

MALLAREDDY(MR)

(DEEMED TO BE UNIVERSITY)

Recognized under Section 3 of the UGC Act, 1956

School of Electrical and Electronics Engineering (EEE)

Course Structure and Syllabus

Academic Year 2025-2026

Approved by AICTE, Accredited by NAAC with 'A++' Grade (Cycle-III)
Maisammaguda,Dhulapally(Post,ViaKompally)Medchal-Malkajgiri.Pin–500100,
www.mrdu.edu.in,

MALLA REDDY (MR)
(DEEMED TO BE UNIVERSITY)

Recognized Under Section 3 of the UGC Act, 1956

SCHOOL OF ELECTRONICS AND ELECTRICAL ENGINEERING

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING							
Course Structure: Semester - I							
S.No	Category	Course Code	Course Details	L	T	P	Credits
1	HSMC	250BT01	Matrices and calculus	3	1	-	4
2	ESC	2505T02	Python for Scientific Computing	3	1	-	4
3	BSC	250HT01	Language and Professional Skills	3	1	-	4
4	ESC	2502T01	Circuit Theory	3	1	-	4
5	ESC	2502P01	Electrical Engineering Practice Lab	-	-	3	1.5
6	ESC	2505P02	Python for Scientific Computing Lab	-	-	3	1.5
7	BSC	250HP01	Language and Professional Skills Lab	-	-	2	1
8	BSC	2500M02	Life Skills for Engineers - I	1	1	-	-
9	MC	2500M01	Indian Knowledge System	1	1	-	-
			Total	**14**	**6**	**8**	**20**
Course Structure: Semester - II							
S.No	Category	Course Code	Course Details	L	T	P	Credits
1	ESC	2504T03	Analog Electronics	3	1	-	4
2	BSC	250BT04	Differential Equations and Vector Calculus	3	1	-	4
3	ESC	2502T02	Network Analysis and Synthesis	3	1	-	4
4	ESC	2505T05	Fundamentals of Data Structures	3	1	-	4
5	ESC	2505P05	Fundamentals of Data Structures Lab	-	-	3	1.5
6	ESC	2504P03	Analog Electronics lab	-	-	3	1.5
7	ESC	2502P02	Electrical Circuits Lab	-	-	2	1
8	MC	2500M03	Life Skills for Engineers - II (Numerical ability)	1	1	-	-
9	MC	2500M04	Universal Human Values	1	1	-	-
			Total	**14**	**6**	**8**	**20**

SCHOOL OF ELECTRONICS AND ELECTRICAL ENGINEERING

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Course Structure: Semester - III							
S.No	Category	Course Code	Course Details	L	T	P	Credits
1	BSC	250BT07	Complex Variables and Numerical Methods	3	1	-	4
2	ESC	2504T02	Digital Circuit Design	3	1	-	4
3	PCC	2502T04	Electromagnetic Fields	3	1	-	4
4	PCC	2502T06	Electrical Machines-I	**3**	**-**	**-**	**3**
5	PCC	2502T07	Design of Photovoltaic Systems	**3**	**-**	**-**	**3**
6	PCC	2502P03	Electrical Machines Lab-1	**-**	**-**	**3**	**1.5**
7	ESC	2504P02	Digital Circuit Design Lab	-	-	3	1.5
8	MC	2500M05	Environmental Science	1	1	-	-
	PCC	2502SD1	Skill Development Course-1			4	2
	PCC	2502IN1	Internship -1				1
			Total	**16**	**4**	**10**	**24**

SCHOOL OF ELECTRONICS AND ELECTRICAL ENGINEERING

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Course Structure: Semester - IV							
S. No	**Category**	**Course Code**	**Course Details**	**L**	**T**	**P**	**Credits**
1	HSMC	250HT03	Management Science	4	-	-	4
2	ESC	2504T04	Signals and Systems ***(Proposed NPTEL Course)***	3	-	-	3
3	PCC	2502T08	Control Systems	3	1	-	4
4	PCC	2502T09	Power Systems-1	3	1	-	4
5	PEC-I	**2502T10**	**Electrical Machines- II** ***(Proposed NPTEL Course)***	**3**	-	-	**3**
		2502T11	**Renewable Energy Engineering** ***(Proposed NPTEL Course)***				
		2502T12	**Fuzzy Sets, Logic and Systems & Applications** ***(Proposed NPTEL Course)***				
6	PCC	2502P04	Electrical Machines Lab- II	-	-	3	1.5
7	ESC	2504P04	Signals and Systems lab	-	-	3	1.5
8	ESC	2500M06	Gender Sensitization Lab	1	1		-
9	PCC	2502SD2	Skill Development Course -2		-	2	1
10	PCC	2502SD3	Skill Development Course -3		-	2	1
11	PCC	2502IN2	Internship -2	-	-	2	1
			Total	**17**	**3**	**12**	**24**

2025-26 Onwards	MALLA REDDY (MR) Deemed to be University	B.Tech. - I Sem		
Code: 250BT01	MATRICES AND CALCULUS	L	T	P
Credits: 4	(Common to ECE,EEECE &ME)	3	1	-

Course Objectives: To learn

1) The types of matrices, finding the inverse of a matrix, rank of a matrix, and applying the concept of rank to know the consistency of linear equations and to find all possible solutions, if any exist.
2) Eigen values and Eigen vectors of a matrix, Diagonalisation of a matrix, the Cayley Hamilton theorem, and reducing a quadratic form into a canonical form through an orthogonal transformation.
3) Concept of mean value theorems and their applications to the mathematical problems and Evaluation of improper integrals using beta and gamma functions.
4) Partial differentiation, Jacobian, maxima and minima, and Taylor series expansion of functions of two variables.
5) Evaluation of multiple integrals and their applications in the allied fields.

MODULE I: Matrices **[8 Periods]**

Matrices: Types of Matrices; Determinant of a matrix, Rank of a matrix by Echelon form, Inverse of Non-singular matrices by Gauss-Jordan method; solving systems of Homogeneous and Non-Homogeneous linear equations,.

MODULE II: Eigen Values and Eigen Vectors **[8 Periods]**

Eigen values, Eigen vectors and their properties; Diagonalisation of a matrix; Cayley-Hamilton Theorem (without proof); Finding inverse and power of a matrix by Cayley-Hamilton Theorem. Quadratic forms: Nature, rank, index and signature of the Quadratic Form, Reduction of the Quadratic form to canonical forms by Orthogonal Transformation Method.

Module-III: Differential Calculus **[8 Periods]**

Mean value theorems: Rolle's Theorem, Lagrange's Mean value theorem with its Geometrical Interpretation and applications, Cauchy's mean value Theorem. Taylor's Series.

Module IV:Functions of Several Variables **[10 Periods]**

Limits, Continuity, Partial Differentiation, Chain rule, Total derivative, Homogeneous Function, Euler's Theorem, Jacobian,Maxima and Minima of two variables, Lagrange's method of undetermined Multipliers.

MODULE - V: Multiple Integrals **[12 Periods]**

Evaluation of Double Integrals both Cartesian and polar coordinates. Change of order of

integration (only Cartesian form). Change of variables (Cartesian to polar). Evaluation of Triple Integrals. Applications: Finding areas using double integrals and Volumes using triple integrals.

Text Books.

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2. Linear Algebra by J.N.Sharma and A.R.Vasista, Krishna PrakashamMandir, Meerut-250002

Reference Books:

1. FeryalAlayont Steven Schlicker ,Linear Algebra and Applications An Inquiry-Based Approach , Grand Valley State University.
2. Linear Algebra by Kenneth Hoffman and Ray Kunze, Pearson Education (low priced edition), New Delhi.

E – RESOURCES

a) Concerned Website links:

1) https://www.geeksforgeeks.org/how-to-solve-a-system-of-equations-using-inverse-of-matrices/?ref=asr8 (Matrices)
2) https://math.mit.edu/~gs/linearalgebra/ila5/linearalgebra5_6-1.pdf (Eigen Values and Eigen Vectors)
3) https://www.geeksforgeeks.org/mean-value-theorem/ (Mean Value Theorems)
4) https://www.scribd.com/document/213828641/Chapter-01-the-Gamma-and-Beta-Functions-01 (Beta and Gamma Function)
5) https://web.ma.utexas.edu/users/m408s/m408d/CurrentWeb/LM15-10-4.php (Jacobian)
6) https://www.geeksforgeeks.org/application-of-partial-derivative-two-variable-maxima-and-minima/ (Maxima and Minima of function of two variables)
7) https://ocw.mit.edu/ans7870/textbooks/Strang/Edited/Calculus/14.pdf (Multiple Integrals)

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

1) Find the Rank of a matrix, inverse of a matrix and analyse the solution of system of linear equations.
2) Find the Eigen values and Eigen vectors of a matrix, Diagonalisation of a matrix, verification of Cayley Hamilton theorem and Reduce the quadratic form to canonical form.
3) Verify mean value theorems; expand the given function using Taylor'sseries and Evaluate Improper Integrals using Beta and Gamma Functions.
4) Find the Jacobian, maxima and minima, Taylor series expansion of functions of two variables and partial derivatives.
5) Evaluate multiple integrals and its applications in areas and volumes.

COURSE ARTICULATION MATRIX:

Correlation of course outcomes with program outcomes and program specific outcomes

CO-PO Mapping (3/2/1 indicates strength of correlation) 3- Strong, 2-Medium, 1-Weak												
COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	2	2	3	3	-	-	-	-	-	-	2
CO2	3	2	2	-	-	-	-	-	-	-	2	-
CO3	3	-	-	3	2	-	-	-	-	-	3	2
CO4	-	2	2	2	3	-	-	-	-	-	2	2
CO5	2	2	2	3	3	-	-	-	-	-	-	2

2025-26 Onwards	MALLA REDDY (MR) Deemed to be University	B.Tech. - I Sem		
Code: 2505T02	PYTHON FOR SCIENTIFIC COMPUTING (Common for All)	L	T	P
Credits: 4		3	1	-

Prerequisites: Programming for Problem Solving

Course Objectives: This course will enable students to

1. Learn syntax and semantics along with the basic data structures of Python
2. Python functions to facilitate code reuse, Handle modules
3. Use Python to read and write files, Explore Python's object-oriented features
4. Understand Exception handling and multithreaded programming in Python.
5. Build GUI programming in Python.

MODULE - I **[10 Periods]**

Introduction: Introduction to Python, Input and Output Functions, Comments, Variables, Data Types - Integers, Strings, Booleans; Operators- Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Type conversions, Expressions and order of evaluations Control Flow- if, if-elif-else, for, while, break, continue, pass.

Data Structures: Lists - Operations, Slicing, Methods; Tuples, Sets, Dictionaries.

MODULE – II **[9 Periods]**

Functions: Functions, Defining Functions, Calling Functions, Passing Arguments, Keyword Arguments, Default Arguments, Variable-length arguments, Anonymous Functions, Fruitful Functions (Function Returning Values), Scope of the Variables in a Function - Global and Local Variables, Lambda Functions, Recursion.

Modules: Modules and Files, Namespaces, Importing Modules, Importing Module Attributes, Module Built-in Functions, Packages, and Other Features of Modules.

MODULE - III **[10 Periods]**

Files: File Objects, File Built-in Function, File Built-in Methods, File Built-in Attributes, Standard Files, Command-line Arguments, File System, File Execution, Persistent Storage Modules.

Classes and Object-Oriented Programming (OOP): OOP, Classes, Class Attributes, Instances, Instance Attributes, Binding and Method Invocation, Composition, Subclassing and Derivation, Inheritance, Built-in Functions for Classes, Instances, and Other Objects, Types vs. Classes/Instances, Customizing Classes with Special Methods, Privacy, Delegation and Wrapping.

MODULE – IV **[10 Periods]**

Exceptions: Exceptions in Python, Detecting and Handling Exceptions, Context Management, Exceptions as Strings, Raising Exceptions, Assertions, Standard Exceptions, Creating Exceptions, Exceptions and the sys Module.

Multithreaded Programming: Introduction, Threads and Processes, Python, Threads, and the Global Interpreter Lock, Thread Module, Threading Module, Related Modules.

MODULE - V **[9 Periods]**

GUI Programming: Introduction, Tkinter and Python Programming, Creating Your First Python GUI Application WithTkinter, Adding a Widget, Text and Images With Label Widgets, Clickable Buttons With Button Widgets, User Input With Entry Widgets, Multiline User Input With Text Widgets, Widgets to Frames With Frame Widgets, Standard attributes, Layout Controlling With Geometry Managers, pack( ),place( )grid( ).

Network programs, Using Web Services, Using databases and SQL

Advance Topics: Regular Expression, NumPy, matplotlib, Pandas

TEXT BOOKS

1. Wesley J. Chun, Core Python Programming, Second Edition, Prentice Hall, 2007.
2. Kenneth A. Lambert, Fundamentals of Python: First Programs, Cengage Learning, 2011.

REFERENCE BOOKS

1. Allen B. Downey, “Think Python, How to think like a Computer Scientist”, First Edition, O’reilly Publishing, 2018.
2. Vamsi Kurama, “Python Programming: A Modern Approach”, Pearson India, 2017.
3. Mark Lutz, “Learning Python”, Fifth Edition, O’rielly Publishers, 2013.
4. Reema Thareja, “Python Programming: Using Problem Solving Approach”, OUP, 2017.
5. RaghunadhP. , “Python Programming”, First Edition, AP, 2024

E–RESOURCES

1. Learn Python - Free Interactive Python Tutorial”, https://www.learnpython.org/
2. Free Python Tutorial - Python For Beginner,” https://www.udemy.com/share/101EfoB UcccV1SQHw
3. “Basics of Python for Data Science”, https://olympus.greatlearning.in/courses/11265
4. “Beginners Guide / Programmers - Python Wiki”, https://wiki.python.org/moin/BeginnersGuide/Programmers
5. “Introduction to Python”, https://www.datacamp.com/courses/intro-to-python-for-data-science

Course Outcomes:

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

1. Learn syntax and semantics along with the basic data structures of Python
2. Handle modules, files and packages in Python.
3. Understand exceptions and multithreaded programming in Python
4. Implement Object Oriented Programming concepts in Python.
5. Implement exemplary applications related to GUI Programming in Python.

COURSE ARTICULATION MATRIX:

Correlation of course outcomes with program outcomes and program specific outcomes

CO- PO Mapping															
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	**Programme Outcomes (POs)**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	-	3		1	-	-	-	-	-	-	1	2	1	-
CO2	-	-	2	1	1	-	-	-	-	-	-	1	1	-	-
CO3	-	-	2	1	1	-	-	-	-	-	-	1	-	-	2
CO4	1	2	3	2	1	-	-	-	-	-	-	1	-	-	3
CO5	-	-	2	2	1	-	-	-	-	-	-	1	-	-	2

2025-26 Onwards	MALLA REDDY (MR) Deemed to be University	B.Tech. I Sem		
Code: 250HT01	LANGUAGE AND PROFESSIONAL SKILLS (Common to All)	L	T	P
Credits: 4		3	1	-

Course Objectives:

This course is designed to improve students' language proficiency, critical thinking, and communication skills through the study of diverse literary works, vocabulary enrichment, grammar fundamentals, and practical applications in listening, speaking, reading, and writing.

This course will enable the students to:

1. Equip students with the ability to analyse and appreciate various literary genres and to achieve proficiency in foundational grammar.
2. Cultivate effective oral communication abilities by mastering listening and speaking techniques and by analysing communication dynamics through case studies.
3. Improve written communication skills, covering critical reading and professional writing.
4. Equip students with practical writing skills necessary for professional communication
5. Develop essential power skills, including creativity, critical thinking, teamwork, and time management, for effective application in both academic and real-world scenarios.

MODULE - I **[10 Periods]**

Theory: Elon Musk on Education (Essay)

Vocabulary: Comprehensive Vocabulary – Synonyms, Antonyms, Prefixes, Suffixes.

Grammar: Phrases, Clauses and Sentences, Synthesis of Sentences

Listening: Importance of Listening, Sub-skills of Listening, Demonstrating Listening Skills

MODULE – II **[9 Periods]**

Theory: Unknown Citizen (A Poem) by W.H. Auden.

Vocabulary: Word Formation, Homophones, Homonyms, Homographs.

Grammar: Articles, Prepositions, Errors Diagnoses.

Speaking: Narration, Descriptions, Case studies dealing with the Communication Process

MODULE - III **[10 Periods]**

Theory: The Tell-Tale Heart (Short Story)

Vocabulary: Idiomatic expressions, One-word Substitutes.

Grammar: Tense and its Aspect- Concord- Noun – Pronoun Agreement

Reading: Critical Reading, Newspaper Reading to enhance creative thinking skills, Reading for Inference and Specific Details.

MODULE – IV **[10 Periods]**

Theory: The Nightingale and the Rose by Oscar Wilde (Short story)

Vocabulary: Transition Words, Words often confused.

Grammar: Voice- Active and Passive- Speech- Direct and Indirect Speech.

Writing: Email and Netiquette, Resume Writing, Technical Report Writing and Letter Writing.

MODULE - V **[9 Periods]**

Theory: The Machine that Won the War (Science Fiction) by Isaac Asimov.

Vocabulary: Analogies, Technical Vocabulary.

Grammar: Adjectives and Degrees of Comparison

Power Skills: Creativity, Critical Thinking, Teamwork, Time Management.

TEXTBOOKS

1. Prompt-English for Digital Natives, 2025

REFERENCE BOOKS

1. Vishwa Mohan, Aysha. (2013). English for Technical Communication for Engineering Students. McGraw-Hill Education India Pvt. Ltd.
2. Chaudhuri, Santanu Sinha. (2018). Learn English: A Fun Book of Functional Language, Grammar, and Vocabulary. (2nd ed.). Sage Publications India Pvt. Ltd.
3. Laplente, Phillip A., Technical Writing: A Practical Guide for Engineers, Scientists, and Non-Technical Professionals, Routledge, Second Edition.
4. Lester, Mark, and Larry Beason, Handbook of English Grammar and Usage. McGraw-Hill Education, Third Edition.
5. Henning, Serena, Technical Writing: A reference Guide to Reports, E- Mails, Resumes and More. Amazon.in.
6. Effective Academic Writing by Liss and Davis (OUP)
7. Swan, Michael. (2016). Practical English Usage. Oxford University Press. Fourth Edition.

E–RESOURCES

1. https://xpressenglish.com/our-stories/machine-that-won-the-war/
2. https://literariness.org/2021/05/29/analysis-of-isaac-asimovs-the-machine-that-won-the-war/
3. https://cummingsstudyguides.net/Guides7/Telltale.html
4. https://www.britannica.com/topic/Brave-New-World
5. https://cummingsstudyguides.net/Guides9/UnknownCitizen.html

Course Outcomes:

Upon successful completion of the course, students will be able to:

1. Understand & apply foundational grammar and utilize an expanded vocabulary for effective comprehension and communication.
2. Analyse diverse literary texts and evaluate the effectiveness, accuracy, and nuances of varied spoken and written communications.
3. Create and produce effective written and oral communications.
4. Apply and adapt language for effective professional communication.
5. Develop and exhibit essential power skills, including creativity, critical thinking, teamwork, and time management.

COURSE ARTICULATION MATRIX:

Correlation of course outcomes with program outcomes and program specific outcomes

CO- PO Mapping															
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	**Programme Outcomes (POs)**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO 2**	**PSO3**
CO1	-	-	-	-	-	-	-	**2**	**2**	**3**	**-**	2	**-**	-	-
CO2	-	-	-	-	-	-	-	-	-	**3**	**2**	-	-	-	-
CO3	-	**1**	**1**	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	**1**	**2**	-	**2**	-	**2**	-	-	-
CO5	-	**1**	**1**	-	-	-	**1**	-	-	**2**	-	-	-	-	-

2025-26 Onwards	MALLA REDDY (MR) Deemed to be University	B.Tech. - I Sem		
Code: 2502T01	CIRCUIT THEORY	L	T	P
Credits: 4		3	1	-

PREREQUISITES: Mathematics, Physics COURSE

OBJECTIVES:

- To introduce electric circuits and its analysis
- To provide key concepts to analyze and understand electrical circuits
- To impart knowledge on solving circuits using mesh and nodal analysis
- To impart knowledge on analysis of magnetic circuits and resonance.
- To introduce Phasor diagrams and analysis of single & three phase circuits

COURSE CONTENTS:

MODULE I INTRODUCTION TO ELECTRICAL CIRCUITS 12 Periods

Basic Concepts of passive elements of R, L, C – Ohm's Law- V-I relations, Sources, Network reduction techniques - star-to delta and delta-to-star transformation, source transformation technique with Numerical Problems.

MODULE II ELECTRICAL CIRCUITS ANALYSIS 12 Periods

Kirchhoff's Voltage Law, Kirchhoff's Current Law, Nodal analysis and Mesh analysis to DC networks with dependent and independent sources. Super Node and Super Mesh Analysis for Independent Sources.

MODULE III AC CIRCUITS 12 Periods

A: Representation of sinusoidal waveforms- Instantaneous, Average and RMS values, Peak factor & Form factor- phasor, phasor diagrams. Impedance and Admittance Concept - Power Factor- Steady state analysis of R, L and C circuits - series and parallel RL, RC and RLC circuits.

B: Analysis of three phase 3-wire and 4-wire circuits with star and delta connected loads, balanced and unbalanced system.

MODULE IV MAGNETIC CIRCUITS 12 Periods

Basic definition of MMF, flux and reluctance, analogy between electrical and magnetic circuits, Faraday's laws of electromagnetic induction – concept of self and mutual inductance, Dot convention – coefficient of coupling and composite magnetic circuit.

MODULE V: RESONANCE 12 Periods

Series Resonance: Characteristics of a series resonant circuit, Q-factor, selectivity and bandwidth, expression for half power frequencies; Parallel resonance: Q-factor, selectivity and bandwidth, Numerical Problems.

TEXT BOOKS

1. Sudhakar. A, Shyammohan. S.P Circuits and Networks-Analysis and Synthesis. Tata Mc Graw Hill publishers, 5 th Edition, 2015.
2. William H. Hayt Jr, Jack E. Kemmerly and Steven M. Durbin, Engineering Circuit Analysis", Tata McGraw Hill publishers, New Delhi, 2013.

REFERENCE BOOKS

1. Fundamentals of Electrical Circuits, Charles K. Alexander and Mathew N.O. Sadiku, Mc Graw Hill Education (India), 2013, Fifth Edition
2. Circuit Theory: Analysis and Synthesis, A. Chakrabarti, Dhanpat Rai & Co., 2018, Seventh Revised Edition.
3. Network Analysis, M. E. Van Valkenburg, Pearson Education, 2019, Revised Third Edition: 1.
4. Electric Circuits (Schaum's outline Series), Mahmood Nahvi, Joseph Edminister, and K. Rao, Mc Graw Hill Education, 2017, Fifth Edition.

COURSE OUTCOME

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

CO1	Explain the basic concepts of electrical circuits and apply network reduction techniques.	Apply
CO2	Solve DC electrical circuits using Kirchhoff's laws, mesh and nodal analysis including super node/mesh cases.	Apply
CO3	Analyze single-phase and three-phase AC circuits and compute current, voltage, and power..	Analyze
CO4	Explain and analyze magnetic circuits using concepts of MMF, flux, reluctance, and inductance.	Analyze
CO5	Analyze resonance in RLC circuits and evaluate parameters like Q-factor and bandwidth.	Evaluate

CO-PO MAPPING

(3/2/1 indicates strength of correlation)
3-Strong, 2-Medium, 1-Weak

COs	Program Outcomes (POs)												PSOs		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	1	2	3	1	3	-	-	-	-	1	3	3	-
CO2	3	3	3	3	3	1	3	-	-	-	-	-	3	2	-
CO3	3	2	1	3	3	-	3	-	-	-	1	-	3	3	-
CO4	3	3	3	3	3	-	3	1	-	-	1	-	3	3	-
CO5	3	3	3	3	3	-	3	1	-	-	1	-	3	3	-

2025-26 Onwards	MALLA REDDY (MR) Deemed to be University	B.Tech. - I Sem		
Code: 2502P01	ELECTRICAL ENGINEERING PRACTICE LAB	L	T	P
Credits: 1.5		-	-	3

PREREQUISITES: Nil

COURSE OBJECTIVES:

The primary objectives of an Electrical Engineering Practice Lab are to provide hands-on experience with basic engineering practices, electrical circuits, and equipment. This includes learning about tools, abbreviations, and symbols used in electrical engineering, as well as understanding and using various measuring instruments. Students also gain practical experience with concepts like wiring, circuit analysis, and the operation of electromechanical devices.

LIST OF EXPERIMENTS:

1. Study of Introduction to different electrical tools, symbols and abbreviations.
2. Study of types and sizes of wires and making "T" joints and straight joints for wires.
3. Residential house wiring using Switches, Fuse, Indicator and Lamp
4. Fluorescent Lamp Wiring.
5. Staircase Wiring.
6. Measurement of Voltage, Current, Power and Power factor in single phase electrical circuit.
7. Measurement of AC signal parameters using CRO.
8. Measurement of Earth Resistance
9. Study of electrical equipment (fan, iron box, mixer-grinder, etc)
10. Study of electronic components and equipment.
    a. Resistor Colour coding.
    b. Assembling electronic components on bread board for a simple circuit.

TEXT BOOKS & REFERENCES

1. R P Sing, Electrical Workshop: A Textbook, 2nd Edition, L K International Publications, 2010
2. Dr. Umesh Rathore, Naresh Kumar Sharma, "**A Textbook of Electrical Workshop Practices**", 1st edition, S.K. Kataria & Sons, 2019, ISBN: 978-93-5014-695-8

COURSE OUTCOME

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

CO1	**Identify** various electrical tools, components, and safety devices used in domestic and industrial wiring.	Understanding	L2
CO2	**Demonstrate** different wiring techniques such as residential, fluorescent lamp, and staircase wiring, ensuring adherence to safety standards.	Analyzing	L4
CO3	**Measure and interpret** electrical parameters like voltage, current, power and power factor using appropriate meters and CRO.	Analyzing	L4
CO4	**Construct** basic electrical joints and assemble components on a breadboard for simple circuits.	Applying	L3
CO5	**Examine and explain** the working of common household electrical appliances.	Analyzing	L4

CO-PO MAPPING

(3/2/1 indicates strength of correlation)
3-Strong, 2-Medium, 1-Weak

COs	**Program Outcomes (POs)**												**PSOs**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	2	1	2	-	-	-	-	-	1	1	-	1	2	2	-
CO2	3	3	2	2	-	-	1	-	1	1	-	1	2	-	-
CO3	3	3	2	2	1	-	1	-	1	1	-	1	2	-	-
CO4	3	2	2	2	1	-	-	-	1	1	-	1	2	-	-
CO5	3	3	3	3	2	-	1	-	1	1	-	1	2	1	-

2025-26 Onwards	Malla Reddy (MR) (Deemed to be University)	B.Tech. - I Sem		
Code: 2505P02	PYTHON FOR SCIENTIFIC COMPUTING LAB (Common for All)	L	T	P
Credits: 1.5		-	-	3

Prerequisites: Programming for Problem Solving

Course Objectives:

This course enables the students to develop various applications using python.

Software Requirements: Python IDLE

WEEK-1

1. a) Use a web browser to go to the Python website http://python.org. This page contains information about Python and links to Python-related pages, and it gives you the ability to search the Python documentation.

b) Start the Python interpreter and type help( ) to start the online help utility.

2. a) Start a Python interpreter and use it as a Calculator.

b) Write a program to purposefully raise Indentation Error and correct it.

c) Write a program to demonstrate different number data types in Python

3. a) Write a program to compute distance between two points taking input from the user (Pythagorean Theorem).

b) Write a program to perform different Arithmetic Operations on numbers in Python.

WEEK-2

1. a) Write a program using a while loop that asks the user for a number, and prints a countdown from that number to zero

b) Write a Program for checking whether the given number is even number or not.

2. a) Write a Python script that prints prime numbers less than N (N to be taken from user), and print the sum of all primes.

b) Write a program, that prints out the decimal equivalents of 1/2, 1/3, 1/4, . . ., 1/10, using for loop

3) Print the below triangle using for loop.

```
4 4                 *   *   *
3 3 3             *   *   *   *   *
2 2 2 2         *   *   *   *   *   *   *
1 1 1 1 1
```

WEEK-3

1. a) Write a program to create, concatenate and print a string and accessing sub- string from a given string

b) Write a program to count the numbers of characters in the given string and store them in a dictionary data structure

2. a) Write a program to combine two lists into a dictionary.
   b) Write a function dups to find all duplicates in the list.
   c) Write a function unique to find all the unique elements of a list.

WEEK-4

1.a) Write a python program to define a module to find Fibonacci Numbers and import the module to another program.
   b) Write a python program to define a module and import a specific function of that module to another program.

2. a) Write a function reverse to reverse a list. Without using the reverse function.
   b) Write a function called palindrome that takes a string argument and returnsTrue if it is a palindrome and False otherwise. Remember that you can use the built-in function len( ), to check the length of a string.

WEEK-5

1. a) Write a program to perform addition of two square matrices
   b) Write a program to perform multiplication of two square matrices
2. a)Write a script named copyfile.py. This script should prompt the user for the names of two text files. The contents of the first file should be input and written to the second file.
   b) Write a program to print each line of a file in reverse order.
   c) Write a program add.py that takes 2 numbers as command line arguments and prints its sum.
   d) Write a program to compute the number of characters, words and lines in a file.

WEEK-6

1. a)Program to implement Animal Communication using Inheritance
   b) Program demonstrates encapsulation by managing bank account details
2. a)Program to implement Vehicle Engine Startup using Abstraction
   b) Program to draw different shapes by using Polymorphism

WEEK-7

1. a)Program to implement Bank Account Management System using Exception handling?
   b) Basic calculator that performs arithmetic operations and handles exceptions for invalid inputs and operations.
2. a)program to implement user registration system using Exception Handling?

   b) Program to implement multi-threading with threading module?

WEEK-8

1.a)Write a GUI for an Expression Calculator using tkinter
   b)A simple to-do list application where users can add and remove tasks.

2.a)Write a GUI Application for student registration form using tkinter?
   b) Write a GUI Application for Employee Login Page form using tkinter?

WEEK-9

1. Write a python programming to implement Stack and Queue using array

2. Write a python programming to implement Single Linkled List

WEEk-10

1. Write a python program to implement various methods in Numpy, Matplotlib and Pandas

TEXT BOOKS

1. Wesley J. Chun, Core Python Programming, Second Edition, Prentice Hall, 2007.
2. Kenneth A. Lambert, Fundamentals of Python: First Programs, Cengage Learning, 2011.

REFERENCE BOOKS

1. Allen B. Downey, "Think Python, How to think like a Computer Scientist", First Edition, O'reilly Publishing, 2018.
2. VamsiKurama, "Python Programming: A Modern Approach", Pearson India, 2017.
3. Mark Lutz, "Learning Python", Fifth Edition, O'rielly Publishers, 2013.
4. RaghunadhP. , "Python Programming", First Edition, AP, 2024

Course Outcomes

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

1. Able to learn core Python scripting elements such as variables and flow control structures
2. Able to know how to work with lists and sequence data
3. Able to write Python functions to facilitate code reuse
4. Able to use Python to read and write files
5. Able to manage exceptions, implement multi-threading, and create GUIs with Tkinter in Python.

CO- PO,PSO Mapping															
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	3	-	2	-	-	-	-	-	-	1	2	1	-
CO2	-	-	2	1	2	-	-	-	-	-	-	1	1	-	-
CO3	-	-	2	1	1	-	-	-	-	-	-	1	-	-	2
CO4	1	1	3	2	1	-	-	-	-	-	-	1	-	-	3
CO5	-	-	2	2	1	-	-	-	-	-	-	1	-	-	2

2025-26 Onwards	MALLA REDDY (MR) Deemed to be University	B.Tech. I Sem		
Code: 250HP01	LANGUAGE AND PROFESSIONAL SKILLS LAB (Common to All)	L	T	P
Credits: 1		-	-	2

Course Objectives:

This course is designed to develop effective communication skills through focused learning in acoustics, pronunciation, interactive communication, and structured expression.

This course will enable the students to:

1. Master accurate English pronunciation and articulation, including speech sounds, word stress, rhythm, and intonation, to reduce mother tongue influence**.**
2. Effectively comprehend and document information from varied audio sources.
3. Participate confidently in a range of interactive communication contexts, including formal presentations and spontaneous discussions.
4. Articulate descriptive and expressive content effectively across both oral and various written formats.
5. Participate proficiently in formal communication settings and integrate an expanded vocabulary.

MODULE - I **[8 Periods]**

Speech Sounds -Building correct Pronunciation/articulation of words & symbols consulting dictionary and developing fluency through practice, Ice- Breaking Activity, Introducing Oneself and Others, Non-Verbal Communication, Conversations (Greetings and Taking Leave), JAM Session.

MODULE – II **[9 Periods]**

Errors in Pronunciation, Fun with English- Tell a story in just six words (include articles, prepositions and conjunctions), Making a Short Speech – Extempore,SWOC Analysis.

MODULE - III **[7Periods]**

Descriptions of current and past events, Jigsaw Activity with Newspapers, Expression through Structured Talk, Describing cartoons, Building and playing with GRE words

MODULE – IV **[8 Periods]**

Minimizing Mother Tongue interference to improve fluency. (Mind your Language), Make a Brochure, Journaling,writing a Book Review, A letter to your future self, “What if” Scenarios.

MODULE - V **[7 Periods]**

Debating, Panel Discussion, TEDx Talks (Listening to Achievers, Eminent Personalities), Listening to Technical Seminar Speeches.

Text Books:

1. Leaver, Betty Lou, and Boris Shekhtman- **Developing Professional-Level Language Proficiency**
2. Steve Hart **-Expand Your English.**
3. Mahanand Anand- **English for Academic and Professional Skills**

REFERENCE BOOKS

1. Shobha, KN&Rayen, J. Lourdes. (2019). Communicative English – A workbook. Cambridge University Press
2. Kumar, Sanjay & Lata, Pushp. (2019). Communication Skills: A Workbook. Oxford University Press
3. Board of Editors. (2016). ELCS Lab Manual: A Workbook for CALL and ICS Lab Activities. Orient Black Swan Pvt. Ltd.
4. Mishra, Veerendra et al. (2020). English Language Skills: A Practical Approach. Cambridge University Press
5. Cambridge IELTS by Cambridge University Press
6. How to prepare for the TOEFL iBT 12th edition by Pamela. J. Sharp, Galgotia Publications
7. The GRE for Dummies, 2nd edition by Suzee Vik, Comdex Computer Publishing.

E–RESOURCES

1. Listening Skills (Audio Lectures, Audio Dialogues), https://takeielts.britishcouncil.org/take-ielts/prepare/free-ielts-english-practice-tests/listening
2. SWOC Analysis, https://www.oneeducation.org.uk/how-to-conduct-a-swot-analysis-for- students/
3. "Jill Diamond for Rhythm and Intonation", https://www.byjilldiamond.com/blog/speak-english-with-confidence-and-inner-trust-a-foundational-lesson
4. Neutralization of Mother Tongue Influence| Mind your Language
5. Listening for British and American Pronunciation| https://www.espressoenglish.net/british-english-vs-american-english-pronunciation/

Course Outcomes:

Upon successful completion of the course, students will be able to:

1. Apply phonetic knowledge and practice to produce accurate English pronunciation, thereby minimizing mother tongue influence. *(*Applying, Creating*)*.
2. Analyze and evaluate spoken content from diverse audio sources to extract key information and construct effective notes. *(*Analyzing, Evaluating, Creating*)*.
3. Engage confidently and effectively in various interactive communication contexts and deliver prepared and impromptu public speeches. *(*Applying, Creating*)*.
4. Articulate descriptive and expressive content effectively across both oral presentations and diverse written formats. (Creating)
5. Participate proficiently in formal communication settings and integrate an expanded, contextually appropriate vocabulary. (Applying, Evaluating, Creating)

COURSE ARTICULATION MATRIX:

Correlation of course outcomes with program outcomes and program specific outcomes

CO- PO Mapping															
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	**Programme Outcomes (POs)**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	-	-	-	-	-	-	-	-	3	3	-	1	-	-	-
CO2	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	2	2	3	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	1	3	-	-	-	-	-
CO5	-	-	-	-	-	-	-	1	2	1	-	1	-	-	-

2025-26 Onwards	MALLA REDDY (MR) Deemed to be University	B.Tech. - I Sem		
Code 2500M02	LIFE SKILLS FOR ENGINEERS – I (Quantitative Aptitude) (Common for All)	L	T	P
Credits:0		1	1	-

Course objectives:

The Quantitative Aptitude course is designed to equip students with essential mathematical and analytical skills required for various competitive exams, academic pursuits, and real-world problem-solving scenarios. The primary objective of this course is to enhance participants' numerical ability and logical reasoning, enabling them to tackle quantitative questions with confidence and efficiency.

MODULE - I **[6 Periods]**

Quants: Percentages, Profit and Loss.

Percentages- Percentage Increase/Decrease; Results on Population; Results on Depreciation.
Profit & Loss- Cost Price; Selling Price: Profit or Gain; Gain Percentage; Loss Percentage.

Logical: Blood Relation

Blood Relations- Classification of blood relations, Pointing a person, Equation related problems.

MODULE - II **[8 Periods]**

Quants: Interests

Interests- Types of interest; Simple interest; principle; Rate of interest; compound interest; interest is compounded Annually; interest is compounded Half-yearly; interest is compounded Quarterly; Rates are different for different years, say R_1%, R_2%, R_3% for 1st, 2nd and 3rd year respectively; Present worth of Rs. x due n years.

Logical: Clocks

Clocks: Introduction, Derivation of angles, Angles between hands of the clock, Hands together, Hands at angular distance, Gain & Loss problems.

MODULE - III **[6 Periods]**

Quants: Ratio and Proportion, Averages

Ratios & Proportion- The ratio of two quantities a and b in the same units; Proportion; The equality of two ratios is called proportion; Fourth Proportional; Mean Proportional; Comparison of Ratios; Duplicate Ratios; Variations.
Averages- Average Speed, Weighted average.

Logical: Coding and Decoding

Coding and Decoding- Number Series, Alphabet Series, Analogy, Odd Man Out, Visual Reasoning.

MODULE - IV **[6 Periods]**

Quants: Time and Work;

Time & Work- Work from Days: Calculate the one-day work; Days from Work: Shortcut to calculate the work in given time.

Logical: Directions
Directions - Introduction, Direction based questions, Shadow based problems.

MODULE - V **[6 Periods]**
Quants: Mixtures and Alligations
Alligation- Mean Price; Rule of Alligation; a container contains x of liquid from which y units are taken out and replaced by water;

Logical: Cubes
Cubes- Cube & cuboid concepts, 3-2-1-0 faced problems.

Text Books:

1. "Quantitative Aptitude for Competitive Examinations" by R.S. Aggarwal

Reference Books:

2. "How to Prepare for Quantitative Aptitude for the CAT" by Arun Sharma
3. "Fast Track Objective Arithmetic" by Rajesh Verma
4. "Magical Book on Quicker Maths" by M. Tyra
5. "Quantitative Aptitude Quantum CAT" by Sarvesh K. Verma

e-Resources:

1. Khan Academy (https://www.khanacademy.org/):
2. MathIsFun (https://www.mathsisfun.com/)
3. GMAT Club (https://gmatclub.com/)
4. IndiaBIX (https://www.indiabix.com/)
5. Studytonight (https://www.studytonight.com/)

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

1. Develop Strong Mathematical Foundations: Gain a comprehensive understanding of fundamental mathematical concepts, including arithmetic, algebra, geometry, and data interpretation, providing a solid basis for tackling quantitative problems.
2. Enhance Problem-Solving Skills: Learn diverse problem-solving techniques and strategies to approach quantitative questions in a systematic manner, enabling efficient and accurate solutions.
3. Improve Speed and Accuracy on Averages: Practice through a variety of exercises and timed quizzes to enhance computational speed and precision, vital for competitive exams and time-sensitive tasks.
4. Master Time and work: Acquire skills in interpreting data from time and work scenarios decisions based on the given information.
5. Build Allegation and mixtures: Strengthen logical reasoning abilities to analyze and deduce patterns, aiding in solving complex quantitative problems.

COURSE ARTICULATION MATRIX:

Correlation of course outcomes with program outcomes and program specific outcomes

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	**Programme Outcomes(POs)**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**	**PSO3**
CO1	1	2	2	-	-	-	-	-	-	2	-	-	-	-	-
CO2	1	2	2	-	-	-	-	-	-	2	-	-	-	-	-
CO3	1	2	2	-	-	-	-	-	-	2	-	-	-	-	-
CO4	1	2	2	-	-	-	-	-	-	2	-	-	-	-	-
CO5	1	2	2	-	-	-	-	-	-	2	-	-	-	-	-

2025-26 Onwards	MALLA REDDY (MR) Deemed to be University	B.Tech. - I Sem		
Code: 2500M01	INDIAN KNOWLEDGE SYSTEM (Common for All)	L	T	P
Credits: 0		1	1	-

Pre requisite: NIL

Course Objectives:

1. Creating awareness amongst the youths about the true history and rich culture of the country;
2. Understanding the scientific value of the traditional knowledge of Bhārata;
3. Promoting the youths to do research in the various fields of Bhāratīya knowledge system;
4. Converting the Bhāratīya wisdom into the applied aspect of the modern scientific paradigm;
5. Adding career, professional and business opportunities to the youths.

Module -I: Bhāratīya Civilization and Development of Knowledge System [4 hours]
Genesis of the land, Antiquity of civilization, On the Trail of the Lost River, Discovery of the Saraswatī River, the Saraswatī-Sindhu Civilization, Traditional Knowledge System, The Vedas, Main Schools of Philosophy (6+3), Ancient Education System, the Takṣaśilā University, the Nālandā University, Alumni, Knowledge Export from Bhārata.

Module-II: Arts, Literature, and Scholars [4 hours]
Art, Music, and Dance, Naṭarāja– A Masterpiece of Bhāratīya Art, Literature, Life and works of Agastya, Lopāmudrā, Ghoṣā, Vālmīki, Patañjali, Vedavyāsa, Yājňavalkya, Gārgī, Maitreyī, Bodhāyana, Caraka, Suśruta, Jīvaka, Nāgārjuna, Kaṇāda, Patañjali, Kauṭīlya, Pāṇini, Thiruvalluvar, Āryabhaṭa, Varāhamihira, Ādi Śaṅkarācārya, Bhāskarācārya, Mādhavācārya.

Module-III: Science, Astronomy, and Mathematics [4 hours]
Concept of Matter, Life and Universe, Gravity, Sage Agastya's Model of Battery, Velocity of Light, Vimāna: Aeronautics, Vedic Cosmology and Modern Concepts, Bhāratīya Kāla-gaṇanā, Kerala School for Mathematics and Astronomy, History and Culture of Astronomy, Sun, Earth, Moon, and Eclipses, Earth is Spherical and Rotation of Earth, Archaeostronomy; Concepts of Zero and Pi, Number System, Pythagoras Theorem, and Vedic Mathematics.

Module-IV: Engineering, Technology, and Architecture [4 hours]

Pre-Harappan and Sindhu Valley Civilization, Laboratory and Apparatus, Juices, Dyes, Paints and Cements, Glass and Pottery, Metallurgy, Engineering Science and Technology in the Vedic Age and Post-Vedic Records, Iron Pillar of Delhi, Rakhigarhi, Mehrgarh, Sindhu Valley Civilization, Marine Technology, and Bet–Dwārkā.

Module-V: Life, Environment, and Health [4 hours]
Ethnic Studies, Life Science in Plants, Anatomy, Physiology, Agriculture, Ecology and Environment, Āyurveda, Integrated Approach to Healthcare, Medicine, Microbiology, Medicine, Surgery, and Yoga, etc.

Text books:

1. Textbook on The Knowledge System of Bhārata by Bhag Chand Chauhan,
2. Histrory of Science in India Volume-1, Part-I, Part-II, Volume VIII, by Sibaji Raha, et al. National Academy of Sciences, India and The Ramkrishan Mission Institute of Culture, Kolkata (2014).

Reference Books:

1. Pride of India- A Glimpse of India's Scientific Heritage edited by Pradeep Kohle et al. Samskrit Bharati (2006).
2. Vedic Physics by Keshav Dev Verma, Motilal Banarsidass Publishers (2012).
3. India's Glorious Scientific Tradition by Suresh Soni, Ocean Books Pvt. Ltd. (2010).

Course outcomes:

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

1. Discover the true history and examine the rich culture of India.
2. Compare the art and literary work of the renowned scholars of Bhārata.
3. Compare and contrast the contributions of Bhārata scholars in the field of Science and Engineering.
4. Evaluate the applicability of the ancient Indian Knowledge to the modern day knowledge.
5. Explore the career opportunities in the realm of Indian Knowledge System

COURSE ARTICULATION MATRIX:

Correlation of course outcomes with program outcomes and program specific outcomes

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1- Weak															
COs	**Programme Outcomes (POs)**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	**2**	**3**	**2**	-	-	-	**2**	-	-	-	-	**3**	-	-	-
CO2	**2**	**2**	**2**	-	-	-	**3**	-	-	-	-	**2**	-	-	-
CO3	**3**	**3**	**2**	-	-	-	**3**	-	-	-	-	**2**	-	-	-
CO4	**3**	**2**	**2**	-	-	-	**3**	-	-	-	-	**3**	-	-	-
CO5	**3**	**3**	**2**	-	-	-	**3**	-	-	-	-	**3**	-	-	-

2025-26 Onwards	MALLAREDDY (MR) Deemed to be University	B.Tech.-II Sem		
Code: 2504T03	ANALOG ELECTRONICS	L	T	P
Credits:4		3	1	-

PREREQUISITES: Physics

COURSEOBJECTIVES:

This course provides the knowledge of Diodes and Transistors, Biasing Techniques, Amplifiers particularly Single Stage Amplifiers and also provides knowledge of study about different amplifiers and understands small signal analysis of different transistor configurations and study about feedback amplifiers and oscillators.

MODULE I Introduction to Diodes & Transistors 10 Periods

P-N Junction Diode: Diode equation, V-I characteristics, Rectifiers- P-N junction as a rectifier, Half wave rectifier, Full wave rectifier, Bridge rectifier -ripple factor, Rectifiers with Capacitive and Inductive Load, Zener Diode as voltage regulator.

Bipolar Junction Transistor (BJT) & Junction Field Effect Transistor (JFET): Construction, Principle of operation, Common Emitter, Common Base and Common Collector configurations and Input-Output characteristics, JFET-Construction, Principle of operation, V-I characteristics. Introduction to MOSFET: WorkingPrinciple of N-channel, P-channel MOSFET.

MODULE II BJT Biasing & FET Biasing 10 Periods

BJT Biasing: Need for biasing, operating point, load line analysis, bias stabilization techniques: fixed bias, collector to base bias, self-bias, Stabilization against variations in ICO, VBE and β for the self-bias circuit, bias compensation techniques, thermal runaway and thermal stability.

FET Biasing: Biasing techniques: Fixed bias, Source self-bias, Voltage divider bias.

MODULEIII BJT Small Signal Analysis 10 Periods

Small signal low frequency transistor Amplifier circuits: h-Parameter representation of a Transistor, Analysis of single stage transistor Amplifier (CE, CB, & CC) using h-parameters: voltage gain, current gain, input impedance and output impedance. Analysis of CE, CC, CB Amplifiers and CE Amplifier with emitter resistance

MODULEIV Feedback Amplifiers 10 Periods

Feedback concept and types, Transfer Gain with feedback, General Characteristics of Negative Feedback Amplifiers, Types of Negative Feedback Connections, Method of Identifying Feedback Topology, Stability of Feedback Amplifier.

MODULEV: Oscillators 10 Periods

Constituents of an Oscillator, Barkhausen Criterion, Classification of Oscillators, Sine Wave Feedback Oscillators of LC Type - General Form of Oscillator Circuit, Hartley Oscillator, Colpitts Oscillator Sine Wave Feedback Oscillator of RC type - RC Phase Shift Oscillator, Wein Bridge Oscillator, Crystal Oscillator, Frequency Stability.

TEXTBOOKS

1. JacobMilliman,ChristosC. Halkias, Satyabrata Jit,"Electronic Devices and Circuits", Mc GrawHill (India), 3rd edition, 2013.
2. Shalivahana,N.Suresh Kumar,A.Vallavaraj,"Electronic Devices and Circuits",Tata Mc Graw Hill (India), 3rd edition, 2007.

REFERENCEBOOKS

1. Robert Boylestad, Lowis Nashelsky, "Electronic Devices and Circuit Theory", Prentice Hall of India, 5th Edition, 1993.
2. G.K.Mithal,"Electronic Devices and Circuits",Khanna Publications,22ndEdition,1999.

COURSEOUTCOME

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

CO1	Understand the basic concepts of Diodes & Transistors and their applications	Understand
CO2	Study different biasing techniques and design the DC bias circuits using BJT&FET	Understand
CO3	Understand the small signal analysis of different transistor configurations.	Understand
CO4	Understand the design of Feedback amplifiers and their frequency response.	Understand
CO5	Understand the design of various oscillators, such as RC Phase Shift Oscillator, Wein Bridge Oscillator, Crystal Oscillator, LC Oscillator, etc	Understand

CO-POMAPPING

(3/2/1indicatesstrengthofcorrelation) 3-Strong, 2-Medium, 1-Weak

COs	ProgramOutcomes(POs)												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	2	1	1	2	2	1	-	1	-	3	2	3	3	2
CO2	2	3	1	2	2		2	-	2	-	1	1	3	2	2
CO3	3	2	-	1	1	2	1	-	2	-	2	2	2	3	2
CO4	2	3	2	1	2	2	1	-	3	-	2	3	3	2	2
CO5	1	2	2	3	2	3	3	-	2	-	2	3	2	2	3

2025-26 Onwards	MALLA REDDY (MR) Deemed to be University	B.Tech. II Sem		
Code: 250BT04	DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS (Common to ECE, EEE, CE & ME)	L	T	P
Credits: 4		3	1	-

Course Objectives: To Learn

- Methods of Solving First order Ordinary Differential Equations and its applications.
- Methods of Solving Higher order Ordinary Differential Equations and its applications.
- Laplace Transforms and its applications.
- Gradient, Divergence, curl and Scalar potential function.
- Line, Surface and volume integrals, and vector integral theorems

Module I: First Order and First Degree ODE **[8 Periods]**

Linear Differential Equation, Bernoulli's Differential, Exact Differential Equation, Non-Exact Differential Equations.

Applications: Orthogonal trajectories, Newton's law of cooling, Law of natural growth and decay.

Module-II: Second and Higher Order ODE with Constant Coefficients **[8 Periods]**

Introduction- Rules for finding complementary function and particular integral. Solution of Homogenous, non-homogeneous differential equations, non-homogeneous terms of the type e^{ax} , Sin(ax), Cos (ax), polynomials in x, e^{ax} V(x), x V(x), Method of variation of parameters.

MODULE - III: Partial Differential Equations **[10 Periods]**

Formation of partial differential equations by eliminating arbitrary constants or arbitrary functions, solutions of first-order linear (Lagrange) equations, solutions of nonlinear first-order equations (four standard types). Charpits' Method.

MODULE - IV: Vector Differentiation **[10 Periods]**

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

MODULE – V: Vector Integration **[10 Periods]**

Line, Surface and Volume Integrals. Green's Theorem, Gauss Divergence Theorem and Stokes Theorem (without proofs) and their applications.

TEXT BOOKS:

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

REFERENCES:

1) Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, Jogn Wiley & Sons,2006.
2) G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Ed, Pearson, Reprint, 2002.
3) N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
4) Alan Jeffrey, Mathematics for Engineers and Scientists, 6th Edition, 2013, Chapman & Hall.
5) KantiB.Datta, Mathematical Methods of Science and Engineering, Cengage Learning.

E – RESOURCES

Concerned Website links:

1) https://www.maths.gla.ac.uk/~cc/2x/2005_2xnotes/2x_chap5.pdf (Ordinary Differential Equations)
2) https://www.uah.edu/images/people/faculty/howellkb/DEText-Ch16.pdf (Higher order ordinary Differential Equations)
3) https://web.stanford.edu/~boyd/ee102/laplace.pdf (Laplace Transforms)
4) https://www.ucl.ac.uk/~ucahmdl/LessonPlans/Lesson7.pdf (Directional derivative)
5) https://www.ms.uky.edu/~droyster/courses/spring98/math2242/classnotes6.pdf (Vector Integral Theorems)

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

1. Solve exact and linear differential equations and find orthogonal trajectories of given family of curves.
2. Understand complementary function, particular integral,and Solvesecond and higher order Ordinary Differential Equations.
3. Find Laplace transform of given functions, inverse Laplace transform by convolution Theorem and Solution of ordinary differential equations.
4. Find Gradient, Divergence, curl and Scalar potential function.
5. Evaluate Line, Surface and volume integrals and verify Vector integral theorems.

COURSE ARTICULATION MATRIX:

Correlation of course outcomes with program outcomes and program specific outcomes

CO-PO Mapping (3/2/1 indicates strength of correlation) 3- Strong, 2-Medium, 1-Weak												
COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		2		2	3	2					2	3
CO2	2		3		3	2					2	3
CO3		2		2	3							2
CO4	2		2	2	3	3					2	3
CO5	3		2	2	3							2

2025-26 Onwards	MALLA REDDY (MR) Deemed to be University	B.Tech. - II Sem		
Code: 2502T02	NETWORK ANALYSIS AND SYNTHESIS	L	T	P
Credits: 4		3	1	-

PREREQUISITES: Circuit Theory

COURSE OBJECTIVES:

This course deals about the network theorems and Two port networks. Additionally, it emphasizes the synthesis, transient analysis, and network parameters of electrical networks. It serves as the basis for all Electrical and Electronics Engineering courses.

MODULE I DC NETWORK THEOREMS 9 Periods

Superposition, Reciprocity, Thevenin's, Norton's, Maximum Power Transfer, Millman's and Compensation and Tellegen's theorems - Statement of theorems and numerical problems

MODULEII AC NETWORK THEOREMS 9 Periods

Superposition, Reciprocity, Thevenin's, Norton's, Maximum Power Transfer, Millman's and Compensation and Tellegen's theorems - Statement of theorems and numerical problems.

MODULE III TWO PORT NETWORK PARAMETERS 9 Periods

Open circuit impedance (Z) network parameters, Short circuit admittance(Y) network parameters – Transmission (ABCD), Relationship between two port network parameters – Reciprocity and Symmetry

concepts of two port network parameters

MODULE IV TRANSIENT ANALYSIS (BOTH AC & DC NETWORKS) 9 Periods

Introduction - Initial conditions of all elements-Transient response of Series R-L, R-C and R-LC circuits (Independent Sources Only) – Solution using Laplace transform approach.

MODULE V NETWORK SYNTHESIS & GRAPH THEORY 9 Periods

Network Synthesis: Realizability concept, Hurwitz property, Synthesis of R-L, R-C and L-C driving point functions, Foster and Cauer forms.

Graph theory: Introduction, Linear graph of a network, Tie-set and cut-set schedule, incidence matrix, Analysis of resistive network using cut-set and tie-set, Dual of a network.

TEXT BOOKS

1. Sudhakar. A, Shyammohan. S.P Circuits and Networks-Analysis and Synthesis. TataMcGraw Hill publishers, 5 th Edition, 2015.
2. William H. Hayt Jr, Jack E. Kemmerly and Steven M. Durbin, Engineering Circuit Analysis", Tata McGraw Hill publishers, New Delhi, 2013.

REFERENCE BOOKS

1. Fundamentals of Electrical Circuits, Charles K. Alexander and Mathew N.O. Sadiku, Mc Graw Hill Education (India), 2013, Fifth Edition
2. Circuit Theory: Analysis and Synthesis, A. Chakrabarti, Dhanpat Rai & Co., 2018, Seventh Revised Edition.
3. Network Analysis, M. E. Van Valkenburg, Pearson Education, 2019, Revised Third Edition: 1.
4. Electric Circuits (Schaum's outline Series), Mahmood Nahvi, Joseph Edminister, and K. Rao, Mc Graw Hill Education, 2017, Fifth Edition.

COURSE OUTCOME

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

CO1	Analyze electrical circuits using DC network theorems like Thevenin's, Norton's, and Millman's.	Analyze
CO2	Analyze electrical circuits using AC network theorems and apply them to solve related problems.	Analyze
CO3	Analyze two-port network parameters and interpret relationships like reciprocity and symmetry.	Analyze
CO4	Analyze the transient behavior of RLC circuits using Laplace transforms for various inputs.	Analyze
CO5	Understand and construct electrical networks based on synthesis functions and apply graph theory concepts.	Understand

CO-PO MAPPING
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Program Outcomes (POs)												PSOs		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	3	3	-	-	-	-	-	-	-	-	3	1	1
CO2	3	3	3	3	-	-	-	-	-	-	-	-	3	1	1
CO3	3	3	3	3	-	-	-	-	-	-	-	-	3	1	1
CO4	3	3	3	2	-	-	-	-	-	-	-	-	3	1	1
CO5	3	3	3	3	-	-	-	-	-	-	-	-	3	1	1

2025-26 Onwards	MALLA REDDY (MR) Deemed to be University	B.Tech. - II Sem		
Code: 2505T05	FUNDAMENTALS OF DATA STRUCTURES (Common for ECE, EEE. CE and ME)	L	T	P
Credits: 4		3	1	-

Prerequisites: A course on "Programming for Problem Solving "

Course Objectives:

- Exploring basic data structures such as stacks and queues.
- Introduces a variety of data structures such as hash tables, search trees, tries, heaps, graphs.
- Introduces sorting and pattern matching algorithms

Module-I **[10 Periods]**

Introduction to Data Structures, abstract data types, Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list.

Module-II **[09 Periods]**

Stacks-Operations, array and linked representations of stacks, stack applications, Queues-operations, array and linked representations.

Module-III **[10 Periods]**

Hash Table Representation: hash functions, collision resolution-separate chaining, open addressing-linear probing, quadratic probing.

Module-IV **[10 Periods]**

Search Trees: Binary Search Trees, Definition, Implementation, Operations- Searching, Insertion and Deletion, AVL Trees, Definition, Height of an AVL Tree, Operations – Insertion, Deletion and Searching,

Module-V **[09 Periods]**

Graphs: Graph Implementation Methods. Graph Traversal Methods.
Sorting: Heap Sort, Merge sort and Quick sort.

Text Books:

1. Fundamentals of Data Structures in C, 2nd Edition, E. Horowitz, S. Sahni and Susan Anderson Freed, Universities Press.
2. Data Structures using C– A. S. Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI / Pearson Education.

References:

1. Data Structures: A Pseudo code Approach with C, 2nd Edition, R.F. Gilberg and B.A. Forouzan, Cengage Learning.

E-Resources:

1. http://nptel.ac.in/courses/106102064/1
2. http://www.sncwgs.ac.in/wp-content/uploads/2015/11/Fundamental-Data-Structures.pdf
3. http://www.learnerstv.com/Free-Computer-Science-Video-lectures-ltv247-Page1.htm
4. http://ndl.iitkgp.ac.in/document/yVCWqd6u7wgye1qwH9xY7-3lcmoMApVUMmjlExpIb1zste4YXX1pSpX8a2mLgDzZ-E41CJ6PVmY4S0MqVbxsFQ

Course Outcomes:

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

COs	Course Outcome	Bloom's Taxonomy Level
CO1	Design data structures using linked list based problems.	Apply
CO2	Apply data structure stacks and Queues with applications and implementations.	Apply
CO3	Design and implement using hashing tables	Apply
CO4	Design programs using a variety of data structures, including hash tables, binary and general tree structures, search trees and AVL-trees.	Apply
CO5	Implement and know the application of algorithms for graphs and sorting	Apply

COURSE ARTICULATION MATRIX:

Correlation of course outcomes with program outcomes and program specific outcomes

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	**Programme Outcomes (POs)**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	3	2	-	-	-	-	-	-	-	-	-	2	3	-
CO2	2	2	3	-	-	-	-	-	-	-	-	-	3	2	-
CO3	-	2	2	-	-	-	-	-	-	-	-	-	-	2	1
CO4	-	2	3	-	-	-	-	-	-	-	-	-	2	3	-
CO5	2	3	3	-	-	-	-	-	-	-	-	-	2	3	-

2025-26 Onwards	MALLA REDDY (MR) Deemed to be University	B.Tech. - II Sem		
Code: 2505P05	FUNDAMENTALS OF DATA STRUCTURES LAB (Common for ECE, EEE, CE & ME)	L	T	P
Credits: 1.5		-	-	3

Prerequisites: Computer Programming

Objectives:

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

Software Requirements: C

List of Programs:

1	Write a program that uses functions to perform the following operations on singly linked list.: i) Creation ii) Insertion iii) Deletion iv) Traversal
2	Write a program that uses functions to perform the following operations on doubly linked list.: i)Creation ii) Insertion iii) Deletion iv) Traversal
3	Write a program that implement stack (its operations) using i) Arrays ii) Pointers
4	Write a program that implement Linear Queue (its operations) using i) Arrays ii) Pointers
5	Write a program that implements the Quick sorting method to sort a given list of integers in ascending order
6	Write a program that implements the Heap sorting method to sort a given list of integers in ascending order
7	Write a program that implements the Merge sorting method to sort a given list of integers in ascending order
8	Write a program to implement the tree traversal methods (Recursive and Non-Recursive).
9	Write a program to implement i) Binary Search tree ii) AVL Trees
10	Write a program to implement the graph traversal methods

Text Books

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

References

1. Data structures: A Pseudocode Approach with C, R.F.Gilberg And B.A.Forouzan, 2nd Edition, Cengage Learning.

Course Outcomes:

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

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

COURSE ARTICULATION MATRIX:

Correlation of course outcomes with program outcomes and program specific outcomes

CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	**Programme Outcomes (POs)**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	3	2										3	2	
CO2	2	2	3										2	3	
CO3		2	3										2	3	1

2025-26 Onwards (MR-25)	MALLA REDDY(MR) DEEMED TO BE UNIVERSITY	I B. Tech. II Semester		
Credits:1	ANALOG ELECTRONICS LAB (Common for EEE & ECE)	L	T	P
		-	-	2

Course Objectives: To Analyze Diode and Transistor characteristics with applications and design different Amplifiers according to given specifications.

PART- A: Implement the following Simulation using Multisim or Any equivalent open-source software

1. Common Emitter Amplifier.
2. Common Collector Amplifier
3. Common Source Amplifier
4. Common Gate Amplifier
5. Transistor Switching Characteristics
6. Characteristics of MOSFET

PART - B: To be performed Using Discrete Electronic Components

1. VI Characteristics of PN Junction Diode
2. Zener Diode as a Voltage Regulator
3. Half Wave Rectifiers without and with Load
4. Full Wave Rectifier without and with Load
5. VI Characteristics of Common Emitter Configuration
6. Drain Characteristics of JFET

Course Outcomes:

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

1. Understand the characteristics of Diodes and Transistors
2. Design different BJT and FET Amplifiers Circuits
3. Identify the variations in characteristics by applying different source values.

COURSE ARTICULATION MATRIX:

Correlation of course outcomes with program outcomes and program specific outcomes

CO- PO, PSO Mapping (3/2/1indicates strength of correlation) 3-Strong,2-Medium,1-Weak															
COS	Programme Outcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	3	3	3		1		2	1	2	2	3	3	3
CO2	2	3	3	3	3		1		2	1	2	2	3	3	3
CO3	3	3	3	3	3	1	3		3	1	2	2	3	3	1

2025-26 Onwards	MALLA REDDY (MR) Deemed to be University	B.Tech. - II Sem		
Code: 2502P02	ELECTRICAL CIRCUITS LAB	L	T	P
Credits: 1		-	-	2

Course Objectives:

To impart hands on experience in verification of circuit laws and theorems, measurement of circuit parameters, study of circuit characteristics and simulation of time response.

List of Experiments:

2. Verification of Thevenin's & Norton's Theorems.
3. Verification of maximum Power Transfer Theorem.
4. Verification of Super Position Theorem.
5. Verification of Compensation Theorem.
6. Verification of Reciprocity Theorem for DC Excitation.
7. Experimental determination of Quality Factor, Bandwidth and resonant frequency.
8. Experimental Determination of Z & Y Parameters.
9. Experimental determination of Transmission & Hybrid Parameters for the given two port network.

Simulation Experiments:

10. Determination of branch currents in a given electrical circuit.
11. Determination of node voltages of a given electrical network.
12. Determination of transient response of a given RL & RC Circuit.
13. Determination of load current and voltage for a given electrical Network.

Course Outcomes

At the end of the course, students should be able to

COs	CO Statement	Blooms Level
CO1	Apply circuit theorems such as Thevenin's, Norton's, and Superposition to simplify circuits and verify results.	Apply
CO2	Determine the impedance conditions for maximum power transfer and validate experimentally.	Analyze

CO3	Design and test resonant circuits to filter specific frequencies and evaluate their performance.	Analyze
CO4	Estimate two-port network parameters for a given electrical network.	Analyze
CO5	Simulate and determine currents and voltages in electrical circuits under steady-state and transient conditions.	Apply

CO-PO Mapping

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	3	-	-	3	1	-	1
CO2	3	3	3	3	-	-	-	-	3	-	-	3	1	-	1
CO3	3	3	3	3	-	-	-	-	3	-	-	3	1	-	1
CO4	3	3	3	3	-	-	-	-	3	-	-	3	1	-	1
CO5	3	3	3	3	-	-	-	-	3	-	-	3	1	-	1

2025-26 Onwards	MALLA REDDY (MR) Deemed to be University	B.Tech. - II Sem		
Code: 2500M03	LIFE SKILLS FOR ENGINEERS – II (Numerical Ability) (Common for All)	L	T	P
Credits: 2		1	1	-

Course objectives:

The Quantitative Aptitude course is designed to equip students with essential mathematical and analytical skills required for various competitive exams, academic pursuits, and real-world problem-solving scenarios. The primary objective of this course is to enhance participants' numerical ability and logical reasoning, enabling them to tackle quantitative questions with confidence and efficiency.

MODULE - I **[8 Periods]**

Quants: Number System (NS)

Number Systems- Factors and Multiples: The H.C.F. of two or more than two numbers; Factorization Method Division Method; Finding the H.C.F. of more than two numbers; product of two numbers = Product of their H.C.F. and L.C.M.; Co-primes; H.C.F. and L.C.M. of Fractions: Comparison of Fractions.

Logical: Calendars

Calendars- Leap year-Non leap year, Odd days, Finding the day from date, Repeated years.

MODULE - II **[6 Periods]**

Quants: Time and Distance, Pipes

Time & Distance- Km/hr to m/sec conversion; m/sec to km/hr conversion; man covers a certain distance at x km/hr and an equal distance at y km/hr.

Logical: Data Interpretation

Data Interpretation- Tables, Pie charts, Bar Graphs, Line graphs

MODULE - III **[6 Periods]**

Quants: Ages, Progression, Logarithms

Ages, Progression-; Arithmetic progression; Arithmetic mean; Geometric progression and mean Logarithms- Why logarithms: Properties of Logarithms: Laws of logarithm: Characteristic of logarithm.

Logical: Data Arrangements

Data Arrangements- Linear Arrangement, Circular Arrangement, Multi-Dimensional Arrangement.

MODULE - IV **[6 Periods]**

Quants: Permutations and Combinations, Probability

Permutations- Factorial Notation: The different arrangements; Number of Permutations: number of all permutations of n things, taken all at a time; n subjects of which p1 are alike of one kind; p2

are alike of another kind; p3 are alike of third kind; Number of Combinations: The number of all combinations of n things, taken r at a time.

Logical: Data Sufficiency

Data Sufficiency- Strategies to solve.

MODULE - V **[6 Periods]**

Quants: Areas and Volumes (Mensuration)

Areas & Volumes- Pythagoras Theorem Results on Quadrilaterals Perimeter; Area of a circle Circumference Length of an arc Area of a sector; Area of a triangle.

Logical: Syllogisms

Syllogisms- Statements and Conclusion, Syllogisms using Venn Diagrams.

Text Books:

Reference Books:

1. "Quantitative Aptitude for Competitive Examinations" by R.S. Aggarwal
2. "How to Prepare for Quantitative Aptitude for the CAT" by Arun Sharma
3. "Fast Track Objective Arithmetic" by Rajesh Verma
4. "Magical Book on Quicker Maths" by M. Tyra
5. "Quantitative Aptitude Quantum CAT" by Sarvesh K. Verma

e-Resources:

1. Khan Academy (https://www.khanacademy.org/):
2. Math Is Fun (https://www.mathsisfun.com/)
3. GMAT Club (https://gmatclub.com/)
4. India BIX (https://www.indiabix.com/)
5. Study tonight (https://www.studytonight.com/)

Course Outcomes:

After completion of the course students will be able to:

1. Apply Mathematics to Numbers in real world Learn to apply quantitative concepts to real-life situations, enhancing practical problem-solving skills and decision-making abilities.
2. Prepare for Competitive Exams: Develop a robust foundation and familiarity with the types of quantitative questions commonly asked in various competitive exams, such as aptitude tests, bank exams, GRE, GMAT, and others.
3. Boost Confidence on Ages and numericals: Gain the confidence to tackle quantitative challenges effectively, overcoming fear or anxiety associated with math-related problem-solving.
4. Foster a Growth in counting : Cultivate a positive attitude towards learning and continuous improvement, motivating students to persistently enhance their quantitative

abilities.

5. Facilitate Self-Assessment on Area and volumes: Engage in regular assessments and quizzes to gauge progress, identify areas of improvement, and refine problem-solving techniques accordingly.

COURSE ARTICULATION MATRIX:

Correlation of course outcomes with program outcomes and program specific outcomes

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	**Programme Outcomes(POs)**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	**1**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	2	**-**	**-**	**-**	**-**	**-**
CO2	**1**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	2	**-**	**-**	**-**	**-**	**-**
CO3	**1**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	2	**-**	**-**	**-**	**-**	**-**
CO4	**1**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	2	**-**	**-**	**-**	**-**	**-**
CO5	**1**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	2	**-**	**-**	**-**	**-**	**-**

2025-26 Onwards	MALLA REDDY (MR) Deemed to be University	B.Tech. - II Sem		
Code: 2500M04	UNIVERSAL HUMAN VALUES (Common for All)	L	T	P
Credits: 0		1	1	-

Course Objectives:

1. To develop a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence
2. To understand (or developing clarity) the harmony in the human being, family, society and nature/existence
3. To strengthen self-reflection
4. To develop commitment and courage to act

MODULE I: COURSE INTRODUCTION - NEED, BASIC GUIDELINES, CONTENT AND PROCESS FOR VALUE EDUCATION [09 Periods]

Purpose and motivation for the course, recapitulation from Universal Human Values-I

1. Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self- exploration
2. Continuous Happiness and Prosperity- A look at basic Human Aspirations
3. Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority
4. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
5. Method to fulfil the above human aspirations: understanding and living in harmony at various levels.

Practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking.

MODULE II: UNDERSTANDING HARMONY IN THE HUMAN BEING - HARMONY IN MYSELF! [09 Periods]

1. Understanding human being as a co-existence of the sentient 'I' and the material 'Body'
2. Understanding the needs of Self ('I') and 'Body' - happiness and physical facility
3. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)
4. Understanding the characteristics and activities of 'I' and harmony in 'I'
5. Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail
6. Programs to ensure Sanyam and Health.

Practice sessions to discuss the role others have played in making material goods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease.

MODULE III: UNDERSTANDING HARMONY IN THE FAMILY AND SOCIETY- HARMONY IN HUMAN-HUMAN RELATIONSHIP [09 Periods]

1. Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship
2. Understanding the meaning of Trust; Difference between intention and competence
3. Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship
4. Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals
5. Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.

Practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives.

MODULE IV: UNDERSTANDING HARMONY IN THE NATURE AND EXISTENCE - WHOLE EXISTENCE AS COEXISTENCE [09 Periods]

1. Understanding the harmony in the Nature
2. Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self regulation in nature
3. Understanding Existence as Co-existence of mutually interacting units in all-pervasive space
4. Holistic perception of harmony at all levels of existence.

Practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.

MODULE V: IMPLICATIONS OF THE ABOVE HOLISTIC UNDERSTANDING OF HARMONY ON PROFESSIONAL ETHICS [09 Periods]

1. Natural acceptance of human values
2. Definitiveness of Ethical Human Conduct
3. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
4. Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems.
5. Case studies of typical holistic technologies, management models and production systems
6. Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations
7. Sum up.

Practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions eg. To discuss the conduct as an engineer or scientist etc.

TEXT /REFERENCE BOOKS

1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010
2. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
3. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.

4. The Story of Stuff (Book).
5. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
6. Small is Beautiful - E. F Schumacher.
7. Slow is Beautiful - Cecile Andrews
8. Economy of Permanence - J C Kumarappa
9. Bharat Mein Angreji Raj – PanditSunderlal
10. Rediscovering India - by Dharampal
11. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
12. India Wins Freedom - Maulana Abdul Kalam Azad
13. Vivekananda - Romain Rolland (English)
14. Gandhi - Romain Rolland (English)

Course Outcomes:

On completion of the course, the student are expected

1. To become more aware of themselves, and their surroundings (family, society, nature)
2. They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind
3. To have better critical ability
4. To become sensitive to their commitment towards what they have understood (human values, human relationship and human society)
5. To apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction

COURSE ARTICULATION MATRIX:

Correlation of course outcomes with program outcomes and program specific outcomes

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1- Weak															
COs	**Programme Outcomes(POs)**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	**3**	**3**	**2**	-	-	-	**3**	-	-	-	-	**3**	-	-	-
CO2	**3**	**2**	**2**	-	-	-	**3**	-	-	-	-	**2**	-	-	-
CO3	**3**	**2**	**2**	-	-	-	**3**	-	-	-	-	**3**	-	-	-
CO4	**3**	**2**	**2**	-	-	-	**3**	-	-	-	-	**3**	-	-	-
CO5	**3**	**3**	**2**	-	-	-	**2**	-	-	-	-	**3**	-	-	-

III-SEMESTER

2025-26 Onwards	MALLAREDDY (MR) Deemed to be University	B. Tech. III Semester		
Code: 250BT07	COMPLEX VARIABLES AND NUMERICAL METHODS (Common for EEE & ECE)	L	T	P
Credits:4		3	1	-

E – RESPrerequisites: Differentiation, Partial differentiation, Integration

Course Objectives: To Learn

1) Continuity, derivability of a function, harmonic function and Milne Thomson Method.
2) Evaluation of line integral of a function of complex variable using Cauchy's Integral formula and verify Cauchy's Integral theorem.
3) Power series expansions of complex functions and Evaluation of contour integrals.
4) Interpolation and Solution of algebraic and transcendental equations.
5) Numerical solution of ordinary differential equations and Numerical Integration.

MODULE I: Functions of Complex variable [9 Periods]

Introduction, Limit, Continuity and Differentiation of complex functions, Cauchy-Riemann equations (without proof), analytic functions, harmonic functions, finding harmonic conjugate,Milne – Thompson method. Elementary analytic functions (exponential, trigonometric and logarithm) and their properties, Conformal mappings, Mobius Transformations.

MODULE II: Complex Integration [8 Periods]

Line integral, Evaluation along a path and by indefinite integration, Cauchy's integral theorem, Cauchy's integral formula, Generalized Cauchy's integral formula.(All theorems without Proof).

MODULE III : Power series expansions of complex functions & Contour Integration [10 periods]

Radius of convergence, Expansion in Taylor's series, Maclaurin's series and Laurent series. Singular point, Isolated singular point, pole of order m, Essential singularity.

Residue, Evaluation of residue by formula and by Laurent series, Cauchy's Residue theorem, Evaluation of integrals by indentation improper real integrals (a) $\int_{-\infty}^{\infty} f(x)dx$ (poles not on the real axis)

(b) $\int_{0}^{2\pi} f(\cos\theta, \sin\theta)d\theta$ (All theorems without Proof).

MODULE IV: Algebraic,transcendental equations and Interpolation [11 periods]

Algebraic and Transcendental Equations: Introduction, Bisection Method, Method of False Position.The Iteration Method, Newton-Raphson Method, Jacobi's Iteration Method, Gauss Seidel Method.

Interpolation: Introduction– Finite differences- Forward Differences-Backward differences –

Symbolic relations and separation of symbols, Differences of a polynomial-Newton's formulae for interpolation, Central difference interpolation Formulae – Gauss Central Difference Formulae –Interpolation with unevenly spaced points-Lagrange's Interpolation formula.

MODULE – V: Numerical Integration and Numerical solution of Ordinary Differential Equations [10 periods]

Numerical Integration: Trapezoidal rule, Simpson's $1/3^{rd}$ and $3/8^{th}$ rules.

Numerical Solution of Ordinary Differential Equations: Introduction, Solution by Taylor's series method, Picard's Method of Successive Approximations, Euler's Method, Modified Euler's Method, Runge-Kutta method of 4th order for first order O.D.E.

Text Books:

1) B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2) R K Jain SRK Iyengar ,Advanced engineering mathematics, Narosa publications.
3) M . K Jain, S R K Iyengar, R.K Jain, Numerical Methods for Scientific and Engineering Computation, New age International publishers.
4) J.W.Brown and R.V.Churchill, Complex Variables and Applications, 7th Edition, Mc-Graw Hill,2004.

Reference Books:

1) Murray Spiegel, Complex variables by Schamusoutlines series.
2) Erwin Kreyszig, Advanced Engineering Mathematics, Wiley publications.
3) S.S.Sastry, Introductory Methods of Numerical Analysis,5^{th}Edition,PHI Learning Private Limited

OURCES

a) Concerned Website links:

1) https://www.lboro.ac.uk/media/media/schoolanddepartments/mlsc/downloads/HELM%20Workbook%2026%20Functions%20of%20a%20Complex%20Variable.pdf (Complex Functions)
2) https://complex-analysis.com/content/complex_integration.html (Complex Integration)
3) https://web.spms.ntu.edu.sg/~ydchong/teaching/09_contour_integration.pdf (Contour Integration)
4) https://www.investopedia.com/terms/i/interpolation.asp (Interpolation)
5) https://www.maths.tcd.ie/~richardt/1S3/ch5.pdf (Numerical Integration)
6) https://homepage.math.uiowa.edu/~atkinson/papers/NAODE_Book.pdf (Numerical Solution of ODE)

b) NPTEL Videos:

1) https://www.youtube.com/watch?v=Mwpz1zjPlzI&list=PLbMVogVj5nJS_i8vfVWJG16mPcoEKMuWT (Complex Functions)
2) https://www.youtube.com/watch?v=T6jHXD78dBI (Complex Integration)
3) https://www.youtube.com/watch?v=abMxwtfdPqs (Cauchy Residue theorem and applications)
4) https://www.youtube.com/watch?v=_Fg4vGx1oi8 (Interpolation)
5) https://www.youtube.com/watch?v=m2p6hrQGaxQ (Numerical Solution of ODE)
6) https://www.youtube.com/watch?v=YTHt4Sp8Hag (Numerical Integration)
7) https://www.youtube.com/watch?v=XcPIQzWZ_1g&list=PLqGm0yRYwTguDcfylj1ZicXxzdZCAr5S&index=7 (Introduction to Nonlinear Equations)
8) https://www.youtube.com/watch?v=pGKRjvRk3JA Laurent Series)

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

1) Apply the conditions for a complex variable function to be analytic and/or harmonic and to construct an Analytic function and understand bilinear transformation.
2) Apply Cauchy's Integral theorem and Cauchy's Integral formula to evaluate complex integrals.
3) Expand a given function as a Taylor's or Laurent's series and evaluate contour integrals.
4) Find the solution of a given equation by various methods and find the unknown value for the given data using interpolation.
5) Evaluate the integrals and find the numerical solutions for a given ODE's using numerical techniques.

COURSE ARTICULATION MATRIX:

Correlation of course outcomes with program outcomes and program specific outcomes

CO-PO Mapping (3/2/1 indicates strength of correlation) 3- Strong, 2-Medium, 1-Weak												PSOs		
COs	Program Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO 1	PSO2	PSO3
CO1	3	3	3	2							1	1	1	
CO2	3	2	2	2							1	1	1	
CO3	3	3	2	2							1	1	1	
CO4	3	2	2	2							1			
CO5	3	2	3	2							1			

2025-26 Onwards (MRD-25)	MALLA REDDY (MR) DEEMED TO BE UNIVERSITY	B.Tech. III Semester		
Code: 2504T02	DIGITAL CIRCUIT DESIGN	L	T	P
Credits:4		3	1	-

Pre-Requisites: Nil

Course Objectives: This course introduces various number systems and conversion from one number system to other and also to understand different binary codes**,** the theory of Boolean algebra and to study representation of switching functions using Boolean expressions and their minimization techniques. Understanding the combinational logic design of various logicand switching devices and their realization**,** the basic flip flops and sequential logic circuits design both in synchronous and Asynchronous modes for various complex logic and switching devices, their minimization techniques and their realizations and to analyze a givensequential circuit by using state tables and state diagrams.

MODULE I: Number systems& Binary codes [8 Periods]

Number systems: Number Systems, Radix conversions, complement of numbers.

Binary codes: Binary codes, Weighted and non-Weighted codes, BCD code, gray code, excess 3codes - Error detecting code, Error Correcting code, Hamming Code.

MODULE II: Boolean Algebra & Boolean functions [10 Periods]

Boolean Algebra: Postulates and Theorems - Canonical and Standard forms: SOP and POS forms, Minterms and Maxterms –

Simplification of Boolean functions: Simplification of functions: Karnaughmap (2,3,4,5,6 Variables) and Quine McCluskey method (Tabular Method) - Prime implicants, essential prime implicants.

Logic gates: NOT, OR, AND, NOR, NAND, XOR, XNOR- Universal gates

MODULE III: Combinational Logic Circuits [10 Periods]

A: Arithmetic circuits: Half adder, full adder, half subtractor, full subtractor, binary adder, Carrylook ahead adder, BCD adder

B: Code conversion circuits, Comparator, Decoder, Encoder, Priority Encoder, Multiplexers andDesign, De – Multiplexers, ROM, PLA, PAL.

MODULE IV: Sequential Logic Circuits – I [10 Periods]

Introduction –Latches and Flip flops: Basic Flip flop circuit, RS, D, JK and T Flip-flops – Triggering of Flip flops: Master Slave Flip flop, edge triggered flip flop – Conversion of onetype of Flip flop to another, Setup time, hold time.

Registers and Counters: Shift Register, Universal Shift Register, Applications of Registers, Asynchronous counter, Synchronous counter, Mod-N Counter, binary up/down counter, Ripple counter, Johnson counter.

MODULE V: Sequential Logic Circuits – II [10 Periods]

Analysis of Sequential Logic circuit: State Diagram, state table, reduction of state table, state Assignment –- Design procedure of sequential circuits using state diagram, state table andFlip flops. Example design Sequence detector.

Finite State Machine: Introduction, FSM capabilities and Limitations, Mealy and Moore models – minimization of completely specified and incompletely specified sequential Machines. Partition techniques and Merger charts

Text Books:

1. ZviKohavi, “Switching and Finite Automata Theory”,TMH, 2nd edition, 2006.
2. Morris Mano, “Digital Design”, PHI, 3rd Edition, 2009.

Reference Books:

1. A.Anand Kumar, "Switching Theory and Logic Design", PHI 2nd Edition, 2014.
2. John F.Wakerly, "Digital Design Principles & Practices", PHI/ Pearson Education Asia, 3rd Ed., 2005.
3. Stephen Brown and Zvonka Vramesic, "Fundamentals of Digital Logic with VHDL Design", McGraw Hill, 2nd Edition, 2008.
4. William I. Fletcher, "An Engineering Approach to Digital Design", PHI, 1st Edition, 2009.

E-Resources:

1. https://www.researchgate.net/publication/264005171_Digital_Electronics
2. https://www.cl.cam.ac.uk/teaching/0708/DigElec/Digital_Electronics_pdf.pdf
3. http://ieeexplore.ieee.org/abstract/document/753678/
4. http://docshare01.docshare.tips/files/20257/202573063.pdf
4. http://nptel.ac.in/courses/117106086/1
5. http://nptel.ac.in/courses/117105080/
6. http://nptel.ac.in/courses/117106114/

Course Outcomes:

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

1. Perform radix conversions
2. Minimize a given boolean function by using k-map or tabular method
3. Design a combinational circuit
4. Design a sequential circuit by using various flipflops
5. Analyze and minimize the circuitry of a given sequential circuit and will be able to design a sequence detector

COURSE ARTICULATION MATRIX:

Correlation of course outcomes with program outcomes and program specific outcomes.

CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COS	**Programme Outcomes(POs)**											**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PSO1**	**PSO2**	**PSO3**
CO1	2	1		1	1							2	2	1
CO2	2	3	3	1	1					1		3	2	2
CO3	3	2	3	2		1				1	2	3	3	2
CO4	2	2	3	3	1	1				1	3	2	2	2
CO5	1	1	3	3	1	1				1	3	3	2	2

2025-26 Onwards	MALLAREDDY (MR) Deemed to be University	B. TECH III Semester		
Code: 2502T04	ELECTROMAGNETIC FIELDS	L	T	P
Credits:4		3	1	-

Course objectives:

Learn the basics of static electric fields, electric potential, and charge distribution. Use Gauss's law and potential theory to solve electrostatic problems. Understand conductors, dielectrics, capacitance, and related conditions. Learn about static magnetic fields, magnetic forces, and inductance. Study time-varying fields, Maxwell's equations, and electromagnetic waves

MODULE-I **[8Periods]**

STATIC ELECTRIC FIELD: Introduction to coordinate systems, Coulomb's law, Electricfield intensity, Electrical field due to point charges. Line, Surface and Volume charge distributions.

MODULE -II **[10Periods]**

Gauss law andits applications. Absolute Electric potential, potential difference, Calculation of potential differences for different configurations. Electric dipole, Electrostatic Energy and Energy density.

MODULE-III **[10Periods]**

CONDUCTORS, DIELECTRICS AND CAPACITANCE: Current and current density, Ohms Law in Point form, Continuity equation, Boundary conditions of conductors and dielectric materials. Capacitance, Poisson's equation, Laplace's equation.

MODULE-IV **[8Periods]**

STATIC MAGNETIC FIELDS AND MAGNETIC FORCES: Biot-Savart Law, Ampere Law, Magnetic flux and magnetic flux density, Scalar and Vector Magnetic potentials. Steady magnetic fields produced by current carrying conductors. Force on a moving charge, Force on a differential current element, Force between differential current elements, Magnetic boundary conditions, Magnetic circuits, Self-inductances and mutual inductances.

MODULE-V **[10Periods]**

TIME VARYING FIELDS AND MAXWELL'S EQUATIONS: Faraday's laws of Electromagnetic induction, Displacement current, Point form of Maxwell's equation, Integral form of Maxwell's equations, Motional Electromotive forces. Poynting vector and Poynting theorem.

TextBooks:

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

ReferenceBooks:

1. Pramanik, "Electromagnetism-Problems with solution", Prentice Hall India, 2012.
2. G. W. Carter, "The electromagnetic field in its engineering aspects", Longmans, 1954.
3. W. J. Duffin, "Electricity and Magnetism", McGraw Hill Publication, 1980.
4. W. J. Duffin, "Advanced Electricity and Magnetism", McGraw Hill, 1968.
5. E. G. Cullwick, "The Fundamentals of Electromagnetism", Cambridge University Press, 1966.

6. B. D. Popovic, “Introductory Engineering Electromagnetics”, Addison-Wesley Educational Publishers,International Edition, 1971.
7. A. Pramanik, “Electromagnetism - Theory and applications”, PHI Learning Pvt. Ltd, New Delhi, 2009

CourseOutcomes:

After completion of the course students will be able to:

1. Describe electric fields and find field strength for different charge arrangements.
2. Use Gauss’s law to find electric potential in various cases.
3. Explain how conductors and dielectrics work, calculate capacitance, and solve related equations.
4. Apply Biot–Savart and Ampere’s laws to find magnetic fields, forces, and inductance.
5. Understand Maxwell’s equations and derive wave equations for changing fields.

COURSE ARTICULATION MATRIX:

Correlation of course outcomes with program outcomes and program specific outcomes.

CO-POMapping (3/2/1indicatesstrengthofcorrelation) 3-Strong, 2-Medium,1-Weak														
COs	ProgrammeOutcomes(POs)											PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	3	2	-	-
CO2	3	3	3	3	-	-	-	-	-	-	3	2	-	-
CO3	3	3	3	3	-	-	-	-	-	-	3	2	-	-
CO4	3	3	3	3	-	-	-	-	-	-	3	2	-	-
CO5	3	3	3	3	-	-	-	-	-	-	3	2	-	-

2025-26 Onwards	MALLAREDDY (MR) Deemed to be University	B.Tech.-III Sem		
Code: 2502T06	ELECTRICAL MACHINES-I	L	T	P
Credits:3		3	-	-

Course objectives:

Learn the working and construction of DC generators and motors.Understand characteristics, testing, and efficiency of DC machines. Study the construction and operation of single-phase transformers. Learn transformer testing, losses, efficiency, and regulation. Understand parallel operation and special transformer connections.

MODULE-I Fundamentals of Transformers [8Periods]

Single-phase ideal transformer -EMF equation and turns ratio -Basic equivalent circuit Core losses,Hysteresis loss ,Eddy current loss -Factors affecting core losses

MODULE -II Practical Transformer Analysis [6Periods]

Leakage flux, winding resistance in equivalent circuit - Inclusion of core loss components Exact and approximate equivalent circuits ,Phasor diagrams under load , Voltage regulation Efficiency of transformer

MODULE-III Transformer Testing & Three-Phase Transformers [6Periods]

Testing of Transformers: Open Circuit and Short Circuit tests - Sumpner's test - predetermination of efficiency and regulation-separation of losses test.

Three-phase transformers : Transformer connections: -Star-Star, Delta-Delta -Star-Delta, Delta-Star Vector groups

MODULE-IV DC Machines – Construction & Principles [6Periods]

DC machine construction and operation -Armature winding: Lap winding ,Wave winding ,Parallel paths, EMF equation - Torque equation Generator types: Separately excited ,Self Excited generator characteristics

MODULE-V DC Machines – Performance & Control [6Periods]

Armature reaction and its effects -Methods to reduce armature reaction Motor characteristics: Shunt motor, Series motor ,Compound motor Starting methods (3-point, 4-point starter) ,Speed control techniques Braking methods ,Testing of DC motors

TextBooks:

1. P.S. Bimbhra, "Electrical Machinery", Khanna Publishers, Revised Edition, 2021.
2. I.J. Nagrath and D. P. Kothari, "Electric Machines", McGraw Hill Education, 2010.

ReferenceBooks:

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

CourseOutcomes:

After completion of the course students will be able to:

1. Explain the working of DC generators and motors.
2. Analyze performance, speed control, and testing methods of DC machines.
3. Describe single-phase transformer operation and draw phasor diagrams.
4. Calculate losses, efficiency, and regulation of transformers.
5. Perform parallel operation and identify special transformer connections

COURSE ARTICULATION MATRIX:

Correlation of course outcomes with program outcomes and program specific outcomes.

CO-POMapping (3/2/1indicatesstrengthofcorrelation) 3-Strong, 2-Medium,1-Weak														
C Os	**ProgrammeOutcomes(POs)**											**PSOs**		
	P O1	**P O2**	**P O3**	**P O4**	**P O5**	**P O 6**	**P O7**	**P O 8**	**P O9**	**P O1 0**	**PO1 1**	**PSO 1**	**PS O2**	**PSO3**
CO 1	**3**	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**1**	**-**	**1**
CO 2	**3**	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**1**	**-**	**1**
CO 3	**3**	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**1**	**-**	**1**
CO 4	**3**	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**1**	**-**	**1**
CO 5	**3**	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**1**	**-**	**1**

2025-26 Onwards	MALLAREDDY (MR) Deemed to be University	B.Tech.-III Sem		
Code: 2502T07	DESIGN OF PHOTOVOLTAIC SYSTEM	L	T	P
Credits:3		3	-	-

Course objectives:

To provide fundamental knowledge of solar energy, photovoltaic cells, and their characteristics.To develop understanding of PV module interconnections and estimation of solar radiation and incident energy.

MODULE-I Fundamentals of Solar Energy and PV Cells [8Periods]

Introduction to solar energy , Energy from the sun (solar radiation basics) , Photovoltaic (PV) cell: construction and working principle ,I–V and P–V characteristics of PV cell Factors affecting PV performance

MODULE -II PV Arrays and Energy Estimation [6Periods]

Series and parallel interconnection of PV modules PV array characteristics Solar radiation measurement Incident energy estimation on horizontal and tilted surfaces Basics of solar resource assessment

MODULE-III PV System Design and Sizing [6Periods]

PV system components (battery, inverter, controller) ,Standalone and grid-connected PV systems , Load estimation

Sizing of PV system for different applications ,Design considerations and performance evaluation

MODULE-IV Maximum Power Point Tracking and Storage Interfaces [6Periods]

Maximum Power Point Tracking (MPPT): concept and need -MPPT techniques and algorithms (P&O, Incremental Conductance, etc.) PV–battery interfacing ,Power electronic converters for PV systems ,Peltier cooling: principle and applications in PV

MODULE-V PV Applications, Grid Integration and Economics [6Periods]

PV water pumping systems ,Grid-connected PV systems ,PV-grid interface (synchronization, control) ,Power quality issues and standards ,Life cycle costing and economic analysis of PV systems

TextBooks:

1. Yaman Abou Jieb and Eklas Hossain, “Photovoltaic Systems: Fundamentals andApplications”, Springer, 1st Edition, 2021.
2. Marta Victoria, “Fundamentals of Solar Cells and Photovoltaic Systems Engineering”, Elsevier, 1st Edition, 2024.
3. N.D. Kaushika, Anuradha Mishra and Anil K. Rai, “Solar Photovoltaics: Technology, System Design, Reliability and Viability”, Springer, 1st Edition, 2018.

ReferenceBooks:

1. · Parimita Mohanty, Tariq Muneer and Mohan Kolhe, “Solar Photovoltaic System Applications: A Guidebook for Off-Grid Electrification”, Springer, 1st Edition, 2016.
2. · Stefan C.W. Krauter, “Solar Electric Power Generation: Photovoltaic Energy Systems”, Springer, 1st Edition, 2006.

3. · Mahinda Vilathgamuwa, Dulika Nayanasiri and Shantha Gamini, “Power Electronics for Photovoltaic Power Systems”, Springer, 1st Edition, 2015.
4. · Md. Rabiul Islam, Faz Rahman and Wei Xu, “Advances in Solar Photovoltaic Power Plants”, Springer, 1st Edition, 2016.
5. · Almoataz Y. Abdelaziz, Mahmoud A. Mossa and Najib El Ouanjli, “Advances in Solar Photovoltaic Energy Systems”, IntechOpen, 1st Edition, 2024.

CourseOutcomes:

After completion of the course students will be able to:

1. Explain the fundamentals of solar energy and analyze the characteristics of PV cells and modules.
2. Analyze series and parallel interconnections of PV modules and estimate solar radiation on different surfaces.
3. Design the size of photovoltaic systems for standalone and grid-connected applications
4. Evaluate the performance of PV systems using Maximum Power Point Tracking techniques.
5. Analyze PV system applications and assess economic feasibility using life cycle costing methods.

COURSE ARTICULATION MATRIX:

Correlation of course outcomes with program outcomes and program specific outcomes.

CO-POMapping (3/2/1indicatesstrengthofcorrelation) 3-Strong, 2-Medium,1-Weak														
COs	**ProgrammeOutcomes(POs)**											**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	**3**	**2**	**1**	**2**	**-**	**-**	**2**	**-**	**-**	**-**	**3**	**1**	**-**	**1**
CO2	**3**	**3**	**2**	**2**	**1**	**-**	**2**	**-**	**-**	**-**	**3**	**1**	**-**	**1**
CO3	**3**	**3**	**3**	**2**	**2**	**-**	**2**	**-**	**-**	**-**	**3**	**1**	**-**	**1**
CO4	**3**	**3**	**3**	**3**	**2**	**-**	**2**	**-**	**-**	**-**	**3**	**1**	**-**	**1**
CO5	**3**	**2**	**2**	**2**	**1**	**1**	**3**	**-**	**-**	**-**	**3**	**1**	**-**	**1**

2026-27 Onwards (MR-25)	MALLAREDDY (MR) Deemed to be University	B.Tech. III Semester		
Code: 2502P03	ELECTRICAL MACHINES LAB-1	L	T	P
Credits:1.5		-	-	3

Course Objectives:

To provide students with a strong back ground in different types of electrical machines. To train the students with well practical knowledge of different DC machines.

List of Experiments:

1. Load Test on Single Phase Transformer (Calculate Efficiency and Regulation).
2. OC and SC Test on Single Phase Transformer (Determination of Equivalent Circuit and Predetermination of Efficiency and Regulation).
3. Magnetization characteristics of DC shunt generator (Determination of critical field resistance and critical speed).
4. Load test on DC shunt generator (Determination of Load characteristics)
5. Brake test on DC shunt motor (Determination of performance characteristics and torque-speed curves)
6. Swinburne's test (Predetermination of efficiencies) and speed control of DC shunt motor.
7. Brake test on DC series motor (Determination of performance characteristics and torque-speed curves)
8. Brake test on DC compound motor (Determination of performance characteristics and torque-speed curves)

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

1. Load test on DC compound generator (Determination of Load characteristics).
2. Separation of losses in DC shunt motor (Determination of constant and variable losses).
3. Fields test on DC series machines (Determination of efficiency)
4. Retardation test on DC shunt motor (Determination of losses at rated speed)

Course Outcomes

At the end of the course, students should be able to

1. Evaluate transformer efficiency and regulation through direct and indirect testing.
2. Determine DC shunt generator excitation limits and magnetization characteristics.
3. Predetermine machine efficiency by analyzing individual losses using indirect methods.

4. Demonstrate speed control techniques and compare characteristics of different DC machines.
5. Analyze DC motor performance and torque-speed curves via mechanical loading.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COS	Programme Outcomes (PO's)											PSO's		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	2	3	-	1	-	3	-	-	3	2	-	-
CO2	3	3	2	3	-	1	-	3	-	-	3	2	-	-
CO3	3	2	2	3	-	1	-	3	-	-	3	2	-	-
CO4	3	2	2	3	-	1	-	3	-	-	3	2	-	-
CO5	3	3	2	3	-	2	-	3	-	-	3	2	-	-

2025-26 Onwards (MRD-25)	MALLA REDDY (MR) DEEMED TO BE UNIVERSITY	B.Tech. III Semester		
Code:2504P02	**DIGITAL CIRCUIT DESIGN LAB**	**L**	**T**	**P**
Credits: 1.5		**-**	**-**	**3**

Course Objectives: To get programming knowledge on Verilog/VHDL programming ofdifferent digital circuits and CMOS circuits

Implement the following using Verilog/VHDL or any equivalent software

1. Introduction to Verilog/VHDL and Design of all the logic gates
2. Design of Half adder, Full adder using 3 modeling styles
3. Design of Half Subtractor, Full Subtractor using 3 modeling styles
4. Design of 4X16 Decoder using two 3x8 Decoders
5. Design of 8X3 Encoder (without and with priority).
6. Design of Multiplexer & Demultiplexer.
7. Design of comparator
8. Design of 4-bit binary to gray converter vice versa
9. Design of BCD to Excess-3 code converter and vice versa
10. Design of flip flops: SR, D, JK, T.
11. Design of 4-bit binary up/down counter.
12. Design of Johnson counter.

Equipment required for laboratory

1. Computers – Dual Core.
2. Software – Verilog/VHDL or any equivalent software

Course Outcomes:

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

1. Design and verify the functionality of various combinational circuits using Verilog/VHDLcoding.
2. Design and verify the functionality of various flipflops and basic sequential circuits usingVerlog/VHDL coding.

COURSE ARTICULATION MATRIX:

Correlation of course outcomes with program outcomes and program specific outcomes.

	CO- PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
	Programme Outcomes(POs)												**PSOs**		
COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO 3
CO1	3	3	3	3	3		1		1	2	2	3	3	3	2
CO2	3	3	3	3	3		1		1	2	2	3	3	3	2

2025-26 Onwards (MRD-25)	MALLA REDDY (MR) DEEMED TO BE UNIVERSITY	B.Tech. III Semester		
Code:2500M05	ENVIRONMENTAL SCIENCE	L	T	P
Credits: Nil		1	1	

Course Objectives:

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

Module - I

Ecosystems: Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biochemical cycles, Bio-accumulation, Bio magnification, ecosystem value, services and carrying capacity, Field visits.

Module - II

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

Module - III

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

Module - IV

Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, **Air Pollution:** Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. **Water pollution:** Sources and types of pollution, drinking water quality standards. **Soil Pollution:** Sources and types, Impacts of modern agriculture, degradation of soil. **Noise Pollution:** Sources and Health hazards, standards, **Solid waste:** Municipal Solid Waste management, composition and characteristics of e-Waste and its management. **Pollution control technologies:** Wastewater Treatment methods: Primary, secondary and Tertiary.

Overview of air pollution control technologies, Concepts of bioremediation. **Global Environmental Issues and Global Efforts: C**limate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol. NAPCC-GoI Initiatives.

Module - V

Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act-1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio- economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP). **Towards Sustainable Future:** Concept of Sustainable Development Goals, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

TEXT BOOKS:

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
2. Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCE BOOKS:

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4 Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.
6. Introduction to Environmental Science by Y. Anjaneyulu, BS. Publications.

Course Outcomes

At the end of the course, students should be able to

1. Explain the structure, functions, energy flow, and ecological significance of ecosystems.
2. Describe the classification, utilization, conservation, and sustainable management of natural resources.
3. Explain the importance of biodiversity, its conservation methods, and the legal measures for its protection.
4. Analyze various types of environmental pollution, pollution control technologies, and global environmental issues.
5. Explain environmental legislation, Environmental Impact Assessment (EIA), and sustainable development practices for environmental management.

COURSE ARTICULATION MATRIX:
Correlation of course outcomes with program outcomes and program specific outcomes.

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COS	Programme Outcomes (PO's)											PSO's		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	2	3	-	-	-	-	1	-	-
CO2	3	2	-	-	-	2	3	-	-	-	-	1	-	-
CO3	3	3	-	-	-	2	3	2	-	-	-	1	-	-
CO4	3	3	1	2	-	2	3	-	-	-	-	1	1	-
CO5	3	2	-	2	-	2	3	2	-	-	-	1	1	-

IV-SEMESTER

2025-26 Onwards (MRD-25)	MALLA REDDY (MR) DEEMED TO BE UNIVERSITY	B.Tech. IVSemester		
Code:250HT03	MANAGEMENT SCIENCE (Common for EEE, ECE)	L	T	P
Credits:4		4	-	-

Prerequisites: Nil

Course Objectives:
Through reading the text, references and discussion of cases students should be able to understand the fundamentals underlying the management of an organization

MODULE I Management and Principles of Management 9 Periods

A. **Introduction to Management:** Concepts of Management and organization-nature, importance and Functions of Management, Taylor's Scientific Management Theory, Fayol's Principles of Management.

B. **Management Theories:** Mayo's Hawthorne Experiments, Maslow's Theory of Human Needs, Douglas McGregor's Theory X and Theory Y, Herzberg's Two-Factor Theory of Motivation, Systems Approach to Management, Leadership Styles, Corporate Social responsibility.

MODULE II Planning, Organization and types of Structures 9 Periods

A. Planning: Need for planning- -Steps in the process of planning-Advantages and limitation of planning. Types of planning - Vision, Mission, Goals, Objectives, Policy, Strategy, Programmes, Elements of Corporate Planning Process, Management by Objectives (MBO).

B. Organization and types of Structures: Basic concepts related to Organization - Departmentation and Decentralization, Types of Organizations- Line organization, Line and staff organization, functional organization, committee organization, matrix organization, Virtual Organization, Cellular Organization, boundary less organization, inverted pyramid structure, lean and flat Organization structure.

MODULE III Staffing and controlling 9 Periods

A. Staffing: Basic concepts of HRM, functions of HR Manager: Manpower planning, Recruitment, Selection, Training and Development. Performance Appraisal, Job Evaluation and Merit Rating.

B. Controlling: process of controlling, types of controlling, managing productivity, Quality Control: chart, R chart, C chart, P chart, (simple Problems), Deming's contribution to quality.

MODULE IV Operations and Materials Management 9 Periods

A. Operations Management : Principles and Types of Plant Layout-Methods of production (Job, batch and Mass Production), Work Study -Basic procedure involved in Method Study and Work Measurement.

B. Materials Management: Objectives, Need for Inventory control, EOQ, ABC Analysis, Purchase Procedure, Stores Management and Stores Records.

MODULE V Project Management and Contemporary Practices 9 Periods

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

B. Contemporary Management Practices: Basic concepts of ERP, Just-In-Time (JIT) System, Total Quality Management (TQM), six sigma and Capability Maturity Model (CMM) Levels, Bench marking, Balanced Score card.

Text Books

1. Aryasri, **Management Science**, 4th edition TMH, 2004.
2. Stoner, Freeman, Gilbert, **Management,** Pearson Education, New Delhi, 6th Ed, 2004.

References

4. Kotler Philip & Keller Kevin Lane, **"Marketing Management"**, PHI, 12th edition, 2005
5. Koontz &Weihrich, **"Essentials of Management"**, TMH, 6th edition, 2005.
6. Thomas N.Duening& John M. Ivancevich **"Management - Principles and Guidelines"**, Biztantra, 5th edition 2003.
7. Memoria & S.V. Gauker, **"Personnel Management"**, Himalaya, 25th edition, 2005
8. Samuel C. Certo, **"Modern Management"**, PHI, 9th edition, 2005.

E- Resources

1. http://freevideolectures.com/Course/2689/Management-Science
2. http://www.onlinevideolecture.com/?course=mba-programs&subject=human-resource- management
3. http://www.onlinevideolecture.com/?course=mba-programs&subject=marketing- fundamental
4. http://freevideolectures.com/Course/2371/Project-and-Production-Management
5. http://nptel.ac.in/courses/110105034/

Course Outcomes

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

1. Understand the various concepts, principles and theories of management.
2. Understand the basic concepts of planning and various structures of organizations.
3. Understand the process of staffing and controlling
4. Understand the process of operations management. Also learn the concepts of materials management and marketing management at an organization.
5. Understand the various contemporary management practices. Also the project management techniques.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	2		3
CO2	3	3	3	3	-	-	-	-	-	-	-	3	2		3
CO3	3	3	3	3	-	-	-	-	-	-	-	3	2		3
CO4	3	3	3	3	-	-	-	-	-	-	-	3	2		3
CO5	3	3	3	3	-	-	-	-	-	-	-	3	2		3

2025-26 Onwards (MRD-25)	MALLA REDDY (MR) DEEMED TO BE UNIVERSITY	B.Tech. IV Semester		
Code: 2504T04	**SIGNALS AND SYSTEMS**	**L**	**T**	**P**
Credits: 3		**3**	**-**	**-**

Prerequisites: Nil

Course Objectives:

This course is introducing the basic concepts of signals and introduce the Fourier series for the analysis of periodic signals, the Fourier transform for the analysis of non-periodic signals and familiarize the concept of sampling and different types of sampling techniques. This course also introduces the LTI system and the concepts of convolution and correlation applied for the signal analysis, the concept of Laplace transform, its properties and its applications for continuous time domain signals, the concept of Z- transform, its properties and its applications for discrete time domain signals.

MODULE- 1 Introduction to Signals 10 Periods

Definition, Classification of Signals (continuous - time and discrete - time), Elementary signals (continuous - time and discrete - time).

Signal Analysis: Analogy between Vectors and Signals, Orthogonal Signal Space, Signal approximation using Orthogonal functions, Mean Square Error, Closed or complete set of orthogonal functions, Orthogonality in Complex functions.

Fourier series: Overview of Fourier series.

MODULE-II Fourier Transforms &Sampling 10 Periods

Fourier Transforms: Derivation of Fourier Transform from Fourier Series, Existence of Fourier Transform, Fourier Transform of Standard signals, Properties of Fourier Transform, Fourier Transform of periodic signals, and Introduction to Hilbert Transform.

Sampling: Sampling theorem – Graphical and analytical proof for Band Limited Signals, Types of Sampling – Impulse Sampling, Natural and Flat Top Sampling, Reconstruction of signal from its samples, Effect of under sampling – Aliasing.

MODULE-III LTI System, Convolution and Correlation 10 Periods

A: Signal Transmission through Linear Systems: System Definition, Classification of systems, Properties of LTI systems, Transfer Function of an LTI system, Filter Characteristics of Linear System, Distortionless Transmission through a system.

B: Convolution and Correlation of Signals: Concept of convolution in Time domain and Frequency domain, Graphical representation of Convolution, Convolution property of Fourier Transforms, Cross Correlation and Auto Correlation functions, Properties of Correlation function, Energy density spectrum, Parseval's Theorem

MODULE-IV Laplace Transforms 10 Periods

Unilateral and Bilateral Laplace Transform, Relation between Laplace Transform and Fourier Transform, Laplace Transform of some commonly used signals and its Region of Convergence (ROC), Properties of Laplace Transform, Inverse Laplace Transform, Solution of Differential equations using Laplace Transform, Laplace Transform of signals using waveform synthesis.

MODULE-V Z–Transforms 8 Periods

One sided and Bilateral Z-Transform, Z-Transform of some commonly used signals and its Region of Convergence (ROC), Properties of Z-Transform, Inverse Z-Transform- Long Division, Partial Fraction and Residue Methods.

Text Books

1. B. P. Lathi, **"Signals Systems & Communications"**, BSP, 2nd Edition, 2013.
2. P Ramakrishna Rao and Shankar Parkriya, **"Signals and Systems"**, MGH International, 2nd Edition, 2013.

References

1. A.V. Oppenheim, A. S. Willsky, S.H. Nawab, **"Signals and Systems"**, PHI, 2nd Edition, 2014.
2. A. Anand Kumar, **"Signals and Systems"**, PHI, 3rd Edition, 2013.
3. Simon Haykin and Van Veen, **"Signals & Systems"**, Wiley, 2nd Edition, 2007.

E-Resources

1. http://www.tutorialspoint.com/signals_and_systems/
2. https://ocw.mit.edu/resources/res-6-007-signals-and-systems-spring-2011/lecture-notes/
3. http://ieeexplore.ieee.org/xpl/mostRecentIssue.jsp?reload=true&punumber=78
4. http://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=8919
5. http://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=82
6. http://nptel.ac.in/courses/117104074

Course Outcomes

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

1. Represent any arbitrary signals in terms of complete sets of orthogonal functions and understand the principles of impulse functions, step function and signum function.
2. Express periodic signals in terms of Fourier series and aperiodic signals in terms of Fourier transform.
3. Understand the principle of linear system, filter characteristics of a system and its bandwidth, the concepts of auto correlation and cross correlation and power Density Spectrum.
4. Express continuous time domain signals in terms of Laplace Transform ie. complex frequency domain (s-plain) and waveform synthesis.
5. Express discrete time domain signals in terms of Z-Transform and its Region of Convergence.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COS	Programme Outcomes (POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	3	1	-	-
CO2	3	3	3	3	-	-	-	-	-	-	3	1	-	-
CO3	3	3	3	3	-	-	-	-	-	-	3	1	-	-
CO4	3	3	3	3	-	-	-	-	-	-	3	1	-	-
CO5	3	3	3	3	-	-	-	-	-	-	3	1	-	-

2025-26 Onwards (MRD-25)	MALLA REDDY (MR) DEEMED TO BE UNIVERSITY	B.Tech. IV Semester		
Code: 2502T08	CONTROL SYSTEMS	L	T	P
Credits: 4		3	1	-

Prerequisites: Laplace Transforms, Differential Equations

Course Objectives: This course introduces different ways of system representations such as Transfer function representation and state space representations and to assess the system dynamic response. It also emphasis on analysis of system performance in time and frequency domain and techniques for improving the performance.

MODULE I Systems and Representations 9 Periods

Mathematical modelling of systems ,Electrical systems (RLC circuits) ,Mechanical systems (translation & rotational) Transfer function concept ,Laplace transforms in system modelling Block diagram representation of systems

MODULE II Time Response & Stability Analysis 9 Periods

Block diagram reduction techniques ,Time response analysis:Step response of first and second order systems ,Time domain specifications (rise time, settling time, overshoot) Stability concept ,Routh–Hurwitz stability criterion

MODULE III Root Locus & Frequency Response Methods 9 Periods

Root locus technique: Construction rules ,Stability analysis using root locus ,Frequency response analysis: Nyquist stability criterion ,Bode plots Gain margin and phase margin

MODULE IV Control System Design Techniques 9 Periods

Basics of control system design ,Controllers: Proportional (P), Integral (I), Derivative (D)
Design using: Root locus method Bode plot method ,Introduction to compensators (lead, lag, lead-lag)

MODULE V Advanced Concepts & State Space Analysis 9

Periods

Effects of zeros on system response Minimum and non-minimum phase systems
State-space analysis: State variables and state models Solution of state equations Concepts of controllability and observability .Design using state space

Text Books

1. I.J.Nagrath and M.Gopal, "Control Systems Engineering", New Age International Publishers, 5th Edition, 2007.
2. Benjamin.C.Kuo, "Automatic Control Systems", Prentice Hall of India, 7th Edition, 1995.

References

1. A.Nagoorkani, "Control Systems", RBA Publications, 2nd Edition, 2006.
2. M.Gopal, "Control System: Principles and Design", Tata McGraw Hill, 2 nd Edition, 2002.
3. Joseph J Distefano, "Schaum's Outline Series of Feedback and Control Systems", Tata McGraw Hill, 2nd Edition, 2014.

4. K. Ogata, “Modern Control Engineering”, Pearson Education, New Delhi, 5th Edition, 2010.
5. M. Gopal, “Control Systems, Principles & Design”, Tata McGraw Hill, 4th Edition,2012.

E - Resources

1. https://www.electrical4u.com/control-engineering-historical-review-and-types-of-control-engineering/
2. http://ieeecss.org/CSM/library/2011.html
3. http://nptel.ac.in/courses/108101037/

Course Outcomes

At the end of the course, students should be able to

1. Apply transfer function models to analyze physical systems.
2. Analyze time response characteristics and determine system stability using Routh–Hurwitz criterion
3. Evaluate system stability and performance using root locus and frequency response methods (Bode and Nyquist plots)..
4. Design control systems using PID controllers, root locus, and Bode plot techniques to meet desired specifications.
5. Analyze and design systems using state-space methods, including controllability, observability, and effects of system zeros.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COS	ProgrammeOutcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	3	1	-	1
CO2	3	3	3	3	-	-	-	-	-	-	3	1	-	1
CO3	3	3	3	3	-	-	-	-	-	-	3	1	-	1
CO4	3	3	3	3	-	-	-	-	-	-	3	1	-	1
CO5	3	3	3	3	-	-	-	-	-	-	3	1	-	1

2025-26 Onwards (MRD-25)	MALLA REDDY (MR) DEEMED TO BE UNIVERSITY	B.Tech. IVSemester		
Code:2502T09	POWER SYSTEMS-I	L	T	P
Credits: 4		3	1	-

Prerequisites: Engineering Chemistry, Electrical Circuit Analysis and Synthesis

Course Objectives: This course deals about the layout of different types of power stations and various power distribution systems. It also emphasis on the importance of economic aspects & tariff.

MODULE I GENERATION OF ELECTRIC POWER 9 Periods

Conventional Sources (Qualitative): Hydro station, Steam Power Plant, Nuclear Power Plant and Gas Turbine Plant.Non-Conventional Sources (Elementary Treatment): Solar Energy, Wind Energy, Fuel Cells, Ocean Energy, Tidal Energy, Wave Energy, Cogeneration, Energy conservation and storage.

MODULE II ECONOMICS OF POWER GENERATION 9 Periods

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

MODULE III OVER HEAD TRANSMISSION LINES 9 Periods

Line conductors, inductance and capacitance of single phase and three phase lines with symmetrical and unsymmetrical spacing, Composite conductors transposition, bundled conductors, and effect of earth on capacitance, skin and proximity effects.

OVERHEAD LINE INSULATORS: Introduction, types of insulators, Potential distribution over a string of suspension insulators, Methods of equalizing the potential, testing of insulators, Sag and tension calculations.

MODULE IV SUBSTATIONS: 9 Periods

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

GAS INSULATED SUBSTATIONS (GIS): Advantages of Gas insulated substations, different types of gas insulated substations, single line diagram of gas insulated substations, bus bar, construction aspects of GIS, Installation and maintenance of GIS, Comparison of Air insulated substations and Gas insulated substations

MODULE V DC &AC Distribution 9 Periods

DC DISTRIBUTION: Classification of Distribution Systems. - Comparison of DC vs. AC and Under-Ground vs. Over- Head Distribution Systems. - Requirements and Design features of Distribution Systems. -Voltage Drop Calculations (Numerical Problems) in D.C Distributors for the following cases:Radial D.C Distributor fed one end and at the both the ends (equal/unequal Voltages) and Ring Main Distributor.

AC. DISTRIBUTION: Introduction, AC distribution, Single phase, 3-phase, 3 phase 4 wire system, bus bar arrangement, Selection of site for substation. Voltage Drop

Calculations (Numerical Problems) in A.C. Distributors for the following cases: Power Factors referred to receiving end voltage and with respect to respective load voltages.

Text Books

1. V.K Mehta and Rohit Mehta, **"Principles of Power Systems",** S.Chand& Company Ltd, New Delhi, 2004.
2. PSR. Murty**, "Electrical Power Systems",**Butterworth-Heinemann Publications, 2017.

References

1. R. K. Rajput, **"A Text Book of Power System Engineering"**, Laxmi Publications (P) Limited, 2nd Edition, 2016.
2. S.N.Singh , **"Electrical Power Generation, Transmission and Distribution"** , PHI Learning Pvt. Ltd., 2nd Edition, 2008.
3. C.L.Wadhwa, **"Electrical Power Systems"**, New Age international (P) Limited, 6th Edition, 2010.
4. Dr.B.R.Gupta, **"Generation of Electrical Energy"** , S.Chand& Company Ltd, 6th Edition, 2008.
5. G.Ramamurthy, **"Handbook of Electrical power Distribution"**, Universities Press, 2013.

E - Resources

1. https://www.electrical4u.com/power-plants-types-of-power-plant/
2. http://spectrum.ieee.org/energy
3. http://nptel.ac.in/courses/108102047/

Course Outcomes

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

1. Understand the layouts of Thermal Power station, Nuclear Power Plant and Gas Power plant.
2. Demonstrate the operation of hydro electric power plants and turbines.
3. Comprehend about various types of substations and its equipment.
4. Analyze the voltage drops in DC and AC distribution systems.
5. Evaluate the cost of generation and tariff.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COS	ProgrammeOutcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	3	2	2	-
CO2	3	3	3	3	-	-	-	-	-	-	3	2	2	-
CO3	3	3	3	3	-	-	-	-	-	-	3	2	2	-
CO4	3	3	3	3	-	-	-	-	-	-	3	2	2	-
CO5	3	3	3	3	-	-	-	-	-	-	3	2	2	-

2025-26 Onwards (MRD-25)	MALLA REDDY (MR) DEEMED TO BE UNIVERSITY	B.Tech. IV Semester		
Code:2502T10	ELECTRICAL MACHINES-II (Professional Elective-I)	L	T	P
Credits:3		3	-	-

Prerequisites: Electromagnetic Fields Electrical Circuit Analysis and Synthesis

Course Objectives:

This course facilitates to study the performance of induction motors which is main drive for industrial applications. It also emphasis about the performance analysis of synchronous machines.

MODULE I Fundamentals of Rotating Machines 12 Periods

Review of transformer basics General constructional features of rotating machines Principle of electromagnetic torque production MMF and flux density distribution in air-gap Single coil and multiple coil systems Basic winding terms and balanced 3-phase winding Electrical and mechanical angle

MODULE II Rotating Magnetic Field & Induced EMF 12 Periods

Production of rotating magnetic field , Speed and direction of rotation ,Synchronous speed concept .Induced EMF in rotating coils ,RMS value and frequency of induced voltage

MODULE III Three-Phase Induction Motors 12 Periods

Types and construction of 3-phase induction motors Slip and its significance Equivalent circuit of induction motor Torque expression and torque-slip characteristics Operating point with load torque Effect of rotor resistance, voltage, and frequency Parameter estimation using: No-load test Blocked rotor test

MODULE IV Single-Phase Induction Motors 12 Periods

Principle of operation of single-phase induction motor Double revolving field theory Equivalent circuit Torque-slip characteristics Starting methods: Auxiliary winding Capacitor start Estimation of starting capacitance

MODULE V Synchronous Machines & Stability 12 Periods

Types and construction of synchronous machines EMF equation and synchronous reactance Operation as generator: Synchronization to bus ,Voltage regulation ,Effect of excitation ,Power-angle characteristic Operation as motor: Phasor diagrams under different conditions ,Effect of excitation variation Salient pole machines: d-axis and q-axis reactances Stability analysis: Swing equation Equal area criterion Steady-state and transient stability.

Text Books

1. P.S. Bimbra, **"Electrical Machinery"**, Khanna Publishers, New Delhi, 7th Edition, 2011.
2. J.B.Gupta, **"Theory & Performance of Electrical Machines"**, S.K. Kataria& Sons, 15th Edition, 2015

References

1. M.G Say, **"Performance and Design of A.C Machines"**, 3rd Edition, BPB Publishers, 2002
2. A.E.Fitzgerald, C.Kingsley and S.Umans, **"Electric Machinery"**, Tata McGraw-Hill Companies, 7th Edition, 2013.
3. I.J.Nagrath&D.P.Kothari, **"Electric Machines"**, Tata McGraw Hill, 4th Edition, 2010.

4 S. Kamakashaiah, **"Electromechanics-II (Transformers and Induction Motors)"**, Hitech Publishers
5 R.K.Rajput, **"Electrical Machines"**, Laxmi Publications Pvt., Ltd., New Delhi, 4th Edition, 2006.

E- Resources

1. R.K.Rajput, **"Electrical Machines"**, Laxmi Publications Pvt., Ltd., New Delhi, 4th Edition, 2006.
2. https://www.electrical4u.com/synchronous-motor-working-principle/
3. https://www.eeweb.com/electromechanical
4. http://nptel.ac.in/courses/108106072/

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

1 Impart knowledge on Poly Phase Induction Motors.
2 Analyze the performance of Induction Motors.
3 Understand the construction and operation of single phase Induction Motors
4 Analyze the performance of Synchronous Generator.
5 Analyze the performance of Synchronous Motor.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COS	Programme Outcomes (POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	3	1	-	1
CO2	3	3	3	3	-	-	-	-	-	-	3	1	-	1
CO3	3	3	3	3	-	-	-	-	-	-	3	1	-	1
CO4	3	3	3	3	-	-	-	-	-	-	3	1	-	1
CO5	3	3	3	3	-	-	-	-	-	-	3	1	-	1

2025-26 Onwards (MRD-25)	MALLA REDDY (MR) DEEMED TO BE UNIVERSITY	B.Tech. IV Semester		
Code:2502T11	**Renewable Energy Sources** (Professional Elective– I)	L	T	P
Credits:3		3	-	-

Prerequisites: Nil

Course Objectives:

The objective of this subject is to provide knowledge about different non-conventional energy sources.

MODULE I Solar Energy Fundamentals 9 Periods

Basics of solar energy ,Solar radiation and its measurement , Solar geometry concepts Non-concentrating solar collectors: Flat plate collectors ,Working principle and applications

MODULE II Advanced Solar Systems & Storage 9 Periods

Practice problems on solar collectors , Concentrating solar collectors: Types (parabolic trough, dish, tower) Working and performance , Energy storage systems: Thermal energy storage Sensible and latent heat storage

MODULE III Biomass Energy Resources 9 Periods

Biomass energy: Types and sources Classification Biomass characterization: Physical and chemical properties Calorific value

MODULE IV Biomass Conversion Technologies 10 Periods

Biochemical conversion processes: Anaerobic digestion ,Fermentation ,Bioconversion to alcohol (bioethanol) Thermo-chemical conversion: Combustion Gasification Pyrolysis

MODULE V Wind Energy Systems 10 Periods

Wind energy basics Wind turbine types: Horizontal axis and vertical axis Aerodynamic principles and Betz limit Wind turbine characteristics Power generation from wind energy Performance analysis

Text Books

1. Joshua Earnest, Tore Wizeliu, 'Wind Power Plants and Project Development', PHI Learning Pvt.Ltd, New Delhi, 2011.
2. D.P.Kothari, K.C Singal, Rakesh Ranjan "Renewable Energy Sources and Emerging Technologies", PHI Learning Pvt.Ltd, New Delhi, 2013.
3. Scott Grinnell, "Renewable Energy & Sustainable Design", CENGAGE Learning, USA, 2016.

References

1. A.K.Mukerjee and Nivedita Thakur," Photovoltaic Systems: Analysis and Design", PHI Learning Private Limited, New Delhi, 2011
2. Richard A. Dunlap," Sustainable Energy" Cengage Learning India Private Limited, Delhi, 2015.
3. Chetan Singh Solanki, " Solar Photovoltaics : Fundamentals, Technologies and Applications", PHI Learning Private Limited, New Delhi, 2011
4. Bradley A. Striebig,AdebayoA.Ogundipe and Maria Papadakis," Engineering Applications

in Sustainable Design and Development", Cengage Learning India Private Limited, Delhi, 2016.
5. Godfrey Boyle, "Renewable energy", Open University, Oxford University Press in association with the Open University, 2004.
6. Shobh Nath Singh, 'Non-conventional Energy resources' Pearson Education ,2015.

E- Resources

1. https://nptel.ac.in/courses/121/106/121106014/
2. https://nptel.ac.in/courses/103/103/103103206/

Course Outcomes

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

1. Understand basics of solar energy and collectors.
2. Analyze solar systems and energy storage methods.
3. Classify biomass resources and properties.
4. Explain biomass conversion techniques.
5. Evaluate wind energy systems and performance.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	-	-	-	3	3	-	-	-	-	3	-	-	-
CO2	1	-	-	-	-	3	3	-	-	-	-	3	-	-	-
CO3	1	-	-	-	-	3	3	-	-	-	-	3	-	-	-
CO4	1	-	-	-	-	3	3	-	-	-	-	3	-	-	-
CO5	1	-	-	-	-	3	3	-	-	-	-	3	-	-	-

2025-26 Onwards (MRD-25)	MALLA REDDY (MR) DEEMED TO BE UNIVERSITY	B.Tech. IV Semester		
Code:2502T12	Fuzzy Sets, Logic and Systems & Applications (Professional Elective-I)	L	T	P
Credits:3		3	-	-

Prerequisites: Nil

Course Objectives:

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

MODULE I Fundamentals of Fuzzy Sets 9 Periods

Introduction to fuzzy logic Crisp sets vs fuzzy sets Basic concepts and terminology.
Membership functions: Types (triangular, trapezoidal, Gaussian, bell-shaped) Representation and properties

MODULE II Fuzzy Set Operations & Arithmetic 9 Periods

Set-theoretic operations: Union, intersection, complement α-cuts and properties Fuzzy arithmetic: Addition, subtraction, multiplication .Extension principle

MODULE III Fuzzy Relations & Inference Systems 9 Periods

Fuzzy relations: Cartesian product Composition (max–min, max–product) Fuzzy inference systems: Mamdani model (FIS I & II),Rule base and reasoning

MODULE IV Advanced Fuzzy Models 9 Periods

Wang and Mendel model ,Takagi–Sugeno–Kang (TSK) model Fuzzifiers and defuzzifiers:
Types of fuzzification Defuzzification methods (centroid, bisector, etc.)

MODULE V Neuro-Fuzzy Systems & Applications 9 Periods

ANFIS (Adaptive Neuro-Fuzzy Inference System) architecture Learning and training in ANFIS Integration of fuzzy systems with machine learning, Applications of fuzzy logic in engineering

Text Books

1. Fuzzy Sets and Fuzzy Logic: Theory and Applications – George J. Klir and Bo Yuan, Prentice Hall of India, 1995
2. A First Course in Fuzzy Logic – Hung T. Nguyen and Elbert A. Walker, CRC Press, 2006.

References

1. Neuro-Fuzzy and Soft Computing – J. S. R. Jang, C. T. Sun and E. Mizutani, Prentice Hall, 1997.

2. Fuzzy Set Theory and Its Applications – H. J. Zimmermann, Kluwer Academic Publishers, 1996.
3. Fuzzy Systems Theory and Its Applications – T. Terano, K. Asai and M. Sugeno, Academic Press, 1992.
4. Uncertain Rule-Based Fuzzy Logic Systems: Introduction and New Directions – Jerry M. Mendel, Prentice Hall, 2001.
5. A Course in Fuzzy Systems and Control – Li-Xin Wang, Prentice Hall, 1997.

E- Resources

1. https://www.tutorialspoint.com/artificial_intelligence/artificial_intelligence_neural_networks.htm
2. http://uni-obuda.hu/users/fuller.robert/nfs.html
3. http://nptel.ac.in/courses/108104049/

Course Outcomes

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

1. Understand basic concepts of fuzzy sets and membership functions.
2. Apply fuzzy set operations and arithmetic.
3. Analyze fuzzy relations and inference systems.
4. Explain advanced fuzzy models and defuzzification methods.
5. Apply neuro-fuzzy systems and machine learning concepts.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COS	Programme Outcomes (POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	-	-	-	-	-	3	3	-	2
CO2	3	3	3	3	3	-	-	-	-	-	3	3	-	2
CO3	3	3	3	3	3	-	-	-	-	-	3	3	-	2
CO4	3	3	3	3	3	-	-	-	-	-	3	3	-	2
CO5	3	3	3	3	3	-	-	-	-	-	3	3	-	2

2025-26 Onwards (MRD-25)	MALLA REDDY (MR) DEEMED TO BE UNIVERSITY	B.Tech. IV Semester		
Code: 2502P04	ELECTRICAL MACHINES LAB-II	L	T	P
Credits: 1.5		-	-	3

Prerequisites: DC Machines Lab

Course Objectives:

This course deals with the practical aspects of various ac machines like transformer, induction motor and synchronous machines.

List of Experiments:

1. Sumpner's test on a pair of Single Phase Transformers.
2. No-load & Blocked rotor tests on Three Phase Induction Motor.
3. Brake test on three phase slip ring Induction Motor.
4. Regulation of Three-Phase Alternator by Synchronous Impedance & M.M.F. Methods.
5. Regulation of Three-Phase Alternator by Z.P.F.
6. Equivalent Circuit of a Single-Phase Induction Motor.
7. V and Inverted V Curves of a Three-Phase Synchronous Motor.
8. Determination of X_d and X_q of Salient Pole Synchronous Machine.

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

1. Scott Connection of Transformers.
2. OC & SC Tests on Single Phase Transformer.
3. Parallel operation of Single Phase Transformers.
4. Load test on Three-Phase Alternator.
5. Regulation of Three-Phase Alternator by A.S.A Methods.

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

1 Assess the performance of single phase transformer using various methods.
2 Assess the performance of single phase induction motor.
3 Determine the regulation of alternator using different methods
4 Determine the performance of 3 phase induction motor by various methods.
5 Assess the performance of synchronous machines.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COS	Programme Outcomes (POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	3	-	3	1	-	-
CO2	3	3	3	3	-	-	-	-	3	-	3	1	-	-
CO3	3	3	3	3	-	-	-	-	3	-	3	1	-	-
CO4	3	3	3	3	-	-	-	-	3	-	3	1	-	-
CO5	3	3	3	3	-	-	-	-	3	-	3	1	-	-

2025-26 Onwards (MRD-25)	MALLA REDDY (MR) DEEMED TO BE UNIVERSITY	B.Tech. IV Semester		
Code: 2504P04	SIGNAL AND SYSTEMS LAB	L	T	P
Credits: 1.5		-	-	3

Course Objectives:

To get knowledge on how to write programs for various operations on signals and LTI systems.

List of Experiments

1. Basic Operations on Matrices.
2. Generation of Various Signals and Sequences (Periodic and Aperiodic), such as Unit impulses, Unit Step, Square, Saw tooth, Triangular, Sinusoidal, Ramp, Sinc.
3. Operation of Signals and Sequences such as Addition, Multiplication, Scaling, Shifting, Folding, Computation of Energy and Average Power.
4. Finding the Even and Odd parts of Signal Sequence and Real and Imaginary parts of Signal.
5. Convolution between Signals and Sequences.
6. Auto Correlation and Cross Correlation between signals and Sequences.
7. Verification of linearity and Time Invariance Properties of a given Continuous/ Discrete System.
8. Computation of unit Sample, Unit Step and sinusoidal responses of the given LTI System and Verifying its Physical reliability and stability Properties.
9. Gibbs Phenomenon.
10. Finding the Fourier Transform of a given Signal and Plotting its magnitude and Phase Spectrum.
11. Waveform Synthesis using Laplace Transform.
12. Sampling Theorem Verification.

Course Outcomes:

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

1. Generate Different Signals with different Parameters
2. Perform Different Operation on Matrices
3. Implement Different algorithms for small operations on a signal
4. Apply FT & LT on Signals
5. Verify the Different theorems on Signals

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COS	ProgrammeOutcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	3	3	2	-	-	-	2	-	2	-	-	-
CO2	3	3	3	3	2	-	-	-	2	-	2	-	-	-
CO3	3	3	3	3	2	-	-	-	2	-	2	-	-	-
CO4	3	3	3	3	2	-	-	-	2	-	2	-	-	-
CO5	3	3	3	3	2	-	-	-	2	-	2	-	-	-

2025-26 Onwards (MRD-25)	MALLA REDDY (MR) DEEMED TO BE UNIVERSITY	B.Tech. IV Semester		
Code: 2500M06	GENDER SENSITIZATION LAB	L	T	P
Credits: NIL		1	1	-

COURSE DESCRIPTION

This course offers an introduction to Gender Studies, an interdisciplinary field that asks critical questions about the meanings of sex and gender in society. The primary goal of this course is to familiarize students with key issues, questions and debates in Gender Studies, both historical and contemporary. It draws on multiple disciplines – such as literature, history, economics, psychology, sociology, philosophy, political science, anthropology and media studies – to examine cultural assumptions about sex, gender, and sexuality.

This course integrates analysis of current events through student presentations, aiming to increase awareness of contemporary and historical experiences of women, and of the multiple ways that sex and gender interact with race, class, caste, nationality and other social identities. This course also seeks to build an understanding and initiate and strengthen programmes combating gender-based violence and discrimination. The course also features several exercises and reflective activities designed to examine the concepts of gender, gender-based violence, sexuality, and rights. It will further explore the impact of gender-based violence on education, health and development.

Objectives of the Course

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

Module -I: UNDERSTANDING GENDER

Introduction: Definition of Gender-Basic Gender Concepts and Terminology- Exploring Attitudes towards Gender-Construction of Gender-Socialization: Making Women, Making Men

- Preparing for Womanhood. Growing up Male. First lessons in Caste.

Module – II: GENDER ROLES AND RELATIONS

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

Module – III: GENDER AND LABOUR

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

Module – IV: GENDER - BASED VIOLENCE

The Concept of Violence- Types of Gender-based Violence-Gender-based Violence from a Human Rights Perspective-Sexual Harassment: Say No!-Sexual Harassment, not Eve- teasing- Coping with Everyday Harassment- Further Reading: "*Chupulu".*

Domestic Violence: Speaking OutIs Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Thinking about Sexual Violence Blaming the Victim-"I Fought for my Life…."

Module – V: GENDER AND CULTURE

Gender and Film-Gender and Electronic Media-Gender and Advertisement-Gender and Popular Literature- GenderDevelopment Issues-Gender Issues-Gender

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

Note: Since it is Interdisciplinary Course, Resource Persons can be drawn from the fields of English Literature or Sociology or Political Science or any other qualified faculty who has expertise in this field from engineering departments.

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

□ **ESSENTIAL READING:** The Textbook, "*Towards a World of Equals: A Bilingual Textbook on Gender"* written by A.Suneetha, Uma Bhrugubanda, DuggiralaVasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, GoguShyamala, Deepa Sreenivas and Susie Tharu published by Telugu Akademi, Telangana Government in 2015.

ASSESSMENT AND GRADING:

- Discussion & Classroom Participation: 20%
- Project/Assignment: 30%
- End Term Exam: 50%

Learning Outcomes

➢ Students will have developed a better understanding of important issues related to gender in contemporary India.

➢ Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.

- Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
- Students will acquire insight into the gendered division of labor and its relation to politics and economics.
- Men and women students and professionals will be better equipped to work and live together as equals.
- Students will develop a sense of appreciation of women in all walks of life.
- Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.