ANNEXURE II

XXXXX (Sub Code)	PROBABILITY AND COMPLEX FUNCTIONS (III SEM FOR EEE)	L T P C 3 1 0 4

COURSE OBJECTIVES:

To make the student conversant with the

- ✓ Concepts of probability and random variables.
- ✓ Concept of two dimensional random variables.
- ✓ Applying vector calculus concepts in electromagnetic field and power system in EEE.
- ✓ Standard techniques of complex variable theory in particular analytic function and its mapping property.
- ✓ Knowledge of complex integration techniques and contour integration techniques which can be used in real integrals.
- ✓ Real-world case studies on probability and complex functions.

UNIT - 1 PROBABILITY AND RANDOM VARIABLES 10

Applications: *Quality control and manufacturing, risk assessment and insurance, finance, stock market analysis.*

Symmetric, Axioms of probability - Conditional probability -Baye's theorem - Discrete and continuous random variables - Moments - Moment generating functions - Binomial, Poisson, Geometric, Uniform, Exponential and Normal distributions - Functions of a random variable.

UNIT - 2 TWO-DIMENSIONAL RANDOM VARIABLES 10

Applications: *Correlation and dependence analysis, regression analysis, risk and reliability analysis, signal processing.*

Limits, Joint distributions - Marginal and conditional distributions - Covariance - Correlation and linear regression - Transformation of random variables - Central limit theorem (only statement). **(C09)**

UNIT - 3 VECTOR CALCULUS 10

Applications: Analyzing and designing *Electromagnetic devices and systems like antennas, communication systems, and power systems*

Gradient, divergence and Curl – Directional derivatives – Line integral – Surface integral – Volume integral– Stokes's theorem, – Gauss's theorem – Divergence theorem – Green's theorem.

UNIT - 4 ANALYTIC FUNCTIONS 10

Applications: *Applications in fluid dynamics, stream function, Schwarz's chirestofel transformation.*

Analytic functions - Necessary and sufficient conditions for analyticity [Cartesian and polar coordinates] **(C 10)**- Properties - Harmonic conjugates - Construction of analytic function - Conformal mapping - Mapping by functions- Bilinear transformation.

UNIT - 5 COMPLEX INTEGRATION 10

Applications: *Gradient descent methods, wave function behaviour, ultrasound and CT scans, stochastic processes, option pricing.*

Double integral- Cauchy's integral theorem **(C 11)** - Cauchy's integral formula - Taylor's and Laurent's series- Singularities. Residues –Cauchy Residue theorem(C-R equation) - Application of residue theorem for evaluation of real integrals - Applications of circular contour and semi-circular contour (with poles NOT on real axis).

UNIT 6 APPLICATIONS OF PROBABILITY AND COMPLEX FUNCTIONS IN REAL LIFE SCENARIO (C 03)

Estimating the revenue of the organisation using binomial distribution–Analyze the stock market and sector analysis using correlation and regression - Analyze the price difference in dynamic components using two dimensional random variables - Green's and Stokes' theorems are being applied to surface and volume integrals in the context of antenna simulations and electromagnetic compatibility studies- Heat prediction in Thermal Management complex functions Applications of C - R equations in medical field.

TOTAL: 60 PERIODS

OUTCOMES:

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

1. Analyse the discrete and continuous random variables using probability distributions such as Binomial, Poisson, Normal, and Exponential.
2. Compare the relationships between two variables using joint distributions, correlation, and regression analysis.
3. Apply the concepts of divergence and curl in electromagnetism to solve problems

involving electric and magnetic fields

4. Utilizing analytic functions to solve complex problems in fields like fluid dynamics.
5. Evaluate integrals using Cauchy's integral theorem and residue theorem.
6. Apply the formulae of Probability and Complex Functions in Financial Marketing and AI (in thermal management).

TEXT BOOKS:

1. Johnson. R.A., Miller. I.R and Freund . J.E, " Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 9th Edition, 2016.
2. Milton. J. S. and Arnold. J.C., "Introduction to Probability and Statistics", Tata McGraw Hill, 4th Edition, 2007.
3. Grewal. B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 44th Edition, 2018.

REFERENCES:

1. Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning,New Delhi, 8th Edition, 2014.
2. Papoulis. A. and Unni krishnapillai. S., "Probability, Random Variables and Stochastic Processes", McGraw Hill Education India, 4th Edition, New Delhi, 2010.
3. Ross. S.M., "Introduction to Probability and Statistics for Engineers and Scientists", 5thEdition, Elsevier, 2014.
4. Spiegel. M.R., Schiller. J. and Srinivasan. R.A., "Schaum's Outline of Theory and Problems of Probability and Statistics", Tata McGraw Hill Edition, 4th Edition, 2012.
5. A Pathway to Complex Analysis, Techno Wold Publication, Kolkata, 2022. 4th Edition Mathews J.H. and Howell R.W., "Complex Analysis for mathematics and engineering".

CO - PO MAPPING

CO	PO												PSO		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
1	3	3	-	-	-	-	-	-	1	-	-	2	-	-	-
2	3	3	-	-	-	-	-	-	1	-	-	2	-	-	-
3	3	3	-	-	-	-	-	-	1	-	-	2	-	-	-
4	3	3	-	-	-	-	-	-	1	-	-	2	-	-	-
5	3	3	-	-	-	-	-	-	1	-	-	2	-	-	-
6	3	3	-	1	-	-	-	-	1	-	-	2	-	-	-
LOW (1) ; MEDIUM (2) ; HIGH (3)															

EEXXX	ELECTRIC CIRCUIT AND NETWORKS	L T P C 3 0 0 3

COURSE OBJECTIVES:

✓	To introduce fundamental concepts of electrical circuit analysis, including circuit elements (R, L, C), DC and AC circuit analysis techniques, and network theorems.
✓	To develop problem-solving skills for analyzing and designing electrical circuits
✓	To provide a foundation for understanding more advanced topics in electrical engineering, such as electronics, power systems, and communication systems.
✓	To familiarize students with the principles of resonance, coupled circuits, and three-phase systems.
✓	To introduce the basic concepts of network topology and its applications in circuit analysis.
✓	To equip students with knowledge of current trends and technologies related to electrical networks in real-world applications.

UNIT - 1	FUNDAMENTALS OF ELECTRIC CIRCUIT AND NETWORKS	8

Applications: *Circuit design, home wiring and Automotive Systems*

Fundamental concepts of R, L and C elements, DC circuits, series and parallel circuits - loop and nodal analysis, A.C. circuits - Phasors - Average and RMS value - Phasor Diagram - Power, Power Factor and Energy.

UNIT - 2	NETWORK REDUCTION & THEOREMS FOR DC & AC CIRCUITS	8

Applications: *Power grid, power delivery and electronic circuit design*

Network reduction: voltage and current division, source transformation - star delta transformation. Thevenin and Norton Theorems - Superposition Theorem - Maximum power transfer theorem - Reciprocity Theorem - Millman's theorem and applications to dc and ac circuits.

UNIT - 3	RESONANCE AND COUPLED CIRCUITS	8

Applications: *Tuned electric circuit and coupling electric circuit in telecommunication and remote sensing*

Introduction of resonance circuit - Types - Resonance in series and parallel circuits, self and mutual inductance's, coefficient of coupling - dot convention - Tuned circuits - Single tuned circuits

UNIT - 4	THREE PHASE CIRCUITS	8

Applications: *Power measurements - power factor calculations in power system*

Introduction – Need of three phase circuits – Phase sequence (A-B-C & A-C-B) of source and load- Star and delta connections-Relation between line and phase voltages and currents in balanced three phase source phasor diagrams - Comparison Between Star and Delta Connections - Analysis of three phase balanced load circuits- Calculation of Active, Reactive power, apparent power in balanced three phase systems - Analysis of three phase unbalanced load circuits-Loop Method-Millman's Theorem method- Measurement Of Power In Three-Phase Circuits.

UNIT - 5	TWO PORT NETWORK ANALYSIS	8

Applications: *Admittance matrices in power system analysis and Microwave Circuits*

Introduction – Types of networks - Network topology - Two port network parameters – Z, Y, ABCD and hybrid parameters and their relations. Concept of transformed network – Two port network parameters using transformed variables- Cascaded networks and analysis of Two - Port networks using the above parameters.

UNIT - 6	CURRENT TRENDS IN ELECTRICAL CIRCUIT ANALYSIS	5

International Market Status: Market Size and Growth - Current Trends and Technology in Electric Circuit and Networks Analysis – Technological Innovation - Top Companies in Circuits and Network Design and Technologies - Simulation Software Integration.

TOTAL: 45 PERIODS

OUTCOMES:

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

1.	Apply the fundamental concepts to find voltage, current, power, and energy in DC and AC circuits.
2.	Apply the concepts of network theorems (Thevenin, Norton, Superposition, Maximum Power Transfer, Reciprocity, Millman) to solve circuit problems.
3.	Understand the concepts of series, parallel resonant circuits to determine resonant frequency, bandwidth, and quality factor.
4.	Calculate power and power factor in three-phase systems.
5.	Apply graph theory concepts (network graph, tree, cut sets)for circuit analysis.
6.	Evaluate the impact of new technologies on the design, manufacturing, and application of electrical circuits.

TEXT BOOKS:

1.	Alexander, C. K., & Sadiku, M. N. O, " Fundamentals of Electric Circuits". (6th Edition, 2023
2.	Whayt"Engineering Circuits Analysis", Tata McGraw Hill Education , 2022
3.	Nilsson, J. W., & Riedel, S. A. " Electric Circuits"(11th Edition, 2020).
REFERENCES:	
1.	J.S. Katre "Electrical Circuits And Networks", TechKnowledge Publications, july 2024
2.	Hayt, W. H., Kemmerly, J. E., & Durbin, S. M. " Engineering Circuit Analysis" (9th Edition, 2018).
3.	William H. Hayt Jr, Jack E. Kemmerly, and Steven M. Durbin, Engineering Circuits Analysis, McGraw Hill publishers, New Delhi, 2013.
4.	A. Sudhakar and Shyammohan S. Palli "Circuits and Networks: Analysis and Synthesis" 5th edition was published in 2015, Published by McGraw Hill.
5.	J. David Irwin and R. Mark Nelms, {"Basic Engineering Circuit Analysis" , 12 edition Wiley publication 2015
6.	https://semiconductorinsight.com/about-us/
7.	https://efymag.com/list-of-electronics-magazine-in-india/
8.	https://enterprise-services.siliconindia.com/ranking/electronic-design-service-providers-2024-rid-2392.html
9.	https://enterprise-services.siliconindia.com/magazines/2024/

CO – PO MAPPING

CO	PO											PSO		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
1	3	3	2	1	-	-	-	-	-	-	-	3	2	1
2	3	3	2	1	-	-	-	-	-	-	-	3	2	1
3	3	3	2	1	-	-	-	-	-	-	-	3	2	1
4	3	3	2	1	-	-	-	-	-	-	-	3	2	1
5	3	3	2	1	-	-	-	-	-	-	-	3	2	1
6	2	2	1	1	-	2	1	1	-	1	1	2	3	1

	ELECTRICAL MACHINES - I	L T P C 3 0 0 3
COURSE OBJECTIVES:		
✓	To understand the fundamental principles of electromechanical energy conversion and magnetic circuits.	
✓	To analyze the operation and characteristics of DC generators, including their construction, windings, and performance.	
✓	To explain the operation, control, and testing of DC motors, and to understand their applications.	
✓	To analyze the construction, operation, testing, and performance of single-phase transformers.	
✓	To understand the construction, operation, and applications of autotransformers and three-phase transformers.	
✓	To discuss current trends and industry-oriented applications in electrical machines.	
UNIT - 1	**ELECTROMECHANICAL ENERGY CONVERSION**	8
Applications:*Motor , Generator, Measuring Instrument and transducer* Fundamentals of Magnetic circuits- Statically and dynamically induced EMF - Principle of electromechanical energy conversion forces and torque in magnetic field systems- energy balance in magnetic circuits- magnetic force- co-energy in singly excited and multi excited magnetic field system mmf of distributed windings – Winding Inductances-, magnetic fields in rotating machines- magnetic saturation and leakage fluxes.		
UNIT - 2	**DC GENERATORS**	8
Applications:*Battery Charging, Lighting, Excitation of Alternators, Small power supplies, Electroplating* Principle of operation, constructional details, armature windings and its types, EMF equation, wave shape of induced emf, armature reaction, demagnetizing and cross magnetizing Ampere turns, compensating winding, commutation, methods of improving commutation, interpoles, OCC and load characteristics of different types of DC Generators.		
UNIT - 3	**DC MOTORS**	8

Applications: *Automotive, Robotics and Automation, Industrial Machinery, Consumer Electronics, Aerospace and Defense, Renewable Energy*

Principle of operation, significance of back emf, torque equations and power developed by armature, speed control of DC motors, starting methods of DC motors, load characteristics of DC motors, losses and efficiency in DC machine, condition for maximum efficiency. Testing of DC Machines: Brake test, Swinburne's test, Hopkinson's test, Field test, Retardation test, Separation of core losses-applications of DC motors.

UNIT - 4	**SINGLE PHASE TRANSFORMER**	8

Applications:*Household and consumer electronics, power distribution and industrial applications*

Construction and principle of operation, equivalent circuit, phasor diagrams, testing - polarity test, open circuit and short circuit tests, voltage regulation, losses and efficiency, all day efficiency, back-toback test, separation of core losses, parallel operation of single-phase transformers, applications of single-phase transformer.

UNIT - 5	**AUTOTRANSFORMER AND THREE PHASE TRANSFORMER**	8

Applications: *Audio systems, industrial heating, voltage regulation and motor starting*

Construction and working of auto transformer, comparison with two winding transformers, applications of autotransformer. Three Phase Transformer- Construction, types of connections and their comparative features, Scott connection, applications of Scott connection.

UNIT - 6	**CURRENT TRENDS IN ELECTRICAL MACHINES**	5

Market Demand and Consumer Preferences - Recent Products -Upcoming Trends in Electrical machines - designing and developing electrical machines with higher efficiency to minimize energy losses - Automation and Control -Integration of Power Electronics- Current Industry oriented applications.

TOTAL: 45 PERIODS

OUTCOMES:

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

1.	Apply the principles of electromechanical energy conversion and magnetic circuits to solve problems related to electrical machines.
2.	Evaluate the performance and characteristics of different types of DC generators for specific applications.

3.	Apply appropriate control and testing methods for DC motors based on their operational requirements.
4.	Analyze the performance and efficiency of single-phase transformers through testing and calculations.
5.	Compare the operation and applications of autotransformers and three-phase transformers.
6.	Explain the latest trends and industry applications in the field of electrical machines.
TEXT BOOKS:	
1.	I. J. Nagrath and D. P. Kothari, "Electric Machines", McGraw Hill Education, 5th Edition, 2017.
2.	P. S. Bimbhra, "Electric Machinery", Khanna Publishers, 2nd Edition, 2021.
3.	P. C. Sen, "Principles of Electric Machines and Power Electronics", John Wiley & Sons,Third Edition (Adapted Indian Edition).
REFERENCES:	
1.	A. E. Fitzgerald and C. Kingsley, "Electric Machinery", New York, McGraw Hill Education, 6th Edition 2017.
2.	A. E. Clayton and N. N. Hancock, "Performance and design of DC machines", CBS Publishers, 2018.
3.	M. G. Say, "Performance and design of AC machines", CBS Publishers, First Edition 2008.
4.	Sahdev S. K. "Electrical Machines", Cambridge University Press, 2018.
5.	I. J. Nagrath and D. P. Kothari, "Electric Machines", McGraw Hill Education, 2010.
6.	IEEE Energy Conversion Congress and Exposition, ECCE

CO – PO MAPPING

CO	PO											PSO		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**1**	**2**	**3**
CO1	2	2	1	-	-	-	-	-	-	-	2	2	1	-
CO2	2	2	1	-	-	-	-	-	-	-	2	2	1	-
CO3	2	2	1	-	-	-	-	-	-	-	2	2	1	-
CO4	2	2	1	-	-	-	-	-	-	-	2	2	1	-
CO5	2	2	1	-	-	-	-	-	-	-	2	1	1	-

CO6	2	1	-	-	-	-	-	-	-	-	3	1	1	-
LOW (1) ; MEDIUM (2) ; HIGH (3)														

	ADVANCED PYTHON PROGRAMMING	L T P C 3 0 0 3

COURSE OBJECTIVES:

✓	To learn how to design object oriented programs with Python classes.
✓	To understand threading concept and multithreading on Python.
✓	To learn about lambda function and regular expression.
✓	To develop GUI based applications and Graphics using python.
✓	To use Numpy, Pandas and Matplotlib packages.
✓	To know about real time applications of python.

UNIT - 1	**OBJECT ORIENTED PROGRAMMING IN PYTHON**	8

Applications: *OOPs concepts in Client Server Systems, OO Databases, Simulation and modeling.*

OOPs in python: Features of Object Oriented Programming system (OOPs) - classes and objects - Creating a class - the self variable, types of variables, namespaces – inheritance in python, types of inheritance – polymorphism – overloading – overriding – data hiding.

UNIT - 2	**THREADS AND ADVANCED FILE OPERATIONS**	8

Applications: *Multiprocessing, better resource utilization, rendering graphics.*

Threads in python: Difference between process and thread - types of threads - benefits of threads - creating threads – multithreading – starting a thread - thread synchronization. File operations – modes of opening a file – seek( ) and tell( ) - working with text file , binary file and CSV file – preparing a pdf file after data processing.

UNIT - 3	**LAMBDA FUNCTION AND REGULAR EXPRESSION**	8

Applications: *Quick data manipulation, less number of lines in coding, flexibility, pattern matching, word (or) character searching.*

Lambda function – syntax - advantages over normal function – difference between lambda and def - Regular expression - sequence characters in regular expressions - quantifiers in regular expressions - special characters in regular expressions - using regular expression on files - retrieving information from a file.

UNIT - 4	**GRAPHICAL USER INTERFACE & GRAPHICS IN PYTHON**	8

Applications: *Self ticket booking system, Video games, Designing Web pages.*

Graphical user interface: Creating a GUI in python - widget classes - working with Fonts and Colors, working with Frames, Layout manager, Event handling – Graphics in python - Turtle Graphics – turtle attributes and methods - Creating drawings and animations – simple shapes – working with colors and pen size – Using loops and functions – creating designs.

UNIT - 5	**PACKAGES IN PYTHON**	8

Applications: *Data Analysis and Visualization, real time numerical calculations, image processing, AIML model predictions.*

Introduction to Numpy -Creation of vectors and matrices - Matrix manipulation - Pandas - Pandas data structures – Series and Data Frame - Data wrangling using pandas – Matplotlib - Scatter plot - Line plot - Bar chart.

UNIT - 6	**REAL TIME APPLICATIONS**	5

Python in Web Development, Data Science , Artificial Intelligence and Machine Learning, Deep Learning, 3D game development, Web Scrap applications, Search Engine optimization. Familiar companies uses python – Netflix, Facebook, Spotify, Google, AWS uses Django and Flask.

TOTAL: 45 PERIODS

OUTCOMES:

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

1	Understand OOP concepts in Python including inheritance and polymorphism.
2	Work with files and perform operations on it using Python
3	Implement regular expression and concept of threads for developing efficient program
4	Design GUI based applications using Python
5	Gain knowledge of using Numpy, Pandas and Matplotlib packages.
6	Know the real time applications and familiar companies using python

TEXT BOOKS:

1.	Paul Gries , Jennifer Campbell, Jason Montojo, Practical Programming: An Introduction to Computer Science Using Python 3, Pragmatic Bookshelf, 3rd Edition, 2018.
2.	Programming through Python, M. T Savaliya, R. K. Maurya, G M Magar, Revised Edition, Sybgen Learning India, 2020.

REFERENCES:

1	Advanced Python Programming, Dr. Gabriele Lanaro, Quan Nguyen, Sakis Kasampalis, Packet Publishing, 2019.

2	Programming in Python 3, Mark Summerfield, Pearson Education, 2nd Ed, 2018.
3	Python: The Complete Reference, Martin C. Brown, McGraw Hill, 2018.
4	Beginning Python: From Novice to Professional, Magnus Lie Hetland, Apress, 2017.
5	Programming in Python 3, Mark Summerfield, Pearson Education, 2nd Ed, 2018.

(XXXXX) Subject Code	LIFE SKILL III – BASIC CONVERSATION SKILLS	L T P C 2 0 0 1

COURSE OBJECTIVES:

- ✓ To develop effective professional communication skills, including greetings, polite conversations, and intervening in dialogues.
- ✓ To introduce and practice framing questions using model auxiliaries (can, could, would) and WH questions in a technical environment.
- ✓ To apply tone, intonation, and voice modulation effectively in two-way conversations to enhance communication clarity and impact.
- ✓ To practice essential one-on-one conversation techniques to communicate effectively in interview settings.
- ✓ To practice various discussion activities.
- ✓ To understand the do's and don'ts of group discussions and perform group discussions.

UNIT – I PROFESSIONAL COMMUNICATION 2

Creating conversation - Professional greetings and courtesies - Introduction to polite conversation techniques – Intervening when two people are conversing - Polite disagreement

Practice: Initial greeting, Transitioning between conversations, Practicing professional greetings using conversation and Courtesy vocabularies in different scenarios **(C 17)**

Role-play: Conducting professional conversations

UNIT – II FRAMING QUESTIONS 2

Basics of framing questions using model auxiliaries (can, could, would, etc.) - WH questions and Yes/No questions in technical environment

Practice: Role - play exercises in question framing, Conducting Q&A sessions based on conversations, Effective questioning techniques in various settings

UNIT – III LISTENING TWO-WAY CONVERSATION 2

Understanding tone and intonation in conversations - Responding appropriately in two - way conversations, practicing real - life two - way conversations

Practices: Practicing two - way conversation with tone and intonation - Voice modulation

UNIT – IV TWO -WAY CONVERSATION – BASICS 2

"Basic one and one techniques in interview"

Practice: Conversation tips for effective two-way dialogue - Common conversation pit falls (how to avoid monotones, Long sentences and Breath control during conversation).

UNIT – V DISCUSSION 2

Techniques of discussion – Brainstorming questions, debate and argumentation, panel discussion

Practice: Asking brainstorming questions

UNIT – VI BASICS OF GROUP DISCUSSION 2

Dos and Don'ts of group discussion – Evaluation process

Practice: Three group discussions

TOTAL: 12 PERIODS

OUTCOMES:

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

1. Initiate and manage professional conversations with correct greetings and courtesies.
2. Demonstrate proficiency in asking clear and appropriate questions in professional and technical conversations.
3. Adjust their tone and intonation based on the context of the conversation.
4. Confidently navigate one-on-one interviews and other personal conversations.
5. Formulate and ask open-ended brainstorming questions.
6. Understand the importance and purpose of group discussions in professional and academic settings.

REFERENCES:

1. "Advanced Communication Skills" by Mathew Richardson, Charlie Creative Lab, 2020.
2. Andy Gillett, Using English for Academic purposes for students in higher Education. https://www.uefap.org/reading/
3. R. K. Agnihotri and A. L. Khanna. *English for Academic and Professional Purposes*. Macmillan India, 2008
4. **Swales, John M., and Christine B. Feak.** *Academic Writing for Graduate Students: Essential Tasks and Skills*. University of Michigan Press, 2012

CO – PO MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	-	-	-	-	-	-	-	-	3	3	-	3	-	-	-
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3	-	-	-	-	-	-	-	-	3	3	-	3	-	-	-
4	-	-	-	-	-	-	-	-	3	3	-	3	-	-	-
5	-	-	-	-	-	-	-	-	3	3	-	3	-	-	-
6	-	-	-	-	-	-	-	-	3	3	-	3	-	-	-
LOW (1) ; MEDIUM (2) ; HIGH (3)															

(XXXXX) Subject Code	HOLISTIC PERSONALITY DEVELOPMENT AND BEHAVIORAL SKILLS	L T P C 2 0 0 1

COURSE OBJECTIVES:

- ✓ To enable students to gain a comprehensive understanding of the self and its key components, including self-identity, self-image, self-concept, and self-confidence.
- ✓ To provide insights into the nature and types of fear, emphasizing its impact on both personal and academic spheres.
- ✓ To equip students with effective tools and strategies to assess and enhance self-esteem, while fostering a growth mindset and cultivating a positive attitude.
- ✓ To introduce the concept and dimensions of Emotional Intelligence (EQ) and differentiate it from Intelligence Quotient (IQ) and Spiritual Quotient (SQ).
- ✓ To develop students' communication proficiency and impression management skills for fostering healthy interpersonal relationships.
- ✓ To strengthen students' interpersonal competence for success in both social and professional environments.

UNIT –I SELF AWARENESS 2

Understanding Self (Self-Identity, Self-Concept, Self-Confidence, Self-Image) Techniques of Self Awareness (Johari Window, Self-Characteristics, Stages of Self Awareness)

UNIT –II FEAR MANAGEMENT 2

Understanding Fear (e.g., fear of failure, public speaking, exams, job interviews) - The science behind fear (Fight or Flight response) - Changing negative thoughts into positive ones - Facing fears step by step

UNIT –III SELF ESTEEM 2

Self Esteem & Effectiveness (Importance, High & Low Self-Esteem, Measurement, Steps to Improve) Adopting a growth mindset for continuous improvement. Building Positive Attitude (Types & Importance of Attitude)

UNIT –IV EMOTIONAL INTELLIGENCE 2

Emotional Intelligence (Difference Between IQ, EQ, and SQ) Managing Emotions & Building Emotional Competence - Power of Now

UNIT –V RELATIONSHIP MANAGEMENT 2

Understanding Relationships (Roles, Healthy Relationships) - Bridging Individual Differences (TA & Communication Styles) - Impression Management

UNIT –VI INTERPERSONAL RELATIONSHIP 2

Interpersonal Relationship Development (Skills & Types) - Theories of Interpersonal

Relationships (Social Exchange, Uncertainty Reduction) - Building Interpersonal Competence.

TOTAL: 12 PERIODS

COURSE OUTCOMES:

1. Students will be able to identify and analyze their self-concept, self-image, and self-confidence, while recognizing their individual strengths and areas for improvement.
2. Students will demonstrate an understanding of the biological and psychological foundations of fear and apply techniques to transform negative thought patterns into positive affirmations.
3. Students will implement evidence-based strategies to enhance self-esteem and adopt a growth-oriented approach to personal and professional development.
4. Students will effectively regulate and manage emotions by applying practical Emotional Intelligence (EQ) frameworks.
5. Students will articulate various roles within relationships, identify traits of healthy relationships, and utilize communication skills to foster meaningful connections.
6. Students will examine the development, theoretical foundations, and essential skills required for cultivating effective interpersonal relationships.

TEXT BOOKS:

1. "Emotional Intelligence: Why It Can Matter More Than IQ" by Goleman andDaniel, 10th Anniversary Edition 2006, Bantam Books.
2. "The 7 Habits of Highly Effective People" byCovey and Stephen R, 30th Anniversary Edition 2020, Simon & Schuster Publisher.
3. "Personality Development and Soft Skills" by Mitra, Barun K, 2nd Edition 2011, Oxford University Press.
4. "You Can Win: A Step by Step Tool for Top Achievers" by Khera, Shiv, Revised and Updated Edition 2014, Bloomsbury India Publisher.

REFERENCE BOOKS:

1. "You Can Win: A Step by Step Tool for Top Achievers" by Khera, Shiv, Revised and Updated Edition 2018, Bloomsbury India Publisher.
2. "Personality Development and Soft Skills" by Mitra, Barun K, 2nd Edition2016, Oxford University Press.
3. "The 7 Habits of Highly Effective People: Powerful Lessons in Personal Change" by Covey and Stephen R, 30th Anniversary Edition 2020.
4. "Emotional Intelligence: Why It Can Matter More Than IQ"by Goleman, Daniel, 10th Anniversary Edition2006.

SUB.CODE DATA STRUCTURES L T P C
3 0 2 4

COURSE OBJECTIVES:

- ✓ To introduce basic concepts of Data types, Algorithms and linear data structures.
- ✓ To perform operations on linear data structures Stack and Queues.
- ✓ To apply suitable non-linear data structure (tree) operations to solve specific problems.
- ✓ To utilize relevant graph algorithms for various graph-based applications.
- ✓ To evaluate different searching, sorting and hashing algorithms.
- ✓ To apply the data structure concepts in different domains.

UNIT- I INTRODUCTION TO DATA STRUCTURE AND LIST 8

Applications: *Linked list- image viewer, Music player, previous & next pages in web browser, GPS navigation, undo redo functionality.*

Introduction to analysis of algorithms - Asymptotic Notations -Recursive, Non Recursive Algorithm - Abstract Data Types (ADTs) -List ADT -Array-based implementation -Linked list implementation - Singly linked lists -Circularly linked lists -Doubly-linked lists -Applications of lists - Polynomial ADT- Polynomial Manipulation.

UNIT- II LINEAR DATA STRUCTURES–STACKS, QUEUES 8

Applications : Stack*-back & forward buttons in a web browser, recursive programs-****Queue****- call centers, printer management, traffic systems, task scheduling*

Stack ADT -Stack Model - Implementations: Array and Linked list - Operations - Applications - Balancing Symbols -Evaluating arithmetic expressions- Infix to Postfix conversion -Function Calls - Queue ADT - Operations - Circular Queue - DeQueue - Applications of Queues.

UNIT- III NON LINEAR DATA STRUCTURES–TREES 8

Applications : *BST- dictionary, phone contacts, online store system, File system.* ***AVL trees****-indexing databases-Heaps-resource allocation, directory structures in file systems.*

Tree ADT -Tree Traversals -Binary Tree ADT- Expression trees- Binary Search Tree ADT- AVL Trees - -Priority Queue (Heaps) - Binary Heap- Multi way Search Trees: B-Tree-B+ Tree.

UNIT -IV NON LINEAR DATA STRUCTURES -GRAPHS 8

Applications : *Social Networks, Transportation, Computer networks, Web crawling, GPS Navigation, Network routing. Telecommunication Networks-route planning for postal delivery, road trips*

Graph Definition-Representation of Graphs-Types of Graph- Breadth-first traversal -Depth-first traversal -Bi-connectivity-Euler circuits-Topological Sort-Shortest Path Algorithm: Dijkstra's algorithm- Minimum Spanning Tree: Prim's algorithm, Kruskal's Algorithm.

UNIT -V SEARCHING, SORTING AND HASHING 8

Applications: *E-commerce Applications, Social Media, Search Engines, Text Editors and IDE ,Accident Detection, Online shopping-* ***Hashing :*** *Bloom Filtering, Data base indexing, Password storage.*

Searching: Linear Search-Binary Search. Sorting: Bubble sort -Selection sort -Insertion sort -Quick sort. Hashing: Hash Functions -Collision Resolution Strategies: Separate Chaining -Open Addressing -Rehashing.

UNIT- VI RECENT TRENDS AND APPLICATIONS IN DIFFERENT DOMAIN 5

Introduction - Cache-Oblivious Data Structures, Sketch Data Structures, Geometric Data Structures, Self-Organizing Data Structures. Applications- AI & ML- Decision Trees for Predictions, Graphs in Neural Networks-Block chain Technology-Merkle trees, Hash tables. Healthcare and Bioinformatics-suffix trees, hash tables and Graphs. IoT- Circular buffer, Graphs & BST.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1: Understand basic concepts in algorithms and data structures.

CO2: Implement linear data structure operations.

CO3: Use appropriate linear/non–linear data structure operations for solving a given problem.

CO4: Apply appropriate graph algorithms for graph applications.

CO5: Analyze the various searching, sorting and hashing algorithms.

CO6: Apply the data structure concepts in different domains.

TEXT BOOKS

1. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C”, 2nd Edition, Pearson Education, 2005.
2. Kamthane, “Introduction to Data Structures in C”, 1st Edition, Pearson Education, 2007
3. SartajSahni, “Data Structures, Algorithms and Applications in C++”, Silicon paper publications,2004.

REFERENCES

1. “SCHAM’S outlines Data Structures With C”, Seymour Lipschutz, Adopted in India by Arrangement with The Tata McGraw-Hill companies, Lnc., New York.
2. Langsam, Augenstein and Tanenbaum, “Data Structures Using C and C++”, 2nd Edition, Pearson Education,2015.
3. Thomas H. Cormen, Charles E. Leiserson, Ronald L.Rivest, Clifford Stein, “Introduction to Algorithms", Fourth Edition, Mcgraw Hill/ MIT Press,2022.
4. Alfred V. Aho, Jeffrey D. Ullman,John E. Hopcroft ,”Data Structures and Algorithms”, 1st edition, Pearson, 2002.
5. Kruse, “Data Structures and Program Design in C”, 2nd Edition, Pearson Education, 2006.
6. RajeshK.Shukla,“Data Structures using C and C++”,Wiley India Publications,2009.

LIST OF EXPERIMENTS: **30 PERIODS**

1. Array implementation of List, Stack and Queue ADTs

2. Implementation of Singly Linked List

3. Write a program to simulate the working of stack using an array with the following:

i. Push

ii. Pop

iii. Display

The program should print appropriate messages for stack overflow, stack underflow

4. Linked list implementation of Linear Queue ADTs

5. Implementation of Polynomial addition and multiplication using Linked list

6. Implementation of Tree traversal Techniques

7. Implementation of Binary Search Trees

8. Implementation of Linear Search and Binary Search

9. Implementation of Insertion Sort and Selection Sort

CO-PO MAPPING

CO	PO											PSO		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
1	3	2	1	1	1	-	-	-	-	-	2	2	2	1
2	2	2	2	1	1	-	-	-	-	-	2	2	2	1
3	3	3	2	2	2	-	-	-	-	-	3	2	2	2
4	3	3	2	2	2	-	-	-	-	-	2	2	2	2
5	3	3	2	2	2	-	-	-	-	-	3	2	2	2
6	3	3	3	2	2	-	-	-	-	-	3	1	-	-

24EE02402	DIGITAL LOGIC CIRCUITS	L T P C 3 0 2 4

COURSE OBJECTIVES:

✓	To Understand and apply number system conversions, binary arithmetic, and Boolean algebra to simplify logic expressions.
✓	Compare different logic families based on speed, power, and interfacing characteristics.
✓	Design and analyze combinational circuits like adders, multiplexers, decoders, and logic minimization techniques.
✓	Understand and design sequential circuits using flip-flops, counters, and shift registers with proper timing analysis.
✓	Develop and simulate digital systems by integrating combinational and sequential logic using state machines and design tools.
✓	Introduce students to modern digital circuit design techniques using HDL, FPGA, and simulation tools, with an emphasis on low-power, high-performance, and real-world applications.

UNIT - 1	NUMBER SYSTEMS AND BOOLEAN ALGEBRA	10

Applications: *Binary arithmetic in digital systems ,Microprocessor logic, Logic gate design, Error detection and correction*

- *ALU and data path operations* Review of Number systems – Binary ,Octal, Decimal , Hexadecimal and conversions - Complements - Subtraction using complements - Binary codes - Theorems of boolean algebra - Canonical forms - Logic gates, Simplification of Boolean functions-K maps-Tabulation method.

UNIT - 2	LOGIC FAMILIES	10

Applications: *IC design using TTL, CMOS, Embedded systems and home appliances, High-speed communication circuits (ECL) , IoT and portable electronics, Power-sensitive designs*

Digital Logic Families - Introduction to RTL, DTL, TTL, ECL and MOSL families - Details of digital logic family -Wired and operation, characteristics of digital logic family - comparison of different logic families.

UNIT - 3	COMBINATIONAL LOGIC CIRCUITS	10

Applications: *ALUs: Adders, subtractors, Multiplexers/demultiplexers, Encoders/decoders , Code converters, Control logic in automation*

Combinational Logic - Representation of logic functions - Simplification and Implementation of combinational logic - Multiplexers and demultiplexers - Code converters, comparator, adders- full adder-half adder-decimal adder, subtractors - half subtractor- full subtractor.

UNIT - 4	SEQUENTIAL LOGIC CIRCUITS	10

Applications: *Counters and digital clocks, Memory units and shift registers, Finite state machines, Serial communication (UART, SPI), Traffic light and control systems*

Sequential Logic-Flip flops - SR, JK, D and T flip flops - Level triggering and edge triggering - Excitation tables - Counters - Asynchronous and synchronous type - Modulo counters - Shift registers - Ring counters.

UNIT - 5	**DESIGN OF DIGITAL SYSTEMS**	**10**

Applications: *Embedded and IoT devices, FPGA/ASIC hardware design, Robotics and automation, Automotive electronics,AI/ML accelerators and smart devices*

Design aspects; asynchronous type: concept of state - state reduction - analysis of asynchronous sequential logic circuits–introduction to design; programmable logic array and devices; finite state machine.

UNIT - 6	**CURRENT TRENDS**	**10**

FPGA, ASIC, and SoC design using tools like Xilinx Vivado, Intel Quartus, Cadence, and Mentor Graphics, with circuit development and simulation performed through HDL languages (Verilog/VHDL) and low-power CMOS techniques for applications in IoT, embedded systems, and high-speed computing.

Total: 60 periods

LIST OF EXPERIMENTS:

1. Verification Of Logic Gates
2. Verification of Boolean's Theorem
3. Design Of Half Adder And Full Adder
4. Design of Half Subtractor and Full Subtractor
5. Design and implementation of code converters
   (i)Binary To Gray Code Converter (ii)Gray To Binary Code Converter
6. Design and implementation of Multiplexer & De-Multiplexer

Total : 60+15 = 75 periods

OUTCOMES:

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

CO1	To understand number system conversions and analyze Boolean expressions to aid in digital logic circuit design.
CO2	To analyze and select appropriate logic families based on circuit requirements..
CO3	To design and implement combinational logic circuits for solving real-world logic problems.
CO4	To design and analyze sequential circuits using flip-flops, counters, and shift registers.
CO5	To model, simulate, and verify complete digital systems using combinational and sequential logic.

CO6	To design, simulate, and implement digital logic circuits using industry-standard tools and technologies like HDL and FPGA, addressing current demands in embedded and IoT systems.
TEXT BOOKS:	
1.	Morris Mano.M, 'Digital Logic and Computer Design', Prentice Hall of India, 6th Edition, 2018.
2.	Donald D.Givone, 'Digital Principles and Design', Tata McGraw Hill,1st Edition, July 2016.
3.	Thomas L Floyd, 'Digital fundamentals', Pearson Education Limited, 11th Edition, 30 August 2017.
REFERENCES:	
1.	Tocci R.J., Neal S. Widmer, 'Digital Systems: Principles and Applications', Pearson Education Asia, 12th Edition, 2017.
2.	Mandal, "Digital Electronics Principles & Application, McGraw Hill Edu, 2013.
3.	Charles H.Roth, Jr, LizyLizy Kurian John, 'Digital System Design using VHDL,Cengage,2013.
4.	William Keitz, Digital Electronics-A Practical Approach with VHDL, Pearson, 2013.
5.	D.P.Kothari,J.S.Dhillon, 'Digital circuits and Design',Pearson Education, 2016.

CO – PO MAPPING

CO	PO											PSO		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**1**	**2**	**3**
1	2	3	2	2	1	-	-	-	-	-	1	1	2	1
2	3	2	3	2	1	-	-	-	-	-	1	1	2	2
3	2	2	2	3	1	-	-	-	-	-	1	2	1	1
4	2	3	2	3	1	-	-	-	-	-	1	1	3	2
5	2	3	3	2	3	-	-	-	-	-	1	2	1	2
6	2	2	3	2	2	-	-	-	-	-	1	1	2	2

EEXXX	ELECTRICAL CIRCUITS LABORATORY	L T P C 0 0 3 1.5

COURSE OBJECTIVES:

✓	To provide students with hands-on experience in applying fundamental electrical circuit laws and network theorems through simulation and experimentation.
✓	To develop students' ability to investigate and analyze the transient and frequency response characteristics of electrical circuits.
✓	To familiarize students with the principles and measurement techniques of three-phase power systems and mutually coupled circuits.

LIST OF EXPERIMENTS:

1.	Simulation and experimental verification of series and parallel electrical circuit using fundamental laws.
2.	Simulation and experimental verification of electrical circuit problems using Thevenin's theorem.
3.	Simulation and experimental verification of electrical circuit problems using Norton's theorem.
4.	Simulation and experimental verification of electrical circuit problems using Superposition theorem.
5.	Simulation and experimental verification of Maximum Power transfer theorem.
6.	Study of Transient Behavior of RC and RL Circuits
7.	Simulation and Experimental validation of frequency response of RLC electric circuit.
8.	Study of series and parallel resonance circuit.
9.	Simulation and experimental verification of three phase balanced star, delta networks circuit (Power and Power factor calculations).
10.	Phase voltage and line voltage measurement of a three phase Y- connected load and Two- watt meter method of measuring power
11.	Study of mutual Inductance

TOTAL: 30 PERIODS

OUTCOMES:

At the end of the course the students is expected to be able to	
CO1	Analyze and verify the behavior of DC circuits using fundamental laws and network theorems (Thevenin's, Norton's, Superposition, Maximum Power Transfer) through simulation and experimental measurements.
CO2	Evaluate the transient and frequency response of RC, RL, and RLC circuits, including resonance phenomena, through simulation and experimental validation.
CO3	Measure and analyze three-phase power systems (star/delta, power factor, two-wattmeter method) and characterize mutually coupled circuits through experimental techniques.

CO – PO MAPPING

CO	**PO**											**PSO**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**1**	**2**	**3**
1	**3**	**3**	**2**	**1**	**3**	**-**	**-**	**-**	**2**	**-**	**-**	**2**	**1**	**-**
2	**3**	**3**	**2**	**1**	**3**	**-**	**-**	**-**	**2**	**-**	**-**	**2**	**1**	**-**
3	**3**	**2**	**2**	**1**	**3**	**-**	**-**	**-**	**2**	**-**	**-**	**2**	**1**	**-**
LOW (1) ; MEDIUM (2) ; HIGH (3)														

EEXXX	ELECTRICAL MACHINES -I LABORATORY	L T P C 0 0 3 1.5
COURSE OBJECTIVES:		
✓	To Provide hands-on experience in understanding the construction, operation, and characteristics of various DC machines (generators and motors) and single-phase transformers.	
✓	To conduct various tests (no-load, load, open circuit, short circuit, Swinburne's) on DC machines and transformers to determine their performance parameters, efficiency, and regulation.	
✓	To Familiarize students with different methods of speed control for DC motors.	
LIST OF EXPERIMENTS:		
1.	Open circuit and load characteristics of self excited DC shunt generator-calculation of critical resistance and critical speed.	
2.	Load test on DC shunt motor	
3.	Load test on DC series motor	
4.	Swinburne’s test.	
5.	Speed control of DC shunt motor.	
6.	Load test on single-phase transformer	
7.	Open circuit and short circuit tests on single phase transformer.	
8.	Separation of no-load losses in single phase transformer.	
9.	Study of starters in DC motor	
TOTAL: 45 PERIODS		

OUTCOMES:	
At the end of the course the students is expected to be able to	
CO1	Determine the operating characteristics, critical resistance, and critical speed of self-excited DC shunt generators through experimental procedures.
CO2	Analyze the performance and efficiency of DC shunt and series motors under various loading conditions.
CO3	Evaluate the performance parameters, efficiency, and regulation of single-phase transformers using appropriate experimental techniques (no-load, load, open-circuit, and short-circuit tests).
CO4	Apply various speed control methods for DC shunt motors and understand their impact on motor operation.
CO5	Understand the function and operation of DC motor starters.

CO – PO MAPPING

CO	**PO**											**PSO**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**1**	**2**	**3**
1	**3**	**3**	**1**	**3**	**2**	**-**	**-**	**-**	**2**	**-**	**-**	**2**	**1**	**-**
2	**3**	**3**	**1**	**3**	**2**	**-**	**-**	**-**	**2**	**-**	**-**	**2**	**1**	**-**
3	**3**	**3**	**1**	**3**	**2**	**-**	**-**	**-**	**2**	**-**	**-**	**2**	**1**	**-**
4	**2**	**2**	**3**	**2**	**2**	**-**	**-**	**-**	**2**	**-**	**-**	**2**	**1**	**-**
5	**2**	**2**	**1**	**1**	**1**	**-**	**-**	**-**	**2**	**-**	**-**	**2**	**1**	**-**
LOW (1) ; MEDIUM (2) ; HIGH (3)														