
2	PE-III	24AEEE7AT	Restructured Power Systems	3	0	0	3
		24AEEE7BT	HVDC & FACTS				
		24AEEE7CT	Embedded Systems				
		24AEEE7DT	Energy Auditing Demand Side Management				
		24AEEE7ET	Data Analytics for Electrical Engineers				
3	PE-IV	24AEEE7FT	Smart Grid	3	0	0	3
		24AEEE7GT	Advanced Power Electronics				
		24AEEE7HT	Program Logic Controllers				
		24AEEE7IT	Utilization of Electrical Energy				
		24AEEE7JT	Quantum Technologies for Electrical Engineering				
4	PE-V	24AEEE7KT	Power Quality	3	0	0	3
		24AEEE7LT	Special Electrical Machines				
		24AEEE7MT	Soft Computing Techniques				
		24AEEE7NT	Energy Storage Technology				
		24AEEE7OT	Cyber Security for Energy Systems				
5	OE-III	24AEEE7PT	Electrical Safety and Risk Management	3	0	0	3
		24AEEE7QT	Electrical Machine Design				
		24AEEE7RT	Digital Signal Processing				
		24AEEE7ST	High Voltage Engineering				
6	OE-IV	24ACIV7NT	Water Resources and Harvesting	3	0	0	3
		24ACIV7MT	Disaster Management				
		24ACSE7QT	Data Base Management systems				
		24ACSE7RT	Operating System				
		24AMEC7HT	Optimization Techniques				
		24AMEC7GT	Entrepreneurship Development				
		24AECE7VT	Introduction to Image Processing				
		24AECE7TT	Introduction to Communications Systems				
		24AMBA71T	Human Resource Management				
		24AMBA72T	Startup Management				
		24AENG71T	English for Competitive Examinations				
		24AMAT72T	Complex Variables and Partial Differential Equations				
		24ACHE71T	Chemistry of Energy Systems				
		24PHY71T	Smart Materials and Devices				
7	Intern	24AEEE72L	Industrial/Research Internship 2 Months after third year (to be evaluated during VII semester)	0	0	3	2
						Total Credits	**20**

Category	Credits
Program Core Courses (PC)	3
Professional Elective Courses-III (PE-III)	3
Professional Elective Courses-IV (PE-IV)	3
Professional Elective Courses-V (PE-V)	3
Open Elective Courses-III (OEC-III)	3
Open Elective Courses-IV (OEC-IV)	3
Internship	2
Total Credits	**20**

IV YEAR II SEMESTER

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	PROJ	24AEEE81P	Project Work	0	0	0	12
						Total Credits	**12**

Category	Credits
Project	12
Total Credits	**12**

Track 1: Power Systems & Smart Grid

PE Slot	Professional Elective Title
PE-I	Distribution of Electrical Power
PE-II	AC Micro Grid
PE-III	Restructured Power Systems
PE-IV	Smart Grid
PE-V	Power Quality

Track 2: Power Electronics & Electric Drives

PE Slot	Professional Elective Title
PE-I	Electric & Hybrid Vehicle Technology
PE-II	Power Semiconductor Drives
PE-III	HVDC & FACTS
PE-IV	Advanced Power Electronics
PE-V	Special Electrical Machines

Track 3: Control Systems & Automation

PE Slot	Professional Elective Title
PE-I	Sensors and Instrumentation
PE-II	Modern Control Theory
PE-III	Embedded Systems
PE-IV	Program Logic Controllers
PE-V	Soft Computing Techniques

Track 4: Renewable Energy & Sustainability

PE Slot	Professional Elective Title
PE-I	Renewable Energy Systems
PE-II	Battery Management System
PE-III	Energy Auditing Demand Side Management
PE-IV	Utilization of Electrical Energy
PE-V	Energy Storage Technology

Track 5: Emerging & Interdisciplinary Technologies

PE Slot	Professional Elective Title
PE-I	IoT Applications in Smart Energy Systems
PE-II	AI & ML in Electrical Engineering
PE-III	Data Analytics for Electrical Engineers
PE-IV	Quantum Technologies For Electrical Engineering
PE-V	Cyber Security for Power & Energy Systems

Total Credits Distribution

S.NO	Category	EEE
1	BSC	21
2	MC	0
3	ESC	17
4	PC	60
5	PE	15
6	OEC	12
7	HSMC	11
8	SKILL COURSES	8
9	INTERNSHIP	4
10	PW	12
	TOTAL	**160**

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RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the Course: Basic Electrical and Electronics Engineering
Category : BS
Year : I
Semester : I
Course Code : 24AEEE11T
Branch/es : CE, ME, EEE, ECE, CSE(AI), AI&DS, CSE(ICB)

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:
1. To understand the fundamental laws and circuit elements.
2. To analyze the working of various Machines.
3. To Summarize the different Energy Resources, various Measuring Instruments and importance of Safety Measures.
4. To Describe the various Electronic Devices.
5. To Illustrate the concepts of Bipolar Junction transistor and Diode Applications.

Course Outcomes:
At the end of the course, the student will be able to
1. understand the fundamental laws and circuit elements.
2. analyze the working of dc and ac machines.
3. summarize the different energy resources, various measuring instruments and importance of safety measures
4. analyze basic semiconductor devices
5. illustrate the concepts of bipolar junction transistor and diode applications.

Unit 1 Fundamental Laws and Electrical Circuits 9

Basic definitions - Voltage, current, power, energy, charge, flux, static and dynamic emf, Faraday's laws of electromagnetic induction, Fleming's right-hand rule, Fleming's left-hand rule, Lenz's law, Corkscrew rule, Right hand thumb rule, Right hand palm rule. Types of elements, Types of sources, ohms law, resistive, inductive, capacitive networks, Series-parallel circuits and Kirchhoff's laws- (Basic Numerical Problems).

Unit 2 DC Machines and Transformers 9

DC Generator: Constructional Details of DC machine, Principle of operation, emf equation, types of generators, applications. (Basic Numerical Problems on EMF equation)
DC Motor: Principle of operation, torque equation, types, losses and efficiency, applications, Brake test, Speed control methods. (Basic Numerical Problems).
Transformers: 1-Φ Transformer: Principle of operation, emf equation, losses, efficiency calculations using OC and SC tests.

Unit 3 Energy Resources, Measuring Instruments & Safety Measures 9

Energy Resources: Conventional and non-conventional energy resources; Layout and operation of Hydel, Solar & Wind power generation.
Measuring Instruments: Construction and working principle of Permanent Magnet Moving Coil (PMMC), Moving Iron (MI) Instruments and CRO.

Equipment Safety Measures: Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits. Personal safety measures: Electric Shock, Earthing and its types, Safety Precautions to avoid shock.

Unit 4 Semiconductor Devices **9**

Energy Band Diagram of Semiconductors (Intrinsic & Extrinsic), PN Diode, V-I Characteristics of PN Junction Diode, Applications of diode- Breakdown Mechanisms in semiconductor diodes, Zener diode characteristics and Zener diode acts as a regulator.

Unit 5 Diode Applications and Introduction to Transistors **9**

Half Wave and Full Wave Rectifiers – Different parameters and comparison, General Filter Considerations – Capacitor Filter. Transistor constructions – Types, Transistor operation in CE configurations and its Characteristics.

Prescribed Textbooks:

1. J.B. Gupta, "Fundamental of Electrical Engineering & Electronics" KATSON Books, First Edition 2012.

Reference Books:

1. V.K. Mehta and Rohit Mehta, "Principles of Electrical Engineering & Electronics",S chand and Company Ltd, First Edition,2010.
2. S.K.Bhattacharya, "Basic Electrical & Electronics Engineering" Pearson Education, Second Edition 2017.

Web Resources:

1.https://electricalvani.com
2.https://www.electrical4u.com
3.https://nptel.ac.in/courses/108105053
4.https://nptel.ac.in/courses/108108076

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning
24AEEE11T.1	2	2	1	1	-	-	-	-	-	-	1
24AEEE11T.2	3	3	2	2	-	-	-	-	-	-	1
24AEEE11T.3	2	2	1	1	-	-	-	-	-	-	1
24AEEE11T.4	3	3	2	2	-	-	-	-	-	-	1
24AEEE11T.5	3	2	1	1	-	-	-	-	-	-	1

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RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the Course: Chemistry
Category : BS
Year : I
Semester : I
Course Code : 24ACHE11T
Branch/es : EEE, ECE, CSE(AI), AI&DS, CSE (ICB)

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives: The course aims to familiarize students with the fundamentals of engineering chemistry and its practical applications. It provides training on key principles of electrochemistry and polymers, while also introducing students to various instrumental methods. Additionally, the course highlights the importance of green energy and e-waste management, emphasizing their relevance in modern engineering practices.

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

1. discuss quantum mechanics and molecular orbital theory to interpret bonding, energy levels, and bond order in various molecules.
2. demonstrate the construction and functionality of various sensors, batteries, and fuel cells through practical examples.
3. summarize the preparation, characteristics, and applications of various polymers in real-world contexts.
4. utilize principles of various analytical techniques to evaluate nanomaterials effectively.
5. analyze sustainable energy solutions and develop strategies for effective e-waste management.

Unit 1 Structure and bonding models **9**

Fundamentals of Quantum mechanics, Schrodinger wave equation, significance of Ψ and Ψ^2, particle in one dimensional box, molecular orbital theory – bonding in homo and heteronuclear diatomic molecules – energy level diagrams of O_2 and CO, etc. π-molecular orbitals of butadiene and benzene, calculation of bond order.

Unit 2 Electrochemistry and applications **8**

Electrochemical cell, Nernst equation, cell potential calculations and numerical problems, types of electrodes - indictor and reference electrodes. Electrochemical sensors – potentiometric and amperometric sensors with examples.

Primary cells – Dry cell, secondary cells – Lithium-ion batteries - working of the batteries including cell reactions; Fuel cells, Hydrogen-Oxygen fuel cell – working of the cell.

Unit 3 Polymer chemistry **8**

Introduction to polymers, functionality of monomers, Thermoplastics and Thermo-setting plastics, properties and applications of PVC and Bakelite.

Fibres - polyesters, mechanical requirements for fibres - crystallinity, stress strain curves. Biodegradable polymers - properties and applications of Poly Glycolic Acid (PGA), Polylactic Acid (PLA).

Elastomers – properties and applications of Buna-S, Buna-N, Thiokol.

Conducting polymers – Polyacetylene – mechanism of conduction and applications.

Unit 4 Nanomaterials and instrumental methods 9

Nanomaterials - Introduction, classification, synthesis of nanomaterial by Sol-gel method, properties and applications of carbon-based nanomaterials - CNT and Graphene.

Electromagnetic spectrum, absorption of radiation: Beer-Lambert's law. UV-Visible spectroscopy, principle, instrumentation and applications, IR spectroscopy – principle, instrumentation and applications, Potentiometry - potentiometric titrations (redox titrations), Conductometric titrations (acid-base titrations).

Unit 5 Alternative energy sources and e-waste management 8

Green Fuels: Introduction, construction and working of photovoltaic cell, applications, generation of green hydrogen energy by electrolysis of water and its advantages.

e-waste management: Introduction, sources of e-waste, composition and health hazards of toxic materials present in electronic and electrical e-waste, need for e-waste management, recycling and recovery; different approaches of recycling, extraction of Gold from e-Waste.

Prescribed Textbooks:

1. Jain, Jain. *Engineering Chemistry*. 16th Ed., Dhanpat Rai, 2013.
2. Atkins, Peter, Julio de Paula, and James Keeler. *Atkins' Physical Chemistry*. 10th Ed., Oxford University Press, 2010.
3. Jing, Dengwei. *Handbook of Hydrogen Energy*. 1st Ed., Wiley-VCH, 2023.
4. Fowler, Bruce A. *Electronic Waste: Toxicology and Public Health Issues*. 1st Ed., Academic Press, 2017.

Reference Books:

1. Skoog, Douglas A., F. James Holler, Stanley R. Crouch. *Principles of Instrumental Analysis*. 7th ed., Cengage Learning, 2016.
2. Lee, J.D. *Concise Inorganic Chemistry*. 5th ed., Wiley-Blackwell, 1999.
3. Billmayer, Fred W. Jr. *Textbook of Polymer Science*. 3rd ed., Wiley, 2007.
4. Sherif, S.A., D. Yogi Goswami, E.K. Stefanakos, A. Steinfeld. *Handbook of Hydrogen Energy*. CRC Press, 2014.

CO-PO Mapping:

Course outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and the world	Ethics	Individual and collaborative teamwork	Communication	Project management and finance	Life-long learning
24ACHE11T.1	2	2	1	1	-	-	-	-	-	-	1
24ACHE11T.2	3	2	1	2	-	-	-	-	-	-	1
24ACHE11T.3	3	2	1	2	-	-	-	-	-	-	1
24ACHE11T.4	3	2	1	2	-	-	-	-	-	-	1
24ACHE11T.5	3	3	2	2	-	-	-	-	-	-	1

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RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the Course: Matrix Theory and Calculus
Category : BS
Year : I
Semester : I
Course Code : 24AMAT11T
Branch/es : Common to all branches

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives: This course aims to familiarize students with matrix theory and its practical applications, equipping them with essential tools for mathematical and engineering problem-solving. It also focuses on imparting knowledge of partial derivatives, mean value theorems, and multiple integrals to effectively address real-world engineering challenges. Additionally, students will develop proficiency in vector differentiation and integration to solve complex engineering problems.

Course Outcomes:
At the end of the course, the student will be able to
1. understand the methods for solving systems of linear equations
2. utilize matrix algebra techniques for engineering applications
3. analyze functions of several variables to optimization techniques
4. determine the area of solids using multiple integrals
5. apply vector integral theorems in evaluating double and triple integrals

Unit 1 Matrices **10**

Rank of a matrix by echelon form, normal form, solving system of homogeneous and non-homogeneous linear equations, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem.

Unit 2 Eigen values and Eigen vectors **8**

Eigen values and Eigen vectors and their properties, diagonalization of a matrix, quadratic forms and nature of the quadratic forms, reduction of quadratic form to canonical form by orthogonal transformation.

Unit 3 Mean Value Theorems & Multivariable calculus **10**

Taylor's theorem and Maclaurin's theorem for one variable (without proofs) – simple problems.
Partial derivatives, total derivatives, Chain rule, change of variables, Jacobian, Maxima and Minima of functions of two variables, method of Lagrange multipliers for three variables.

Unit 4 Multiple Integrals **8**

Double integrals, change of order of integration, change of variables (Cartesian to polar), areas enclosed by plane curves, evaluation of triple integrals.

Unit 5 Vector Calculus **10**

Vector differentiation: Scalar and Vector point functions, vector operator Del, del applies to scalar point functions-Gradient, directional derivative, del applied to vector point functions-Divergence and Curl.
Vector integration: Line integral - work done, surface integral, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, divergence theorem (without proof) and related problems.

Prescribed Textbooks:

1. E. Kreyszig. *Advanced Engineering Mathematics*. 10th Ed., John Wiley & Sons, 2011.
2. B. S. Grewal. *Higher Engineering Mathematics*, 44th Ed., Khanna Publishers, 2017.

Reference Books:

1. B. V. Ramana. *Higher Engineering Mathematics.* Mc Graw Hill Education
2. G. B. Thomas. *Maurice D. Weir and Joel* Hass. Thomas Calculus, 13th Ed., Pearson Publishers, 2013
3. R.L. Garg Nishu Gupta. *Engineering Mathematics Volumes-I &II.* Pearson Education
4. H. K. Das, Er. Rajnish Verma. *Higher Engineering Mathematics.* S. Chand

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The Engineer and world	Ethics	Individual and Collaborative teamwork	Communication	Project management and finance	Life-long learning
24AMAT11T.1	2	2	1	1	-	-	-	-	-	-	1
24AMAT11T.2	3	2	1	2	-	-	-	-	-	-	1
24AMAT11T.3	3	3	2	2	-	-	-	-	-	-	1
24AMAT11T.4	2	2	1	1	-	-	-	-	-	-	1
24AMAT11T.5	3	2	1	2	-	-	-	-	-	-	1

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RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the Course: Computational Problem Solving

Category : ES

Year : I

Semester : I

Course Code : 24ACSE11T

Branch/es : Common to all branches

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. Understanding the steps in problem solving and formulation of algorithms to problems.
2. Develop programming skills as a means of implementing an algorithmic solution with appropriate control and data structures.
3. Develop intuition to enable students to come up with creative approaches to problems.
4. Develop programs using pointers, structures and unions.
5. Manipulation of text data using files.

Course Outcomes:

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

1. demonstrate solutions to problems and represent those using algorithms/flowcharts.
2. choose proper control statements and use arrays for solving problems.
3. decompose a problem into modules and use functions to implement the modules.
4. apply and use allocation of memory for pointers and solve the problems related to manipulation of text data using files and structures.
5. develop the solutions for problems using c programming language.

Unit 1 Problem Solving and Introduction to C **9**

Steps to solve problems, algorithm, Pseudo code, Flowchart with examples, Program Development. Environments. Introduction to programming: Programming languages and generations.
Introduction to C: Introduction, structure of C program, keywords, identifiers, Variables, data types, constants, I/O statements, operators, precedence and associatively

Unit 2 Introduction to decision control statements and Arrays **9**

Selective, looping and nested statements, jumping statements.
Arrays: Introduction, declaration of arrays, accessing and storage of array elements, searching (linear and binary search algorithms) and sorting (selection and bubble) algorithms, multidimensional arrays, matrix operations

Unit 3 Strings and Functions **9**

Strings: Declaration and Initialization, String Input / Output functions, String manipulation functions.
Functions: Types of functions, recursion, scope of variables and storage classes.
Preprocessor Directives: Types of preprocessor directives, examples

Unit 4 Pointers **9**

Pointers: Understanding computer ‘s memory, introduction to pointers, declaration pointer variables, pointer arithmetic, pointers and strings, array of pointers, function pointers, dynamic memory allocation, advantages and drawbacks of pointers

Unit 5 Structures and Files **9**

Structures: Structure definition, initialization and accessing the members of a structure, nested structures, array of structures, structures and functions, structures and pointers, self-referential structures, unions and enumerated data types.

Files: Introduction to files, file operations, reading and writing data on files, error handling during file operations.

Prescribed Textbooks:

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

Reference Books:

1. LET US C, Yeswanth Kanitkar, Ninth Edition, BPB Publication.
2. Byron Gottfried, Schaum 's‖ Outline of Programming with C‖, McGraw-Hill.
3. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India.
4. A K Sharma —Computer Fundamentals and Programming‖, 2nd Edition, University Press, 2018.
5. Pradeep Dey and Manas Ghosh, —Programming in C‖, Oxford Press, 2ndEdition, 2017.
6. Reema Tharaja —Introduction to C Programming‖, Second Edition, OXFORD Press, 2015.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and the world	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning
24ACSE11T.1	3	2	1	2	-	-	-	-	-	-	-
24ACSE11T.2	3	3	2	2	-	-	-	-	-	-	-
24ACSE11T.3	3	3	2	2	-	-	-	-	-	-	3
24ACSE11T.4	3	2	1	2	-	-	-	-	-	-	3
24ACSE11T.5	3	3	3	3	-	-	-	-	-	-	3

ANNAMACHARYA UNIVERSITY

(ESTD UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)
(UNIVERSITY LISTED IN UGC AS PER THE SECTION 2(f) OF THE UGC ACT, 1956)

RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the Course: Engineering Drawing
Category : ES
Year : I
Semester : I
Course Code : 24AMEC11T
Branch/es : CE, EEE, ME, ECE, CSE(AI), AI&DS, CSE(ICB)

Lecture Hours	Tutorial Hours	Practice Hours	Credits
1	0	4	3

Course Objectives:

1. To enable the students with various concepts like dimensioning, conventions and standards related to Engineering Drawing.
2. To impart knowledge on the projection of points, lines and plane surfaces.
3. To improve visualization skills for better understanding of projection of solids.
4. To develop the imaginative skills of the students required to understand Section of solids and Developments of surfaces.
5. To make the students understand the viewing perception of a solid object in Isometric and Perspective projections.

Course Outcomes:

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

1. apply the appropriate annotations and geometric techniques to draw the conic sections, cycloidal curves and involutes
2. apply the principles of orthographic projection for engineering problems involving inclined lines to create drawings that represent real-world objects.
3. apply the principles of orthographic projection for solving engineering problems of planes with respect to both reference planes.
4. apply the principles of orthographic projection for solving engineering problems of solids.
5. apply the conversion techniques to solve problems related to orthographic projections and isometric projection views.

Unit 1 **5**

Introduction: Lines, Lettering and Dimensioning, Geometrical Constructions and Constructing regular polygons by general method.

Engineering Curves:

Construction of Ellipse, Parabola and Hyperbola by General Method - Normal and tangent
Cycloid & Epicycloid curves (basic problem) - Normal and tangent
Involute of Square, Pentagon - Normal and tangent

Unit 2 **3**

Orthographic Projections: Reference plane, importance of reference lines or Planes, Projections of a point situated in any one of the four quadrants.

Projections of Straight Lines: Projections of straight lines parallel to both reference planes, perpendicular to one reference plane and parallel to other reference plane, inclined to one reference plane and parallel to the other reference plane, Projections of Straight Line Inclined to both the reference planes.

Unit 3 **5**

Projections of Planes (Square, Circle, Pentagon, Hexagon): A Plane perpendicular to one reference plane and parallel to other, A plane Perpendicular to both reference planes, A plane perpendicular to one reference plane and inclined to the other, A plane inclined to both the reference planes.

Unit 4 **5**

Projections of Solids: Projections of solids (Prism, Pyramid, Cylinder and Cone): Axis perpendicular to Horizontal reference plane and parallel to other, Axis inclined to Horizontal reference plane and parallel to another plane.

Development of Surfaces: Simple Developments of a prism, cylinder, Pyramid and Cone

Unit 5 **5**

Isometric Projections / Conversions: Principles of Isometric Projection – Isometric Scale – Isometric Views of Lines, Planes, Conversion of orthographic views to isometric views (simple problems) and
Conversion of isometric views to orthographic views (simple problems)

Prescribed Textbooks:

1. N. D. Bhatt, Engineering Drawing, Charotar Publishing House
2. Engineering Drawing, K.L. Narayana and P. Kannaiah, Tata McGraw Hill

Reference Books:

1. Engineering Drawing, M.B.Shah and B.C. Rana, Pearson Education Inc
2. Engineering Drawing with an Introduction to AutoCAD, Dhananjay Jolhe, Tata McGraw Hill

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool usage	The Engineer and The World	Ethics	Individual and Collaborative teamwork	Communication	Project management and finance	Life-long learning
24AMEC11T.1	3	2	1	2	-	-	1	-	1	-	1
24AMEC11T.2	3	2	1	2	-	-	1	-	1	-	1
24AMEC11T.3	3	2	1	2	-	-	1	-	1	-	1
24AMEC11T.4	3	2	1	2	-	-	1	-	1	-	1
24AMEC11T.5	3	2	1	2	2	-	1	-	1	-	1

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RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the Course: Basic Electrical and Electronics Engineering Lab
Category : BS
Year : I
Semester : I
Course Code : 24AEEE11L
Branch/es : CE, EEE, ME, ECE, CSE(AI), AI&DS, CSE(ICB)

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	2	1

Course Objectives:

1. To identify the various electrical and electronic components and devices.
2. To impart knowledge and practical exposure on various elements of electrical circuits, operational aspects of various electrical machines and electronic circuits.
3. To analyze the performance of rectifier circuits in practical approach.
4. To observe the characteristics of semiconductor devices.

Course Outcomes:

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

1. identify the various electrical and electronic components and devices.
2. analyze various characteristics of electrical circuits, electrical machines and measuring instruments.
3. analyze the characteristics of various semiconductor devices through practical investigations.
4. comprehend the usage of electronic devices as half wave and full wave rectifier.

List of Experiments

1. Identification, Specifications, Testing of R, L, C Components (Color Codes), Potentiometers, Switches (SPDT, DPDT, and DIP), Coils, Gang Condensers, Relays, Bread Boards, PCBs, Diodes, BJT)
2. Study and operation of Multi-meters (Analog and Digital), Function Generator, Regulated Power Supplies
3. Verification of KCL and KVL
4. Measurement of resistance by using Ammeter and Voltmeter method
5. Measurement of Earth Resistance using Megger
6. Speed control of a DC Shunt Motor
7. Brake Test on DC Shunt Motor
8. OC and SC Test on Single Phase Transformer
9. Plot V-I characteristics of PN Junction diode A) Forward bias B) Reverse bias
10. Plot V – I characteristics of Zener Diode
11. Determination of Ripple Factor and Regulation of Half Wave Rectifier with and without capacitive filter
12. Determination of Ripple Factor and Regulation of Full Wave Rectifier with and without capacitive filter
13. Study of Cathode Ray Oscilloscope. (CRO)

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning
24AEEE11L.1	1	1	1	1	-	-	-	-	-	-	1
24AEEE11L.2	3	3	2	2	-	-	-	-	-	-	1
24AEEE11L.3	3	3	2	2	-	-	-	-	-	-	1
24AEEE11L.4	2	2	1	1	-	-	-	-	-	-	1

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RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the Course: Chemistry Lab
Category : BS
Year : I
Semester : I
Course Code : 24ACHE11L
Branch/es : EEE, ECE, CSE(AI), AI&DS, CSE (ICB)

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	2	1

Course Objectives: The course aims to equip students with practical skills in Conductometry, Potentiometry, and Colorimetry for precise chemical analysis. It also provides hands-on experience in synthesizing polymers and nanomaterials, emphasizing their industrial relevance. Additionally, students are trained in separation techniques and UV-Visible spectroscopy for material identification, while enhancing their ability to perform quantitative chemical analyses, such as metal estimation and battery acid strength determination.

Course Outcomes:
At the end of the course, the student will be able to
1. Determine the strength of an acid present in secondary batteries.
2. Calculate the cell constant and conductance of solutions.
3. Estimate metal ions by using various analytical techniques.
4. Analyse the separation methods used for various organic compounds.
5. Synthesize nanomaterials and polymers.

List of experiments
1. Conductometric titration of strong acid vs. strong base.
2. Determination of cell constant and conductance of solutions.
3. Potentiometry - determination of redox potentials and emfs.
4. Determination of strength of an acid in Pb-acid battery.
5. Preparation of Poly Methyl Methacrylate (PMMA).
6. Preparation of Poly Glycidyl Methacrylate (PGMA).
7. Determination of chromium (VI) in potassium dichromate by Colorimetry.
8. Estimation of Zinc by EDTA titration.
9. Preparation of nanomaterials by precipitation method.
10. Identification of simple organic compounds by IR spectroscopy.
11. Estimation of Ferrous Iron by Dichrometry
12. Wavelength measurement of sample through UV-Visible Spectroscopy.

Prescribed books:

1. Mendham, J., Denney, R. C., Barnes, J. D., and Sivasankar, B. *Vogel's Quantitative Chemical Analysis.* 6th ed., Pearson Publications, 2009.
2. Anand, Amirtha, and Kumari, Ramesh. *Physical Chemistry Laboratory Manual: An Interdisciplinary Approach.* Dreamtech Press, 2020.

CO-PO Mapping:

Course outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and the world	Ethics	Individual and collaborative teamwork	Communication	Project management and finance	Life-long learning
24ACHE11L.1	2	2	-	1	1	-	-	1	-	-	3
24ACHE11L.2	2	2	-	1	1	-	-	1	-	-	3
24ACHE11L.3	3	2	-	2	1	-	-	1	-	-	3
24ACHE11L.4	3	3	-	2	1	-	-	1	-	-	3
24ACHE11L.5	3	3	-	2	1	-	-	1	-	-	3

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RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the Course: Computational Problem Solving Lab
Category : ES
Year : I
Semester : I
Course Code : 24ACSE11L
Branch/es : Common to all branches

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	2	1

Course Objectives:

1. Setting up programming environment.
2. Develop Programming skills to solve problems.
3. Use of appropriate C programming constructs to implement algorithms.
4. Identification and rectification of coding errors in program
5. Develop applications using a modular programming and Manage data using files

Course Outcomes:

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

1. identify and setup program development environment
2. develop the algorithms using c programming language constructs
3. analyze and rectify the syntax errors and debug program for semantic errors
4. demonstrate problems in a modular approach using functions
5. assessing file operations with simple text data

A minimum number of FOUR programs from each exercise is to be done students.

Data Types, Constants, Input and Output and expressions

Exercise 1: Data types, Variables, Constants and Input and Output.
Exercise 2: Operators, Expressions and Type Conversions.

Decision Control Statements and Arrays

Exercise 3: Conditional Statements [two way and multipath].
Exercise 4: Loop Control Statements. [for, while and do-While]
Exercise 5: Unconditioned JUMP Statements- break, continue, goto.
Exercise 6: Declaring Arrays, Referencing Arrays, Array Subscripts. Using for loop for sequential Access.
Exercise 7: Multidimensional Arrays

Strings and Functions

Exercise 8: String Basics, String Library Functions and Array of Strings.
Exercise 9: Simple user defined functions, Parameter passing methods- pass by value, pass by reference.
Exercise 10: Storage classes- Auto, Register, Static and Extern
Exercise 11: Recursive Functions, Preprocessor commands.
Exercise 12: Array Elements as Function Arguments

Pointers

Exercise 13: Pointers, Dynamic memory allocation and error handling

Structures and Files

Exercise 14: Structures
Exercise 15: File handling

Prescribed Textbooks:

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

Reference Books:

1. Let Us C, Yeswanth Kanitkar, Ninth Edition, BPB Publication
2. A K Sharma —Computer Fundamentals and Programming, 2nd Edition, University Press, 2018
3. Pradeep Dey and Manas Ghosh, —Programming in C, Oxford Press, 2ndEdition, 2017
4. Reema Tharaja —Introduction to C Programming, Second Edition, OXFORD Press, 2015
5. https://www.cprogramming.com/
6. https://www.mycplus.com/tutorials/c-programming-tutorials

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and the world	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning
24ACSE11L.1	3	2	1	2	-	-	-	-	-	-	-
24ACSE11L.2	3	3	3	3	-	-	-	-	-	-	-
24ACSE11L.3	3	3	2	2	-	-	-	-	-	-	3
24ACSE11L.4	3	2	1	2	-	-	-	-	-	-	3
24ACSE11L.5	3	3	2	3	-	-	-	-	-	-	3

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RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the Course: Language Elective
Category : HSM
Year : I
Semester : I
Course Code : 24ALAN11T
Branch/es : Common to all branches

Lecture Hours	Tutorial Hours	Practice Hours	Credits
1	0	0	1

Course Objectives:
The course aims to enhance students' global communication skills through foreign language acquisition while fostering cultural awareness and appreciation of diverse backgrounds. It provides a flexible learning platform with a range of reputable online courses, empowering students to tailor their educational experiences. Additionally, the course allows to focus on career development by equipping students with valuable language skills that enhance their employability.

Course Outcomes:
At the end of the course, the student will be able to
1. Enhance their global communication skills by learning foreign language of their choice.
2. understand cultural diversity
3. apply a variety of reputed online courses and enjoy flexible learning
4. acquire additional language skills to secure suitable job opportunities
5. analyze the ability in self-paced learning

Guidelines:
1. **Course Selection:** Students can choose from the following languages:
    - German
    - French
    - Spanish
    - Arabic
2. **Approved Platforms:** Courses must be taken from recognized MOOC platforms such as NPTEL, Coursera, Udemy, or edX.
3. List of recommended courses:
    - German: https://www.udemy.com/course/german-course-for-beginners-learn-german
    - French: https://www.udemy.com/course/complete-french-course
    - Spanish: https://www.udemy.com/course/el-metodo-spanish-1
    - Arabic: https://www.udemy.com/course/arabic-a21/
4. Enrolment Verification: Students must submit proof of enrolment in the chosen course to the academic office of I Year at the beginning of the semester.
5. Minimum Course Duration: The selected course should be a minimum of 4 weeks in duration.
6. Progress Reports: Students are encouraged to submit progress reports periodically to their course mentor.
7. Completion Deadline: The course must be completed by the end of the semester.
8. Certificate Submission: Students must submit the certificate of completion issued by the MOOC platform to the Head, First Year Academics.

Policies

1. **Credit Allocation**: Upon successful completion and submission of the certificate, students will be awarded 1 academic credit.
2. **Grading**: The course will be graded on a Pass/Fail basis. A pass grade is awarded upon verification of the completion certificate.
3. **Integrity and Authenticity**: The submitted certificate must be authentic and verifiable. Any attempt to submit falsified documents will result in disciplinary action.
4. **Support**: Students can seek support from language faculty/course mentors if they encounter any difficulties during the course.
5. **Non-Completion**: Failure to complete the course within the stipulated time frame will result in no credit being awarded, and the elective will need to be retaken

A committee shall be formed at the level of the University to evaluate the grades / marks given for a course by external agencies and convert to the equivalent marks / grades. The recommended conversions and appropriate grades / marks are to be approved by the Academic Council of the University.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and the world	Ethics	Individual and collaborative teamwork	Communication	Project management and finance	Life-long learning
24ALAN11T.1	-	-	-	-	-	-	-	-	2	-	1
24ALAN11T.2	-	-	-	-	-	-	-	-	2	-	1
24ALAN11T.3	-	-	-	-	-	-	-	-	2	-	1
24ALAN11T.4	-	-	-	-	-	-	-	-	2	-	1
24ALAN11T.5	-	-	-	-	-	-	-	-	2	-	1

Title of the Course: Applied Physics
Category : BS
Year : I
Semester : II
Course Code : 24APHY21T
Branch/es : EEE, ECE, CSE-AI, AI&DS, CSE(ICB)

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:
The course aims to provide a strong foundation in the basic concepts of wave optics, lasers, and fiber optics, while also introducing students to crystal structures and X-ray diffraction techniques. It further explains key principles of dielectrics, magnetic materials, semiconductors, and superconductors, highlighting their importance and applications in various engineering fields**.**

Course Outcomes:
At the end of the course, the student will be able to
1. understand interference, diffraction and polarization in engineering.
2. explain the types of crystal structures and X-ray diffraction.
3. analyze various types of polarization of dielectrics and magnetic materials.
4. apply laser and fiber optics principles in communication field.
5. describe the properties and behavior of semiconductors and superconductors.

Unit 1 Wave Optics **10**

Interference: Introduction – Principle of superposition – Interference of light – Interference in thin films (Reflection Geometry)– Newton's Rings, determination of wavelength – Engineering applications of interference.
Diffraction: Introduction – Fresnel and Fraunhofer diffractions – Fraunhofer diffraction due to single slit, double slit & Diffraction Grating - Grating spectrum – Dispersive power of Grating– Engineering applications of diffraction.
Polarization: Introduction –Types of polarization – Double refraction – Nicol's Prism – Half wave and Quarter wave plates – Engineering applications of polarization.

Unit 2 Crystallography and X-ray diffraction **9**

Crystallography: Space lattice, basis, unit cell and lattice parameters – 7 crystal systems- Bravais Lattices – coordination number – packing fraction of SC, Bcc & Fcc – Miller indices – separation between successive (hkl) planes.
X-ray diffraction: Bragg's law – X-ray Diffractometer –Laue's method and powder method.

Unit 3 Dielectric and Magnetic Materials **10**

Dielectric Materials: Introduction – Dielectric polarization – Dielectric polarizability, susceptibility, dielectric constant and displacement vector – relation between the electric vectors – Types of polarizations– electronic, ionic, orientation (Qualitative) and Space charge (Qualitative) – Frequency dependence of polarization – Lorentz internal field – Clausius-Mossotti equation – Applications of dielectrics.
Magnetic Materials: Introduction – Magnetic dipole moment – Magnetization–Magnetic susceptibility and permeability –Origin of magnetic moments – Classification of magnetic materials: Dia, para, ferro, anti-ferro & ferri magnetic materials – Hysteresis – soft and hard magnetic materials – Applications of magnetic materials.

Unit 4 LASERs and Fiber Optics **10**

LASERs: Introduction – characteristics of lasers – spontaneous and stimulated emission of radiation – Einstein's coefficients – population inversion – pumping mechanism – He-Ne laser – semiconductor laser – Applications of lasers.

Fiber Optics: Introduction - Optical Fiber construction – Working principle (Total Internal Reflection & critical Angle) – Acceptance angle & Numerical Aperture of optical fiber – Classification of fibers based on Refractive index profile & modes (Step index and Graded index optical fibers) – optical fiber losses – Block diagram of fiber optic communication – Medical and Sensor Applications.

Unit 5 Semiconductors and Superconductors **9**

Semiconductors: Formation of energy bands – classification of solids on the basis energy band theory- Intrinsic and Extrinsic semiconductors – Drift and diffusion currents – Einstein's equation–Direct and indirect band gap semiconductors- Hall Effect and its applications.

Superconductors: Properties of superconductors– Meissner's effect – Type-1 and Type-2 Superconductors – BCS Theory – Josephson effect (AC & DC) – Applications of superconductors.

Prescribed Textbooks:

1. M. N. Avadhanulu, P. G. Kshirsagar & T. V. S. Arunmurthy. *A Textbook of Engineering Physics.* 11th Ed., S. Chand Publications, 2019
2. K. Thyagarajan. *Applied Physics.* McGraw Hill Education (India) Private Ltd, 2020
3. Neeraj Mehta. *Applied Physics for Engineers.* PHI Learning Private Limited, 2014

Reference Books:

1. K. Palanisamy. *Applied Physics.* Sci. Tech, 2017
2. K. Vijaya Kumar. *A Textbook of Engineering Physics.* S. Chand Publications, 2018
3. Charles Kittel. *Introduction to Solid State Physics.* Wiley Publications, 2011

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The Engineer and world	Ethics	Individual and Collaborative teamwork	Communication	Project management and finance	Life-long learning
24APHY21T.1	2	2	1	1	-	-	-	-	-	-	1
24APHY21T.2	2	2	1	1	-	-	-	-	-	-	1
24APHY21T.3	3	3	2	2	-	-	-	-	-	-	1
24APHY21T.4	3	2	1	2	-	-	-	-	-	-	1
24APHY21T.5	2	2	1	1	-	-	-	-	-	-	1

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RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the Course: Differential Equations and Transform Techniques

Category : BS

Year : I

Semester : II

Course Code : 24AMAT21T

Branch/es : Common to all branches

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives: The course aims to develop proficiency in solving ordinary and partial differential equations, emphasizing their application in engineering and scientific contexts. It will cover Laplace Transforms and their inverses, illustrating their role in solving engineering and real-world problems. Additionally, the course will introduce Fourier Series and Fourier Transforms, focusing on their practical applications for addressing real-life challenges

Course Outcomes:

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

1. describe the application of higher order differential equations with constant coefficients in modeling dynamic systems.
2. solve the standard partial differential equations relevant to engineering scenarios.
3. utilize the Laplace transformations to handle various types of functions in engineering context.
4. analyze ordinary differential equations by employing Laplace transformations for solutions derivation.
5. apply Fourier series and Fourier transforms in engineering context.

Unit 1 Linear differential equations of higher order with constant Coefficients 10

Basic concepts - general solution-operator D-rules for finding complimentary function-inverse operator-rules for finding particular integral for RHS term of the type $e^{ax}, \sin ax / \cos ax$, polynomials in x, $e^{ax} \sin ax / e^{ax} \cos ax / e^{ax} x^n, x \sin ax / x \cos ax$ -method of variation of parameters

Unit 2 Partial Differential Equations 8

Introduction and formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, solutions of first order linear equations using Lagrange's method, non-linear PDEs (Charpit's method), method of separation of variables for second order linear partial differential equations.

Unit 3 Laplace transforms 8

Laplace transforms of standard functions- first shifting theorem - change of scale property - multiplication by t^n - division by t - transforms of derivatives and integrals - Unit step function – second shifting theorem– Laplace transform of periodic functions (without proofs).

Unit 4 Inverse Laplace transforms 8

Inverse Laplace transforms (without proofs) – Convolution theorem (without proof).

Applications of Laplace transforms to ordinary differential equations of first and second order with constant coefficients.

Unit 5 Fourier series and Fourier Transforms 10

Fourier series: Dirichlet conditions - functions of any period - odd and even functions - half range series.

Fourier Transforms: Fourier integrals - Fourier cosine and sine integrals - Fourier transform - sine and cosine transform.

Prescribed Textbooks:

1. E. Kreyszig. *Advanced Engineering Mathematics*. 10th Ed., John Wiley & Sons, 2011.
2. B. S. Grewal. *Higher Engineering Mathematics.* 44th Ed., Khanna Publishers, 2017.

Reference Books:

1. B. V. Ramana. *Higher Engineering Mathematics.* Mc Graw Hill Education.
2. G. B. Thomas, Maurice D. Weir and Joel Hass. *Thomas Calculus*. 14th Ed., Pearson Publishers, 2022.
3. D. G. Zill. *Advanced Engineering Mathematics*. 6th Ed., Jones and Bartlett, 2016
4. Glyn James. *Advanced Modern Engineering Mathematics*. 5th Ed., Pearson publishers, 2018.
5. R. K. Jain and S. R. K. Iyengar. *Advanced Engineering Mathematics.* 5th Ed., Alpha Science International Ltd., 2021 (9th reprint).

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The Engineer and world	Ethics	Individual and Collaborative teamwork	Communication	Project management and finance	Life-long learning
24AMAT21T.1	2	2	1	1	-	-	-	-	-	-	1
24AMAT21T.2	3	2	1	2	-	-	-	-	-	-	1
24AMAT21T.3	3	2	1	2	-	-	-	-	-	-	1
24AMAT21T.4	3	3	2	2	-	-	-	-	-	-	1
24AMAT21T.5	3	2	1	2	-	-	-	-	-	-	1

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RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the Course: English for Engineers
Category : HSM
Year : I
Semester : II
Course Code : 24AENG21T
Branch/es : CE, EEE, ME, ECE, AI&DS, CSE (AI), CSE(ICB)

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives: The course aims to enhance listening, reading, speaking, and writing skills of the students by improving their comprehension abilities and knowledge of grammatical structures and vocabulary. Through targeted instruction, students will develop effective speaking and writing capabilities, fostering a more comprehensive understanding of language use.

Course Outcomes:
At the end of the course, the student will be able to
1. understand the context, topic, and pieces of specific information from social or transactional details
2. analyze literary forms, journalistic articles and scientific readings for comprehension and retention
3. demonstrate effective writing and speaking skills
4. apply grammatical knowledge in speaking and writing and formulate sentences with grammatical accuracy
5. produce coherent and unified paragraphs with adequate support and detail

Unit 1 **9**
Lesson: A Proposal to Girdle the Earth
Reading: Skimming the text to get main ideas of it; scanning the text to look for specific pieces of information.
Writing: Mechanics of Writing - Capitalization, Spellings, Punctuation
Grammar: Parts of Speech, Content and Structure words, Basic Sentence Structures, Forming Questions
Vocabulary: Synonyms, Antonyms, Affixes (Prefixes/Suffixes), Root words

Unit 2 **9**
Lesson: The District School As It Was by One Who Went to It
Reading: Identifying the sequence of ideas; recognizing verbal techniques that help to link ideas in a paragraph together
Writing: Paragraph writing: Structure of a Paragraph, Cohesive devices - linkers
Grammar: Use of Articles and Zero Article; Prepositions
Vocabulary: Homonyms, Homophones, Homographs

Unit 3 **9**
Lesson: The Future of Work
Reading: Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension
Writing: Summarizing, Note-making, paraphrasing
Grammar: Verbs - Tenses; Subject-verb Agreement
Vocabulary: Compound words, Collocations

Unit 4 **9**

Lesson: H. G. Wells and the Uncertainties of Progress

Reading: Studying the use of graphic elements in texts to convey information, revealing trends/patterns/relationships, communicate processes or display complicated data.

Writing: Letter Writing: Official Letters, Resumes

Grammar: Reporting verbs, Direct & Indirect speech, Active & Passive Voice

Vocabulary: Words often confused, Jargon

Unit 5 **8**

Lesson: Leaves from the Mental Portfolio of a Eurasian

Reading: Reading comprehension.

Writing: Writing structured essays on specific topics.

Grammar: Editing short texts –identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)

Vocabulary: Technical Jargon

Prescribed Textbooks:

1. Prabhavathi Y et al. *English All Round: Communication Skills for Undergraduate Students – 1*. Orient Black Swan, 2022

Reference Books:

1. Dubey, Sham Ji & Co. *English for Engineers*. Vikas Publishers, 2020
2. Bailey, Stephen. *Academic writing: A Handbook for International Students*. Routledge, 2014.
3. Murphy, Raymond. *English Grammar in Use. 4th Ed. Cambridge University Press*, 2019.
4. Lewis, Norman. *Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary.* Anchor, 2014.

Web Resources:

GRAMMAR:

1. www.bbc.co.uk/learningenglish
2. https://dictionary.cambridge.org/grammar/british-grammar/
3. www.eslpod.com/index.html
4. https://www.learngrammar.net/
5. https://english4today.com/english-grammar-online-with-quizzes/
6. https://www.talkenglish.com/grammar/grammar.aspx

VOCABULARY

1. https://www.youtube.com/c/DailyVideoVocabulary/videos
2. https://www.youtube.com/channel/UC4cmBAit8i_NJZE8qK8sfpA

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of	Engineering tools usage	The Eengineer and World	Ethics	Individual and collaborative teamwork	Communication	Project M a nagement and Finance	Life-long Learning
24AENG21T.1	-	-	-	-	-	-	1	-	3	-	1
24AENG21T.2	-	-	-	-	-	-	1	-	3	-	1
24AENG21T.3	-	-	-	-	-	-	1	-	3	-	1
24AENG21T.4	-	-	-	-	-	-	1	-	3	-	1
24AENG21T.5	-	-	-	-	-	-	1	-	3	-	1

ANNAMACHARYA UNIVERSITY

(ESTD UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

(UNIVERSITY LISTED IN UGC AS PER THE SECTION 2(f) OF THE UGC ACT, 1956)

RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the Course:		Fundamentals of Electronic Devices and Circuits
Category	:	ES
Year	:	I
Semester	:	II
Course Code	:	24AECE21T
Branch/es	:	EEE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To analyses the transistor biasing circuits.
2. To understand the amplification action of BJT and its h-parameter models.
3. To understand the operation and Characteristics of FET.
4. To analyses the FET biasing circuits.
5. To understand the working principles of special purpose electronic diodes.

Course Outcomes:

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

1. analyses the transistor biasing circuits.
2. understand the amplification action of BJT and its h-parameter models.
3. understand the operation and characteristics of FET.
4. analyses the FET biasing circuits.
5. understand the working principles of special purpose electronic diodes.

Unit 1 Transistor Biasing **9**

Bias Stability - Need for Stabilization – Stabilization Factors (s, s1,s11) – Types of Biasing-Fixed Bias, Collector to Base bias, Emitter-Stabilized bias, Voltage Divider Bias. Simple numerical problems.

Unit 2 Single Stage Amplifiers 9

Single Stage Transistor Amplifier- Transistor Amplifying Action – Practical circuit of Transistor Amplifier- Classification of Amplifiers- Amplifier equivalent circuit – Concept of h-parameters – Analysis of CE, CB and CC Amplifiers – Comparisons of CE, CB and CC. Simple numerical problems.

Unit 3 Field Effect Transistors 9

Construction of JFETs – Types – Operation - Characteristics - Construction and Characteristics of MOSFETs– Depletion type MOSFETs–Enhancement type MOSFET.

Unit 4 FET Biasing 9

FET Biasing: Fixed Bias Configuration–Self Bias Configuration–Voltage Divider Biasing. Simple numerical problems.

Unit 5 Special Purpose Electronic Devices 9

LED, Tunnel Diode, PIN Diode, SCR, UJT, Photo diode, Photo transistor, Varactor diode, Introduction to wide band gap devices, SiC, GaN and their applications

Prescribed Textbooks:

1. Electronic Devices and Circuits, David A Bell, Fifth Edition, 2008, Oxford University Press.
2. Electronic Devices and Circuits, J. Millman and Halkias, 1991 edition, 2008, TMH.

Reference Books:

1. Electronic Devices and Circuit Theory, Robert L. Boylestad and Louis Nashelsky, 9th edition, PHI.
2. Principles of Electronics, V. K. Mehta, S. Chand Publications2004
3. Integrated Electronics, Analog and Digital Circuits and Systems, J. Millman and Halkias, TMH.
4. Micro Electronic Circuits, Sedra and Smith, Oxford University Press

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and the World	Ethics	Individual and Collaborative teamwork	Communication	Project management and finance	Life-long learning
24AECE21T.1	-	3	2	-	-	-	-	-	-	1	1
24AECE21T.2	-	3	3	-	1	-	-	-	-	1	1
24AECE21T.3	-	3	2	-	1	-	-	-	-	2	2
24AECE21T.4	-	3	2	-	1	-	-	-	-	2	2
24AECE21T.5	-	3	2	-	1	-	-	-	-	1	1

ANNAMACHARYA UNIVERSITY

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(UNIVERSITY LISTED IN UGC AS PER THE SECTION 2(f) OF THE UGC ACT, 1956)

RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the Course: Electrical Circuits-I
Category : ES
Year : I
Semester : II
Course Code : 24AEEE22T
Branch/es : EEE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To learn a number of powerful engineering circuit analysis techniques such as nodal analysis, mesh analysis and graph theory.
2. To learn the concepts of reactance and impedance to analyze simple a.c circuits and methods to calculate power and power factor.
3. To analyze two port network parameters.
4. To solve complex circuits using Network theorems.
5. To understand frequency response in electrical circuits and clear understanding of the important parameters of coupled circuits.

Course Outcomes:

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

1. apply the concepts of mesh and nodal analysis and analyze electrical circuits using graph theory.
2. understand the basic concepts of 1-phase ac circuits.
3. analyze the calculation of two port network parameters.
4. analyze the circuit using network theorems.
5. analyze resonant circuits and coupled circuits.

Unit 1 Network Analysis **9**

Star delta conversion, source transformation, voltage division and current division, Mesh and Super Mesh, Nodal and Super Node analysis, Network Topology– Graph – Tree, Basic Cut-set and Basic Tie-set Matrices for Planar Networks –Problems, Network equilibrium equations using topology. Duality & Dual Networks-Problems.

Unit 2 Fundamentals of 1-ϕ ac circuits **9**

period, frequency, Peak value, peak –peak value. Determination of Average, R.M.S Values, Peak and Form Factor for different Periodic Waveforms, Phase and Phase Difference, j-notation, Steady State Analysis of R, L and C with Sinusoidal Excitation, Concept of Reactance, Impedance, Susceptance and Admittance, Real and Reactive Power, Complex Power, Concept of Power Factor. Analysis of Single-Phase ac Circuits-Problems.

Unit 3 Two Port Networks **9**

Two Port Network Parameters – Impedance, Admittance, Transmission and Hybrid Parameters and Their Relations, Condition for Reciprocity and Symmetry-inter connections.

Unit 4 Network Theorems **9**

Superposition, Thevenin ‘s, Norton ‘s, Maximum Power Transfer, Millman’s, Reciprocity, Substitution and Tellegen‘s Theorems for DC and AC excitations.

Unit 5 Resonance & magnetically coupled circuits: 9

Resonance – Definition, Resonant frequency, bandwidth and Q-factor for series and parallel resonant circuits, Problems. Magnetically Coupled Circuits: Coupled circuits – self & mutual inductance, Dot convention, Coefficient of coupling-Analysis of Coupled Circuits.

Prescribed Textbooks:

1. A. Sudhakar and Shyam mohan S Palli, "Circuits and Networks" McGraw Hill, 2015.
2. A. Chakrabarti, "Circuit Theory-Analysis and Synthesis", Dhanpat Rai & Co, 2014.

Reference Books:

1. M.E. Van Valkenberg. "Network Analysis". 3rd edition, Pearson Publications, New Delhi 2006.
2. William H. Hayt& Jack E. Kennedy & Steven M. Durbin. "Engineering Circuit Analysis". 8th edition, Tata McGraw Hill Company, 2013.
3. J. A. Edminister & M. D. Nahvy. "Theory and Problems of Electric Circuits". 4th Edition Schaums Outline series, New Delhi Tata McGraw Hill Company, 2004.
4. G. K. Mittal, Ravi Mittal. "Network Analysis". 14th Edition, Khanna Publishers, New Delhi, 1997.
5. C. K. Alexander and M. N. O. Sadiku. "Fundamentals of Electric Circuits". 5th Edition, Tata McGraw hill Publishing Company Limited, New Delhi, 2012.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning
24AEEE22T.1	3	2	-	-	-	-	-	-	-	-	-
24AEEE22T.2	3	2	-	-	-	-	-	-	-	-	-
24AEEE22T.3	3	2	-	-	2	-	-	-	-	-	-
24AEEE22T.4	3	2	-	-	-	-	-	-	-	-	-
24AEEE22T.5	3	2	-	-	2	2	-	-	-	-	-

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RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the Course:		Engineering & IT Workshop
Category	:	ES
Year	:	I
Semester	:	II
Course Code	:	24AMEC22L
Branch/es	:	CE, EEE, ME, ECE, CSE(AI), AI&DS, CSE(ICB)

Lecture Hours	Tutorial Hours	Practice Hours	Credits
1	0	4	3

Engineering Workshop Syllabus:

Course Objectives:

This course will enable the student to

1. make familiar with different types of wooden joints.
2. make conversant with tools used in sheet metal work.
3. develop electrical wiring skills.
4. have practical exposure to metal joining processes.
5. gain knowledge with tools used in Plumbing and Fitting

Course Outcomes:

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

1. apply wood working skills to prepare different joints.
2. develop sheet metal jobs with G.I sheet.
3. apply basic electrical engineering knowledge for house wiring practice.
4. operate on different metal joining equipment.
5. apply practical skills in trouble shooting the plumbing systems and various fittings.

Unit 1 Wood Working **6**

Familiarity with different types of woods and tools used in wood working and making following joints.

a) Cross- Lap joint b) Mortise and Tenon joint

Unit 2 Sheet Metal Working **6**

Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheet.

a) rectangular tray b) Conical funnel

Unit 3 Electrical Wiring **6**

Familiarity with different types of basic electrical circuits and make the following connections.

a) Series connection and two switches, two bulbs in parallel connection.

b) Staircase connection and tube light connection.

Unit 4 Metal Joining process **9**

Familiarity with different types of tools used in metal joining process and practice on

a) Soldering

b) Brazing (preparation of Butt joint)

c) Arc welding (Preparation of Lap joint)

Unit 5 Demonstration & Practice **3**

Demonstration and practice of Plumbing tools, Preparation of Pipe joints with coupling for same diameter

and with reducer for different diameters.
a) Tap Connection
(For practice: branches other than civil & mechanical.
For Demonstration: civil & mechanical Branch)
Demonstration and practice of fitting tools.
Familiarity with different types of tools used in fitting and do the following fitting exercises.
a) Square-Fit
b) Dove-tail Fit
(For practice: civil & mechanical.
For Demonstration: branches other than civil & mechanical.)

Prescribed Textbooks:

1. A Course in Workshop Technology Vol I. & II, B.S. Raghuwanshi, Dhanpath Rai & Co., 2015 & 2017.
2. Kannaiah P. and Narayana K.L., Workshop Manual, 3rd Edn, Scitech publishers.

Reference Books:

1. Elements of Workshop Technology, Vol. I by S. K. Hajra Choudhury & Others, Media Promoters and Publishers, Mumbai. 2007, 14th edition
2. Workshop Practice by H. S. Bawa, Tata-McGraw Hill, 2004.
3. Wiring Estimating, Costing and Contracting; Soni P.M. & Upadhyay P.A.; Atul Prakashan, 2021-22.
4. Jeyapoovan T. and Pranitha S., Engineering Practices Lab Manual, 3rd Edn. Vikas Pub.2008.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool usage	The Engineer and The World	Ethics	Individual and Collaborative teamwork	Communication	Project management and finance	Life-long learning
24AMEC22L.1	3	3	1	-	-	-	1	2	2	-	2
24AMEC22L.2	3	3	2	-	-	-	1	2	2	-	2
24AMEC22L.3	3	3	1	-	-	-	1	2	2	-	2
24AMEC22L.4	3	3	1	-	-	-	1	2	2	-	2
24AMEC22L.5	3	3	1	-	-	-	1	2	2	-	2

IT Workshop Syllabus

Course Objectives:

This course will enable the student to

1. Demonstrate the disassembling and assembling of a personal computer system.
2. Demonstrate the Installation the operating system and other software required in a personal computer system.
3. Introduce connecting the PC on to the internet from home and work place and effectively usage of the internet, Usage of web browsers, email, news groups and discussion forums.
4. Introduce the usage of Productivity tools in crafting professional word documents, excel spreadsheets and power point presentations.
5. To utilize Cloud based productivity enhancement and collaboration tools.

Course Outcomes:

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

1. interpret the peripherals of a computer, perform assembling and disassembling of various components of a computer.
2. illustration of installation and un-installation of Windows and Linux operating systems and also perform troubleshooting of various hardware and software components.
3. discuss about Web browsers to access Internet, Search Engines.
4. apply and use word processor; spread sheet, presentation and data storage tools.
5. analyze and Implement Cloud based productivity enhancement and collaboration tools.

Task 1 **2**

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

Task 2 **2**

Assembling a computer: Disassemble and assemble the PC back to working condition. Students should be able to record the process of assembling and troubleshooting a computer.

Task 3 **2**

Install Operating System: Student should install Linux on the computer. Students should record the entire installation process.

Task 4 **2**

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

Task 5 **2**

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

Task 6 **2**

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

Task 7 **4**

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

Task 8 **4**

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

Task 9 **4**

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

Task 10 **2**

Store, sync, and share files with ease in the cloud-Google Drive
Document creation and editing text documents in your web browser- Google docs

Prescribed Textbooks:

1. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
2. Upgrading and Repairing PC's, 22nd Edition, Scott Muller QUE, Pearson Education
3. Comdex Information Technology Course Kit, Vikas Gupta, WILEY Dreamtech
4. MOS 2010 Study Guide for Microsoft Word, Excel, PowerPoint, and Outlook Exams, 1st Edition, Joan Lambert, Joyce Cox, Microsoft Press

Reference Books:

1. IT Essentials PC Hardware and Software Companion Guide, CICSO Networking Academy.
2. Network Your Computer & Devices Step by Step 1st Edition, Ciprian Rusen, Microsoft Press.
3. Troubleshooting, Maintaining & Repairing PCs, 5th Edition, Bigelow, TMH.
4. Introduction to computers, Peter Norton, 6/e, Mc Graw Hill.
5. Cloud computing, productivity and collaboration tools, software and products offered by Google: https://en.wikipedia.org/wiki/G_Suite.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and the world	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning
24AMEC22L.1	3	2	1	2	-	-	-	-	-	-	-
24AMEC22L.2	3	2	1	2	-	-	-	-	-	-	-
24AMEC22L.3	3	3	2	2	-	-	-	-	-	-	-
24AMEC22L.4	3	2	1	2	-	-	-	-	-	-	-
24AMEC22L.5	3	3	2	2	-	-	-	-	-	-	-

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RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the Course: Applied Physics Lab
Category : BS
Year : I
Semester : II
Course Code : 24APHY21L
Branch/es : EEE, ECE, CSE(AI), AI&DS, CSE(ICB)

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	2	1

Course Objectives: This course aims to provide a comprehensive understanding of interference and diffraction, including their practical applications and the significance of optical fiber parameters in communication. It emphasizes the role of energy gaps in semiconductor conductivity and the Hall effect, explores the applications of magnetic and dielectric materials, and applies semiconductor principles to various electronic devices.

Course Outcomes:
At the end of the course, the student will be able to
1. operate various optical instruments to measure optical parameters.
2. determine the magnetic and dielectric parameters by various methods.
3. evaluate various parameters of semiconductors by different methods.
4. estimate general parameters of materials.

List of Experiments
1. Determination of the thickness of the wire using wedge method.
2. Determination of the radius of curvature of the lens by Newton's ring method.
3. Determination of wavelength of light radiation using plane diffraction grating by spectrometer.
4. Determination of Dispersive power of a diffraction grating.
5. Determination of Particle size using laser.
6. Determination of dielectric constant by bridge resonance method.
7. Determination of Magnetic field along the axis of a circular coil carrying current by stewart-Gee's method.
8. Determination of Wavelength of laser by using Diffraction grating.
9. Determination of Hysteresis loss of ferro magnetic material by tracing B-H curve.
10. Determination of the numerical aperture and acceptance angle of an optical fiber.
11. Deterrmination of the rigidity modulus of metal wire by using torsional pendulum.
12. Determination of Hall coefficient and carrier concentration of a given semiconductor using Hall effect.
13. Determination of the resistivity of semiconductor by Four probe method.
14. Determination of the energy gap of a semiconductor by using P-N Junction diode.
15. Determination of resistance with varying temperature using thermister.

Reference Books:

1. S. Balasubramanian, M.N. Srinivasan. *A Textbook of Practical Physics.* S Chand Publishers, 2017
2. C.V. Madhusudan Rao, V. Vasanth kumar. *Engineering Physics laboratory.* SciTech publications, 2010

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The Engineer and world	Ethics	Individual and Collaborative teamwork	Communication	Project management and finance	Life-long learning
24APHY21L.1	3	2	1	2	3	-	-	-	-	-	3
24APHY21L.2	3	2	1	2	3	-	-	-	-	-	3
24APHY21L.3	3	3	2	2	3	-	-	-	-	-	3
24APHY21L.4	3	3	2	2	3	-	-	-	-	-	3

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RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the Course : English Language Communication Skills Lab
Category : HSM
Year : I
Semester : II
Course Code : 24AENG21L
Branch/es : CE, EEE, ME, ECE, AI&DS, CSE(ICB)

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	2	1

Course Objectives: The main objective of introducing this course is to expose the students to a variety of self-instructional, learner-friendly modes of language learning. The students will get trained in basic communication skills.

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

1. relate and differentiate English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
2. develop communication skills through various language learning activities.
3. demonstrate professional skills in participating role-plays and descriptions.
4. build effective resonate and equip themselves with employability skills.
5. enhance public speaking skills and deliver oral presentations with clarity and confidence.

List of Topics
1. Phonetics: Vowels / Consonants; Accent Rules
2. Just a Minute
3. Role Play / Situational Dialogues
4. Oral Presentation
5. Information Transfer
6. Describing people/Objects/Situations

Suggested Software:
1. Sky Pronunciation Suite
2. Clarity Pronunciation Power – Part I
3. Learning to Speak English - 4 CDs
4. Lose Your Accent in 28 days, CD Rom, Judy Ravin

Reference Books:

1. Meenakshi Raman, Sangeeta-Sharma. *Technical Communication*. Oxford Press, 2018.
2. Grant Taylor. *English Conversation Practice*. Tata McGraw-Hill Education India, 2016.
3. Hewing's, Martin. *Cambridge Academic English* (B2). CUP, 2012.
4. T. Balasubramanyam. *A Textbook of English Phonetics for Indian Students*. 3rd Ed., Trinity Press.

Web Resources:
Spoken English:
1. www.esl-lab.com

2. www.englishmedialab.com
3. www.englishinteractive.net
4. https://www.britishcouncil.in/english/online
5. http://www.letstalkpodcast.com/
6. https://www.youtube.com/c/mmmEnglish_Emma/featured
7. https://www.youtube.com/c/ArnelsEverydayEnglish/featured
8. https://www.youtube.com/c/engvidAdam/featured
9. https://www.youtube.com/c/EnglishClass101/featured
10. https://www.youtube.com/c/SpeakEnglishWithTiffani/playlists
11. https://www.youtube.com/channel/UCV1h_cBE0Drdx19qkTM0WNw

Voice & Accent:

1. https://www.youtube.com/user/letstalkaccent/videos
2. https://www.youtube.com/c/EngLanguageClub/featured
3. https://www.youtube.com/channel/UC_OskgZBoS4dAnVUgJVexc
4. https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp_IA

CO-PO Mapping:

COs	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of	Engineering tools usage	The Eengineer and World	Ethics	Individual and collaborative teamwork	Communication	Project Management and Finance	Life-long Learning
24AENG21L.1	-	-	-	-	-	-	1	1	3	-	1
24AENG21L.2	-	-	-	-	-	-	1	1	3	-	1
24AENG21L.3	-	-	-	-	-	-	1	1	3	-	1
24AENG21L.4	-	-	-	-	-	-	1	1	3	-	1
24AENG21L.5	-	-	-	-	-	-	1	1	3	-	1

ANNAMACHARYA UNIVERSITY

(ESTD UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)
(UNIVERSITY LISTED IN UGC AS PER THE SECTION 2(f) OF THE UGC ACT, 1956)

RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the Course: Fundamentals of Electronic Devices and Circuits Lab

Category : ES
Year : I
Semester : II
Course Code : 24AECE21L
Branch/es : EEE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	2	1

Course Objectives:

1. To identify the various electrical and electronic components and devices.
2. To analyze the performance of rectifier circuits in practical approach.
3. To observe the characteristics of semiconductor devices.
4. To determine parameters like gain, impedances and band width of BJT and FET amplifier circuits.

Course Outcomes:

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

1. gain the practical knowledge of diode, BJT, JFET, MOSFET and some special electronic devices.
2. design the amplifier circuits under given requirements.

LIST OF EXPERIMENTS: (Execute any 10 experiments)

1. Load regulation and line regulation of Zener Diode.
2. Full Wave bridge rectifier with and without filter.
3. Input and Output Characteristics of Transistor in CE Configuration.
4. Input and Output Characteristics of Transistor in CC Configuration.
5. Characteristics of photodiode and photo transistor.
6. JFET and MOSFET Characteristics.
7. Frequency response of CE Amplifier.
8. Frequency Response of CC Amplifier.
9. Frequency response of Common Source FET Amplifier.
10. SCR Characteristics.
11. UJT Characteristics.
12. Design self-bias circuit.
13. Transistor as a switch.
14. RC coupled Amplifier
15. Diode clippers

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and the World	Ethics	Individual and Collaborative teamwork	Communication	Project management and finance	Life-long learning
24AECE21L.1	2	2	2	2	2	-	-	-	-	-	2
24AECE21L.2	2	2	2	2	2	-	-	-	-	-	2

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RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the Course: DC Machines and Transformers

Category : PC

Year : II

Semester : I

Course Code : 24AEEE31T

Branch/es : EEE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To discuss the construction, operation, and performance characteristics of DC generators and motors.
2. To describe the starting methods, speed control techniques, and performance testing of DC machines.
3. To explain the operation and derive performance parameters of single-phase transformers under various conditions.
4. To conduct standard tests and compare the performance of two-winding and autotransformers.
5. To interpret poly-phase transformer connections and explain the operation of special configurations like Scott connections and tap changers.

Course Outcomes:

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

1. Understand the construction, operation, characteristics, and applications of DC generators and DC motors.
2. Analyze starting methods, speed control techniques, and testing procedures to evaluate the performance and efficiency of DC machines.
3. Explain the principle, operation, equivalent circuit, and performance characteristics of single-phase transformers.
4. Interpret various tests on transformers and auto transformers to determine their parameters and operational characteristics.
5. Understand poly-phase transformer connections, vector groups, three-winding transformers, tap changers, and their practical applications.

Unit 1 DC Generators and DC Motors 10

Construction of DC machines and principle of operation of DC generator – EMF equation – excitation techniques – classification of DC generators – armature reaction and commutation – characteristics of DC generators – applications of DC generators – principle of operation of DC motor – classification of DC motors – significance of back-emf – torque equation of DC motor – characteristics of DC motors – applications of DC motors.

Unit 2 Starting, Speed Control and Testing of DC Machines 10

Losses and efficiency, necessity of a starter – starting by 3-point starter – speed control by armature voltage and field current control–testing of DC machines–Brake test, Swinburne's test – Hopkinson's test – Field's Test.

Unit 3 Single-phase Transformers 10

Construction – principle of operation of single-phase transformer – classification – emf equation – operation on no-load and on load – equivalent circuit – regulation – losses and efficiency – effect of variation of frequency and supply voltage on losses – applications.

Unit 4 Testing of Transformers and Auto Transformer 10

Open circuit test – short circuit test – Sumpner 's test – separation of core losses— Parallel operation with equal and unequal voltage ratios – auto transformer – equivalent circuit – comparison with two winding transformers.

Unit 5 Three-Phase Transformers 10

Polyphase connections- Y/Y, Y/Δ, Δ/Y, Δ/Δ, open Δ and Vector groups – third harmonics in phase voltages – three winding transformers – transients in switching – off load and on load tap changers – Scott connection.

Prescribed Textbooks:

1.Electrical Machinery by Dr. P S Bimbhra, 7th edition, Khanna Publishers, New Delhi,1995.

2.Performance and analysis of AC machines by M.G. Say, CBS, 2002.

Reference Books:

1. Electrical Machines by D. Kothari, I .J .Nagarth, McGraw Hill Publications, 5th edition
2. Electrical Machinery Fundamentals by Stephen J Chapman McGraw Hill education 2011.
3. Generalized Theory of Electrical Machines by Dr. P S Bimbhra, 7th Edition, Khanna Publishers, 2021
4. Theory & Performance of Electrical Machines by J.B.Gupta, S.K.Kataria & Sons,2007.
5. Electric Machinery by A. E. Fitzgerald, Charles Kingsley, and Stephen D. Umans, 7th edition, McGraw-Hill Education, 2014.

CO-PO Mapping:

Course outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and the world	Ethics	Individual and collaborative teamwork	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE31T .1	3	2	-	-	-	-	-	-	-	-	-	3	-
24AEEE31T .2	3	2	-	2	2	-	-	-	-	-	-	3	3
24AEEE31T .3	3	2	-	-	-	-	-	-	-	-	-	3	-
24AEEE31T .4	3	2	-	2	2	-	-	-	-	-	-	3	3
24AEEE31T .5	3	2	-	-	-	-	-	-	-	-	-	3	-

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RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the Course: Network Analysis and Synthesis
Category : PC
Year : II
Semester : I
Course Code : 24AEEE32T
Branch/es : EEE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
2	1	0	3

Course Objectives:

1. To introduce the principles of three-phase circuits and power measurement techniques.
2. To explain the fundamentals and applications of Laplace transforms in circuit analysis.
3. To familiarize students with the transient behavior of electrical circuits under DC and AC excitations.
4. To provide a foundation in Fourier series and Fourier transforms for analyzing periodic and aperiodic signals.
5. To develop an understanding of network functions and the synthesis of RL, RC, and LC networks.

Course Outcomes:

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

1. Analyze three-phase circuits and measure real and reactive power using two-wattmeter method.
2. Apply Laplace transform techniques to solve electrical circuits and interpret initial and final conditions of system responses.
3. Determine the transient response of RL, RC, and RLC circuits for both DC and AC excitations using time-domain analysis.
4. Compute the Fourier series and transforms of electrical signals and analyze their frequency-domain characteristics.
5. Evaluate network functions and synthesize RL, RC, and LC one-port networks satisfying positive real function criteria.

Unit 1 Analysis of three phase circuits **9**

Phase sequence, star and delta connection of sources and loads, relation between line and phase quantities, analysis of balanced three phase circuits, analysis of unbalanced delta, Analysis of unbalanced 3-wire star using millman's theorem, analysis of 4-wire star, measurement of active and reactive power using two-wattmeter method for measurement of three phase power.

Unit 2 Laplace Transforms **9**

Definition of Laplace transform – advantages - Laplace transform of important functions and signals – inverse Laplace transform - application of Laplace transform to electrical circuits – initial and final value theorem.

Unit 3 Transient Analysis (DC & AC) **9**

Introduction- Initial Conditions -DC Transient response of RL, RC and RLC series circuits -Response of RL, RC and RLC series circuits with AC excitation.

Unit 4 Fourier Series & Fourier Transform 9

Introduction- trigonometric Fourier series - waveform symmetry, exponential form of Fourier series, effective value, application to electrical circuits. Fourier transforms & Properties, Fourier transform of important signals and periodic signals.

Unit 5 Network Functions and Synthesis 9

Network functions- necessary conditions for driving point function-necessary conditions for transfer function –Hurwitz polynomials – positive Real functions - definitions and properties - synthesis of single port networks (RL, RC and LC networks).

Prescribed Textbooks:

1. A. Chakrabarti. Circuit theory (Analysis and Synthesis) 7th Revised edition 2020.

Reference Books:

1. M.E. Van Valkenberg. Network Analysis. 3rd edition, Pearson Publications, New Delhi 2019.
2. A. Sudhakar, Shyammohan S Palli. Circuits and Networks. (Analysis and Synthesis), 5th edition, Tata McGrawHill Publishing company Ltd, 2017.
3. Umesh Sinha. Network Analysis and Synthesis. 5th edition, Satyaprakashan, New Delhi, 2018.
4. D. Roy Choudhury. Networks and Systems. 3rd edition, New Age international publishers 2023.

CO-PO Mapping:

Course outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and the world	Ethics	Individual and collaborative teamwork	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE32T.1	3	3	2	2	3	2	1	2	2	2	2	3	2
24AEEE32T.2	3	3	2	2	2	1	–	2	2	1	2	3	2
24AEEE32T.3	3	2	2	3	3	1	–	2	2	2	3	3	3
24AEEE32T.4	3	3	2	3	3	2	–	2	2	2	3	3	3
24AEEE32T.5	3	3	3	3	3	2	1	2	2	3	3	3	3

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RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the Course: Analog Electronics
Category : PC
Year : II
Semester : I
Course Code : 24AEEE33T
Branch/es : EEE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To discuss the concept of Feedback Amplifier and oscillators.
2. To discuss signal analysis using Op-amp based circuits
3. To provide basic knowledge on special ICs like Timers, PLL circuits and its applications.
4. To analyze A/D and D/A Converter.

Course Outcomes:

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

1. Discuss and gain knowledge on Feedback Amplifier and oscillators.
2. Describe the importance of Signal analysis using Op-amp based circuits.
3. Analysis and acquire knowledge on the Non-linear Applications of Op-amp.
4. Discuss the functional blocks and the applications of special ICs like Timers, PLL circuits.
5. Design and analysis of A/D and D/A Converter.

Unit 1 Feedback Amplifiers and Oscillators **9**

Advantages of negative feedback – voltage / current, series, Shunt feedback –positive feedback – Condition for oscillations, phase shift – Wien Bridge, Hartley, Colpitts and Crystal oscillators.

Unit 2 Operational Amplifier and its Linear Applications: **9**

Ideal OP-AMP characteristics, Internal Block diagram of op-amp, DC characteristics, AC characteristics, Basic op-amp applications, Instrumentation Amplifier, AC amplifier V/I & I/V converters, Differentiator, Integrator, Log and Antilog Amplifiers.

Unit 3 Non-Liner Applications of op-amp **9**

Comparator and its applications, Multivibrators: Astable and Monostable operation, Schmitt Trigger, Triangle and Sawtooth Waveform Generator, Op-amp circuits using Diodes: Half-wave Rectifier, Full-wave Rectifier, Peak-value detector, Clipper, Clamper, Sample and Hold circuits, RC Active Filters.

Unit 4 555 Timer and PLL **9**

IC 555 Timer and applications: Monostable operation, Applications in Monostable mode, Astable operation, Applications in Astable mode, Phase Locked Loop- Phase Detector, VCO, Monolithic PLL, Applications of PLL.

Unit 5 D/A and A/D Converters **8**

Introduction to DAC/ADC, Basic DAC Techniques: Weighted Resistor DAC, R-2R ladder DAC, Inverted R-2R DAC, Monolithic DAC, A/D Converters: Flash AC, Counter Type ADC, Servo Tracking ADC, Successive Approximation ADC, Dual Slope ADC, DAC/ADC specifications.

Prescribed Textbooks:

1. David A. Bell," Electronic devices and circuits", Oxford University higher education, 5th edition 2008.

Reference Books:

1. Ramakant A. Gayakwad, 'Op-amps and Linear Integrated Circuits', IV edition, Pearson Education, 2003.
2. S. Salivaganan, L.S.Kanchana, "Linear Integrated Circuits', III edition, Mc. Graw Hill, 2018.
3. D. Roy Choudhary, Sheil B. Jani, 'Linear Integrated Circuits', New Age, edition, 2018.
4. Sedra and smith, "Microelectronic circuits", 7th Ed., Oxford University Press.

CO-PO Mapping:

Course outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and the world	Ethics	Individual and collaborative teamwork	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE33T .1	3	2	2	-	1	-	-	-	-	-	-	1	2
24AEEE33T .2	3	2	2	1	1	-	-	-	-	-	-	1	2
24AEEE33T .3	3	2	2	1	1	-	-	-	-	-	-	1	2
24AEEE33T .4	2	3	3	1	1	-	-	-	-	-	-	2	2
24AEEE33T .5	2	3	3	1	1	-	-	-	-	-	-	2	2

Title of the Course:		**Universal Human Values-II**
Category	**:**	HSM
Year	**:**	II
Semester	**:**	I
Course Code	**:**	24AUHV31T
Branch/es	**:**	CE, EEE, ECE, AIDS, AIML, CSE(AI), CSE(AIML), CSE(DS)

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives: The course aims to help students recognize the vital interplay between values and skills, promoting sustained happiness and prosperity. It seeks to foster a holistic perspective on life and profession, encouraging value-based living through a clear understanding of human reality and existence. Additionally, the course emphasizes the ethical implications of such an understanding, fostering trustful behaviour, fulfilling human interactions, and a harmonious relationship with nature.

Course Outcomes:

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

1. Comprehend the terms like Natural Acceptance, Happiness and Prosperity.
2. Analyze one's self, and one's surroundings (family, society, nature).
3. Apply human values in enriching human relationships and human society.
4. Analyze the need for universal human values and harmonious existence.
5. Evaluate themselves as socially and ecologically responsible engineers.

Unit 1 Introduction to Value Education 12

Lecture1: Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education)
Lecture2: Understanding Value Education
Tutorial 1: Practice Session1: Sharing about oneself
Lecture 3: Self-Exploration as the Process for Value Education
Lecture4: Continuous Happiness and Prosperity – The Basic Human Aspirations
Tutorial 2: Practice Session2: Exploring Human Consciousness
Lecture 5: Happiness and Prosperity – Current Scenario
Lecture 6: Method to Fulfill the Basic Human Aspirations
Tutorial 3: Practice Session3: Exploring Natural Acceptance

Unit 2 Harmony in the Human Being 8

Lecture 7: Understanding Human being as the co-existence of the self and the body.
Lecture 8: Distinguishing between the needs of the self and the body
Tutorial 4: Practice Session4: Exploring the difference of needs of self and body.
Lecture 9: The body as an instrument of the self
Lecture 10: Understanding harmony in the self
Tutorial 5: Practice Session5: Exploring sources of imagination in the self
Lecture 11: Harmony of the self with the body
Lecture 12: Programme to ensure self-regulation and health
Tutorial 6: Practice Session 6: Exploring harmony of self with the body

Unit 3 Harmony in the Family and Society 8

Lecture 13: Harmony in the Family – the Basic Unit of Human Interaction
Lecture 14: 'Trust' – the Foundational Value in Relationship
Tutorial 7: Practice Session7: Exploring the Feeling of Trust
Lecture 15: 'Respect' – as the Right Evaluation
Tutorial 8: Practice Session 8: Exploring the Feeling of Respect
Lecture 16: Other Feelings, Justice in Human-to-Human Relationship
Lecture 17: Understanding Harmony in the Society
Lecture 18: Vision for the Universal Human Order
Tutorial 9: Practice Session9: Exploring systems to fulfil human goal

Unit 4 Harmony in the Nature/Existence 10

Lecture 19: Understanding Harmony in the Nature
Lecture 20: Interconnectedness, Self-Regulation and Mutual Fulfilment among the Four Orders of Nature
Tutorial 10: Practice Session 10: Exploring the Four Orders of Nature
Lecture 21: Realizing Existence as Co-existence at All Levels
Lecture 22: The Holistic Perception of Harmony in Existence
Tutorial 11: Practice Session11: Exploring Co-existence in Existence

Unit 5 Implications of the Holistic Understanding – A Look at Professional Ethics 10

Lecture 23: Natural Acceptance of Human Values
Lecture 24: Definitiveness of (Ethical) Human Conduct
Tutorial 12: Practice Session 12: Exploring Ethical Human Conduct
Lecture 25: A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order
Lecture 26: Competence in Professional Ethics
Tutorial 13: Practice Session13: Exploring Humanistic Models in Education
Lecture 27: Holistic Technologies, Production Systems and Management
Models-Typical Case Studies
Lecture 28: Strategies for Transition towards Value-based Life and Profession
Tutorial 14: Practice Session14: Exploring Steps of Transition towards Universal Human Order

Practice Sessions for UNIT I – Introduction to Value Education

PS1 Sharing about Oneself
PS2 Exploring Human Consciousness
PS3 Exploring Natural Acceptance

Practice Sessions for UNIT II – Harmony in the Human Being

PS4 Exploring the Difference of Needs of Self and Body
PS5 Exploring Sources of Imagination in the Self
PS6 Exploring Harmony of Self with the Body

Practice Sessions for UNIT III – Harmony in the Family and Society

PS7 Exploring the Feeling of Trust
PS8 Exploring the Feeling of Respect
PS9 Exploring Systems to fulfil Human Goal

Practice Sessions for UNIT IV – Harmony in the Nature (Existence)

PS10 Exploring the Four Orders of Nature
PS11 Exploring Co-existence in Existence

Practice Sessions for UNIT V – Implications of the Holistic Understanding – a Look at Professional Ethics

PS12 Exploring Ethical Human Conduct
PS13 Exploring Humanistic Models in Education

PS14 Exploring Steps of Transition towards Universal Human Order

Prescribed Textbooks:

1. **The Textbook** - R R Gaur, R Asthana, G P Bagaria. *A Foundation Course in Human Values and Professional Ethics.* 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1.
2. The Teacher's Manual - R R Gaur, R Asthana, G P Bagaria. *Teachers' Manual for A Foundation Course in Human Values and Professional Ethics.* 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2.

Reference Books:

1. Nagaraj. *Jeevan Vidya: Ek Parichaya.* Jeevan Vidya Prakashan, Amarkantak, 1999.
2. A.N. Tripathi. *Human Values.* New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. Mohandas Karamchand Gandhi. *The Story of My Experiments with Truth.*
5. E. F Schumacher. *Small is Beautiful.*

Web Resources:

1. https://fdp-si.aicte-india.org/UHV II%20Class%20Notes%20&%20Handouts/UHV%20Handout%201I introduction%20to%20Value%20Education.pdf
2. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%202-Harmony%20in%20the %20Human%20Being.pdf
3. https://fdp-si.aicte-india.org/UHV%201%20Teaching%20Material/D3S2%20Respect%20July%2023.pdf
4. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%205-Harmony%20in%20the%20Nature%20and%20Existence.pdf
5. https://dpsi.aicteindia.org/UHV%20II%20Teaching%20Material/UHV%20II%20Lecture%202325%20Ethics %20v1.pdf
6. https://www.studocu.com/in/document/kiet-group-of-institutions/universal-humanvalues/chapter-5-holistic- understanding-of haprofessionalethics/62490385https:// onlinecourses.swayam2.ac.in /aic22_ge23/preview
7. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%203-Harmony%20in%20the %20Family.pdf

CO-PO Mapping:

Course outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and the world	Ethics	Individual and collaborative teamwork	Communication	Project management and finance	Life-long learning
24AUHV31T.1			-	-	-	-	3	-	1	-	2
24AUHV31T.2			-	-	-	-	3	-	1	-	2
24AUHV31T.3			-	-	-	-	3	-	1	-	2
24AUHV31T.4			-	-	-	-	3	-	1	-	3
24AUHV31T.5			-	-	-	2	3	-	1	-	2

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RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the Course: Managerial Economics & Financial Analysis
Category : HSM
Year : II
Semester : I
Course Code : 24AMBA31T
Branch/es : CE, EEE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To inculcate the basic knowledge of microeconomics and financial accounting.
2. To make the students learn how demand is estimated for different products, input-output relationship for optimizing production and cost.
3. To Know the Various types of market structure and pricing methods and strategy.
4. To give an overview on investment appraisal methods to promote the students to learn how to plan long-term investment decisions.
5. To provide fundamental skills on accounting and to explain the process of preparing financial statements.

Course Outcomes:

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

1. Summarize the concepts related to Managerial Economics, Financial Accounting.
2. Comprehend the fundamentals of Economics viz., Production, Cost, Revenue.
3. Examine the different forms of business & Market Structures.
4. Analyze how to invest their capital and maximize returns.
5. Develop the accounting statements and evaluate the financial performance of business entity.

Unit 1 Managerial Economics 12

Introduction – Nature, meaning, significance, functions, and advantages. Demand-Concept, Function, Law of Demand - Demand Elasticity- Types – Measurement. Demand Forecasting Factors governing Forecasting, Methods. Managerial Economics and Financial Accounting and Management.

Unit 2 Production and Cost Analysis 12

Introduction – Nature, meaning, significance, functions and advantages. Production Function– Least- cost combination– Short run and long run Production Function- Iso quants and Is costs, Cost & Break-Even Analysis - Cost concepts and Cost behavior- Break-Even Analysis (BEA) - Determination of Break-Even Point (Simple Problems).

Unit 3 Business Organizations and Markets 12

Introduction – Forms of Business Organizations- Sole Proprietary - Partnership - Joint Stock Companies - Public Sector Enterprises. Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition Monopoly- Monopolistic Competition– Oligopoly-Price-Output Determination - Pricing Methods and Strategies.

Unit 4 Capital Budgeting 12

Introduction – Nature, meaning, significance. Types of Working Capital, Components, Sources of Short-term and Long-term Capital, Estimating Working capital requirements. Capital Budgeting– Features, Proposals, Methods and Evaluation. Projects – Pay Back, Accounting Rate of Return (ARR) Net Present Value (NPV) Internal Rate Return (IRR) Method (sample problems).

Unit 5 Financial Accounting and Analysis 12

Introduction – Concepts and Conventions- Double-Entry Bookkeeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments). Introduction to Financial Analysis - Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability.

Prescribed Textbooks:

1. Varshney & Maheswari: Managerial Economics, Sultan Chand.
2.Aryasri: Business Economics and Financial Analysis, 4/e, MGH.

Reference Books:

1. Ahuja Hl Managerial economics Schand.
2.S.A. Siddiqui and A.S. Siddiqui: Managerial Economics and Financial Analysis, New Age International.
3. Joseph G. Nellis and David Parker: Principles of Business Economics, Pearson, 2/e, New Delhi.
4. Domnick Salvatore: Managerial Economics in a Global Economy, Cengage.

Web Resources:

1. https://www.slideshare.net/123ps/managerial-economics-ppt https://www.slideshare.net/rossanz/production-and-cost-45827016 https://www.slideshare.net/darkyla/business-organizations-19917607
2.https://www.slideshare.net/balarajbl/market-and-classification-of-market https://www.slideshare.net/ruchi101/capital-budgeting-ppt-59565396 https://www.slideshare.net/ashu1983

CO-PO Mapping:

Course outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and the world	Ethics	Individual and collaborative teamwork	Communication	Project management and finance	Life-long learning
24AMBA31T.1	2	1	1	-	1	2	-	1	1	2	1
24AMBA31T.2	2	1	1	1	1	1	1	-	1	1	1
24AMBA31T.3	1	1	-	1	2	1	1	2	1	1	1
24AMBA31T.4	1	1	-	1	1	-	1	1	-	1	1
24AMBA31T.5	-	2	1	1	-	1	-	1	1	-	1

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RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the Course: Environmental Science
Category : MC
Year : II
Semester : I
Course Code : 24AENS31T
Branch/es : EEE, ME, CSE, CSE(AIML), CSE(ICB)

Lecture Hours	Tutorial Hours	Practice Hours	Credits
2	0	0	3

Course Objectives:
This course aims to raise environmental awareness, promote sustainable practices aligned with the Sustainable Development Goals (SDGs), and highlight the significance of ecosystems and biodiversity. It sensitizes students to major pollution issues and related legislative measures, fosters ethical responsibility and problem-solving skills to tackle environmental challenges, and explains the impact of human population growth on the environment and public health. The course also emphasizes the role of education, information technology, and public policy in promoting environmental sustainability.

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

1. explain how natural resources should be utilised with a focus on sustainability.
2. describe the need to protect ecosystems and biodiversity for future generations.
3. comprehend major pollution problems related to ecosystems.
4. Summarize key environmental issues, sustainable practices, and laws supporting environmental protection in the context of sustainable development goals.
5. explain the effects of population growth on environment and health, and the role of education, IT, and welfare programs in managing them.

Unit 1 Natural resources 7

Natural Resources: Renewable and non-renewable resources – Forest resources: Uses, deforestation – Water resources: Uses, floods, drought – Mineral resources: Uses, environmental effects of extracting mineral resources– Energy resources: Renewable and non-renewable energy sources (overview only).

Unit 2 Ecosystems, Biodiversity and its conservation 6

Ecosystems: Producers, consumers and decomposers – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and functions of the following ecosystems: Forest ecosystem and lake ecosystem.
Biodiversity and its conservation: Definition – Values of biodiversity – Hot-spots of biodiversity – Threats to biodiversity – Conservation of biodiversity.

Unit 3 Environmental pollution 5

Definition, causes, effects and control measures of: Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards.
Self-learning: Genetically modified crops.

Unit 4 Social issues and the Environment 6

Sustainable development – Rainwater harvesting – Environmental ethics – Climate change, global warming, acid rain, ozone layer depletion – Air (Prevention and Control of Pollution) Act – Water (Prevention and Control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Environment Protection Act.

Unit 5 Human population and the Environment 6

Population explosion – Family welfare programmes – Environment and human health – Value education – Role of information technology in environment and human health, Field work – Visit to a local area to document environmental assets.

Prescribed Textbooks:

1. Kaushik, Anubha, and C. P. Kaushik. *Perspectives in Environmental Studies*. 7th ed., New Age International Publishers, 2022.
2. Chawla, Shashi. *A Textbook of Environmental Studies*. 1st ed., McGraw Hill Education, 2017.

Reference Books:

1. Joseph, Benny. *Environmental Studies*. 3rd ed., McGraw Hill Education India, 2017.
2. Dhinakaran, A., and Sankaran, B. *A Textbook of Environmental Studies*. 1st ed., Himalaya Publishing House, 2023.
3. Basu, Mahua, and Xavier, S. *Fundamentals of Environmental Studies*. 1st ed., Cambridge University Press, 2017.
4. Bharucha, Erach. *Textbook of Environmental Studies for Undergraduate Courses*. 3rd ed., Universities Press (India), 2021.
   Tiwari, Vijay Kumar. *A Textbook of Environmental Studies*. 1st ed., Himalaya Publishing House, 2024.

CO-PO Mapping:

Course outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and the world	Ethics	Individual and collaborative teamwork	Communication	Project management and finance	Life-long learning
24AENS31T.1	2	2	-	-	-	-	2	-	-	-	2
24AENS31T.2	2	2	-	-	-	-	2	-	-	-	2
24AENS31T.3	2	2	-	-	-	-	2	-	-	-	2
24AENS31T.4	3	2	-	-	-	-	2	-	-	-	3
24AENS31T.5	2	2	-	-	-	-	2	-	-	-	2

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RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the Course: DC Machines and Transformers Lab

Category : PC
Year : II
Semester : I
Course Code : 24AEEE31L
Branch/es : EEE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

To impart hands on experience in Testing of DC and AC Machines, measurement of performance parameters, study of machine characteristics. It also gives practical exposure to the usage of different DC and AC Machines with different conditions.

Course Outcomes:

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

1. Apply theoretical concepts to determine the performance characteristics of DC Machines.
2. Demonstrate starting and speed control methods of DC Machines.
3. Analyze the parallel operation of single-phase transformers.
4. Analyze the performance analysis of transformers using various tests
5. Determine the performance parameters of single-phase transformer.

List of Experiments:

Any 10 of the following experiments are to be conducted:

1. Magnetization characteristics of DC Shunt Generator. Determination of Critical resistance and Critical Speed.
2. Speed control of DC shunt motor by Field Current and Armature Voltage Control.
3. Brake test on DC shunt motor- Determination of performance curves.
4. Swinburne's test - Predetermination of efficiencies as DC Generator and Motor.
5. Load test on DC compound generator-Determination of characteristics.
6. Load test on DC shunt generator-Determination of characteristics.
7. Load test on DC series generator-Determination of characteristics
8. Fields test on DC series machines-Determination of efficiency.
9. Brake test on DC compound motor-Determination of performance curves.
10. Retardation Test on DC Shunt Motor-Determination of Stray Losses.
11. OC & SC tests on single phase transformer.
12. Sumpner's test on single phase transformers.
13. Scott connection of transformers.
14. Parallel operation of Single-phase Transformers.
15. Separation of core losses of a single-phase transformer.

Prescribed Textbooks:

1. Laboratory Manual for Electrical Machines by D. P.Kothari, BS Umre, Dreamtech Press, 2nd Edition, 2020 .
2. Electrical Machinery Fundamentals by Stephen J Chapman McGraw Hill education,4th Edition, 2017.
3. Generalized Theory of Electrical Machines by Dr. P S Bimbhra, 7th Edition,2021, Khanna Publishers.

Web resource

https://ems-iitr.vlabs.ac.in/List%20of%20experiments.html

CO-PO Mapping:

Course outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and the world	Ethics	Individual and collaborative teamwork	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE31L.1	3	2	2	-	2	-	-	2	1	-	1	3	2
24AEEE31L.2	3	3	2	-	1	-	-	2	1	-	1	3	2
24AEEE31L.3	3	2	3	1	-	-	-	2	1	-	1	3	2
24AEEE31L.4	3	3	2	1	-	-	-	2	1	-	1	3	2
24AEEE31L.5	3	3	2	-	-	-	-	2	1	-	1	3	2

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RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the Course: Electrical Circuits Lab
Category : PC
Year : II
Semester : I
Course Code : 24AEEE32L
Branch/es : EEE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

1. To verify basic laws and various theorems of electrical circuits
2. To calculate self and mutual inductance and coefficient of coupling of coupled circuits
3. To calculate network parameters of the two-port networks
4. To describe the phenomenon of series and parallel resonance
5. To measure active and reactive power of 3-Φ balanced loads

Course Outcomes:

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

1. Apply and validate fundamental circuit theorems experimentally to solve DC circuits.
2. Determine the self, mutual inductance parameters of single-phase transformer and Analyze the co-efficient of coupling.
3. Characterize the two port networks by evaluating Z, Y, ABCD and h parameters.
4. Investigate Resonance Phenomena in RLC circuits
5. Measure active and reactive power in balanced star/delta three-phase loads and correlate results with theoretical calculations.

List of Experiments

Any 10 of the following experiments are to be conducted:

1. Verification of Ohm's law.
2. Verification of Thevenin's and Norton's theorems.
3. Verification of Maximum Power Transfer theorem.
4. Verification of Superposition theorem.
6. Verification of Reciprocity and Millman's theorems.
7. Determination of self and mutual inductances and co-efficient of coupling.
8. Determination of Z and Y Parameters.
9. Determination of Transmission and hybrid parameters.
10. Series and Parallel resonance.
11. Measurement of single-phase Active power for Star and Delta connected balanced loads.
12. Measurement of single-phase Reactive power for Star and Delta connected balanced loads.
13. Measurement of Active Power in a 3-Phase System Using the Two-Wattmeter Method.
14. Determination of cold and hot resistance of electric lamp.

Hardware Requirements: Regulated Power supplies, Analog/Digital Function Generators, Digital Multimeters, Decade Resistance Boxes/Rheostats, Decade Capacitance Boxes, Ammeters (Analog or Digital), Voltmeters (Analog or Digital), Active & Passive Electronic Components.

Prescribed Textbooks:

1. Circuit Analysis Theory and Practice, 5Th Edition, Allan H Robbins Wilhelm C. Miller, Cengage Publishers.
2. Introduction to Electric Circuits, Sixth Edition, Richard C. Dorf, James A. Svoboda, Wiley Student Edition.

Reference Books:

1. Network Analysis – ME Van Altenburg, Prentice Hall of India, revised 3rd Edition, 2019 2. Engineering Circuit Analysis by William H. Hayt, Jack Kemmerly, Jamie Phillips, Steven M. Durbin, 9th Edition 2020.

Web Resources:

https://asnm-iitkgp.vlabs.ac.in/

CO-PO Mapping:

Course outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and the world	Ethics	Individual and collaborative teamwork	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE32L. 1	3	3	2	2	3	1	1	2	2	1	2	3	1
24AEEE32L. 2	3	2	1	2	2	1	1	1	1	1	1	3	2
24AEEE32L. 3	3	3	2	3	3	1	1	1	2	1	2	3	1
24AEEE32L .4	2	3	2	2	3	1	1	1	1	1	2	2	2
24AEEE32L. 5	3	3	2	3	3	2	2	2	2	2	2	3	3

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RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the Course: Electrical and Electronics Simulation Lab

Category : PC
Year : II
Semester : I
Course Code : 24AEEE33L
Branch/es : EEE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
-	-	3	1.5

Course Objectives:

The main goal of this lab is to help students understand how electrical and electronic circuits work by using simulation software. Students will learn to verify circuit laws and theorems, analyze different types of networks, and study the behavior of electronic devices without using actual hardware. This hands-on practice through simulation will strengthen their basic concepts and improve their problem-solving skills.

Course Outcomes:

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

1. Understand and verify basic electrical circuit laws and theorems using simulation tools.
2. Analyze electrical networks and determine various network parameters like Z, Y, ABCD, and hybrid models.
3. Simulate and interpret the behavior of electronic devices such as diodes and transistors.
4. Design and analyze basic analog circuits like rectifiers and filters using simulation software.
5. Demonstrate the functioning of fundamental digital logic gates using circuit simulation.

List of Experiments:

Any 10 of the following experiments are to be conducted:

1. Verification of Kirchhoff's laws using simulation tools.
2. Verification of Thevenin's and Norton's theorems using simulation tools
3. Verification of super position and maximum power transfer theorems using simulation tools.
4. Verification of Reciprocity and Millman's theorems using simulation tools.
5. Determination of Impedance and Admittance parameters using simulation tools.
6. Determination of ABCD and Hybrid parameters using simulation tools.
7. Study of Logic gates AND, OR, XOR and NOT using simulation tools.
8. Measurement of Ripple factor of Half wave rectifier and Full wave Rectifier using simulation tools.
9. Simulation of PN junction diode characteristics.
10. Simulation of Zener diode characteristics.
11. Simulation of Input and output characteristics of Transistor in CE configuration.
12. Simulation of Input and output characteristics of Transistor in CB configuration.
13. Simulation of Low pass and High pass filters.
14. Simulation of series and parallel resonance circuit.

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Prescribed Textbooks:

1. Circuit Analysis Theory and Practice, 5Th Edition, Allan H Robbins Wilhelm C. Miller, Cengage Publishers.

Reference Books:

1. SPICE for Power Electronics and Electric power, third edition, Muhammad H. Rashid Hasan M. Rashid.
2. Fundamentals of Electrical Circuits, seventh Edition, Charles K. Alexander, Mathew N.O. Sadiku.
3. Introduction to Electric Circuits, Sixth Edition, Richard C. Dorf, James A. Svoboda, Wiley Student Edition.
4. Circuits and networks Analysis and Synthesis, fifth edition, A Sudhakar Shyammohan S Palli.

Web resources:

1. https://youtu.be/3aPp8L2jon8?si=uahAyPv22W_09Ezq
2. https://youtu.be/JuWQJYcl60Y?si=__PQd5l1oJ47hwwN
3. https://youtu.be/ld1aqfOlm3w?si=_JYSLcWWB8Cb7gc8
4. https://youtu.be/16POVzL4wRo?si=OPnhlaj074kObOlZ
5. https://youtu.be/Q_pi-VQsPpo?si=Pvm9O73OlPHr7V2p

CO-PO Mapping:

Course outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and the world	Ethics	Individual and collaborative teamwork	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE33L.1	3	2	1	2	3	1	-	1	2	2	2	3	1
24AEEE33L.2	3	3	2	2	3	1	1	1	2	-	2	3	3
24AEEE33L.3	3	3	2	2	3	-	1	1	2	1	2	2	3
24AEEE33L.4	3	3	3	2	3	-	1	1	2	1	2	3	3
24AEEE33L.5	3	2	2	2	3	-	1	1	2	1	2	2	3

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RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the Course: PCB Design and Fabrication
Category : SEC
Year : II
Semester : I
Course Code : 24AEEE34L
Branch/es : EEE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
1	0	2	2

Course Objectives:

1. To impart knowledge on PCB designing.
2. Apply advance techniques, skills and modern tools for designing of PCBs.
3. Apply the knowledge and techniques to fabricate Single layer Copper clad PCB.
4. To impart knowledge on Fabricate of a Prototype PCB.

Course Outcomes:

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

1. Summarize the steps involved in schematic, layout, fabrication and assembly process of PCB design.
2. Design a circuit and create a schematic Capture.
3. Design (schematic and layout) and fabricate PCB for simple circuits.
4. Summarize the concept of developing copper clad PCB.
5. Summarize the concept of copper clad PCB Etching process and soldering.

Unit 1 Introduction to PCB T:3, P:6

What is PCB - Types of PCBs: Single Sided (Single Layer), Multi-Layer (Double Layer)- PCB Materials. Draw a Schematic, Bill of materials (B.O.M.), Types of Components -Active Components- Diode- Transistor- MOSFET- LED- SCR- Integrated Circuits (ICs)- Passive Components- Resistor-Capacitor-Inductor-Transformer Speaker/Buzzer Component Package Types.

Unit 2 Introduction: Setting up Software T:3, P:6

Introduction to PCB Design using Software tool, installing software, Initial Startup, Components and Library Creation (Symbol, Package, Device), Creating a New Schematic Design (Starting a Project, Placing Parts, Finishing Up).

Unit 3 PCB Laying Out the Board T:3, P:6

PCB Layout Designing- Prototype Designing, Board Editor, Arrange the Components, Creating Traces, Ground Plane. Error Checking, Initialize and Outline Board, Connections and Routing (The Auto Router, Manual Routing, Setting Up a Simple Auto Route, Optimizations, Manual Traces & Shapes), Generating Gerber's, Self-Check and Final Touches, Post-lab Reviewing the Files. Selecting a Manufacturer.
Case Study: Design one circuit for hardware development.

Unit 4 PCB Fabrication Process-I T:3, P:6

Finalizing PCB and Studying the Circuit for errors, printing final circuit using laser printer on glossy paper, selecting proper size of Copper clad PCB, transform the circuit on to copper clad PCB with proper temperature.

Unit 5 PCB Fabrication Process-II T:3, P:6

Etching process (any Etching process). Safety precautions before starting the Etching process, Cleaning the PCB. Drilling holes on PCB. Components Mounting, Soldering and De-soldering.
Case Study: DIY PCB Prototyping.

Prescribed Textbooks:

1. Simon Monk, Duncan Amos - Make Your Own PCBs with EAGLE: From Schematic Designs to Finished Boards, 2nd Edition 2017.

Reference Books:

1. Tom Clarke, © Imperial College London The EAGLE Schematic & PCB Layout Editor - A Guide.
2. Scarpino Matthew, Designing Circuit Boards with EAGLE: Make High-Quality PCBs at Low-Cost 1st Edition, Kindle Edition.
3. Kenji Aono-Application Note: PCB Design with EAGLE. April 4, 2011.
4. Autodesk Eagle manual version 9.5 Copyright © 2019 Autodesk.
5. R. S. KHANDPUR - Printed Circuit Boards_ Design, Fabrication, Assembly and Testing (2005, MC GRAW HILL INDIA).
6. Kraig Mitzner - Complete PCB Design Using OrCAD Capture and PCB Editor (2009, Newnes).

Web Resources

1. https://onlinecourses.nptel.ac.in/noc24_ee127/preview
2. https://hillmancurtis.com/nptel-pcb-design/
3. https://www.youtube.com/watch?v=f1soGt0uNqc

CO-PO Mapping:

Course outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and the world	Ethics	Individual and collaborative teamwork	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE34L.1	2	-	2	-	2	-	-	-	1	2	-	2	1
24AEEE34L.2	3	2	3	-	3	-	-	-	1	2	-	3	2
24AEEE34L.3	3	2	3	-	3	-	-	-	2	1	-	3	3
24AEEE34L.4	2	-	2	-	1	-	-	-	-	-	-	1	1

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RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the Course: Numerical methods
Category : BS
Year : II
Semester : II
Course Code : 24AMAT42T
Branch/es : EEE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:
The objective of the Numerical Methods course is to introduce students to numerical techniques for solving algebraic and transcendental equations, and to familiarize them with interpolation methods for estimating values between known data points. The course also aims to explain various numerical approaches for evaluating definite integrals and solving ordinary differential equations. Additionally, it describes the applications of numerical methods in solving partial differential equations, equipping students with practical tools for computational problem-solving in scientific and engineering contexts.

Course Outcomes:
At the end of the course, the student will be able to
1. Solve algebraic and transcendental equations using numerical methods.
2. Solve the simultaneous equations using numerical methods.
3. Apply interpolation techniques to solve real-world problems by estimating intermediate values from discrete data points.
4. Evaluate differentiation and integration of a function using numerical technique.
5. Solve the ordinary differential equations using numerical methods.

Unit 1 Solutions of algebraic and transcendental equations 12
Bisection method - Regula-Falsi method - The Iteration Method-Newton-Raphson method.

Unit 2 Numerical solutions of simultaneous equations and Eigen value problems 10
Introduction, Gaussian elimination method, Gauss-Jordan elimination method. Iterative methods: Gauss Jacobi iteration method, Gauss-Seidel iteration method. Power method for determining the largest eigen values.

Unit 3 Interpolation and Curve fitting 8
Interpolation: Finite differences - forward differences and backward differences - Newton's forward interpolation formula - Newton's backward interpolation formula - Lagrange's interpolation formula.
Curve fitting: Fitting a straight line-second degree parabola-Exponential curve –power curve by the method of least squares.

Unit 4 Numerical Differentiation and Numerical integration 8
Numerical Differentiation, Numerical integration - Trapezoidal rule - Simpson's 1/3rd and Simpson's 3/8 rules.

Unit 5 Numerical solutions of ordinary differential equations of first order 10

Picard's method -Taylor's series- Euler's method - Modified Euler's method - Runge-Kutta method of fourth order.

Prescribed Textbooks:

1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.
2. R.K. Jain, S.R.K. Iyengar, Advanced Engineering Mathematics, 5/e, Narosa Publishers, 2016.

Reference Books:

1. P. Kandasamy, K. Thilagavathi, K. Gunavathi, Numerical Methods, S. Chand & Company, 2/e, Reprint 2012.
2. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
3. T. Veerarajan, Engineering Mathematics, Tata McGraw-Hill, New Delhi, 2008.

CO-PO Mapping:

Course outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and the world	Ethics	Individual and collaborative teamwork	Communication	Project management and finance	Life-long learning
24AMAT41T.1	2	2	1	1	-	-	-	-	-	-	1
24AMAT41T.2	3	3	2	2	-	-	-	-	-	-	1
24AMAT41T.3	2	2	1	1	-	-	-	-	-	-	1
24AMAT41T.4	3	2	1	2	-	-	-	-	-	-	1
24AMAT41T.5	3	2	1	2	-	-	-	-	-	-	1

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RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the Course: Digital Electronics
Category : PC
Year : II
Semester : II
Course Code : 24AEEE41T
Branch/es : EEE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To analyze the concepts and techniques associated with the number systems and codes.
2. To minimize the logical expressions using Boolean laws, postulates and K-Map method.
3. To design, and implement combinational logic circuits for digital functions.
4. To design of sequential logic, memory elements, and their use in registers and counters.
5. To analyze the finite states machines & classification of memory devices**.**

Course Outcomes:

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

1. Analyze the number systems and codes.
2. Simplify the logical expressions using Boolean laws, postulates & also by using k map method.
3. Design of combinational logic circuits using conventional logic gates and various programmable logic devices.
4. Design of sequential logic circuits.
5. Analyze the finite state machines & classification of memory devices**.**

Unit 1 Number Systems, Codes & Boolean Algebra: 10

Introduction to number systems – r, (r-1)'s complement 1's & 2's complement, 9's & 10's Complement, representation of negative numbers, Binary arithmetic, Binary codes, Error detecting & Error correcting codes, hamming code.

Boolean Algebra: Fundamental postulates of Boolean algebra, Basic theorems and Properties, Logic gates, Properties of XOR gate, universal gates.

Unit 2 Switching Functions and Their Minimization: 10

Switching Functions-Canonical and Standard forms, Algebraic simplification using Boolean theorems, two level & Multilevel Realization of Boolean Functions using Universal Gates.

Minimization: K-Map methods, Prime implicants, don't care combinations, Minimal SOP and POS forms (up to 4 variables).

Unit 3 Combinational Logic Design & Programmable Logic Devices: 9

Design using conventional logic gates-Binary Adders (half, full,parallel), Subtractors, Magnitude comparator, Encoder, Decoder, Multiplexer, De-Multiplexer (1-Line to 4-Line and 1-Line to 8-Line).

Programmable Logic Devices (PLDs): Introduction to PLDs; PROM, PLA, PAL, FPGA (Theoretical concepts only).

Unit 4 Sequential Circuits: 10

Classification of sequential circuits (Synchronous, Asynchronous, Pulse mode, Level mode), Basic flip-flops, Triggering and excitation tables, flip flop conversions, Design of modulo-N Synchronous counters – up/down counter, ring counter, Johnson counter (Synchronous counters only).

Unit 5 FSM Minimization and Memory Devices: 8

Finite state machine-capabilities and limitations, Mealy and Moore models and their conversions, minimization of completely specified sequential machines, Partition technique.
Memory Devices**:** Classification of memories; RAM (SRAM, DRAM); ROM (PROM, EPROM, EEPROM, Flash) (theoretical concepts only).

Prescribed Textbooks:

1. M. Morris Mano and Michael D. Ciletti**,** *Digital Design with an Introduction to the Verilog HDL*, 6th Edition, Pearson Education, 2017.

Reference Books:

1. R. P. Jain and Kishor Sarawadekar, *Modern Digital Electronics*, 5th Edition, McGraw Hill India, 2022
2. A. Anand Kumar, "Fundamentals of Digital Circuits," 4th Edition, PHI Learning, 2018.
3. Charles H. Roth, Jr, Larry L.Kinney. Fundamentals of Logic Design. Cengage Learning, 2015, 6th Ed.
4. William I. Fletcher, An Engineering Approach to Digital Design. Pearson, 3rd Ed, 2015.

CO-PO Mapping:

Course outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and the world	Ethics	Individual and collaborative teamwork	Communication	Project management and finance	Life-long learning	PSO 1	PSO 2
24AEEE41T.1	3	2	1	-	-	-	2	-	3	-	1	-	-
24AEEE41T.2	3	3	2	-	-	-	-	1	3	-	--	-	-
24AEEE41T.3	3	3	3	2	3	1	1	-	2	1	1	3	2
24AEEE41T**.**4	3	2	3	2	2	-	-	2	3	-		3	1
24AEEE41T .5	2	3	2	-	1	1	1	-	3	-	1	2	-

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RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the Course: Induction and Synchronous Machines
Category : PC
Year : II
Semester : II
Course Code : 24AEEE42T
Branch/es : EEE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To understand the constructional features and operating principles of 3-phase induction motors, single-phase motors, synchronous generators, and synchronous motors.
2. To analyze performance characteristics, equivalent circuits, phasor diagrams, and torque equations of electrical machines.
3. To apply suitable testing methods for evaluating machine performance and efficiency.
4. To study various starting and speed control techniques for induction and synchronous machines.

Course Outcomes:

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

1. Apply the principle of rotating magnetic field and equivalent circuit concepts to analyze the operation and performance of 3-phase induction motors.
2. Analyze the performance of 3-phase induction motors using torque equations, tests, circle diagram, and various starting and speed control methods.
3. Apply double revolving field theory and equivalent circuit models to evaluate the performance and starting methods of single-phase motors.
4. Analyze the performance of synchronous generators by applying EMF equation, armature reaction, voltage regulation methods, and synchronization techniques.
5. Apply the principles of synchronous motor operation to evaluate power factor control, power developed, hunting, and starting methods.

Unit 1 3-phase induction motors 9

Construction of Squirrel cage and Slipring induction motors– production of rotating magnetic field – principle of operation – rotor emf and rotor frequency – rotor current and power factor at standstill and during running conditions– rotor power input, rotor copper loss and mechanical power developed and their interrelationship –equivalent circuit – phasor diagram, Applications.

Unit 2 Performance of 3-Phase induction motors 9

Torque equation – expressions for maximum torque and starting torque – torque-slip characteristics – double cage and deep bar rotors – No load, Brake test and Blocked rotor tests – circle diagram for predetermination of performance- methods of starting –starting current and torque calculations - speed control of induction motor with V/f control method, rotor resistance control and rotor emf injection technique –crawling and cogging – induction generator operation.

Unit 3 Single Phase Motors 9

Single phase induction motors – constructional features – double revolving field theory, Cross field theory – equivalent circuit- starting methods: capacitor start capacitor run, capacitor start induction run, split phase & shaded pole, AC series motor, Applications.

Unit 4 Synchronous Generator **9**

Constructional features of non-salient and salient pole type alternators- armature windings – distributed and concentrated windings – distribution & pitch factors – E.M.F equation – armature reaction – voltage regulation by synchronous impedance method – MMF method and Potier triangle method – two reaction analysis of salient pole machines - methods of synchronization- Slip test – Parallel operation of alternators.

Unit 5 Synchronous Motor **9**

Synchronous motor principle and theory of operation – Effect of excitation on current and power factor– synchronous condenser –expression for power developed –hunting and its suppression – methods of starting.

Prescribed Textbooks:

1. Electrical Machinery, Dr. P.S. Bimbhra, Khanna Publishing, 2021, First Edition.

Reference Books:

1. Electrical machines, D.P. Kothari and I.J. Nagrath, McGraw Hill Education, 2017, Fifth Edition.
2. Theory & Performance of Electrical Machines by J.B.Gupta, S.K.Kataria & Sons,2007.
3. Electric Machinery, A.E.Fitzgerald, Charles kingsley, Stephen D.Umans, McGraw-Hill, 2020, Seventh edition

CO-PO Mapping:

Course outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and the world	Ethics	Individual and collaborative teamwork	Communication	Project management and finance	Life-long learning	PSO 1	PSO 2
24AEEE42T.1	2	2	1	1	-	-	-	-	1	2	2	2	2
24AEEE42T.2	2	2	1	1	-	-	-	-	1	-	-	2	2
24AEEE42T.3	2	2	1	1	-	-	-	-	1	-	-		
24AEEE42T.4	3	2	1	2	-	-	-	1	1	-	-	1	1
24AEEE42T.5	3	3	2	2	-	-	-	1	1	-	-	2	2

Title of the Course: Electrical & Electronics Measurements and Instrumentation
Category : PC
Year : II
Semester : II
Course Code : 24AEEE43T
Branch/es : EEE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To understand the basic methods of electrical measurement and the classification of instruments.
2. To understand the construction and working of various types of wattmeters, energy meters and power factor meter.
3. To apply the principle and operation of DC and AC potentiometers.
4. To analyze the methods of measuring resistance inductance and capacitance using bridge techniques.
5. To analyze the advantages and limitations of different types of digital measuring instruments.

Course Outcomes:

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

1. Understand various methods of measurement and classify different types of measuring instruments.
2. Describe the construction and working of single-phase and three-phase wattmeters and energy meters.
3. Apply the principle, standardization, and applications of DC Crompton's and AC potentiometers (Polar and Coordinate types).
4. Analyze low, medium, and high resistances, inductance, capacitance using appropriate bridge methods.
5. Analyze the basic block diagram of CRO and operation of different types of digital voltmeters.

Unit 1 Measuring Instruments 10

Methods of measurements, Classification of instruments, Characteristics of instruments, Error-definition and types – Forces required to operate an instrument, different mechanisms used to obtain deflecting, control and damping torques – Ammeters and Voltmeters – PMMC, Dynamometer, Moving Iron type instruments – expression for the deflecting torque and control torque – Errors and compensations, extension of range using shunts and series resistance.

Unit 2 Measurement of Power, Energy & Power Factor 10

Power measurement: Single-phase dynamometer wattmeter – LPF wattmeter – Double element and three element dynamometer wattmeter. Energy measurement: Single-phase induction type energy meter – Driving and braking torques – Errors and compensations, Single-phase Dynamometer Power factor meters.

Unit 3 Potentiometers & Measurement of Frequency 10

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.

Principle and operation of single-phase frequency meter- vibrating reed type, - Ferro dynamic type meters.

Unit 4 DC & AC Bridges 10

Method of measuring low, medium and high resistance – sensitivity of Wheat stone's bridge – Kelvin's double bridge for measuring low resistance, measurement of high resistance – loss of charge method. Measurement of inductance–Maxwell's bridge, Anderson's bridge. Measurement of capacitance–Desauty's bridge, Schering Bridge. Measurement of frequency–Wien's bridge.

Unit 5 Oscilloscope, Smart & Digital Meter 10

Cathode Ray Oscilloscope- Cathode Ray Tube- Time base generator- Horizontal and vertical amplifiers application of CRO- Measurement of phase, frequency, current & voltage- Lissajous pattern.

Digital Voltmeter- Successive approximation, ramp, integrating type DVM's, Digital frequency meter-Digital multimeter-Digital Tachometer. Construction and working of smart energy meter- Advantages and Disadvatages.

Prescribed Textbooks:

1. A.K.Sawhney, Electrical & Electronic Measurement & Instruments, 4 th Edition, Dhanpat Rai & Co. Publications.

Reference Books:

1. E.W. Golding and F.C. Widdis Electrical Measurements and measuring Instruments, 5th Edition, Reem Publications.
2. R K Rajput Electrical & Electronic Measurement & Instrumentation., 2nd Edition, S. Chand & Co
3. H. S. Kalsi Electronic Instrumentation. Tata Graw Hill Mc, 3rd Edition.
4. Reissland, M.U Electrical Measurements: Fundamentals, Concepts, Applications-New Age International (P) Limited, Publishers

Web resources:

1. https://nptel.ac.in/courses/108105153
2. https://www.indiabix.com/electrical-engineering/electrical-measurements/

CO-PO Mapping:

Course outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and the world	Ethics	Individual and collaborative teamwork	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE43T .1	3	1	-	1	1	-	-	-	3	-	-	1	2
24AEEE43T .2	3	3	1	2	2	-	-	-	2	-	-	2	2
24AEEE43T .3	3	3	2	3	2	-	-	-	2	-	-	2	2
24AEEE43T .4	2	3	1	3	1	-	-	-	2	-	-	-	2
24AEEE43T .5	2	2	3	2	3	-	-	-	3	-	-	1	1

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RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the Course: Electromagnetic Field Theory
Category : PC
Year : II
Semester : II
Course Code : 24AEEE44T
Branch/es : EEE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
2	1	0	3

Course Objectives:

1. To introduce the fundamentals of vector analysis and its applications in electric and magnetic field theory.
2. To provide an understanding of electrostatics, magnetostatics, time-varying fields, and Maxwell's equations.
3. To enable students to apply field theory concepts to real-world electrical systems**.**

Course Outcomes:

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

1. Understand Coulombs law and Gauss's Law and its applications.
3. Evaluate electric field intensity and potential for various charge distributions.
4. Analyze the behavior of conductors, dielectrics, and capacitors in electrostatic fields.
5. Examine the laws of magnetostatics and determine forces and inductance in magnetic circuits.
6. Apply Maxwell's equations to time-varying fields and understand Poynting theorem.

Unit 1 Electrostatics 10

Review of Vector Algebra.

Coulomb's law and Electric field intensity (EFI) – EFI due to Continuous charge distributions (line and surface charge), Electric flux density, Gauss's law, Maxwell's first equation, Applications of Gauss's law, Electric Potential, Work done in moving a point charge in an electrostatic field, second Maxwell's equation for static electric fields, Potential gradient, Laplace's and Poison's equations.

Unit 2 Conductors – Dielectrics and Capacitance 10

Behavior of conductor in Electric field, Electric dipole and dipole moment – Potential and EFI due to an electric dipole, Torque on an Electric dipole placed in an electric field, Current density-conduction and convection current densities, Behavior of conductors in an electric field, Polarization, dielectric constant and strength, Continuity equation and relaxation time, Boundary conditions between conductor to dielectric, dielectric to dielectric and conductor to free space, Capacitance of parallel plate, coaxial and spherical capacitors, Energy stored and density in a static electric field.

Unit 3 Magneto statics, Ampere's Law and Force in magnetic fields 10

Biot-Savart's law and its applications viz. Straight current carrying filament, circular and solenoid current carrying wire – Magnetic flux density and Maxwell's second Equation), Ampere's circuital law and its applications viz. MFI due to an infinite sheet, long filament, solenoid, toroidal current carrying conductor, point form of Ampere's circuital law, Maxwell's third equation.

Magnetic force, moving charges in a magnetic field – Lorentz force equation, force on a current element in a magnetic field, force on a straight and a long current carrying conductor in a magnetic field, force between two straight long and parallel current carrying conductors, Magnetic dipole, Magnetic torque, and moment.

Unit 4 Self and mutual inductance 10

Self and mutual inductance – determination of self-inductance of a solenoid, toroid, coaxial cable and mutual inductance between a straight long wire and a square loop wire in the same plane – Energy stored and energy density in a magnetic field.

Unit 5 Time Varying Fields 10

Faraday's laws of electromagnetic induction, Maxwell's fourth equation, integral and point forms of Maxwell's equations, statically and dynamically induced EMF, Displacement current, Modification of Maxwell's equations for time varying fields, Poynting theorem and Poynting vector.

Prescribed Textbooks:

1. "Elements of Electromagnetics" by Matthew N O Sadiku, Oxford Publications, 7th edition, 2018.

Reference Books:

1. Introduction to Electro Dynamics by D J Griffiths, Prentice-Hall of India Pvt. Ltd, 2nd edition, 1989.
2. "Engineering Electromagnetics" by William H. Hayt Jr. & John A. Buck, McGraw-Hill Education, 9th Editon 2019.
3. Field Theory by Yaduvir Singh, Pearson India, 1st edition, 2011.
4. Fundamentals of Engineering Electromagnetics by Sunil Bhooshan, Oxford University Press, 2012.
5. Schaum's Outline of Electromagnetics by Joseph A. Edminister, Mahamood Navi, 4th Edition,2014

CO-PO Mapping:

Course outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and the world	Ethics	Individual and collaborative teamwork	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE44T.1	3	3	2	2	2	-	-	1	1	-	2	3	-
24AEEE44T.2	3	3	2	2	2	1	-	1	1	-	2	3	-
24AEEE44T.3	3	2	2	2	2	1	1	1-	1	1	2	3	2
24AEEE44T.4	3	3	2	2	2	1	1	1	1	1	2	3	3
24AEEE44T.5	3	3	2	2	2	1	1	1	1	1	2	3	3

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RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the Course: Analog and Digital Electronics Lab
Category : PC
Year : II
Semester : II
Course Code : 24AEEE41L
Branch/es : EEE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

1. To analysis of transistor-based amplifiers
2. To generate different types of non-sinusoidal signals
3. To verify the applications of Op-Amp

Course Outcomes:

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

1. Design of Amplifiers with its frequency response.
2. Design of oscillators with its frequency response.
3. Evaluate the efficiency of power Amplifier.
4. Analysis of wave shaping circuits.
5. Discuss the applications of Op-Amp and Timer.

List of Experiments Perform any ten experiments out of the following

1. Two stage RC-Coupled Amplifier.
2. Hartley/ Colpitts Oscillator.
3. Feedback Amplifier (Current Series & Voltage Series).
4. Linear Wave Shaping.
5. Class A power Amplifier.
6. Class B power Amplifier.
7. Non-Linear Wave Shaping-Clippers.
8. Non-Linear Wave Shaping-Clampers.
9. Op-Amp application – Adder and Subtractor circuits.
10. Op-Amp application- LPF, HPF (First order).
11. Function Generator using Op-Amp.
12. IC 555-Timer- Monostable / Astable operation circuit.
13. Three-Bit DAC using Op-Amp.
14. Three-Bit ADC using Op-Amp.

CO-PO Mapping:

Course outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and the world	Ethics	Individual and collaborative teamwork	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE41L.1	3	2	2	2	2	-	-	-	-	-	-	3	2
24AEEE41L.2	3	2	2	-	-	-	-	-	-	-	-	3	2
24AEEE41L.3	3	1	1	-	2	-	-	-	-	-	-	3	2
24AEEE41L.4	3	2	2	2	2	-	-	-	-	-	-	2	1
24AEEE41L.5	3	2	2	2	-	-	-	-	-	-	-	2	1

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RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the Course: Induction and Synchronous Machines Lab
Category : PC
Year : II
Semester : II
Course Code : 24AEEE42L
Branch/es : EEE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

1. To analyze the characteristics and parameters of induction motors using no-load, blocked rotor, and brake tests.
2. To determine voltage regulation and sequence impedance of alternators and understand synchronous machine behaviour using V-curves and salient pole analysis.

Course Outcomes:

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

1. Analyze the performance characteristics of single-phase and three-phase induction motors using various test methods.
2. Determine the voltage regulation of three-phase alternators using various standard methods, such as EMF, MMF, and the Potier Triangle Method.
3. Examine the operational behavior of synchronous machines using V-curves, inverted V-curves, and sequence impedance tests.
4. Demonstrate speed control and power factor improvement techniques for AC machines.
5. Evaluate machine parameters such as efficiency, reactance (Xd and Xq), and equivalent circuits using experimental data.

Perform any ten in the following Experiments

1. Performance of 3-Ph induction motor using No-load & blocked rotor tests.
2. Regulation of a three-phase alternator by E.M.F. and M.M.F. methods.
3. V and inverted V curves of a three-phase synchronous motor.
4. Determination of Xd and Xq of a salient pole synchronous machine.
5. Equivalent circuit of a single-phase induction motor.
6. Determination of the performance of a 3-phase Induction motor using the Brake test.
7. Determination of performance of Single-Phase Induction motor using Brake test.
8. Measurement of sequence impedance of a three-phase alternator.
9. Speed control of a three-phase induction motor by the V/F method.
10. Power factor improvement of a single-phase induction motor by using capacitors.
11. Regulation of the three-phase alternator by the Potier triangle method.
12. Determination of the efficiency of a single-phase AC series Motor by conducting a Brake test.

CO-PO Mapping:

Course outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and the world	Ethics	Individual and collaborative teamwork	Communication	Project management and finance	Life-long learning	PSO 1	PSO 2
24AEEE42L.1	3	3	3	3	-	-	-	-	-	-	1	-	-
24AEEE42L.2	3	3	2	2	-	-	-	-	-	-	1	1	1
24AEEE42L.3	3	3	2	2	-	-	-	-	-	-	1	1	-
24AEEE42L.4	2	2	2	2	-	-	-	-	-	-	1	1	1
24AEEE42L.5	2	2	2	2	-	-	-	-	-	-	1	1	1

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RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the Course: Measurements and Instrumentation Lab

Category : PC

Year : II

Semester : II

Course Code : 24AEEE43L

Branch/es : EEE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

1. To enable students to calibrate electrical measuring instruments such as wattmeters, energy meters, and power factor meters using standard techniques.
2. To develop the ability to measure electrical parameters like resistance, inductance, and capacitance using conventional bridge methods.
3. To provide hands-on experience in measuring power and energy in single-phase and three-phase systems using practical and simulation-based approaches.
4. To familiarize students with the use of modern test instruments, including CROs and DSOs, for signal observation and analysis.
5. To introduce the use of transducers and sensors for measuring physical quantities such as displacement, temperature, and strain.

Course Outcomes:

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

1. Calibrate single-phase electrical instruments such as wattmeters, energy meters, and power factor meters using standard testing methods.
2. Measure electrical parameters including resistance, inductance, and capacitance using Kelvin's double bridge, Wheatstone bridge, Anderson bridge, and Schering bridge.
3. Evaluate power and energy in single-phase and three-phase systems using conventional methods and simulation tools.
4. Analyze electrical waveforms and signal parameters using CRO and DSO, including amplitude, frequency, phase, and RMS computation.
5. Demonstrate the working and application of transducers such as LVDTs, RTDs, thermocouples, and strain gauges for physical quantity measurement.

LIST OF EXPERIMENTS: (Execute any 10 experiments)

1. Calibration of 1-Φ wattmeter by Phantom testing.
2. Calibration of 1-Φ energy meter.
3. Calibration of 1-Φ dynamometer type power factor meter.
4. Measurement of 3-Φ reactive power with 1-Φ wattmeter.
5. Measurement of parameters of an inductive coil using 3-voltmeter and 3-ammeter method.
6. Measurement of resistance using Kelvin's double Bridge, Wheatstone Bridge.
7. Measurement of inductance using Anderson bridge and capacitance using Schering Bridge.
8. Measurement of Insulation resistance using Megger.

9. Simulation of Maxwell's Bridge and De-Sauty's Bridge.
10. Measurement of three phase Active Power using Simulation.
11. Study of CRO: Measurement of amplitude, time period, frequency and phase shift using Lissajous patterns.
12. Download of one-cycle data of a periodic waveform from a DSO and use values to compute the RMS value.
13. Measurement of displacement using LVDT.
14. Measurement of different ranges of temperatures using i) RTD ii) Thermocouple.
15. Measurement of strain with the help of strain gauge transducers.

Web Resources:

1. https://www.youtube.com/watch?v=TlklTHPa1js&pp=ygUnRWxlY3RyaWNhbCBNZWFzdXJlbWVudHMgTGFiIEV4cGVyaW1lbnRz
2. https://www.youtube.com/watch?v=_GfNeGi8xKg&pp=ygUnRWxlY3RyaWNhbCBNZWFzdXJlbWVudHMgTGFiIEV4cGVyaW1lbnRz
3. https://www.youtube.com/watch?v=rDPcBqtn6yE&pp=ygUnRWxlY3RyaWNhbCBNZWFzdXJlbWVudHMgTGFiIEV4cGVyaW1lbnRz0gcJCd4JAYcqIYzv
4. https://www.youtube.com/watch?v=Huu3p4k25DM&pp=ygUnRWxlY3RyaWNhbCBNZWFzdXJlbWVudHMgTGFiIEV4cGVyaW1lbnRz
5. https://www.youtube.com/watch?v=NXuRrOBJ8sY&pp=ygUnRWxlY3RyaWNhbCBNZWFzdXJlbWVudHMgTGFiIEV4cGVyaW1lbnRz

CO-PO Mapping:

Course outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and the world	Ethics	Individual and collaborative teamwork	Communication	Project management and finance	Life-long learning	PSO 1	PSO 2
24AEEE43L.1	3	2	2	2	3	2	1	2	2	2	2	3	2
24AEEE43L.2	3	3	2	2	3	1	–	2	2	1	2	3	2
24AEEE43L.3	3	3	2	2	3	2	–	2	2	2	3	3	3
24AEEE43L.4	3	3	2	3	3	2	–	2	2	2	3	3	3
24AEEE43L.5	3	3	3	3	3	2	2	2	2	3	3	3	3

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RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the Course: Java Programming
Category : SEC
Year : II
Semester : II
Course Code : 24ACSE45L
Branch/es : CE, EEE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
1	0	2	2

Course Objectives:

1. Understand the basic concepts of java programming.
2. Analyze and apply concepts like packages, interfaces, and exception handling.
3. Implement the multi-threading and GUI applications developed using JAVA

Course Outcomes:

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

1. Understand the importance of datatypes, operators, functions, arrays and strings in Java Programming.
2. Apply reusability concepts like Inheritance, interfaces and packages in real time applications developed using JAVA.
3. Relate the abstract class and interfaces in java programming.
4. Construct and classify error and exception handling.
5. Implement genetics and JavaFX basic concepts in java programs.

Unit 1 **Introduction to Java Programming** **10**

Introduction to Java: Install Java & Java IDE, First Java Program, Variables and Data Types in Java, Operators in Java, Flow Control Statements in Java, functions in java, arrays in java, Strings in java.

Unit 2 **Object Oriented Programming** **10**

Object-Oriented Programming, Classes and Objects, Encapsulation, Abstraction, Inheritance, polymorphism.

Unit 3 **Packages and Interfaces** **10**

Packages and Interfaces: Packages, Defining a Package, A Short Package Example, Access Protection, an Access Example, Importing Packages. Abstract keyword, Interfaces: Defining an Interface, Implementing Interfaces, Nested Interfaces, Applying Interfaces, Variables in Interfaces, Interfaces Can Be Extended.

Unit 4 **Exception Handling and Multithreaded Programming** **10**

Exception Handling: Exception-Handling Fundamentals, Exception Types, Uncaught Exceptions, Using try and catch, Displaying a Description of an Exception, Multiple catch Clauses, Nested try Statements, throw, throws, finally, Built-in Exceptions.

Multithreaded Programming: The Java Thread Model, Thread Priorities, Synchronization, Messaging, The Thread Class and the Runnable Interface, The Main Thread, Creating a Thread, Implementing Runnable, Extending Thread, Choosing an Approach, Creating Multiple Threads.

Unit 5 **Generics and JavaFX Basics** **10**

Generics: What Are Generics, Generics Work Only with Reference Types, A Generic Class with Two Type Parameters, The General Form of a Generic Class.

JavaFX Basic Concepts, Using Image and Image View, Button, Radio Button, CheckBox, TextField.

Prescribed Textbooks:

1. Herbert Schildt.Java. The complete reference, TMH, 9th Edition.

Reference Books:

1. Nino and F.A. Hosch, An Introduction to programming and OO design using Java, John Wiley & sons.
2. Y. Daniel Liang, Introduction to Java programming, Pearson Education. 6th Edition.
3. R.A. Johnson- Thomson, An introduction to Java programming and object-oriented Application Development.

CO-PO Mapping:

Course outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and the world	Ethics	Individual and collaborative teamwork	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24ACSE45L.1	3	3	-	-	-	-	-	-	-	-	1	2	-
24ACSE45L.2	-	3	3	2	-	-	-	-	-	-	1	3	-
24ACSE45L.3	3	3	3	2	-	-	-	-	-	-	1	2	-
24ACSE45L.4	3	3	3	-	-	-	-	-	-	-	1	3	-
24ACSE45L.5	3	3	3	-	-	-	-	-	-	-	1	3	3

Title of the Course: Linear Control Systems
Category : PC
Year : III
Semester : I
Course Code : 24AEEE51T
Branch/es : EEE

Lecture Hours	Tutorial Hours	Practical Hours	Credits
3	0	0	3

Course Objectives:
The objectives of this course are to:
1. Provide a fundamental understanding of open-loop and closed-loop control systems and the role of feedback
2. Introduce the techniques of block diagram reduction and Mason's Gain Formula for analyzing and simplifying control systems
3. Develop an understanding of time-domain analysis, including transient response, steady-state response, time-domain specifications, and Root Locus techniques for stability analysis.
4. Familiarize students with frequency-domain analysis using Bode plots, Polar Plots, Nyquist plots for assessing system performance and stability.
5. Introduce the concepts of state-space representation and state-variable analysis for modeling and analyzing modern control systems.

Course Outcomes:
At the end of the course, the student will be able to
1. Apply control concepts for modeling, Block diagram/Signal flow graph analysis, and servo motor operation.
2. Analyze time response, steady-state errors, and controller performance.
3. Analyze system stability using Routh's criterion and root locus techniques.
4. Analyze frequency response stability using Bode, Polar, and Nyquist plots and design compensators for stability.
5. Analyze state-space models, system response, controllability, and observability of continuous systems.

Unit 1 Introduction to Control Systems Concepts **12**

Open loop and closed loop control systems and their differences- Examples of control systems, Feedback characteristics; Mathematical models – Differential equations of translational and rotational mechanical systems, Analogous Systems, problems; Block diagram reduction Rules, problems; Signal flow graphs using Mason's gain formula, problems; DC and AC Servo motors, Transfer function of DC servo motor & AC servo motor, Synchros.

Unit 2 Time Response Analysis **8**

Standard test signals - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems, problems- Time domain specifications, problems – Steady state response - Steady state errors and Static error co-efficients, problems, P, PI, PID Controllers.

Unit 3 Stability Analysis in Time Domain **10**

The concept of stability – Routh's stability criterion, problems-absolute stability and conditional stability – limitations of Routh's stability criterion. The Root locus concept, problems –effect of adding poles and zeros to G(S)H(S) on the root loci.

Unit 4 Frequency Response Analysis **10**

Frequency domain specifications-Definitions, Bode Diagrams-Stability Analysis from Bode Plots, Problems. Polar Plots-Stability Analysis from polar plots, problems - Nyquist stability criterion - Nyquist Plots, problems. Compensation techniques - Lag, Lead, and Lag-Lead Compensator design using Bode plots.

Unit 5 State Space Analysis of Continuous Systems **10**

Concept of state, state variables and state model, state models – differential equations & Transfer function models, problems, Transfer function from state model, solving the linear time invariant state equations – State transition Matrix and it's properties. System response through state space models. The concepts of controllability and observability, problems.

Textbooks:

1. I. J. Nagrath and M. Gopal "Control Systems Engineering" New Age International (P) Limited, Publishers, 6th edition, September 2018

Reference Books:

1. Automatic Control Systems by B. C. Kuo and Farid Golnaraghi, John wiley and sons, 8th edition, 2003.
2. Modern Control Engineering by Katsuhiko Ogata, Prentice Hall of India Pvt. Ltd., 5th edition, 2010.
3. Control System Design by Graham C. Goodwin, Stefan F. Graebe and Mario E. Salgado, Pearson, 2000.

Web Resources:

1. https://nptel.ac.in/courses/107106081
2. https://www.youtube.com/watch?v=ziu1OTwUrbw
3. https://www.youtube.com/watch?v=jji35E9hyAs
4. https://www.youtube.com/watch?v=C4-auv8J_7E
5. https://www.youtube.com/watch?v=pv3sqbzgTrI

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE51T.1	3	3	3	-	2	1	-	-	-	-	3	3	3
24AEEE51T.2	3	3	2	-	3	1	-	-	-	-	3	3	3
24AEEE51T.3	3	2	3	-	3	3	1	-	-	-	3	3	3
24AEEE51T.4	3	3	3	-	3	3	3	-	-	-	3	3	3
24AEEE51T.5	3	3	2	-	3	3	3	-	-	-	3	3	3

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(ESTD UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)
(UNIVERSITY LISTED IN UGC AS PER THE SECTION 2(f) OF THE UGC ACT, 1956)

RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the Course: Power Electronics
Category : PC
Year : III
Semester : I
Course Code : 24AEEE52T
Branch/es : EEE

Lecture Hours	Tutorial Hours	Practical Hours	Credits
3	0	0	3

Course Objectives:

1. To understand the construction, characteristics, and switching behavior of SCR.
2. To study the working principles, operation modes, and analysis of dc-to-dc converters.
3. To analyze the operation and performance of single-phase and three-phase controlled rectifiers with R and RL Load.
4. To examine the principles and control strategies of single-phase and three-phase inverters, focusing on PWM techniques, harmonic reduction, and inverter performance.
5. To explore the operation of AC voltage controllers, and cycloconverters, and understand their applications in controlling AC power.

Course Outcomes:

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

1. Understand the I-V Characteristics and Gate Drive Requirements of Power Devices.
2. Analyze steady state waveforms of dc-to-dc converters.
3. Design Single-Phase and Three-Phase Rectifiers with Different Load Conditions.
4. Explore the Operation of single phase and three phase Inverters
5. Analyze the operation of AC Voltage Controllers and Cycloconverters with Various Load Conditions.

Unit 1 Power Semiconductor devices and Characteristics 10

Basic Structure and I-V Characteristics of Thyristor, turn on and turn-off methods and switching characteristics of SCR, series and parallel connection of SCR, R, RC and UJT Firing circuits and commutation circuits for SCR, Snubber circuit, numerical problems, I-V Characteristics of Power Diode, Power MOSFET and IGBT, Introduction to Gallium Nitride (GaN) and Silicon Carbide (SiC) devices.

Unit 2 Choppers 10

Introduction to chopper; classification of choppers – class A, B, C, D, and E, concept of duty ratio; control strategies average output voltage and current, list of applications of DC-DC converters, numerical problems.

Unit 3 Rectifiers 10

Single-phase half controlled and fully controlled bridge thyristor rectifier with R and RL load with relevant waveforms, average output voltage and current; Three-phase half controlled and fully controlled bridge thyristor rectifier with R and RL load with relevant waveforms, average output voltage and current, single Phase dual converter, list of applications of rectifiers and dual converter - numerical problems.

Unit 4 Inverters 10

Single phase half bridge and full bridge Voltage Source Inverter (VSI)s, operating principle, voltage control techniques for inverters and Pulse Width Modulation (PWM) schemes for single phase inverters - single pulse, multiple pulse and sinusoidal PWM, basic series inverter, single phase parallel inverter, basic principle of operation, three phase VSI (180° conduction mode) - three phase CSI – list of applications of Inverters.

Unit 5 AC Voltage Controllers & Cycloconverters 12

Single phase AC voltage controllers – half wave and full wave AC voltage controllers, wave forms RMS load voltage and current - numerical problems. Cycloconverters - Midpoint and Bridge connections - Single phase to single phase step-up and step - down cycloconverters, principle of operation, waveforms, output voltage equation with Resistive load, list of applications of AC voltage controllers and Cycloconverters.

Textbooks:

1. M. D. Singh & K. B. Khanchandani, Power Electronics, Tata MC Graw Hill Publishing Company, 2nd edition 2017.

Reference Books:

1. Power Electronics by P.S. Bimbhra, 7th edition, Khanna Publishers, New Delhi, 2025.
2. Power Electronics: Circuits, Devices and Applications by Muhammad H. Rashid- 2003.
3. Power Electronics: Converters, Applications and Design (An Indian Adaptation) by Ned Mohan, Tore M. Underland, William P. Robbins-2022.
4. Power Electronics by V. R. Murthy, 1st Edition, Oxford University Press, 2005.
5. Power Electronics by P. C. Sen, McGraw Hill Education, 2017.

Web resources:

- https://nptel.ac.in/courses/108102145
- https://onlinecourses.nptel.ac.in/noc22_ee23/preview
- https://www.coursera.org/learn/power-electronics
- https://www.eepower.com/technical-articles/

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE52T.1	3	2	1	1	2	-	-	-	-	1	-	3	-
24AEEE52T.2	3	3	1	2	2	-	-	-	-	3	-	3	3
24AEEE52T.3	3	3	3	2	3	-	-	-	-	3	-	3	-
24AEEE52T.4	3	2	1	1	2	-	-	-	-	2	-	3	3
24AEEE52T.5	3	3	2	2	2	-	-	-	-	2	-	3	-

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(UNIVERSITY LISTED IN UGC AS PER THE SECTION 2(f) OF THE UGC ACT, 1956)

RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the Course: Electrical Power Transmission and Switch Gear

Category : PC

Year : III

Semester : I

Course Code : 24AEEE53T

Branch/es : EEE

Lecture Hours	Tutorial Hours	Practical Hours	Credits
3	0	0	3

Course Objectives:

1. To enrich the students with the fair knowledge of transmission line parameters and performance
2. To analyze mechanical design of transmission
3. To understand operation of switch gear equipment.

Course Outcomes:

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

1. Calculate the transmission line parameters for various configurations.
2. Evaluate the Performance of Transmission Lines
3. Recognize the importance of mechanical design in transmission lines.
4. Evaluate parameters for underground transmission lines.
5. Explain various switchgear equipment.

Unit 1 Transmission Line Parameters 10

Electrical design of Overhead Transmission Lines – Calculation of Line constants of 1- phase, 3-phase system of symmetrical, unsymmetrical and transposed configurations –Calculation of Line constants of stranded conductor, double circuit 3-phase system using GMD and GMR Concepts.

Unit 2 Performance of Transmission Lines 10

Classification of Transmission Lines -Short, medium and long line and their model representations - Nominal-T, Nominal-π and A, B, C, D Constants for symmetrical networks, Numerical Problems and solutions for estimating regulation and efficiency of all types of lines. – Numerical Problems. Skin and Proximity effects, Ferranti effect, Charging Current

Unit 3 Mechanical Design of Overhead Transmission Line 10

Corona - factors affecting corona, critical voltages and power loss.

Overhead Line Insulators, Types of Insulators, String efficiency and Methods for improvement, voltage distribution, calculation of string efficiency, Numerical Problems. Sag and Tension Calculations: Sag and Tension Calculations with equal and unequal heights of towers, Effect of Wind and Ice on weight of Conductor, Stringing chart, Numerical Problems.

Unit 4 Underground Cables 08

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

Unit 5 Switchgear **10**

Fuses— Introduction-Definitions-Fuse Characteristics-Types of Fuses- Applications of HRC fuse. Circuit Breakers: Elementary principles of arc interruption, Restriking Voltage and Recovery Voltages-Average and Max. RRRV, Numerical Problems Current Chopping and Resistance Switching -Description and Operation of following types of circuit breakers: Minimum Oil Circuit breakers, Air Blast Circuit Breakers, Vacuum and SF_6 circuit breakers.

Textbooks:

1. C. L. Wadhwa, Electrical Power Systems, New Age International (P) Limited, Publishers, 1st Edition 2006.

Reference Books:

1. M. L. Soni, P. V. Gupta, U. S. Bhatnagar, A. Chakrabarthy,- A Text Book on Power System Engineering, Dhanpat Rai & Co Pvt. Ltd. 1st Edition, 1999.
2. Badari Ram, D.N Viswakarma, Power System Protection and Switchgear TMH Publications.1st Edition, 2012.
3. S. Sivanagaraju S. Satyanarayana, Electric Power Transmission and Distribution 1st edition Pearson Education, 2008.

Web Resources:

- https://nptel.ac.in/courses/108/105/108105067/
- https://nptel.ac.in/courses/108/104/108104051/
- https://nptel.ac.in/courses/108/107/108107167/

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE53T.1	3	3	3	-	-	-	-	-	-	-	-	3	3
24AEEE53T.2	3	3	3	-	-	-	-	-	-	-	-	3	3
24AEEE53T.3	3	3	3	-	-	-	-	-	-	-	-	3	3
24AEEE53T.4	3	3	3	-	-	-	-	-	-	-	-	3	3
24AEEE53T.5	3	3	2	-	-	-	-	-	-	-	-	3	3

Title of the Course: Distribution of Electrical Power
Category : PE
Year : III
Semester : I
Course Code : 24AEEE5AT
Branch/es : EEE

Lecture Hours	Tutorial Hours	Practical Hours	Credits
3	0	0	3

Course Objectives:

1. To discuss the basics of the distribution system, different types of loads and their characteristics, and to understand the concept of DC distribution of power in terms of voltage drop and power loss.
2. To explain the concepts of AC distribution of power in terms of load voltage drop and power loss, the need for protection of Distribution systems, and protecting devices.
3. To describe the fundamental components of the substation and bus bar arrangements.
4. To explain the need for Power Factor and Voltage Control in Distribution systems.
5. To discuss the concept of Distribution System Planning and different planning techniques.

Course Outcomes:

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

1. Understand load modeling concepts and characteristics of various consumer loads in distribution systems.
2. Explain the structure, classification, and operational features of distribution substations.
3. Apply design considerations to analyze voltage drop and power losses in distribution systems.
4. Analyze power factor improvement techniques and protection methods used in distribution systems.
5. Understand distribution system planning approaches and the fundamentals of distribution automation.

Unit 1 Load Modeling and Characteristics 08

Introduction to Distribution Systems and definitions: Daily load curve, load duration curve, peak load estimation, Load Modelling and Characteristics. Diversity Factor, Coincidence Factor, Contribution Factor, Loss Factor - Relationship between the Load Factor and Loss Factor, problems. Classification of Loads (Residential, Commercial, Agricultural and Industrial) and Their Characteristics.

Unit 2 Substations 10

Location of Substations, Rating of Distribution Substation, Service Area with 'n' Primary Feeders and Comparison of the four and six feeder patterns, Derivation of the K constant. Classification of Substations: Air Insulated Substations - Indoor & Outdoor Substations. Bus Bar Arrangements in the Sub-Stations: Simple Arrangements Like Single Bus Bar, Sectionalized Single Bus Bar, Double bus double breaker, Main and Transfer Bus Bar, Double bus single Breaker – One and Half Breaker System with Relevant Diagrams.

Unit 3 Design Considerations of Distribution Systems 10

Classification of Distribution Systems - Comparison of DC vs AC and Under-Ground vs Over - Head Distribution Systems- Requirements and Design Features of Distribution Systems. Design

Considerations of Distribution Feeders: Radial and Loop Types of Primary Feeders, Voltage Levels, Feeder Loading, Basic Design Practice of the Secondary Distribution System. Voltage Drop and Power-Loss Calculations: Derivation for Voltage Drop and Power Loss in Lines.

Unit 4 Power Factor Improvement and Distribution System Protection 10

Causes of Low Power Factor -Methods of Improving Power factor -Most Economical Power factor, Numerical Problems. Economic Justification for Capacitors - Procedure to Determine the Best Capacitor Location.

Distribution System Protection: Objectives of distribution system protection, Protective Devices: Fuses, Circuit Reclosures, line sectionalizes, and circuit breakers, Coordination of Protective Devices, General coordination procedure.

Unit 5 Distribution System Planning and Automation 9

Distribution System Planning: Factors Affecting System Planning, Present Distribution System Planning Techniques, Distribution System Planning Models.

Distribution Automation (DA) – Definitions – Alternatives of Communication Systems- Supervisory Control and Data Acquisition (SCADA) – Consumer Information Service (CIS), Outage Management System (OMS).

Textbooks:

1. Electric Power Distribution Engineering, Turan Gonen, CRC Press, 3rd Edition, 2014.

Reference Books:

1. A.S. Pabla, Electric Power Distribution, Tata Mc Graw Hill (India) Pvt. Ltd., 6th Edition, 2011.
2. Dr. M. K. Khedkar and Dr. G. M. Dhole Electric Power Distribution Automation, University Science Press, 2010.
3. Electrical Power Distribution Systems, V. Kamaraju, Jain Book Depot. 2012

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE5AT.1	3	2	-	-	-	-	-	-	-	-	1	3	-
24AEEE5AT.2	3	2	1	-	-	-	-	-	-	-	1	3	3
24AEEE5AT.3	3	3	2	1	2	-	-	-	-	-	1	3	-
24AEEE5AT.4	3	3	2	1	1	-	-	-	-	-	1	3	3
24AEEE5AT.5	3	2	2	-	1	2	-	-	-	1	2	3	-

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RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the Course	Electric & Hybrid Vehicle Technology
Category	PE
Couse Code	24AEEE5BT
Year	III
Semester	I
Branch	EEE

Lecture Hours	Tutorial Hours	Practical Hours	Credits
3	0	0	3

Course Objectives:

1. To explain the basics of electric and hybrid electric vehicles, their architecture, technologies and fundamentals.
2. To analyze various electric drives suitable for hybrid electric vehicles.
3. To discuss the case studies of electric and hybrid electric vehicle.

Course Outcomes:

1. Explain the operation of Hybrid electric vehicle.
2. Identify suitable drive for developing hybrid and electric vehicle depending on resources
3. Discuss the energy storage technologies
4. Discuss the types of hybrid electric vehicle
5. Analyze and compare the performance, architecture, and technological features of practical Electric and Hybrid Electric Vehicles through case studies.

Unit 1 Introduction to Electric Vehicles 08

Introduction – History of electric vehicle -Components of EV System – Energy storage device for EVs – Performance of EVs – Electric Vehicle drive train– EV Transmission Configurations and components – Types of Electric Vehicle.

Unit 2 Electric Vehicle Modelling 10

Consideration of Rolling Resistance – Transmission Efficiency – Consideration of Vehicle Mass – Tractive Effort – Modelling Vehicle Acceleration – Modelling Electric Vehicle Range -Aerodynamic Considerations – EV Motor Sizing.

Unit 3 Energy Sources 10

Electric vehicle power source - Battery capacity, State of charge and discharge, Specific energy, specific power, Ragone plot. Battery modeling - run time battery model, first principle model, battery management system- SoC Estimation, battery cell balancing- Simple numerical problems. Types of batteries - Li-ion, Li-polymer battery.

Unit 4 Hybrid Electric Vehicles 10

HEV Fundamentals -Architectures of HEVs- State of the Art of HEVs – Advantages and Disadvantages – Types of Hybrid Electric vehicles - Challenges and Key Technology of HEVs – Plug-in Hybrid Electric Vehicles – Design and Control Principles of Plug-In Hybrid Electric Vehicles.

Unit 5 Electric and Hybrid Vehicle – Case studies 08

Hybrid vehicle case study –Toyota Prius, Honda Insight. Lightly hybridized vehicles and low voltage systems. Hybrid electric heavy-duty vehicles. Electric vehicle case study - GM EV1, Nissan Leaf, Mitsubishi Miev.

Text Books:

1. Modern Electric, Hybrid Electric and Fuel Cell Vehicles – Fundamentals, Theory and Design – Mehrdad Ehsani, Uimin Gao and Ali Emadi – Second Edition – CRC Press, 2010

Reference Books:

1. Hybrid electric Vehicles Principles and applications with practical perspectives -Chris Mi, Dearborn – M. Abul Masrur, David Wenzhong Gao – A John Wiley & Sons, Ltd., – 2011
2. Review of Battery Charger Topologies, Charging Power Levels, and Infrastructure for Plug-In Electric and Hybrid Vehicles – Murat Yilmaz, and Philip T. Krein, – IEEE transactions on power electronics, vol. 28, no. 5, May 2013
3. James Larminie, John Lowry, "Electric Vehicle Technology", Explained, Wiley, 2003.

Web Resources:

- https://nptel.ac.in/courses/108/106/108106170/
- https://nptel.ac.in/courses/108/102/108102121/
- https://nptel.ac.in/courses/108/103/108103009/

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE5BT.1	2	2	-	-	-	-	-	-	-	-	-	2	1
24AEEE5BT.2	2	2	1	2	-	-	-	-	-	-	-	2	2
24AEEE5BT.3	3	2	2	2	-	-	-	-	-	-	-	3	2
24AEEE5BT.4	3	2	2	2	2	-	-	-	-	-	-	3	3
24AEEE5BT.5	3	2	2	2	2	-	-	-	-	-	-	3	3

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RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the Course: Sensors and Instrumentation

Category : PE

Year : III

Semester : I

Course Code : 24AEEE5CT

Branch/es : EEE

Lecture Hours	Tutorial Hours	Practical Hours	Credits
3	0	0	3

Course Objectives:

1. To understand the basic concepts, classification, and characteristics of sensors and transducers used in engineering applications.
2. To study the working principles of various sensors used for measurement of physical parameters such as displacement, force, pressure, temperature, flow, and level.
3. To analyze different measurement techniques and select appropriate sensors for specific industrial and automation applications.
4. To introduce data acquisition systems and virtual instrumentation for signal measurement, processing, and monitoring.
5. To understand the concept and applications of intelligent (smart) sensors in modern control and automation systems.

Course Outcomes:

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

1. Explain the principles, classification, and characteristics of sensors and transducers used in measurement systems.
2. Apply appropriate sensors to measure physical parameters such as displacement, force, pressure, temperature, flow, and level.
3. Analyze sensor output characteristics and evaluate measurement errors in practical instrumentation systems.
4. Design and implement basic data acquisition and virtual instrumentation systems for industrial applications.
5. Demonstrate understanding of intelligent (smart) sensors and their applications in automation, robotics, and automotive systems.

Unit 1 Sensors, Transducers and Calibration 08

Definition, Classification & Selection of Sensors, Calibration of Sensors, Measurement of displacement using Potentiometer, LVDT & Optical Encoder, Measurement of force using Strain Gauge, Measurement of pressure using LVDT based Diaphragm & Piezoelectric Sensor.

Unit 2 Measurement of Temperature using Thermistor 10

Thermocouple & RTD, Concept of thermal imaging, Measurement of position using Hall effect sensors, Proximity sensors: Inductive & Capacitive, Use of proximity sensor as accelerometer and vibration sensor, Flow Sensors: Ultrasonic & Laser, Level Sensors: Ultrasonic & Capacitive

Unit 3 Virtual Instrumentation 10

Graphical programming techniques, Data types, Advantage of Virtual Instrumentation techniques, Concept of WHILE & FOR loops, Arrays, Clusters & graphs, Structures: Case, Sequence & Formula nodes, Need of software-based instruments for industrial automation.

Unit 4 Data Acquisition Methods and SCADA Basics 09

Basic block diagram, Analog and Digital IO, Counters, Timers, Types of ADC: successive approximation and sigma-delta, Types of DAC: Weighted Resistor and R-2R Ladder type, Use of Data Sockets for Networked Communication, Multi-Sensor Data Fusion.

Unit 5 Intelligent Sensors 08

General Structure of smart sensors & its components, Characteristic of smart sensors: Self calibration, Self- testing & self-communicating, Application of smart sensors: Automatic robot control & automobile engine control.

Textbooks:

1. DVS Murthy, Transducers and Instrumentation, PHI 2nd Edition 2013.

Reference Books:

1. Arun K. Ghosh, Introduction to measurements and Instrumentation, PHI, 4th Edition 2012.
2. A.D. Helfrick and W.D. Cooper, Modern Electronic Instrumentation & Measurement Techniques, PHI – 2001
3. Hermann K.P. Neubert, "Instrument Transducers" 2nd Edition 2012, Oxford University Press.
4. Gary Johnson / LABVIEW Graphical Programing II Edition / McGraw Hill, 1997.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE5CT.1	3	2	-	-	-	-	-	-	-	-	3	3	-
24AEEE5CT.2	3	2	-	2	2	-	-	-	-	-	3	3	3
24AEEE5CT.3	3	2	-	-	-	-	-	-	-	-	3	3	-
24AEEE5CT.4	3	2	-	2	2	-	-	-	-	-	3		3
24AEEE5CT.5	3	2	-	-	-	-	-	-	-	-	3	3	-

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RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the Course: Renewable Energy Systems
Category : PE
Year : III
Semester : I
Course Code : 24AEEE5DT
Branch/es : EEE

Lecture Hours	Tutorial Hours	Practical Hours	Credits
3	0	0	3

Course Objectives:

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

Course Outcomes:

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

1. Describe fundamentals of solar energy and the basic concepts of solar radiation and its measurements.
2. Describe different types of solar collectors and its applications.
3. Explain design of wind energy conversion systems.
4. Realize power from oceans (thermal, wave, tidal) and conversion devices.
5. Describe biomass conversion technologies, geothermal resources.

Unit 1 Renewable Energy Sources 10

Different forms of energy, Renewable and non-renewable energy sources, Advantages and Limitations of renewable energy sources, comparison of conventional and nonconventional energy sources, Solar Radiation: solar constant, solar Irradiance, spectral distribution of solar radiation-Beam, Diffuse and Reflected Radiation, Instruments for measuring solar radiation - pyranometer, pyrheliometer and sun shine recorder.

Unit 2 Solar Energy Collection and Its Applications 10

Solar collector, Flat plate and concentrating collectors, classification of concentrating collectors. Energy Storage: necessity of energy storage methods-, Sensible, latent heat and thermo chemical storage. Solar Applications- solar water heating, solar distillation, solar ponds, drying, solar pumping and solar cookers.

Unit 3 Wind Energy 10

Wind Energy: Air, wind, Classification of Wind turbines-Lift type and Drag type, Types of rotors-Multiblade, propeller, savonious and Darrieus, Parts of Wind Energy, types, Derivation for Power in the wind-power coefficient and Betz Limit, Performance Characteristics of Wind machines, Advantages and Disadvantages of WECS.

Unit 4 Ocean Energies 10

Ocean thermal energy sources, working principle, Types of OTEC systems- Closed and open cycles. Advantages. Tidal energy: tidal characteristics, tidal Range, principle of tidal power, types of tidal power plants-single and double basin operation, advantages and disadvantages. Wave energy: wave energy conversion machines-Buoy type and Dolphin type energy generation.

Unit 5 **Bio-Mass and Geothermal Energy and Grid Integration Techniques** **10**

Bio-Mass: Biomass Classification, Biochemical Conversion-Anaerobic and Ethanol fermentation, Bio gas plants: Floating Drum Type and Fixed Dome Type. Geothermal Energy: Geothermal field, Resources, Geothermal Power Generation and introduction to Grid Integration Techniques.

Textbooks:

1.Renewable Energy Sources and Emerging Technologies by D. P. Kothari, K. C. Singal, 2nd edition, PHI Learning Private Limited Delhi, 2014.

Reference Books:

1. Khan BH, Non-conventional Energy Resources, TMH, New Delhi, 2006.
2. G. D. Rai, Non-conventional Energy Resources, Khanna publishers, Delhi, 2007.
3. Ramesh and Kumar, Renewable Energy Technologies, Narosa Publications, 2012.
4.G. N. Tiwari & M. K. Ghosal, Fundamentals of Renewable Energy Resources.
5.Twidell & Wier, Renewable Energy Resources, CRC press (Taylor & Francis).

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE5DT.1	3	2	-	-	-	-	-	-	-	-	-	3	-
24AEEE5DT.2	3	2	-	2	2	-	-	-	-	-	-	3	3
24AEEE5DT.3	3	2	-	-	-	-	-	-	-	-	-	3	-
24AEEE5DT.4	3	2	-	2	2	-	-	-	-	-	-	3	3
24AEEE5DT.5	3	2	-	-	-	-	-	-	-	-	-	3	-

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RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the course: IoT Applications in Smart Energy Systems

Category : PE

Year : III

Semester : I

Course Code : 24AEEE5ET

Branch/es : EEE

Lecture Hours	Tutorial Hours	Practical Hours	Credits
3	0	0	3

Course Objectives:

1. Understand the evolution of IoT from its predecessors such as WSN, M2M, and Cyber-Physical Systems and analyze the technological interdependence enabling IoT.
2. Explain IoT sensing, actuation, data formats, and processing architectures for efficient IoT system design.
3. Analyze IoT connectivity and communication technologies and evaluate interoperability standards and frameworks.
4. Understand cloud and fog computing paradigms and their role in scalable IoT deployments.
5. Apply IoT concepts to real-world domains and analyze future trends, challenges, and research directions in IoT.

Course Outcomes:

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

1. Understand the evolution of the IoT from Wireless Sensor Networks, Machine-to-Machine communication, and Cyber-Physical Systems, along with IoT enabling technologies.
2. Analyze IoT sensing, actuation, data formats, and processing architectures for effective design and deployment of IoT systems.
3. Evaluate IoT connectivity and communication technologies and assess interoperability standards and frameworks.
4. Understand the role of cloud and fog computing architectures in supporting scalable, reliable, and low-latency IoT applications.
5. Apply IoT concepts to real-world case studies and analyze challenges, paradigms, and future trends in IoT.

Unit 1 M2M to IoT **10**

Introduction - Predecessors of IoT: Wireless Sensor Networks - Machine-to-Machine Communications - Cyber Physical Systems. **Emergence of IoT:** Evolution of IoT-Enabling IoT and the Complex Interdependence of Technologies- IoT Networking Components-Addressing Strategies in IoT.

Unit 2 IoT Fundamentals **10**

IoT Sensing and Actuation: Sensors-Sensor Characteristics -Sensing Types- Actuators-Actuator Characteristics-Actuator Types. **IoT Processing Topologies and Types** Data Format -Importance of Processing in IoT-Processing Topologies-IoT Device Design and Selection Considerations.

Unit 3 IoT Connectivity, Communication Technologies and Interoperability 10

Connectivity Technologies: IEEE 802.15.4 129-Zigbee-RFID-Z-Wave-LoRa-Wi-Fi-Bluetooth. **Communication Technologies:** Infrastructure Protocols-Discovery Protocols-Data Protocols-Identification Protocols- Device Management- Semantic Protocols. **Interoperability:** Introduction-Standards-Frameworks.

Unit 4 IoT Associated Technologies 8

Cloud Computing: Introduction Virtualization Cloud Models-Sensor-Cloud: Sensors-as-a-Service **Fog Computing and Its Applications**: Introduction View of a Fog Computing Architecture Fog Computing in IoT Selected Applications of Fog Computing.

Unit 5 IoT Case Studies, IoT in Energy Systems and Future Trends 8

Introduction and case studies: Agricultural IoT — Vehicular IoT — Healthcare IoT — IoT in Energy Systems — Paradigms, Challenges and the Future.

Textbooks:

1. Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands - on - Approach), 1st Edition VPT, 2014.

Reference Books:

1. Sudip Misra, Anandarup Mukherjee, Arijit Roy, Introduction to IoT, 1st edition, Cambridge University Press, 2021.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE5ET.1	3	3	3	3	3	-	-	-	-	3	2	3	2
24AEEE5ET.2	3	3	3	3	3	-	-	-	-	1	2	3	2
24AEEE5ET.3	3	3	3	1	3	-	-	-	-	3	1	3	2
24AEEE5ET.4	2	2	3	1	2	-	-	-	-	1	2	2	2
24AEEE5ET.5	2	2	2	3	2	-	-	-	-	2	2	2	2

ANNAMACHARYA UNIVERSITY

(ESTD UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

(UNIVERSITY LISTED IN UGC AS PER THE SECTION 2(f) OF THE UGC ACT, 1956)

RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the course: Control Systems and Simulation Lab

Category : PC

Year : III

Semester : I

Course Code : 24AEEE51L

Branch/es : EEE

Lecture Hours	Tutorial Hours	Practical Hours	Credits
0	0	3	1.5

Course Objectives:

1. To demonstrate the basic concepts of linear control theory
2. To understand the design of control systems in time response of systems and steady state error analysis
3. To describe the concept of stability of control systems and methods of stability analysis.

Course Outcomes:

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

1. Explain the characteristics of DC/AC servo motors, stepper motors, synchros, and magnetic amplifiers.
2. Apply PLC programming, transfer function modeling, and PSPICE simulation techniques.
3. Analyze time response, steady-state error, and stability using Bode, Root Locus, and Nyquist methods.
4. Evaluate the performance of P, PI, PD, PID controllers, and lag-lead compensators.
5. Design and implement motor speed, temperature, and level control systems using PLCs and PID controllers.

List of Experiments

Any 10 of the following experiments are to be conducted:

1. Time response of Second order system
2. Programmable logic controller – Study and verification of truth tables of logic gates, simple Boolean expressions and application of speed control of motor.
3. Effect of feedback on DC servo motor
4. Transfer function of DC Machine
5. Effect of P, PD, PI, PID Controller on a second order systems
6. Lag and lead compensation
7. Temperature controller using PID
8. Characteristics of Magnetic amplifiers
9. Characteristics of Stepper motor
10. Characteristics of Synchros
11. Characteristics of AC servo motor
12. PSPICE simulation of Op-Amp based Integrator and Differentiator circuits.
13. Linear system analysis (Time domain analysis, Error analysis) using Simulation.
14. Stability analysis (Bode, Root Locus, Nyquist) of Linear Time Invariant system using Simulation.
15. State space model for classical transfer function using Simulation - Verification.
16. Effect of P-PI-PID controller on level processing unit.

Web Resources:

- https://www.youtube.com/watch?v=DyI7OieCbxs
- https://www.youtube.com/watch?v=6-TDhsCUIZA
- https://www.youtube.com/watch?v=-HMhKVZ0EtQ

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE51L.1	3	2	1	2	1	-	-	1	1	-	1	3	2
24AEEE51L.2	3	2	2	2	3	-	-	1	1	-	1	3	3
24AEEE51L.3	3	3	1	3	2	-	-	1	1	-	2	3	2
24AEEE51L.4	3	3	2	2	2	-	-	1	1	-	2	3	3
24AEEE51L.5	3	2	3	2	3	1	-	2	1	1	2	3	3

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RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the Course: Power Electronics & Simulation Lab

Category : PC
Year : III
Semester : I
Course Code : 24AEEE52L
Branch/es : EEE

Lecture Hours	Tutorial Hours	Practical Hours	Credits
0	0	3	1.5

Course Objectives:

1. To study the operating principles and triggering methods of thyristors and their commutation techniques used in power electronic circuits.
2. To understand the operation and performance of single-phase controlled and semi-controlled rectifier circuits.
3. To analyze the working of single-phase dual converters and inverter circuits under different operating conditions.
4. To simulate and evaluate the performance of DC–DC choppers and AC voltage controllers for power control applications.
5. To examine the operation of single-phase and three-phase power electronic converters and voltage source inverters through simulation studies.

Course Outcomes:

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

1. Analyze firing methods, and commutation techniques of SCRs used in power electronic applications.
2. Analyze the operation and performance characteristics of single-phase half-controlled, fully controlled, and dual converter circuits.
3. Analyze the working principles of series and parallel inverter circuits and evaluate their output characteristics.
4. Simulate DC–DC buck and boost choppers, AC voltage controllers, and cyclo converters to study their control and performance.
5. Analyze and interpret the operation of three-phase fully controlled converters and voltage source inverters using simulation tools.

List of Experiments

Any 10 of the following experiments are to be conducted:

1. Study of Gate firing circuits for SCR.
2. Study of Forced commutation circuits for SCR.
3. Analysis of Single phase half-controlled bridge converter.
4. Analysis of Single phase fully-controlled bridge converter.
5. Analysis of Single-phase dual converter.
6. Analysis of Single-phase series inverter.
7. Analysis of Single-phase parallel inverter.
8. Simulation of dc - dc converters.
9. Simulation of single-phase full wave ac voltage controller.
10. Simulation of single-phase cyclo converter.
11. Simulation of three-phase fully controlled converter.
12. Simulation of three-phase voltage source inverter.

Textbooks:

1. M. D. Singh and K. B. Khanchandani, Power Electronics, Tata Mc Graw Hill Publishing Company, 2nd edition, 2017.

Reference Books:

1. P. S. Bimbhra, Power Electronics, 4th Edition, Khanna Publishing House, 2022.

Web Resources:

- https://www.nielit.gov.in/content/power-electronics-lab

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE52L.1	3	3	1	2	2	–	–	1	1	–	2	3	2
24AEEE52L.2	3	3	2	2	3	–	–	2	2	–	2	3	3
24AEEE52L.3	3	3	2	2	2	–	–	1	1	–	2	3	3
24AEEE52L.4	3	3	3	3	3	–	–	2	2	1	3	3	3
24AEEE52L.5	3	3	2	3	3	1	–	2	2	1	3	3	3

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RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the Course:		Power Systems Lab
Category	**:**	PC
Year	**:**	III
Semester	**:**	I
Course Code	**:**	24AEEE53L
Branch/es	**:**	EEE

Lecture Hours	Tutorial Hours	Practical Hours	Credits
0	0	3	1.5

Course Objectives:

1. To analyze the performance of relays
2. To demonstrate the Performance of Transmission lines
3. To analyze the performance of AC machines
4. To demonstrate the performance of Renewable Energy sources

Course Outcomes:

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

1. Analyze the performance of relays
2. Demonstrate the Performance of Transmission lines
3. Analyze the performance of AC machines
4. Demonstrate the performance of Renewable Energy sources

List of Experiments

Any 10 of the following experiments are to be conducted:

1. Characteristics of IDMT Over Current relay (Electromagnetic Type).
2. Characteristics of Negative Phase Sequence relay (Static Type).
3. Characteristics of Percentage biased differential relay (static type).
4. Characteristics of Over voltage relay (Electromagnetic Type).
5. Characteristics of Over voltage / Under voltage relay (Microprocessor Based Type).
6. Characteristics of Percentage Biased Differential relay (Electromagnetic Type).
7. Determination of ABCD parameters of transmission lines.
8. Study of Ferranti effect
9. Separation of No-Load Losses of Three Phase Squirrel Cage Induction motor.
10. Equivalent Circuit of three winding transformer.
11. Power Angle Characteristics of Salient pole Synchronous machine.
12. L-G, L-L, L-L-G Fault Analysis of a three-phase alternator.
13. Wind Speed measurement.

Textbooks:

1. Badari Ram, D.N Viswakarma, Power System Protection and Switchgear, TMH Publications, 2011

Reference Books:

1. Bhuvanesh A Oza, Power system protection and switchgear, TMH, 2010.

Web Resources:

https://vp-dei.vlabs.ac.in/Dreamweaver/

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE53L.1	3	3	3	3	3	3	–	–	3	–	3	3	2
24AEEE53L.2	3	3	3	3	2	3	–	–	3	–	3	3	3
24AEEE53L.3	3	3	3	3	2	3	–	–	3	–	3	3	2
24AEEE53L.4	3	3	3	3	3	–	–	–	3	–	3	2	2

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RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the Course: Python Programming
Category : SEC
Year : III
Semester : I
Course Code : 24ACSE5ES
Branch/es : EEE

Lecture Hours	Tutorial Hours	Practical Hours	Credits
1	0	2	2

Course Objectives:

1. Introduce core programming concepts of Python programming language
2. Demonstrate about Python data structures like Lists, Tuples, Sets and dictionaries
3. Implement Functions, Modules and Regular Expressions in Python Programming and to create practical and contemporary applications.

Course Outcomes:

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

1. Showcase adept command of Python syntax, deftly utilizing variables, data types, control structures, functions, modules, and exception handling to engineer robust and efficient code solutions.
2. Apply Python programming concepts to solve a variety of computational problems
3. Understand the principles of object-oriented programming (OOP) in Python, including classes, objects, inheritance, polymorphism, and encapsulation, and apply them to design and implement Python programs
4. Proficient in using commonly used Python libraries and frameworks such as JSON, XML, NumPy, pandas
5. Exhibit competence in implementing and manipulating fundamental data structures such as lists, tuples, sets, dictionaries

Unit 1 **10**

History of Python Programming Language, Thrust Areas of Python, Installing Anaconda Python Distribution, Installing and Using Jupyter Notebook. Parts of Python Programming Language: Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data Types, Indentation, Comments, Reading Input, Print Output, Type Conversions, the type () Function and Is Operator, Dynamic and Strongly Typed Language. Control Flow Statements: if statement, if-else statement, if...elif…else, Nested if statement, while Loop, for Loop, continue and break Statements, Catching Exceptions Using try and except Statement.

Unit 2 **8**

Functions: Built-In Functions, Commonly Used Modules, Function Definition and Calling the function, return Statement and void Function, Scope and Lifetime of Variables, Default Parameters, Keyword Arguments, *args and **kwargs, Command Line Arguments. Strings: Creating and Storing Strings, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods, Formatting Strings. Lists: Creating Lists, Basic List Operations, Indexing and Slicing in Lists, Built-In Functions Used on Lists, List Methods, del Statement.

Unit 3 **9**

Dictionaries: Creating Dictionary, Accessing and Modifying key: value Pairs in Dictionaries, Built-In Functions Used on Dictionaries, Dictionary Methods, del Statement. Tuples and Sets: Creating Tuples, Basic Tuple Operations, tuple() Function, Indexing and Slicing in Tuples, Built-In Functions Used on Tuples, Relation between Tuples and Lists, Relation between Tuples and Dictionaries, Using zip() Function, Sets, Set Methods, Frozen set.

Unit 4 **8**

Files: Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data, Reading and Writing Binary Files, Pickle Module, Reading and Writing CSV Files, Python os and os.path Modules. Object-Oriented Programming: Classes and Objects, Creating Classes in Python, Creating Objects in Python, Constructor Method, Classes with Multiple Objects, Class Attributes Vs Data Attributes, Encapsulation, Inheritance, Polymorphism.

Unit 5 **7**

Introduction to Data Science: Functional Programming, JSON and XML in Python, NumPy with Python, Pandas.

Text Books:

1. Gowri Shankar S, Veena A., Introduction to Python Programming, CRC Press.

Reference Books:

1. Python Programming, S Sridhar, J Indumathi, V M Hariharan, 2nd Edition, Pearson, 2024
2. Introduction to Programming Using Python, Y. Daniel Liang, Pearson.

Online Learning Resources/Virtual Labs:

- https://www.coursera.org/learn/python-for-applied-data-science-ai
- https://www.coursera.org/learn/python?specialization=python#syllabus

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24ACSE5ES.1	3	3	2	1	2	-	-	1	1	1	2	2	-
24ACSE5ES.2	3	3	3	2	3	-	-	1	1	1	2	3	-
24ACSE5ES.3	3	3	3	3	3	-	-	2	1	2	3	2	-
24ACSE5ES.4	3	3	3	3	3	2	-	2	1	2	3	3	-
24ACSE5ES.5	3	3	3	3	3	2	-	2	2	2	3	3	3

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RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the Course: Gender Sensitization
Category : MC
Year : III
Semester : I
Course Code : 24AAUD51T
Branch/es : Common to all branches

Lecture Hours	Tutorial Hours	Practical Hours	Credits
2	0	0	0

Course Objectives:

1. To enable students to understand the gender related issues, and foster humane attitude,
2. To familiarize them about constitutional safeguards for gender equality.
3. To expose students to debates on the politics and economics of work related discrimination.
4. To help students reflect critically on gender violence.
5. To make them understand gender identities and gender relations as part of culture.

Course Outcomes:

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

1. Understand the basic concepts of gender and its related terminology.
2. Identify the biological, sociological, psychological and legal aspects of gender.
3. Understand how gender discrimination prevails in our society and how to counter it.
4. Analyze the gender division of labor and its relation to politics and economics.
5. Appraise how gender-role beliefs and sharing behavior are associated with more well-being

Unit 1 Understanding Gender **6**

Introduction: Definition of Gender-Basic Gender Concepts and Terminology-Exploring Attitudes towards Gender-Socialization: Making Women, Making Men - Preparing for Womanhood. Growing up Male.

Unit 2 Gender Roles and Relations **6**

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.

Unit 3 Gender and Labour **7**

Division and Valuation of Labor-Housework: The Invisible Labor- “My Mother doesn‘t Work”. “Share the Load”- Unrecognized and Unaccounted work -Gender Development Issues-Gender, Governance and Sustainable Development-Gender and Human Rights-Gender and Mainstreaming

Unit 4 Gender-Based Violence **7**

The Concept of Violence- Types of Gender-based Violence- Human Rights Perspective-Sexual Harassment - Domestic Violence - Different forms of violence against women - Causes of violence, impact of violence against women - Consequences of gender-based violence

Unit 5 Gender and Culture **6**

Gender and Films-Gender and Electronic Media-Gender and Advertisement-Gender and Popular Literature- Gender Development Issues-Gender Sensitive Language- Just Relationships

Textbooks:

1. A.Suneetha, Uma Bhrugubanda, et al. Towards a World of Equals: A Bilingual Textbook on Gender‖, Telugu Akademi, Telangana, 2015.

Reference Books:

1. Wtatt, Robin and Massood, Nazia, Broken Mirrors: The dowry Problems in India,London : Sage Publications, 2011.
2. Datt, R. and Kornberg, J.(eds), Women in Developing Countries, Assessing Strategies for Empowerment, London: Lynne Rienner Publishers, 2002.
3. Brush, Lisa D., Gender and Governance, New Delhi, Rawat Publication, 2007.
4. Singh, Direeti, Women and Politics World Wide, New Delhi, Axis Publications, 2010 5.
5. Raj Pal Singh, Anupama Sihag, Gender Sensitization: Issues and Challenges (English, Hardcover), Raj Publications, 2019.
6. A.Revathy& Murali, Nandini, A Life in Trans Activism(Lakshmi Narayan Tripathi). The University of Chicago Press, 2016.
7. Butler, Judith. Gender Trouble: Feminism and the Subversion of Identity. UK Paperback Edn. March 1990

Online Learning Resources ():

1. Understanding Gender chrome-extension: //kdpelmjpfafjppnhbloffcjpeomlnpah/https://www.arvindguptatoys.com/arvindgupta/kamla-gender1.pdf
https://onlinecourses.swayam2.ac.in/nou24_hs53/preview
2. Gender Roles and Relations
https://www.plannedparenthood.org/learn/gender-identity/sex-gender-identity/what-are-gender-roles-and-stereotypes
https://www.verywellmind.com/understanding-gender-roles-and-their-effect-on-our-relationships-7499408
https://onlinecourses.swayam2.ac.in/cec23_hs29/preview
3. Gender and Labour
https://www.economicsobservatory.com/what-explains-the-gender-division-of-labour-and-how-can-it-be-redressed
https://onlinecourses.nptel.ac.in/noc23_mg67/preview
4. Gender based Violence
https://eige.europa.eu/gender-based-violence/what-is-gender-based violence?language_content_entity=en
https://www.worldbank.org/en/topic/socialsustainability/brief/violence-against-women-and-girls
https://onlinecourses.swayam2.ac.in/nou25_ge38/preview
5. Gender and Culture
https://gender.study/psychology-of-gender/culture-impact-gender-roles-identities/
https://sociology.iresearchnet.com/sociology-of-culture/gender-and-culture/
https://archive.nptel.ac.in/courses/109/106/109106136/

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AAUD51T.1	-	-	-	-	-	-	3	-	1	-	-	-	-
24AAUD51T.2	-	-	-	-	-	-	3	-	1	-	-	-	-
24AAUD51T.3	-	-	-	-	-	-	3	-	1	-	-	-	-
24AAUD51T.4	-	-	-	-	-	-	3	-	1	-	-	-	-
24AAUD51T.5	-	-	-	-	-	-	3	-	1	-	-	-	-

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RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the Course: Power System Analysis
Category : PC
Year : III
Semester : II
Course Code : 24AEEE61T
Branch/es : EEE

Lecture Hours	Tutorial Hours	Practical Hours	Credits
3	0	0	3

Course Objectives:

1. To describe the formation of Y_{bus} and Z_{bus} matrices for Power Systems.
2. To describe the need and formulation of power flow problem.
3. To model various components of power system and carry out the short circuit studies.
4. To acquire basic knowledge about the dynamic mechanisms behind the synchronous machine using steady state and transient stability criterion.

Course Outcomes:

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

1. Discuss various methods to formulate the network matrices (Y_{bus} and Z_{bus}) for a power system network.
2. Apply the iterative Load Flow Techniques to estimate steady state electrical quantities at any bus in a Power System
3. Analyze the behavior of power system under different fault conditions
4. Analyze the behavior of Synchronous machine under steady state stability.
5. Analyze the dynamics of Synchronous machine under transient stability

Unit 1 Power System Network Modeling 10

Representation of Power System Elements, Bus Incidence matrices (A, B & C), Y_{bus} formation by Direct and Singular Transformation Methods, Formation of Z_{bus}: Partial network, Algorithm for the Modification of Z_{bus} Matrix for addition of elements (Type1 to Type4 modifications) Derivations and Numerical Problems

Unit 2 Power Flow Studies 12

Necessity of Power Flow Studies, Data for Power Flow Studies, Derivation of Static load flow equations (Polar and Rectangular form).

Power flow solution using Gauss Seidel Method: Acceleration Factor, Load flow solution with and without P-V buses, Algorithm. Numerical Load flow Solution for Simple Power Systems (Max. 3-Buses), Determination of Bus Voltages, Injected Active and Reactive Powers (Sample One Iteration only) and finding Line Flows/Losses for the given Bus Voltages.

Power flow solution using Newton Raphson Method (Polar & Rectangular Form): Power Flow Solution with or without PV Buses- Derivation of Jacobian Elements, Algorithm and Flowchart.
Power flow solution using Decoupled and Fast Decoupled Method: Derivation and Numerical Load flow solution for simple 3 bus power system, Comparison of Different Methods.

Unit 3 Short Circuit Studies: 12

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

Unit 4 Power System Steady State Stability Analysis: 10

Elementary concepts of Steady State, Dynamic and Transient Stability. Description of Steady State Stability Power Limit, Transfer Reactance, Synchronizing Power Coefficient, Power Angle Curve and Determination of Steady State Stability and Methods to improve steady state stability.

Unit 5 Power System Transient Stability Analysis: 10

Derivation of Swing Equation- Determination of Transient Stability by Equal Area Criterion, Application of Equal Area Criterion- Critical Clearing Angle Calculation - Solution of Swing equation by Point by Point method - Methods to improve Transient Stability.

Textbooks:

1.Modern Power system Analysis by I. J. Nagrath & D. P. Kothari, Tata McGraw-Hill Publishing Company, 4th Edition, 2011.

Reference Books:

1. "Computer Techniques and Models in Power Systems" by K. Umararao, I. K. International Publishing house Pvt. Ltd, 2nd Edition, 2014.
2. "Power System Analysis" by John J Grainger and William D Stevenson JR,Tata McGraw Hill, New Edition 1 July 2017.
3. "Computer Techniques in Power System Analysis" by M A Pai, Dheeman Chatterjee, Tata McGraw Hill, 3rd Edition, 1 July 2017.
4. "Power System Analysis and Design" by J. Duncan Glover, Mulukutla S. Sarma and Thomas J. Overbye 4th Edition, Nelson Engineering Publisher, 17 June 2007.
5. "Power System Analysis" by Hadi Saadat, PSA PUBLISHING LLC, 3rd Edition, 1 January 2011.
6. Computer Methods in Power Systems" by Stagg & El – Abiad, Medtech Publisher,1 January 2019 Edition

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE61T.1	3	3	-	-	3	-	-	-	-	-	-	3	-
24AEEE61T.2	3	3	-	-	-	-	3	-	-	-	-	3	-
24AEEE61T.3	3	3	-	-	3	-	-	-	-	-	-	3	-
24AEEE61T.4	3	3	-	-	3	-	-	-	-	-	-	3	-
24AEEE61T.5	3	3	-	-	3	-	-	-	-	-	-	3	-

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RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the Course: Microprocessors and Microcontrollers
Category : PC
Year : III
Semester : II
Course Code : 24AEEE62T
Branch/es : EEE

Lecture Hours	Tutorial Hours	Practical Hours	Credits
3	0	0	3

Course Objectives:

1. To describe the hardware and software details of 8086 microprocessor and 8051 microcontroller.
2. To explain their interfacing with memory and I/O devices.
3. To write assembly level programming on the above to implement real time projects.
4. To describe the hardware and software details of 8051 microcontroller.
5. To Learn the fundamental architectural concepts of ARM processor.

Course Outcomes:

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

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

Unit 1 8086 Architecture and Programming 10

Architecture of 8086 microprocessor, Register organization, Memory organization, Pin diagram, Minimum mode and Maximum mode of operation with timing diagram approach only, Addressing modes, types of Instruction sets, simple ALP programs on 8086.

Unit 2 Data Transfer methods and I/O Interfacing of 8086 10

Programmed I/O Interrupt driven I/O, DMA-Need for DMA, Architecture of DMA-8257, Architecture of 8255 PPI and its Various modes of operation, I/O Interfacing methods-I/O mapped I/O, Memory mapped I/O, Interrupt Structure of 8086, Vector Interrupt table, Interrupt Service routines.8259 PIC architecture only.

Unit 3 Communication Interface 10

Synchronous and Asynchronous Communication, RS232, SPI, I2C, Introduction to protocols like Blue-tooth and Zig-bee.

Unit 4 8051 Microcontroller 08

Architecture of 8051, Pin diagram, Memory organization, addressing modes, Instruction set, Simple Programs, Timers/Counters, Serial Communication features, Interrupts.

Unit 5 Advanced Microcontrollers 10

The ARM Architecture, ARM7, ARM9 Features and applications of ARM only, ARDUINO: Block diagram, Architecture, pin function, overview of main features such as I/O ports, Timers, Interrupts Serial Port, PWM, ADC.

Textbooks:

1. 1. A. K. Ray and K. M. Bhurchandi, Advanced microprocessors and Peripherals, 3rd edition, TMH 2013.
2. Muhammad Ali Mazidi.8051 Microcontroller and Embedded systems using assembly and C.2nd edition, Pearson Education, 2008.

Reference Books:

1. Barry B. Brey the Intel Microprocessors architecture, programming and Interfacing 8th edition, Pearson Education, 2009.
2. Douglas V. Hall, Microprocessors and Interfacing, 2nd edition, TMH, 2007.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE62T.1	3	-	-	-	3	-	-	-	2	-	3	3	3
24AEEE62T.2	3	-	3	3	3	-	-	-	-	-	3	-	3
24AEEE62T.3	3	-	-	2	3	-	-	-	2	-	3	3	-
24AEEE62T.4	-	-	-	-	-	-	-	-	3	3	3	3	2
24AEEE62T.5	-	-	3	3	3	-	-	-	-	3	3	-	3

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(ESTD UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)
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RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the Course: Power System Operation and Control
Category : PC
Year : III
Semester : II
Course Code : 24AEEE63T
Branch/es : EEE

Lecture Hours	Tutorial Hours	Practical Hours	Credits
3	0	0	3

Course Objectives:

1. To familiarize the students with economic operation of power systems.
2. To provide knowledge about modeling of Power Plant Components.
3. To prepare the students to realize the need of controlling the frequency.
4. To understand importance of voltage and reactive power control in a power system

Course Outcomes:

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

1. Explore the significance of optimal allocation of Thermal units
2. Explore the significance of optimal scheduling of hydrothermal Systems
3. Describe the mathematical models of turbines and governors
4. Analyze the Load Frequency Control problem
5. Explain how shunt and series compensation helps in reactive power control

Unit 1 Economic Operation: 10

Optimal Operation of Thermal Power Units - Heat Rate Curve – Cost Curve – Incremental Fuel and Production Costs, Input-Output Characteristics, Optimum Generation Allocation with Line Losses Neglected. Optimum Generation Allocation Including the Effect of Transmission Line Losses – Loss Coefficients, General Transmission Line Loss Formula.

Unit 2 Hydrothermal Scheduling: 8

Optimal Scheduling of Hydrothermal System: Hydroelectric Power Plant Models, Scheduling Problems-Short Term Hydrothermal Scheduling Problem

Unit 3 Modelling Turbine and Governor: 10

Modeling of Turbine: First Order Turbine Model, Block Diagram Representation of Steam Turbines and Approximate Linear Models. Modeling of Governor: Mathematical Modeling of Speed Governing System – Derivation of Small Signal Transfer Function – Block Diagram.

Unit 4 Load Frequency Control: 12

Necessity of Keeping Frequency Constant. Definitions of Control Area – Single Area Control – Block Diagram Representation of an Isolated Power System – Steady State Analysis – Dynamic Response Uncontrolled Case. Load Frequency Control of 2-Area System – Uncontrolled Case and Controlled Case, Tie-Line Bias Control. Proportional Plus Integral Control of Single Area and Its Block Diagram Representation, Steady State Response – Load Frequency Control and Economic Dispatch Control.

Unit 5 Reactive Power Control: 10

Overview of Reactive Power Control – Reactive Power Compensation in Transmission Systems – Advantages and Disadvantages of Different Types of Compensating Equipment for Transmission Systems; Load Compensation – Specifications of Load Compensator, Difference between Shunt and Series Compensation.

Textbooks:

1. S. Sivanagaru & G. Sreenivasan, Power System Operation and Control, Pearson Publications, 1st Edition, 2009.

Reference Books:

1. Power System Analysis Operation and Control, Abhijit Chakrabarti and Sunita Halder, PHI Learning Pvt. Ltd, 3rd Edition, 2010.
2. Modern Power System Analysis, D. P. Kothari and I. J. Nagrath, Tata McGraw Hill Publishing Company Ltd., 3rd Edition, 2003, Ninth Reprint 2007.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE63T.1	3	3	3	2	-	-	-	-	-	-	-	3	-
24AEEE63T.2	3	3	3	1	-	-	-	-	-	-	-	3	1
24AEEE63T.3	3	3	3	3	-	-	-	-	-	-	-	3	2
24AEEE63T.4	3	3	3	1	-	-	-	-	-	-	-	3	-
24AEEE63T.5	3	2	2	1	-	-	-	-	-	-	-	3	-

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RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the Course: AC Microgrid
Category : PE
Year : III
Semester : II
Course Code : 24AEEE6AT
Branch/es : EEE

Lecture Hours	Tutorial Hours	Practical Hours	Credits
3	0	0	3

Course Objectives:

1. To introduce basic concepts and operation of microgrids.
2. To study management needs of microgrids and micro source control.
3. To understand centralized control of microgrids.
4. To understand protection and islanding issues in microgrids.
5. To study power electronic interfaces used in microgrids.

Course Outcomes:

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

1. Explain microgrid configuration and grid interaction.
2. Analyze micro source control and load management.
3. Apply central controller strategies for microgrids.
4. Identify islanding conditions and protection methods.
5. Explain converter integration and PEBB concepts.

Unit 1 Concept of Microgrid 12

A typical Microgrid configuration, Interconnection of Microgrids, Technical and economic advantages of Microgrid, Challenges and disadvantages of Microgrid development, Management and operational issues of a Microgrid, Dynamic interactions of Microgrid with main grid.

Unit 2 Microgrid Management-1 10

Network management needs of Microgrid- Micro source generation control, Domestic process control, Energy storage, Regulation and load shifting, Ancillary services, Micro source controller- Control functions for Micro source controller.

Unit 3 Microgrid Management-2 10

Central controller- Energy manager module (EMM), Protection co-ordination module (PCM), Information needed for central controller operation, Control strategies for central controller design.

Unit 4 Protection issues for Microgrids 10

Islanding: separation from utility, Different islanding scenarios, Major protection issues of stand-alone Microgrid- Microgrid distribution system protection, Protection of micro sources.

Unit 5 Power Electronic Interfaces 10

Standard computer architecture, Very Large-Scale Integration (VLSI), Power converter trends- Custom design and manufacturing, Power module integration and component packaging, Power electronic building blocks (PEBB), Packaging framework design.

Textbooks:

1. Microgrids and Active Distribution Networks by S. Chowdhury, S.P. Chowdhury and P. Crossley, IET,1st Edition,2009.

Reference Books:

1. Micro Grids, Sanjeev Kumar Padmanaban.1st edition, CR Press, 2022 edition.
2. Micro Grids and Methods of Analysis Gevork B. Gharehpetian. 1st ed. Pub: Elsevier Academic Press, 2021.
3. Fundamentals of Micro Grid by Stephen A. Roosa CRC press, 2nd Edition, 2014.

CO-PO Mapping:

Course outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and the world	Ethics	Individual and collaborative teamwork	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE6AT.1	3	2	3	-	-	-	-	-	-	3	-	3	-
24AEEE6AT.2	3	2	3	2	2	-	-	-	-	3	-	3	3
24AEEE6AT.3	3	2	3	-	-	-	-	-	-	3	-	3	-
24AEEE6AT.4	3	2	3	2	2	-	-	-	-	3	-	3	3
24AEEE6AT.5	3	2	3	-	-	-	-	-	-	3	-	3	-

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RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the Course: Power Semiconductor Drives

Category : PE

Year : III

Semester : II

Course Code : 24AEEE6BT

Branch/es : EEE

Lecture Hours	Tutorial Hours	Practical Hours	Credits
3	0	0	3

Course Objectives:

1. To understand the principles and operation of power electronic converters used for DC and AC motor drives.
2. To study various speed control, braking, and four-quadrant operating methods of DC motor drives.
3. To analyze chopper and inverter-based control techniques for DC and induction motor drives.
4. To examine different control strategies for induction and synchronous motor drives.
5. To evaluate the performance characteristics of electric drives under different operating conditions through analytical and numerical methods.

Course Outcomes:

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

1. Analyze single and three-phase controlled rectifier fed DC motor drives and compute output voltage, current, speed, and torque characteristics.
2. Apply electrical braking methods and analyze four-quadrant DC drive operation
3. Analyze single, two, and four-quadrant chopper fed DC motor drives and evaluate their performance using waveforms and speed–torque expressions.
4. Analyze induction motor control techniques including AC voltage control, V/f control, VSI/CSI drives, and slip power recovery methods.
5. Evaluate variable-frequency and load-commutated inverter fed synchronous motor drives.

Unit 1 Controlled Rectifier Fed DC Motor Drives 12

Introduction to power semiconductor drives, block diagram, single phase semi controlled, single phase fully controlled converter, three phase semi controlled and three phase fully controlled converter fed separately excited DC motor and DC series motor drives – continuous current operation – output voltage and current waveforms – Speed and Torque expressions and characteristics - numerical problems

Unit 2 Electrical Braking & Four Quadrant Operation of DC Drives 12

Electric Braking – Plugging, Dynamic and Regenerative Braking operations - Speed torque expressions and characteristics – numerical problems on braking methods.

Introduction to Four quadrant operation, four quadrant operation of D.C motors by dual converter-numerical problems on dual converter fed DC motor Drive – closed loop operation of DC motor (Block Diagram Only).

Unit 3 Control of DC Motors by Choppers 10

Single quadrant, two – quadrant and four quadrant chopper fed separately excited dc motor and series motor drives – continuous current operation – output voltage and current wave forms – Speed torque expressions and characteristics – numerical problems on chopper fed dc Motor.

Unit 4 Three Phase Induction Motor Drives 10

Control of induction motors by AC Voltage Controllers – waveforms – speed torque characteristics, V/f control of induction motor Speed torque equations and characteristics, numerical problems, control of induction motor by Voltage Source Inverter (VSI), and Current Source Inverter (CSI), Static rotor resistance control of wound rotor induction motor – Slip power recovery – Static Scherbius drive – Static Kramer Drive – speed torque characteristics and numerical problems.

Unit 5 Three Phase Synchronous Motor Drives 8

Variable frequency control, separate & Self-control of synchronous motor drives – closed loop load commutated CSI fed synchronous motor drive – numerical problems.

Textbooks:

1. G K Dubey, Fundamentals of Electric Drives, Narosa Publications, 2nd Edition, 2010.

Reference Books:

1. M. D. Singh & K. B. Khanchandani, Power Electronics, Tata MC Graw Hill Publishing Company, 2nd edition, 2017.
2. P. S. Bimbhra, Power Electronics, Khanna Publishers, 2022.

Web Resources:

- https://nptel.ac.in/courses/108/104/108104140/
- https://nptel.ac.in/courses/108/102/108102046/
- https://swayam.gov.in/nd1_noc19_ee65/preview

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE6BT.1	3	3	1	1	–	–	–	–	1	–	2	3	2
24AEEE6BT.2	3	3	2	2	1	–	–	–	1	–	2	3	3
24AEEE6BT.3	3	3	2	2	1	–	–	–	1	–	2	3	3
24AEEE6BT.4	3	3	2	2	1	–	–	–	1	–	3	3	3
24AEEE6BT.5	3	3	2	2	1	1	–	–	1	–	3	3	3

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RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the course: Modern Control Theory
Category : PE
Year : III
Semester : II
Course Code : 24AEEE6CT
Branch : EEE

Lecture Hours	Tutorial Hours	Practical Hours	Credits
3	0	0	3

Course Objectives:

1. To introduce the concept of state and develop state-space models of dynamic systems for continuous-time analysis.
2. To provide knowledge of controllability and observability concepts and their role in system analysis and transformation.
3. To develop skills for designing state feedback controllers and state observers to meet desired performance specifications.
4. To familiarize students with nonlinear system behavior and methods for analyzing nonlinear dynamics and stability.
5. To impart an understanding of stability concepts using Lyapunov methods and related analytical techniques.

Course Outcomes:

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

1. Apply state-space concepts to model and analyze linear continuous-time dynamic systems using state transition matrices.
2. Analyze controllability and observability of continuous-time systems using appropriate mathematical tests and state transformations.
3. Design state feedback controllers and state observers using pole placement techniques to achieve specified system performance.
4. Analyze nonlinear systems and evaluate their stability using describing function and phase-plane methods.
5. Evaluate the stability of linear continuous-time systems using Lyapunov's direct method and construct suitable Lyapunov functions.

Unit 1 State Variable Analysis 10

The concept of state – State space model of Dynamic systems – Time invariance and Linearity – Non uniqueness of state model – State diagrams for Continuous-Time State models – Existence and Uniqueness of Solutions to Continuous-Time State Equations – Solutions of Linear Time Invariant Continuous-Time State Equations – State transition matrix and its properties. Complete solution of state space model due to zero input and due to zero state.

Unit 2 Controllability and Observability 10

General concept of controllability – Controllability tests, different state transformations such as diagonalization, Jordan canonical forms and Controllability canonical forms for Continuous-Time Invariant Systems – General concept of Observability – Observability tests for Continuous-Time Invariant Systems – Observability of different State transformation forms.

Unit 3 State Feedback Controllers and Observers 10

State feedback controller design through Pole Assignment, using Ackkermans formula– State observers: Full order and Reduced order observers

Unit 4 Non-Linear Systems 10

Introduction – Non-Linear Systems – Types of Non-Linearities – Saturation – Dead-Zone – Backlash – Jump Phenomenon etc; Linearization of nonlinear systems, Singular Points and its types– Describing function– describing function of different types of nonlinear elements, – Stability analysis of Non-Linear systems through describing functions. Introduction to phase-plane analysis, Method of Isoclines for Constructing Trajectories, Stability analysis of nonlinear systems based on phase-plane method.

Unit 5 Stability Analysis 10

Stability in the sense of Lyapunov, Lyapunov's stability, and Lyapunov's instability theorems – Stability Analysis of the Linear continuous time invariant systems by Lyapunov second method – Generation of Lyapunov functions – Variable gradient method – Krasovsky's method.

Textbooks:

1. Modern Control Engineering — Katsuhiko Ogata, Edition: 5th Edition, Pearson Education Inc. 2021

Reference Books:

1. Modern Control Systems by Richard C. Dorf and Robert H. Bishop**,** 14th Edition, published by Pearson Education Inc. (Global Edition, 2021)
2. Modern Control System Theory by Dr. M. Gopal**,** 5th Edition (2024), published by New Age International Pvt. Ltd.
3. Modern Control Systems: Theory, Design and Applications by Zhou Gaofeng and Zhang Qi**,** 1st Edition (2025), published by BP International**.**

Web resources:

1. https://controleducation.sites.sheffield.ac.uk/statespacemethods/statespaceobsvState space observability & controllability notes (with PDFs/examples)
2. https://edurev.in/t/187274/State-Space-Representation-of-Control-System State-space representation and controllability/observability notes (PDF option)
3. https://edurev.in/p/416570/Short-Notes-State-Space-Analysis Short notes on state-space analysis (PDF available)

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and the world	Ethics	Individual and collaborative teamwork	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE6CT.1	2	3	-	1	1	-	-	-	-	-	3	1	3
24AEEE6CT.2	3	3	-	1	2	-	-	-	-	-	2	1	3
24AEEE6CT.3	2	3	2	1	1	-	-	-	-	-	3	3	3
24AEEE6CT.4	3	3	1	1	2	-	-	-	-	-	2	3	3
24AEEE6CT.5	3	3	1	2	2	-	-	-	-	-	2	3	3

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RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the Course:		Battery Management System
Category	**:**	PE
Year	**:**	III
Semester	**:**	II
Course Code	**:**	24AEEE6DT
Branch/es	**:**	EEE

Lecture Hours	Tutorial Hours	Practical Hours	Credits
3	0	0	3

Course Objectives:

1. To understand the different types of energy storage system.
2. To study about the battery characteristic
3. To study about the battery parameters.
4. To know the concepts of battery management system.
5. To know the concepts of Battery Testing, Disposal & Recycling.

Course Outcomes:

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

1. Discuss about the different types of energy storage system.
2. Describe the battery characteristics.
3. Describe the battery parameters.
4. Apply the concepts of battery management systems.
5. Explain about the battery testing, disposal and recycling.

Unit 1 Types of Batteries 8

Batteries: Lead Acid Battery, Nickel based Batteries, Sodium based Batteries, Lithium based Batteries – Li-ion & Li-poly, Metal Air Battery, Zinc Chloride Battery.

Unit 2 Battery Characteristics 10

Cells and Batteries- principle of energy conversion- Battery Specifications: Variables to characterize Battery operating conditions and Specifications to characterize, Battery nominal and maximum characteristics; Efficiency of Batteries. Simple numerical problems.

Unit 3 Battery Parameters 10

Electrical parameters- Heat generation- Battery design- Performance criteria for Electric vehicles Batteries- Vehicle propulsion factors- Power and energy requirements of Batteries Meeting Battery performance criteria- setting new targets for Battery performance.

Unit 4 Battery Management System 10

Battery thermal management system, Battery Management System: Definition, Parts: Power Module, Battery, DC/DC Converter, load, communication channel, Battery Pack Safety, Battery Standards.

Unit 5 Battery Testing, Disposal & Recycling 8

Battery testing, limitations for transport and storage of cells and Batteries, Disposal and Reuse of Batteries. Recycling, Methods of recycling of EV Batteries, General recycling issues. Environment and Human Health, Impact assessments of Batteries, Standards for Battery Testing.

Text Books:

1.Yongping Zhai. Handbook on Battery Energy Storage System Asian Development Bank.2018.

Reference Books:

1. G. Pistoia, J.P. Wiaux, S.P. Wolsky, "Used Battery Collection and Recycling", Elsevier, 2001. (ISBN: 0-444-50562-8)

2. Guangjin Zhao, "Reuse and Recycling of Lithium-Ion Power Batteries", John Wiley & Sons. 2017. (ISBN: 978-1-1193-2185-9)

3. T R Crompton, "Battery Reference Book-3rd Edition", Newnes- Reed Educational and Professional Publishing Ltd., 2000.

4. Arno Kwade, Jan Diekmann, "Recycling of Lithium-Ion Batteries: The LithoRec Way", Springer, 2018.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE6DT.1	3	2	1	1	-	-	-	-	-	-	-	2	1
24AEEE6DT.2	3	2	1	1	-	-	-	-	-	-	-	2	2
24AEEE6DT.3	3	2	2	1	-	-	-	-	-	-	-	2	1
24AEEE6DT.4	3	2	2	2	1	-	-	-	-	-	-	3	2
24AEEE6DT.5	3	2	2	3	1	-	-	-	-	-	-	3	2

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RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the course: AI & ML in Electrical Engineering
Category : PE
Year : III
Semester : II
Course Code : 24AEEE6ET
Branch : EEE

Lecture Hours	Tutorial Hours	Practical Hours	Credits
3	0	0	3

Course Objectives:

1. To introduce the fundamentals of Artificial Intelligence and Machine Learning concepts relevant to engineering applications.
2. To provide knowledge of data preprocessing, feature engineering, and model evaluation techniques for engineering datasets.
3. To enable students to understand and apply supervised and unsupervised machine learning algorithms for solving electrical engineering problems.
4. To expose students to real-world AI/ML applications in electrical engineering domains.

Course Outcomes:

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

1. Explain the basic concepts of Artificial Intelligence and Machine Learning and their relevance to electrical engineering applications.
2. Apply data pre-processing and supervised learning techniques to solve regression and classification problems in electrical systems.
3. Analyse unsupervised learning methods for pattern recognition and clustering in electrical engineering data.
4. Design simple neural network models for electrical engineering applications such as load forecasting and fault diagnosis.
5. Evaluate AI/ML models and identify suitable techniques for real-time electrical engineering problems.

Unit 1 Introduction to Artificial Intelligence and Machine Learning 10

Introduction to Artificial Intelligence, history and applications of AI, scope of AI in electrical engineering, introduction to Machine Learning, types of learning: supervised, unsupervised and reinforcement learning, AI vs ML vs Deep Learning, data-driven modeling in electrical systems.

Unit 2 Data Processing and Feature Engineering 10

Data collection and Data Cleaning- Handling Missing, Noisy and inconsistent data, Outliers, feature selection, Feature Scaling- Normalization and Standardization, Feature Extraction and Construction, Dealing with Imbalanced Datasets.

Unit 3 Supervised Learning 10

Regression techniques: Linear regression and Multiple regression, classification techniques: k-Nearest Neighbors, Decision Trees and Random Forest, Support Vector Machines, Performance Metrics and Model Validation.

Unit 4 Unsupervised Learning 10

Clustering Techniques: k-means and Hierarchical Clustering, Dimensionality Reduction: PCA, Association Rule Mining (Introduction), Anomaly Detection, Cluster Evaluation Metrics-Silhouette Score, Davies–Bouldin Index.

Unit 5 AI & ML Applications in Electrical Engineering 10

AI/ML in power systems- load forecasting, economic dispatch, fault diagnosis, AI in renewable energy systems, smart grids, condition monitoring and predictive maintenance, future trends and challenges.

Textbooks:

1. Ian Good fellow, Yoshua Bengio, and Aaron Courville, *Deep Learning*, MIT Press, 1st Edition.

Reference Books:

1. Ethem Alpaydin, *Introduction to Machine Learning*, MIT Press, 4th Edition.

Web Resources:

- https://ocw.mit.edu/courses/6-036-introduction-to-machine-learning-fall-2020/
- https://developers.google.com/machine-learning/crash-course
- https://www.coursera.org/learn/machine-learning
- https://nptel.ac.in/courses/106/106/106106139
- https://www.mathworks.com/solutions/machine-learning.html

CO-PO Mapping:

Course outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and the world	Ethics	Individual and collaborative teamwork	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE6ET.1	3	2	–	–	1	–	–	–	–	–	–	1	3
24AEEE6ET.2	3	3	2	–	3	–	–	–	–	–	–	1	3
24AEEE6ET.3	3	3	–	2	2	–	–	–	–	–	–	3	3
24AEEE6ET.4	3	2	3	–	3	–	–	–	–	–	–	3	3
24AEEE6ET.5	3	3	2	2	3	–	1	–	–	–	–	3	3

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RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the Course:		Technical Paper Writing and Intellectual Property Rights
Category	**:**	MC
Year	**:**	III
Semester	**:**	II
Course Code	**:**	24AMBA61T
Branch/es	**:**	Common to All Branches

Lecture Hours	Tutorial Hours	Practical Hours	Credits
2	0	0	0

Course Objectives:

1. To enable the students to practice the basic skills of research paper writing.
2. To make the students understand the importance of IP and to educate them on the basic concepts of Intellectual Property Rights.
3. To practice the basic skills of performing quality literature review
4. To help them in knowing the significance of real-life practice and procedure of Patents.
5. To enable them learn the procedure of obtaining Patents, Copyrights, & Trade Marks

Course Outcomes:

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

1. Identify key secondary literature related to their proposed technical paper writing
2. Explain various principles and styles in technical writing.
3. Use the acquired knowledge in writing a research/technical paper
4. Analyse rights and responsibilities of holder of Patent, Copyright, Trademark, International Trademark etc.
5. Evaluate different forms of IPR available at national & international level and search of various forms of IPR by using modern tools and techniques.

Unit 1 Principles of Technical Writing **6**

Principles of Technical Writing: styles in technical writing; clarity, precision, coherence and logical sequence in writing-avoiding ambiguity- repetition, and vague language -highlighting your findings-discussing your limitations -hedging and criticizing -plagiarism and paraphrasing.

Unit 2 Technical Research Paper Writing **6**

Technical Research Paper Writing: Abstract- Objectives-Limitations-Review of Literature- Problems and Framing Research Questions- Synopsis.

Unit 3 Process of Research **6**

Process of research: publication mechanism: types of journals- indexing-seminars- conferences-proof reading –plagiarism style; seminar & conference paper writing; Methodology-discussion-results- citation rules.

Unit 4 Introduction to Intellectual Property **6**

Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights Trade Marks: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

Unit 5 Fundamentals of Copy Right Law 6

Fundamentals 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. Patent law, intellectual property audits.

Textbooks:

1. Deborah. E. Bouchoux, Intellectual Property Rights, Cengage Learning India, 2013

Reference Books:

1. R. Myneni, Law of Intellectual Property, 9th Ed, Asia law House, 2019.
2. Prabuddha Ganguli, Intellectual Property Rights Tata McGraw Hill, 2001
3. P.Naryan, Intellectual Property Law, 3rd Ed, Eastern Law House, 2007.

CO-PO Mapping:

Course outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and the world	Ethics	Individual and collaborative teamwork	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AMBA61T.1	3	2	2	2	1	2	-	-	-	1	-	-	-
24AMBA61T.2	2	3	3	2	2	1	-	-	-	-	-	-	-
24AMBA61T.3	3	2	3	2	2	1	1	-	-	-	-	-	-
24AMBA61T.4	2	3	2	2	2	1	1	-	-	-	-	-	-
24AMBA61T.5	2	2	2	1	3	1	1	-	-	1	1	-	-

ANNAMACHARYA UNIVERSITY

(ESTD UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)
(UNIVERSITY LISTED IN UGC AS PER THE SECTION 2(f) OF THE UGC ACT, 1956)

RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the Course: EV and RES Lab
Category : PC
Year : III
Semester : II
Course Code : 24AEEE61L
Branch/es : EEE

Lecture Hours	Tutorial Hours	Practical Hours	Credits
0	0	3	1.5

Course Objectives:

1. To provide practical exposure to solar, wind, hydro, fuel cell, and hybrid energy systems.
2. To analyze performance characteristics of standalone, grid-connected, and hybrid renewable energy systems.
3. To introduce simulation tools and intelligent control techniques for renewable energy applications

Course Outcomes:

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

1. Simulate and analyze the performance of renewable and hybrid energy systems.
2. Experimentally evaluate efficiency and operating characteristics of solar and wind energy systems.
3. Apply intelligent control methods for effective operation of hybrid renewable energy systems.

List of Experiments:

Any 10 of the following experiments are to be conducted:

1. Simulation study on solar PV energy system.
2. Experiment on “VI-Characteristics and Efficiency of 1kWp solar PV system”.
3. Experiment on “Shadowing effect & diode-based solution in1kWp solar PV system”.
4. Experiment on performance assessment of Grid connected and standalone 1kWp solar power system.
5. Simulation study on wind energy generator.
6. Experiment on performance assessment of micro wind energy generator.
7. Simulation study on hybrid (Solar-Wind) power system.
8. Experiment on performance assessment of hybrid (Solar-Wind) power system.
9. Simulation study on hydel power.
10. Experiment on performance assessment of 100W fuel Cell.
11. Simulation study on intelligent controllers for hybrid systems.
12. Simulation of Battery energy storage systems performance characteristics
13. Load test on EV
14. Study of RES integrated EV charging Station
15. Fast charging EV stations
16. Simulation of micro and smart grids
17. Simulation of hybrid energy control system
18. Simulation of cyber security events
19. Simulation of Battery Energy Storage System (BESS) performance characteristics

CO-PO Mapping:

Course outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and the world	Ethics	Individual and collaborative teamwork	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE61L.1	3	2	3	3	3	2	-	3	-	3	-	3	-
24AEEE61L.2	3	2	3	3	3	2	-	2	-	3	-	3	3
24AEEE61L.3	3	2	3	3	3	2	-	2	-	3	-	3	-

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RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the Course: Microprocessors and Microcontrollers Lab

Category : PC

Year : III

Semester : II

Course Code : 24AEEE62L

Branch/es : EEE

Lecture Hours	Tutorial Hours	Practical Hours	Credits
0	0	3	1.5

Course Objectives:

1. To become skilled in 8086 Assembly Language programming.
2. To understand the detailed software and hardware structure of the microprocessor.
3. To Train their practical knowledge through laboratory experiments.
4. To understand and learn 8051 Microcontroller.
5. To acquire knowledge on microprocessors and microcontrollers, interfacing of various peripherals.

Course Outcomes:

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

1. Formulate a program and implement algorithms using Assembly language.
2. Describe an Assembly language program for the 8086 Microprocessor.
3. Develop programs for different applications in the 8086 Microprocessor.
4. Interface peripheral devices with 8086 and 8051.
5. Use an Assembly/Embedded C programming approach for solving real-world problems.

List of Experiments

Any 10 of the following experiments are to be conducted:

EXP 1 Programs for 16 Bit Arithmetic Operations (Using various addressing modes)

a) Write an ALP to Perform Addition and Subtraction of Multi-byte numbers.
b) Write an ALP to Perform Multiplication and division of unsigned Hexadecimal numbers.
c) Write an ALP to find square, cube and factorial of a given number.

EXP 2 Programs ASCII Arithmetic Operations

a) Write an ALP to Perform Addition and Subtraction of two ASCII numbers.
b) Write an ALP to Perform Multiplication and division of two ASCII numbers.

EXP 3 Programs Involving Bit Manipulation Instructions

a) Write an ALP to find the given data is positive or negative.
b) Write an ALP to find the given data is odd or even.
c) Write an ALP to find Logical ones and zeros in a given data.

EXP 4 Programs on Arrays for 8086

a) Write an ALP to find Addition/subtraction of N numbers.
b) Write an ALP for finding largest/smallest number.

EXP 5 Programs on String Manipulations for 8086

a) Write an ALP to find String length.
b) Write an ALP for Comparing two Strings.
c) Write an ALP to reverse String

EXP 6 Interfacing Stepper Motor with 8086

Write an ALP to 8086 processor to Interface a stepper motor and operate it in clockwise/ Anti-clockwise by choosing variable step-size.

EXP 7 Interfacing ADC/DAC with 8086

Write an ALP to 8086 processor to Interface DAC and generate Square Wave/Triangular Wave/Step signal.

EXP 8 Programs using Arithmetic Instructions for 8051

Write an ALP to 8051 Microcontroller to perform Arithmetic operations like addition, subtraction, Multiplication and Division

EXP 9 Programs using Logical Instructions for 8051

Write an ALP to 8051 Microcontroller to perform Logical operations like AND, OR and XOR.

EXP 10 8051 Port Reading & Writing

a) Write an ALP to Perform Reading data from Port,
b) Write an ALP to Perform Writing data to Port.

EXP 11 Programs for Digital Clock Design Using 8086

a) Write an ALP for Designing clock using INT 21H Interrupt.
b) Write an ALP for Designing clock using DOS Interrupt Functions.
c) Write an ALP for Designing clock by reading system time.

EXP 12 Communication between Two Microprocessors

a) Write an ALP to have Parallel communication between two microprocessors using 8255
b) Write an ALP to have Serial communication between two microprocessor kits using 8251.

EXP 13 Programs to Verify Timers/Counters of 8051

a) Write a program to create a delay of 25 msec using Timer 0 in mode 1 and blink all the Pins of P0.
b) Write a program to create a delay of 50 µsec using Timer 1 in mode 0 and blink all the Pins of P2.
c) Write a program to create a delay of 75 msec using counter 0 in mode 2 and blink all the Pins of P1.
d) Write a program to create a delay of 80 µsec using counter 1 in mode 1 and blink all the Pins of P3.

EXP 14 UART Operation in 8051

a) Write a program to transfer a character serially with a baud rate of 9600 using UART.
b) Write a program to transfer a character serially with a baud rate of 4800 using UART.
c) Write a program to transfer a character serially with a baud rate of 2400 using UART.

EXP 15 Programs for 16 Bit Arithmetic Operations (Signed Numbers)

a) Write an ALP to Perform Addition and Subtraction of Multi-byte numbers.
b) Write an ALP to Perform Multiplication and division

Textbooks:

1. Advanced microprocessors and peripherals - A. K Ray and K. M. Bhurchandani, TMH, 2nd edition2006.

Reference Books:

1. Kenneth. J. Ayala. The 8051 microcontroller, 3rd edition, Cengage learning, 2010.
2. The 8051 Microcontroller and Embedded Systems: Using Assembly and C by Muhammad AliMazidi, Janice Gillispie Mazidi, Second Edition.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE62L.1	3	3	3	2	3	–	–	1	1	–	2	3	1
24AEEE62L.2	3	2	1	1	2	–	–	1	2	–	2	2	1
24AEEE62L.3	3	3	3	2	3	–	–	2	2	–	2	3	1
24AEEE62L.4	3	3	3	3	3	1	–	2	2	1	3	3	2
24AEEE62L.5	3	3	3	3	3	1	1	2	2	1	3	3	2

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RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the Course: Power System Simulation Lab

Category : PC

Year : III

Semester : II

Course Code : 24AEEE63L

Branch/es : EEE

Lecture Hours	Tutorial Hours	Practical Hours	Credits
0	0	3	1.5

Course Objectives:

1. To analyze the efficiency, regulation and stability of transmission system.
2. To enable the students to know about different load flow techniques and fault analysis.
3. To acquire the knowledge on formation of bus impedance and bus admittance matrices.
4. To study the Ferranti effect and optimum loading of generators.

Course Outcomes:

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

1. Analyze the efficiency, regulation and stability of transmission system
2. Describe the formation of Admittance and Impedance matrices
3. Analyze Load Flow analysis of transmission systems
4. Evaluate Symmetrical and unsymmetrical faults
5. Estimate optimum loading of generators and study of Ferranti effect.

List of Experiments

Any 10 of the following experiments are to be conducted:

1. Performance of Short/Medium Transmission Lines using Simulation
2. Computation of parameters and modeling of Long Transmission Lines using Simulation
3. Determination of GMD and GMR of a Transmission Line using Simulation
4. Formation of Admittance matrix using Direct Inspection method in Simulation
5. Formation of Impedance matrix using Z_{bus} Building Algorithm in Simulation
6. Gauss Seidal method of Load Flow Analysis using Simulation
7. Newton Raphson method of Load Flow Analysis using Simulation
8. Decouple method of Load Flow Analysis using Simulation
9. Short Circuit Analysis for LG and LL faults using Simulation
10. Short Circuit Analysis for DLG and symmetrical faults using Simulation
11. Transient Stability Analysis of SMIB system using Equal Area Criteria in Simulation
12. Transient Stability Analysis of SMIB system using Swing equation in Simulation
13. Simulation of Power Quality Problems (Voltage Sag and Swell, Harmonics, Transients)
14. Simulation Program to find the optimum loading of generators neglecting transmission losses
15. Simulation Program to find the optimum loading of generators with penalty factor

Textbooks:

1. Electrical Power Systems by C. L. Wadhwa, 7th Multi Color Edition, New Age International Publishers, 2016.

Reference Books:

1. Modern Power System Analysis, by I. J. Nagrath & D. P. Kothari. 4th edition. Tata McGraw-Hill Publishing Company, 2011 Edition.

Web Resources:

https://www.ee.iitb.ac.in/~vlabsync/template/vlab/index.html

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE63L.1	3	3	1	2	2	–	–	1	1	–	2	3	2
24AEEE63L.2	3	3	2	2	3	–	–	2	2	–	2	3	3
24AEEE63L.3	3	3	2	2	2	–	–	1	1	–	2	3	2
24AEEE63L.4	3	3	3	3	3	–	–	2	2	1	3	3	3
24AEEE63L.5	3	3	2	3	3	1	–	2	2	1	3	3	3

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RAJAMPET, Annamayya District, AP – 516126, INDIA

Title of the course: IoT with Arduino & Node MCU

Category : SEC

Year : III

Semester : II

Course Code : 24AEEE64S

Branch/es : EEE

Lecture Hours	Tutorial Hours	Practical Hours	Credits
1	0	2	2

Course Objectives:

1. To impart knowledge on Hardware Architecture of Arduino & Node MCU
2. To impart knowledge on Programming Tools of Arduino
3. To impart knowledge on Internet of Things

Course Outcomes:

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

1. Design hardware and software for specific application using Arduino
2. Recognize various devices, sensors and applications
3. Summarize general concepts of Internet of Things (IoT)
4. Design hardware and software for specific application using Node MCU
5. Create IoT solutions using sensors, actuators and Devices

Unit 1 Introduction to Arduino **8**

Introduction to Arduino, Pin configuration and architecture, Device and platform features, Concept of digital and analog ports, familiarizing with Arduino Interfacing Board, few examples where a Microcontroller is used, Installation of Arduino IDE windows OS, Run the Arduino executable file.

Unit 2 Interfacing of LED, LCD and Push button **8**

Default program environment, Arduino Libraries, Serial Communications.

Project 1: write an Arduino program to blink an LED, Arduino program is saved as Sketch. Write a program to blink tricolor LED.

Project 2: Connect an LCD to Arduino board, Installation of LCD Library. write a program to display a text message on the LCD.

Project 3: Connect an LCD and a Push button to Arduino board, write a program to increase count on LCD when push button was pressed.

Unit 3 Interfacing of seven segment display, DC Motor, Temperature & Humidity **8**

Project 4: Types of seven segment display, Interface a seven-segment display to Arduino board, Installation of LCD Library. Write a Program to display digits 0 to 9 in seven segment display.

Project 5: Pulse Width Modulation, duty cycle and frequency, Formula to calculate the duty cycle. Experiment to control the brightness of LED by varying the duty cycle, Experiment to control the speed and direction of a DC motor. Circuit connection explanation of the above experiments

Project 6: Circuit connection details of DHT11 sensor and Arduino, Installation DHT11 Arduino library, write a Code to detect the temperature and humidity using DHT11 sensor and display the output in the Serial Monitor screen.

Unit 4 Introduction to IoT and Thing speak 10

Working of IoT, IoT system components, About Thing speak platform, create an account in Thing speak, Generate 224 the API keys, Importance of Write API key and Read API key. About MQTT Protocol.

Project 7: Various pins of ESP8266-01 Wi-Fi module Circuit connection of ESP8266 - 01 module with Arduino install ESP8266 Wi-Fi of Library, Establish a connection between Wi-Fi modules.

Project 8: Circuit connection of DHT11 and Wi-Fi module with Arduino, write a program to upload temperature and humidity values from the DHT11 sensor in Thing Speak platform. Data Import/Export option to download the data as CSV file

Unit 5 Introduction to Node MCU, Blynk cloud, Arduino IoT Cloud and Drone Technology 10

Introduction to Node MCU, Pin configuration and architecture, Concept of digital and analog ports, few examples where a Microcontroller is used. Create an account in Blynk cloud. Create an account in Arduino IoT cloud.

Project 9: Circuit connection of DHT11 with Node MCU, write a program to upload temperature and humidity values from the DHT11 sensor in Blynk cloud.

Project 10: Circuit connection of DHT11 with Node MCU, write a program to upload temperature and humidity values from the DHT11 sensor in Arduino IoT cloud.

Project 11: Identification and study of Drone components — Frame, Brushless Motors, ESC, Flight Controller and Battery connections.

Project 12: ESC Calibration and Motor Direction Testing using Arduino.

Project 13: Circuit connection of Ultrasonic Sensor with Arduino, write a program for Obstacle Detection and display alert.

Project 14: Integration of Node MCU with Drone Flight Controller for real-time GPS/telemetry data upload to Blynk Cloud.

Textbooks:

1. Massimo Banzi, Getting Started with Arduino, Second Edition
2. Manoj R. Thakur, NodeMCU ESP8266 Communication Methods and Protocols

Reference Books:

1. Sooriyan, Nithukanth - Arduino Exodus Beginner Arduino Projects_ ESP8266 Arduino IDE Guide Basic Arduino Coding (2021)
2. Michael Margolis - Arduino Cookbook (Oreilly Cookbooks) (2011, OReilly Media)
3. Boxall, John - Arduino Workshop_ a Project-based Introduction (2013, Oreilly & Associates Inc)
4. Michael McRoberts (auth.) - Beginning Arduino (2013, Apress)

Web Resources

- https://www.arduino.cc/
- https://thingspeak.com/
- https://blynk.io/
- Sooriyan, Nithukanth - Arduino Exodus Beginner Arduino Projects_ ESP8266 Arduino IDE Guide Basic Arduino Coding (2021)
- Michael Margolis - Arduino Cookbook (Oreilly Cookbooks) (2011, OReilly Media)
- Boxall, John - Arduino Workshop_ a Project-based Introduction (2013, Oreilly & Associates Inc) 7. Michael McRoberts (auth.) - Beginning Arduino (2013, Apress)
- https://spoken-tutorial.org

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and the world	Ethics	Individual and collaborative teamwork	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24AEEE64S.1	3	3	3	-	3	3	-	-	-	-	3	3	3
24AEEE64S.2	3	3	3	-	3	-	-	-	-	-	3	3	3
24AEEE64S.3	3	3	3	-	3	3	-	-	-	-	3	3	3
24AEEE64S.4	3	3	3	3	3	3	-	-	-	-	3	3	3
24AEEE64S.5	3	3	3	3	-	-	-	-	-	-	3	3	3