

MALLA REDDY (MR)

(DEEMED TO BE UNIVERSITY)

Recognized under Section 3 of the UGC Act, 1956

School of Electronics and Electrical Engineering

Course Structure and Syllabus

Academic Year 2025-2026

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

Malla Reddy (MR) Deemed to be University

Electronics and Communication Engineering (MR 25 Regulation)

Course Structure: Semester - I

S.No	Category	Course Code	Course Details	L	T	P	Credits	CIE	SEE	Total
1	BSC	250BT01	Matrices and calculus	3	1	-	4	50	50	100
2	ESC	2505T02	Python for Scientific Computing	3	1	-	4	50	50	100
3	HSMC	250HT01	Language and Professional Skills	3	1	-	4	50	50	100
4	BSC	250BT03	Semiconductor Physics and Devices	3	1	-	4	50	50	100
5	BSC	250BP01	Semiconductor Physics and Devices Lab	-	-	3	1.5	50	50	100
6	ESC	2505P02	Python for Scientific Computing Lab	-	-	3	1.5	50	50	100
7	HSMC	250HP01	Language and Professional Skills Lab	-	-	2	1	50	50	100
8	MC	2500M02	Life Skills for Engineers - I	1	1	-	-	100	-	100
9	MC	2500M01	Indian Knowledge System	1	1	-	-	100	-	100
			Total	**14**	**6**	**8**	**20**	**550**	**350**	**900**

Electronics and Communication Engineering (MR 25 Regulation)

Course Structure: Semester - II

S.No	Category	Course Code	Course Details	L	T	P	Credits	CIE	SEE	Total
1	BSC	250BT04	Differential Equations and Vector Calculus	3	1	-	4	50	50	100
2	ESC	2505T05	Fundamentals of Data Structures	3	1	-	4	50	50	100
3	PCC	2504T01	Analog Circuit Design	3	1	-	4	50	50	100
4	PCC	2504T02	Digital Circuit Design	3	1	-	4	50	50	100
5	ESC	2505P05	Fundamentals of Data Structures Lab	-	-	3	1.5	50	50	100
6	PCC	2504P01	Analog Circuit Design Lab	-	-	3	1.5	50	50	100
7	PCC	2504P02	Digital Circuit Design Lab	-	-	2	1	50	50	100
8	MC	2500M03	Life Skills for Engineers-II	1	1	-	-	100		100
9	MC	2500M04	Universal Human Values	1	1	-	-	100		100
			Total	**14**	**6**	**8**	**20**	**550**	**350**	**900**

Electronics and Communication Engineering (MR 25 Regulation)										
Course Structure: Semester - III										
S.No	**Category**	**Course Code**	**Course Details**	**L**	**T**	**P**	**Credits**	**CIE**	**SEE**	**Total**
1	BSC	250BT08	Random Variables and Stochastic Processes	3	1	-	4	50	50	100
2	PCC	2504T04	Signals and Systems	3	-	-	3	50	50	100
3	PCC	2504T05	Analog and Digital Integrated Circuits	3	-	-	3	50	50	100
4	ESC	2504T06	Introduction To Internet of Things	3	1	-	4	50	50	100
5	ESC	2504T07	Electronic Systems Design: Hands-on Circuits and PCB Design with CAD Software	3	1	-	4	50	50	100
6	PCC	2504P03	Signals and Systems Lab	-	-	3	1.5	50	50	100
7	PCC	2504P04	Analog and Digital Integrated Circuits Lab	-	-	3	1.5	50	50	100
8	EEC		Skill Development Course-1	-	-	2	1		-	
9	EEC		Skill Development Course-2	-	-	2	1		-	
10	EEC	2500IN1	Internship - 1	-	-	2	1	100	-	100
11	MC	2500M05	Environmental Science	1	1	-	0	100	-	100
			Total	**16**	**4**	**12**	**24**	**550**	**350**	**900**

Electronics and Communication Engineering (MR 25 Regulation)										
Course Structure: Semester - IV										
S.No	**Category**	**Course Code**	**Course Details**	**L**	**T**	**P**	**Credits**	**CIE**	**SEE**	**Total**
1	HSMC	250HT03	Management Science	3	1	-	4	50	50	100
2	PCC	2504T08	Analog and Digital Communications	3	1	-	4	50	50	100
3	PCC	2504T09	Electromagnetic Fields and Transmission Lines	3	1	-	4	50	50	100
4	ESC	2504T10	Microprocessors and Interfacing	3	-	-	3	50	50	100
5	PEC-1		Professional Elective-1	3	-	-	3	50	50	100
6	PCC	2504P04	Analog and Digital Communications Lab	-	-	3	1.5	50	50	100
7	PCC	2504P05	Microprocessors and Interfacing Lab	-	-	3	1.5	50	50	100
8	EEC	2500IN2	Internship - 2	-	-	2	1	100	-	100
9	EEC		Skill Development Course-3	-	-	2	1		-	
10	EEC		Skill Development Course-4	-	-	2	1		-	
11	MC	2500M06	Gender Sensitization Lab	-	1	1	0	100	-	100
			Total	**15**	**4**	**13**	**24**	**550**	**350**	**900**

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 theJacobian, 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.

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.

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: 250BT03	Semiconductor Physics and Devices	L	T	P
Credits:4		3	1	-

Course Objective: To provide the knowledge of Diodes, Transistors and FET family, Transistor and FET Biasing Techniques, understands the small signal analysis of different transistor configurations and provides knowledge about Single Stage Amplifiers.

MODULEI: Quantum Mechanics **10 Periods**

Principles of Quantum Mechanics: Introduction, Waves and Particle, de-Broglie Hypothesis-Matter Waves, Phase Velocity and Group Velocity, Davisson and Germer's Experiment, G.P. Thomson's Experiment, Heisenberg's Uncertainty Principle, Schrodinger Wave Equation

Band Theory of Solids: Energy levels in solids, Valance band, Conduction band and Forbidden Band, Classification of Solids

MODULEII: Semiconductor Physics **[10Periods]**

Semiconductor Physics: Introduction, Intrinsic Semiconductors, Intrinsic Carrier Concentration, Fermi level, Extrinsic Semiconductors, Electron and Hole Densities, Law of Mass Action, Recombination, Minority Carrier lifetime, Drift Current, Diffusion Current, Hall Effect

MODULEIII: P-N Junction Diode **[10Periods]**

P-N Junction Diode: Diode equation, Energy Band diagram, Volt-Ampere characteristics, Temperature dependence, Ideal versus practical, Static and dynamic resistances, Equivalent circuit, Diffusion and Transition Capacitances, Zener diode operation, Zener diode as voltage regulator.
Rectifiers: P-N junction as a rectifier - Half Wave Rectifier, Ripple Factor, Full Wave Rectifier, Bridge Rectifier.
Filters: Filters – Inductor Filters, Capacitor Filters, L- section Filters, π- section Filters.

MODULEIV: Bipolar Junction Transistor (BJT) **[10Periods]**

Bipolar Junction Transistor (BJT): Construction, Principle of Operation, Symbol, Amplifying Action, Common Emitter, Common Base and Common Collector configurations and Input-Output Characteristics, Comparison of CE, CB and CC configurations.

MODULEV: Field-Effect Transistor **[10Periods]**

Junction Field-Effect Transistor: Construction, Principle of Operation, Symbol, Pinch-Off Voltage, Volt-Ampere Characteristic, Comparison of BJT and FET.
Metal–Oxide–Semiconductor Field-Effect Transistor: Principle of operation - N-channel, P-channel.

Text Books:

1. K. Vijaya Kumar, S. Chandralingam, "Modern Engineering Physics", S. Chand, 1st edition, 2007.

2. P K Palanisamy, "Engineering Physics", Scitech Publications (INDIA) Pvt. Ltd., 4th edition, 2014.

3. Jacob Milliman, Christos C.Halkias, SatyabrataJit, "Electronic Devices and Circuits", McGraw Hill (India), 3rd edition, 2013.

4. Shalivahana, N.Suresh Kumar, A.Vallavaraj, "Electronic Devices and Circuits", Tata McGraw Hill (India), 3rd edition, 2007.

References:

1. Donald A. Neamen, "Semiconductor Physics and Devices", 4th Edn., McGraw-Hill.

2. G. K. Mithal, "Electronic Devices and Circuits", Khanna Publications, 22nd Edition, 1999.

3. David A. Bell-"Electronic Devices and Circuits" 5th Edition, Oxford.

E-Resources:

1. http://nptel.ac.in/courses/113104012/
2. http://www.elektormagazine.com/
3. http://electronicsforu.com
4. http://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=16
5. http://nptel.ac.in/courses/117101106/6

Course Outcomes:

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

1. Understand the basic concepts of Quantum mechanics and band theory in solids.
2. Analyze the concepts of Semiconductor physics.
3. To study the p-n junction diode and it's applications.
4. Analyze different configurations of BJT.
5. To study the principle of operation of JFET and MOSFET.

CO-PO,PSOMapping (3/2/1indicatesstrengthofcorrelation)3-Strong,2-Medium,1-Weak															
COs	ProgrammeOutcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	1	2	1	1	-	-	1	3	3	3	3	2
CO2	2	3	2	1	3	1	1	-	-	1	3	3	3	3	1
CO3	3	2	2	1	2	1	1	-	-	1	2	2	3	3	1
CO4	2	2	2	2	3	1	1	-	-	1	2	3	3	3	1
CO5	2	3	3	1	3	1	1	-	-	1	2	3	3	3	2

2025-26 Onwards	MALLA REDDY (MR) Deemed to be University	B.Tech.-I Sem		
Code: 250BP01	Semiconductor Physics and Devices Lab	L	T	P
Credits: 1.5		-	-	3

Course Objectives: To Analyze voltage - current characteristics of Diode and Transistor and to study the performance characteristics of rectifiers using diode.

To be performed Using Discrete Electronic Components:

1. Identification, Specifications, testing of electronic components and devices.
2. VI Characteristics of PN Junction Diode
3. VI Characteristics of Zener Diode
4. Zener diode as a Voltage Regulator
5. Half Wave Rectifier without and with filter
6. Full Wave Rectifier without and with filter
7. Input and Output Characteristics of Common Emitter Configuration
8. Input and Output Characteristics of Common Base Configuration
9. Input and Output Characteristics of Common Collector Configuration
10. Drain Characteristics of JFET

Course Outcomes:

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

1. Characteristics of p-n junction and zener Diodes under forward and reverse bias conditions.
2. Input and Output characteristics of Transistors in CE, CB and CC configurations.
3. Characteristics of JFET.

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

COS	Programme Outcomes(POs)												PSOs		
	PO 1	PO2	PO3	PO4	PO 5	PO6	PO 7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO 2	PSO3
CO1	2	3	3	3	3		1		2	1	2	2	3	3	1
CO2	2	3	3	3	3		1		2	1	2	2	3	3	1
CO3	2	3	3	3	3		1		2	1	2	2	3	3	1

2025-26 Onwards	Malla Reddy (MR) (Deemed to be University)	B.Tech. - I Sem		
Code: 250BP02	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)

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: Nil		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.

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: Nil		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. History 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

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	MALLA REDDY (MR) Deemed to be University	B.Tech. II Sem		
Code: 2504T03	DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS (Common to ECE, EEE, CE & ME)	L	T	P
Credits: 4		3	1	-

Course Objectives: To Learn

1) Methods of Solving First order Ordinary Differential Equations and its applications.
2) Methods of Solving Higher order Ordinary Differential Equations and its applications.
3) Laplace Transforms and its applications.
4) Gradient, Divergence, curl and Scalar potential function.
5) 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:

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

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: 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.
2.

E-Resources:

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

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: 2504T01	Analog Circuit Design	L	T	P
Credits:4		3	1	-

Pre-Requisites: Semiconductor Physics and Devices.

Course Objectives: This course provides the knowledge of Transistor and FET 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 and oscillators

MODULE-I **[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.

MODULE–II **[9 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. Comparison of transistor configurations in terms of Ai, Ri, Av, Ro. Analysis of CE Amplifier with Emitter resistance, Millers theorem and its Dual, Simplified h-parameter Model.

MODULE-III **[10 Periods]**

A: Classification of Amplifiers, Distortion in Amplifiers, Low Frequency response of common emitter Amplifiers, Common Base Amplifiers and Common Collector Amplifier.

B: Small signal JFET model, JFET Amplifiers: Common Drain Amplifier, Common Source Amplifier and Common Gate Amplifier.

MODULE–IV **[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.

MODULE-V **[9 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.

TEXT BOOKS

1. Jacob Milliman, Christos C. Halkias, SatyabrataJit, "Electronic Devices and Circuits", McGraw Hill (India), 3rd edition, 2013.
2. Shalivahana N. Suresh Kumar, A. Vallavaraj, "Electronic Devices and Circuits", Tata McGraw 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, 22nd Edition, 1999.

E–RESOURCES

1. http://electronicsforu.com/
2. https://www.elektormagazine.com/
3. http://ieeexplore.ieee.org/xpl/RecentIssue.jsp?reload=true&punumber=101
4. http://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=16
5. http://nptel.ac.in/courses/117101106/6

Course Outcomes:

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

1. Study different biasing techniques and design the DC bias circuits using BJT & FET
2. Understand the small signal analysis of different transistor configurations.
3. Understand the design of single stage Amplifiers
4. Understand the design of Feedback amplifiers and their frequency response.
5. Understand the design of various oscillators such as RC Phase Shift Oscillator, Wein Bridge Oscillator, Crystal Oscillator, LC Oscillator etc

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	2	2	1	2	1	1	-	-	1	3	3	3	3	2
CO2	2	3	2	1	3	1	1	-	-	1	3	3	3	3	1
CO3	3	2	2	1	2	1	1	-	-	1	2	2	3	3	1
CO4	2	2	2	2	3	1	1	-	-	1	2	3	3	3	1
CO5	2	3	3	1	3	1	1	-	-	1	2	3	3	3	2

2025-26 Onwards	MALLAREDDY (MR) Deemed to be University	B.Tech.-II Sem		
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 logic and 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 given sequential 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 Variables) and QuineMcCluskey 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, BCD adder
B: Code conversion circuits, Comparator, Decoder, Encoder, Priority Encoder, Multiplexers and Design, De – Multiplexers.

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

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 and Flip 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. Zvi Kohavi, "Switching and Finite Automata Theory", TMH, 2nd edition, 2006.
2. Morris Mano, "Digital Design", PHI, 3rd Edition, 2009.
3. A. Anand Kumar, "Switching Theory and Logic Design", PHI 2nd Edition, 2014.
4. John F. Wakerly, "Digital Design Principles & Practices", PHI/Pearson Education Asia, 3rd Ed., 2005.

Reference Books:

1. Stephen Brown and Zvonka Vramesic, "Fundamentals of Digital Logic with VHDL Design", McGraw Hill, 2nd Edition, 2008.
2. 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
5. http://nptel.ac.in/courses/117106086/1
6. http://nptel.ac.in/courses/117105080/
7. 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

CO-PO, PSOMapping
(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	PO 10	PO 11	PO 12	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			1	2	1	3	3	2
CO4	2	2	3	3	1	1	1			1	3	1	2	2	2
CO5	1	1	3	3	1	1	1			1	3	1	3	2	2

2025-26 Onwards	MALLAREDDY(MR) Deemed to be University	B.Tech.-II Sem		
Code: 2504P01	Analog Circuit Design Lab	L	T	P
Credits: 1.5		-	-	3

Course Objectives: To design different amplifiers, Feedback amplifiers and Oscillator circuits according to the given specifications.

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

1. Common Source Amplifier.
2. Common Gate Amplifier.
3. Voltage Shunt Feedback Amplifier
4. Wein Bridge Oscillator using Transistors.
5. Hartley Oscillator Using Transistors.
6. Colpitt's Oscillator Using Transistors.

PART - B: To be performed Using Discrete Electronic Components

1. Common Emitter Amplifier.
2. Common Collector Amplifier.
3. Common Drain Amplifier.
4. Voltage Series Amplifier.
5. Current Series Amplifier
6. RC Phase Shift Oscillator using Transistors.

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

1. Design Amplifiers Circuits.
2. Design Oscillator Circuits.
3. Analyze Feedback topology for amplifiers.

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	3	3	3	-	2	-	-	1	1	2	3	3	1
CO2	2	3	3	3	3	-	2	-	-	1	1	2	3	3	1
CO3	2	3	3	3	2	-	1	-	-	1	-	2	3	3	1

2025-26 Onwards	MALLAREDDY(MR) Deemed to be University	B.Tech.-II Sem		
Code: 2504P02	Digital Circuit Design Lab	L	T	P
Credits: 1		-	-	2

Course Objectives: To get programming knowledge on Verilog/VHDL programming of different 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/VHDL coding.
2. Design and verify the functionality of various flip flops and basic sequential circuits using Verlog/VHDL coding.

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	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	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

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	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: Nil		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.

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: Nil		1	1	

UNIVERSAL HUMAN VALUES

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

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	-	-	-

2025-26 Onwards	MALLA REDDY (MR) (Deemed to be University)	B.Tech. III Sem		
Code: 250BT08	Random Variables and Stochastic Processes	L	T	P
Credits:4		3	1	-

Pre-Requisites: Differential Equations and Vector Calculus

MODULE I: Review of Probability Theory [10Periods]

Probability introduced through sets and Relative Frequency, Experiments and Sample Spaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Mathematical Model of Experiments, Probability as a Relative Frequency, Joint Probability, Conditional Probability, Total Probability, Bayes,,Theorem, Independent events.

MODULE II: Random Variable & Operations [14Periods]

Random variables: Definition of A Random Variable, Classification of Random Variables, Cumulative Distribution Function (CDF) and its properties, Probability Density Function (pdf) and its Properties, CDF & pdf of Random Variables – Uniform, Gaussian, Rayleigh, Bernoulli, Binomial, Exponential, Poisson, Conditional distribution and density functions.

Operations on Single Random Variable: Expectation, Moments, Variance and Skew, Characteristic Function, Moment Generating Function, Transformations of a Random Variable

MODULE III: Multiple Random Variables &Operation [12 Periods]

Multiple Random Variables: Joint Distribution and its Properties, Joint Density and its Properties, Conditional Distribution and Density, Statistical Independence, Sum of Two Random Variables, Central Limit Theorem (Without Proof).

Operations on Two Random Variables: Joint Moments of the Origin, Joint Central Moments, Joint Characteristic Functions. Transformation of Multiple Random Variables, Linear Transformation of Gaussian Random Variable.

MODULE IV: Random Processes-Temporal Characteristics [14 Periods]

Classification of Random Processes, Stationary – WSS and SSS Processes, Time Averages and Ergodicity, Mean-Ergodic Processes, Autocorrelation Function and its Properties, Cross- Correlation Function and its Properties, Covariance and its Properties, Linear System Response of Mean and Mean-squared Value, Autocorrelation Function, Cross-Correlation Functions.

MODULE V: Random Processes-Spectral Characteristics [14 Periods]

Power Density Spectrum and its Properties. Relationship between PSD and Autocorrelation Function, Cross-Power Density Spectrum and its Properties, Relationship between Cross PSD and Cross-correlation Function, Spectral Characteristics of System Response: Power Density Spectrum of Response, Cross-Power Spectral Density of Input and Output of a Linear System

Text Books:

1. Probability, Random Variables & Random Signal Principles, Peyton Z. Peebles, TMH, 4th Edition, 2001.

2. Probability, Random Variables and Stochastic Processes, Athanasios Papoulis and S. Unnikrishnan, PHI, 4th Edition, 2002.

3. Probability and Random Processes with Applications to Signal Processing, Henry Stark and John W. Woods, Pearson Education, 3rd Edition, 2001.

Reference Books:

1. Schaum's Outline of Probability, Random Variables, and Random Processes, 1997.

2. An Introduction to Random Signals and Communication Theory, B.P. Lathi, International Textbook, 1968.

3. Probability Theory and Random Processes, P. Ramesh Babu, McGraw-Hill, 2015.

E-Resources:

1. nptel.ac.in/courses/111102111
2. Probability and Random Variables | Mathematics | MIT OpenCourseWare
3. Probability, Statistics & Random Processes | Free Textbook | Course
4. Lecture 21: Random Variables
5. Probability and Random Processes - Course
6. Random Variables (Statistics and Probability) | PPTX

COURSE OUTCOMES:

Upon completion of this course, students will be able to:

1. Classify and analyze discrete and continuous random variables using appropriate distribution functions.
2. Compute expectation, variance, and apply basic transformations of random variables in problem solving.
3. Analyze joint, marginal, and conditional distributions of multiple random variables and evaluate statistical independence.
4. Analyze random processes in terms of stationarity, mean, and autocorrelation functions.
5. Apply spectral analysis and evaluate the response of linear systems to random inputs.

CO–PO–PSO Articulation Matrix (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PS O1	PS O2	PS O3
CO1	3	2	-	2	-	-	-	-	-	-	-	2	1	1
CO2	3	2	-	2	-	-	-	-	-	-	-	2	1	1
CO3	3	2	-	2	-	-	-	-	-	-	-	2	1	1
CO4	3	2	3	2	-	-	-	-	-	-	-	2	1	1
CO5	3	2	3	2	-	-	-	-	-	-	-	2	1	1

2025-26 Onwards	MALLA REDDY (MR) (Deemed to be University)	B.Tech. III Sem		
Code: 2504T04	Signals And Systems	L	T	P
Credits: 3		3	-	-

Pre-Requisites: Calculus, Analog Circuit Design

COURSE OBJECTIVES:

This course aims to:

1. Provide an understanding of signals and systems, their classification, and properties.

2. Develop the ability to analyse signals in time and frequency domains using the Fourier series and Fourier transform techniques.

3. Introduce LTI systems and evaluation of system response using convolution methods.

4. Provide knowledge of Laplace transform techniques and their applications, along with correlation and spectral concepts.

5. Develop the ability to apply sampling theory and analyse signals and systems using Z transforms.

Module-1

Signal Fundamentals: **[12 periods]**

Introduction to signals and systems, their representation, and Classification of signals into continuous-time and discrete-time, energy and power signals, periodic and aperiodic signals, basic signals -Sinusoidal, exponential, unit step, impulse, signum functions; basic system properties-linearity, time invariance, causality, and stability. Introduction to LTI (Linear Time Invariant) systems.

Module-2

Fourier Analysis: **[12 periods]**

Fourier Series: Representation of periodic signals, Trigonometric & Exponential forms, and Properties, Dirichlet's conditions. Fourier Transform: Fourier Transform of Standard Signals, Properties of Fourier Transform, Spectrum analysis (Magnitude & Phase), Hilbert Transform.

Module-3

LTI Systems & Convolution [12 Periods]

Linear Time-Invariant (LTI) System, impulse response, and system response, convolution including Continuous-time and Discrete-time convolution and graphical method, frequency response of LTI systems, ideal filters such as low-pass (LPF), high-pass (HPF), and band-pass (BPF) filters, and concept of signal bandwidth.

Module-4

Laplace Transform & Correlation [12 Periods]

Laplace transform definition, Region of Convergence (ROC) and properties; Inverse Laplace transform using basic methods, stability conditions using (ROC), correlation including autocorrelation and cross correlation; basic concepts of Power Spectral Density (PSD), relation between Fourier Transform (FT) and Laplace transform (LT); Parseval's theorem, relation between autocorrelation function and Power Spectral Density.

Module-5

Sampling & Z Transform [14 Periods]

Sampling Theorem, including Nyquist rate and aliasing, types of sampling such as impulse sampling, natural sampling, and flat-top sampling; Z-transform- Region of Convergence (ROC) and Properties, Inverse Z transform using basic methods, ROC conditions for different types of signals; Comparison of Laplace Transform(LT), Fourier Transform(FT), and Z transform (overview).

TEXT BOOKS

1. Signals, Systems & Communications -B.P. Lathi, BS Publications.

2. Signals and Systems – Allan. V. Oppenheim, Allan. S. Willsky with S. Hamid. Nawab, 2nd Ed. Pearson**.**

REFERENCE BOOKS

1. Signals and Systems–Simon Haykin, Barry Van Veen, 2nd Ed., Wiley.

2. Signals and Systems – A. Rama Krishna Rao, 2008, TMH.

3. Fundamentals of Signals and Systems – Michel J. Roberts, Govind Sharma, 2nd Ed., MGH.

4. Signals, Systems, and Transforms - Charles. L. Philips, John M. Parr and Eve A. Riskin, 4th Ed., 2004, Pearson, Prentice Hall.

E-Resources:

1.https://nptel.ac.in/courses/117101055

2. https://nptel.ac.in/courses/117104074

3. Signals and Systems | Electrical Engineering and Computer Science | MIT OpenCourseWare

4. https://onlinecourses-archive.nptel.ac.in/noc18_ee02/previe

5. NOC:Principles of Signals and Systems NPTEL Course - Free Practice Questions & Materials | NPTELPrep

COURSE OUTCOMES:

Upon completion of this course, students will be able to:

1. Classify and analyse Continuous and discrete time signals and system properties.

2. Apply the Fourier series and Fourier transform techniques to analyse signals.

3. Analyse LTI systems and compute system response using CT & DT Convolution methods.

4. Apply Laplace transform techniques to analyse system behaviour and to evaluate correlation, PSD.

5. Understand Sampling theory and apply Z transforms to analyse signals and systems.

CO–PO–PSO Articulation Matrix
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PSO1	PSO2	PSO3
CO1	3	2	1	1								2	1	
CO2	3	2	1	1								2	1	
CO3	3	2	1	1								2	1	
CO4	3	2	1	1								2	1	
CO5	3	2	1	1								2	1	1

2025-26 Onwards	MALLA REDDY (MR) (Deemed to be University)	B.Tech. III Sem		
Code: 2504T05	Analog and Digital Integrated Circuits	L	T	P
Credits: 3		3	-	-

Pre-Requisites: Analog Circuit Design, Digital Circuit Design

COURSE OBJECTIVES:

This course aims to:

1. Understand the fundamentals and characteristics of operational amplifiers and analyze basic Op-Amp configurations.

2. Apply Op-Amp principles to design and analyze analog circuits such as amplifiers, integrators, differentiators, and waveform generators.

3. Explain and analyze timer circuits, voltage regulators, and data converters used in analog integrated circuit applications.

4. Understand the characteristics and operation of different digital logic families such as TTL and CMOS.

5. Design and analyze combinational and sequential circuits and understand the organization and operation of semiconductor memories and programmable logic devices.

Module:1

Operational Amplifier: [14 periods]

Op-Amp block diagram, ideal Op-Amp Characteristics, Inverting and Non-inverting amplifiers with ideal and non-ideal Op-amps, Voltage Follower, Op-Amp parameters-Input offset voltage, Output offset voltage, input offset and bias currents, Slew rate, CMRR and PSRR.

Module:2

Op-Amp Applications: [12 periods]

Summing Amplifier, Difference Amplifier, ideal and practical Integrator, and differentiator. Sample and hold circuit, Comparator, Schmitt Trigger with and without reference voltage, Triangular waveform generator.

Module:3

Timer Circuits, Voltage Regulators, and Data Converters [12 Periods]

555 Timer: Functional diagram. Modes of operation: Monostable, Astable multivibrators. **Voltage Regulator**: IC7805, Analysis and design of voltage regulator using IC 723.

Data Converters: Specifications, DAC - Weighted Resistor, R-2R Ladder, ADC - Comparator, Successive Approximation and Dual Slope

Module:4

Digital Logic Families: [12 Periods]

Logic Families:

Digital IC characteristics, TTL logic family, TTL series, and TTL output configurations: open collector, Totem pole, tri-state logic. MOS logic family, CMOS logic family, and its series characteristics, CMOS transmission gate, CMOS open drain, and high impedance outputs. Comparison of TTL and CMOS logic families.

Module:5

Combinational and Sequential Circuits and Memories [14 Periods]

Combinational and Sequential Circuits: Design of logic functions/circuits - Decoder, Multiplexer, Adder- Serial adder, parallel adder, and BCD adder, counters - asynchronous counter (IC7493) and synchronous counter (IC74163).

Semiconductor Memories: Memory Terminology, ROM, RAM types, Architectures, operation, Expanding word size and capacity, Introduction to PLD's- PAL and PLA, Programming with PLDs, Introduction to CPLD&FPGA and its architectures.

TEXT BOOKS:

1. Ramakant A. Gayakwad, "Op-Amps and Linear Integrated Circuits", 4/e, PHI, 2015.

2. Ronald J. Tocci, Neal S. Widmer & Gregory L. Moss, "Digital Systems: Principles and Applications", PHI, 12/e, 2016.

REFERENCE BOOKS:

1. K.R. Botkar, "Integrated Circuits", 10/e, Khanna Publishers, 2010.

2. Roy Chowdhury D, Jain S.B, "Linear Integrated Circuits",4/e, New Age International Publishers, 2018.

3. Jain R.P., "Modern Digital Electronics", 4/e, TMH, 2011.

4. Charles H Roth and Larry L Kinney, "Fundamentals of Logic Design," 7th edition, Cengage Publication, 2014.

5. David A. Bell, 'Operational Amplifier and Linear ICs', third edition, Oxford University Press, 2013.

E-Resources:

1. **https://nptel.ac.in/courses/117107094**
2. **Lecture 04 : Transistor Transistor Logic (TTL)**

COURSE OUTCOMES:

Upon completion of this course, students will be able to:

1. Analyze the characteristics and configurations of operational amplifiers for linear applications.

2. Design and evaluate Op-Amp-based circuits such as amplifiers, integrators, differentiators, and waveform generators.

3. Explain the operation of timer circuits, voltage regulators, and data converters and apply them in practical applications.

4. Compare and analyze different digital logic families and understand their electrical characteristics and interfacing.

5. Design and analyze combinational and sequential circuits and explain the architecture and operation of semiconductor memories and programmable logic devices.

CO–PO–PSO Articulation Matrix
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

CO/PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	1	-	-	-	-	-	-	-	-	3	2	-
CO2	3	2	3	1	-	-	-	-	-	-	-	3	2	1
CO3	2	2	2	1	1	-	-	-	-	-	-	3	2	1
CO4	3	2	1	-	-	-	-	-	-	-	-	3	2	-
CO5	3	2	3	1	1	-	-	-	-	-	-	3	3	2

2025-26 Onwards	MALLA REDDY (MR) (Deemed to be University)	B.Tech. III Sem		
Code: 2504T06	Introduction to Internet of Things	L	T	P
Credits: 4		3	1	-

Course Objective: To provide knowledge of IoT architecture, communication protocols, and sensor technologies and also to develop skills in IoT system design, data management, and security for connected environments.

MODULE I: Fundamentals of IoT and Networking.

Introduction to IoT, Fundamentals of IIOT, Sensing and Actuation, Basics of Networking – Origin of terminology, altenate definition, Communication Protocols.

MODULE II: Communication and Sensor Networks

Communication Protocols –HTTP,COAP,MQTT, Sensor Networks-WSN, Multi hop path in WSN, Sensor nodes, Target tracking, Wsn coverage, Node behaviour in Wsn, Machine-to-Machine (M2M) Communications, Interoperability in IoT

Module III: IoT Hardware Platforms and Programming

Introduction to Arduino Programming – Control statement, Loop condition, Integration of Sensors and Actuators with Arduino-Servo Actuators, Introduction to Python Programming, Introduction to Raspberry Pi

MODULE IV: Advanced IoT Architectures and Data Management

Implementation of IoT with Raspberry Pi (continued), Introduction to Software Defined Networking (SDN), SDN for IoT, Data Handling and Analytics, Cloud Computing, Sensor-Cloud, Fog Computing

MODULE V: IoT Applications and Case Studies

Smart Cities and Smart Homes, connected Vehicles, Smart Grid, Industrial IoT
Case Studies: Agriculture, Healthcare, Activity Monitoring

Text Books:

1) S. Misra, A. Mukherjee, and A. Roy, 2020. Introduction to IoT. Cambridge University Press.

2) S. Misra, C. Roy, and A. Mukherjee, 2020. Introduction to Industrial Internet of Things and Industry 4.0. CRC Press.

E-Resources:

1. http://nptel.ac.in/courses/117101106/6

Course Outcomes:

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

1. Understand the basic concepts of IIOT
2. Analyze the concepts of Protocols
3. Understand the basic concepts of networking.
4. Applying and Implementing the Raspberry Pi with SDN Networking.
5. Apply the concepts of case studies and applications of IIOT.

COs	Program Outcomes (Pos)											PSOs		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
1	3	1				1	1					3	2	1
2	3	3	2	2	2	1						3	3	2
3	3	3	3	3	3	1	1				2	3	3	1
4	2	2	3	2	3	1		2		2		3	3	2
5	2	2	2	2	2	1	3	1		2	2	2	3	3

2025-26 Onwards	MALLA REDDY (MR) (Deemed to be University)		B.Tech. III Sem	
Code: 2504T07	Electronic System Design hands-on circuits and PCB design with CAD software	L	T	P
Credits:-3		-	-	-

Pre-Requisites: Basic Electronics

Module I: Circuit Foundations & Components [10Periods]

Introduction, passive circuit elements (R,L,C), resistor color coding, and surface mount component basics-Surface mount capacitors and inductors on PCBs. Active elements (MOSFETs, BJTs), Kirchhoff's Laws- KCL, KVL and network theorems (Superposition, Thevenin, Norton, Maximum Power Transfer).

Module II: Circuit Simulation & Interconnects [12Periods]

Circuit simulations using SPICE: operating point analysis, DC, small-signal AC, and large-signal simulations. Metal interconnections through holes, vias, interconnect design, and CMOS inverter basics.

Module III: CMOS & Digital Logic Foundations [12 Periods]

CMOS inverter design alongside core combinational circuit design principles. Sequential circuit design and fundamental digital design using Boolean Algebra.

Module IV: Logic Interfacing & Digital Subsystems [14 Periods]

Classification of Random Processes, Stationary – WSS and SSS Processes, Time Ave- logic families, component data-sheets, TTL/CMOS interfacing constraints, and HDLs (VHDL/Verilog) Digital subsystem layouts including inverters, logic gates, decoders, multiplexers, adders, multipliers, and ALUs.

Module V: PCB Architecture, Prototyping & Case Studies [14 Periods]

Single-layer versus multi-layer PCBs, holes, vias, and structural layer limitations. Intensive hands-on training labs focused on PCB prototyping phases 1, 2, and 3. Prototyping phase 4 wrapped with basic step-by-step PCB design implementation examples. Advanced PCB design and final system layout conclusions.

Text Books &Reference Books:

1. Complete PCB Design Using OrCAD Capture and Layout, K. Mitzner, 2nd Edition, Academic Press.
2. Digital Integrated Circuits, J. M. Rabaey, 2nd Edition, Pearson.
3. Network Analysis, M. E. Van Valkenburg, 3rd Edition, Pearson.

E-Resources:

https://www.khanacademy.org/science/electrical-engineering?
https://www.allaboutcircuits.com/textbook/

https://falstad.com/circuit/?
https://www.youtube.com/@nesoacademy?
https://learn.sparkfun.com/tutorials/pcb-basics/
https://www.pcbway.com/helpcenter.html?

COURSE OUTCOMES:

Upon completion of this course, students will be able to:

1. Analyze and solve complex electrical networks using standard circuit theorems and component verification techniques.
2. Simulate and validate DC, AC, and transient behaviors of electronic systems prior to physical prototyping.
3. Design and optimize high-performance CMOS-based combinational, sequential, and arithmetic logic subsystems.
4. Write and synthesize VHDL/Verilog code to interface mixed TTL/CMOS digital components seamlessly.
5. Manufacture and deliver a fully routed, multi-layer printed circuit board (PCB) that meets physical constraint standards.

CO–PO–PSO Articulation Matrix

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

CO/ PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO1	PS O2	PS O3
CO1	3	3	-	1	-	-	-	-	-	-	-	3	1	-
CO2	2	2	-	3	3	-	-	-	-	-	-	3	3	-
CO3	2	1	3	-	2	-	-	-	-	-	1	3	2	-
CO4	2	1	3	-	3	-	-	-	-	-	1	3	3	-
CO5	2	-	3	-	3	1	1	-	-	2	2	2	3	2

2025-26 Onwards	MALLA REDDY (MR) (Deemed to be University)	B.Tech. III Sem		
Code: 2504P03	Signals And Systems Laboratory	L	T	P
Credits: 1.5		-	-	3

Pre-Requisites: Calculus and differential equations, Signals and Systems

COURSE OBJECTIVES:

This course aims to:

1) Understand and analyze continuous-time and discrete-time signals and systems
2) Apply signal processing concepts such as convolution, transforms, and sampling
3) Implement and validate signal/system operations using computational tools like MATLAB/Octave

Implement the following using MATLAB or an equivalent open-source software such as Scilab or Octave.

List of Experiments

Part A: Signal Representation and Analysis

1. Generation of Continuous-Time and Discrete-Time Signals
2. Study of Basic Operations on Signals
3. Computation of Energy and Power of Signals
4. Verification of System Properties (Linearity, Time-Invariance, Causality, Stability)
5. Fourier Series Representation of Periodic Signals
6. Fourier Transform Analysis of Signals (Magnitude and Phase Spectrum)

Part B: System Analysis and Transform Techniques

7. Convolution of Continuous-Time and Discrete-Time Signals
8. Determination of Impulse and Step Response of LTI Systems
9. Frequency Response and Filter Analysis (LPF, HPF, BPF)
10. Laplace Transform and Region of Convergence (ROC) Analysis
11. Correlation Analysis and Power Spectral Density (PSD)
12. Verification of Sampling Theorem and Aliasing Effect
13. Z-Transform Analysis of Discrete-Time Systems

E-Resources:

1. Welcome to Virtual Labs
2. https://youtu.be/qycZOWDU7F4?si=NZmTJW_OazreAk4i

COURSE OUTCOMES:

Upon completion of this course, students will be able to:

1. Generate and simulate continuous-time and discrete-time signals using computational tools. (Apply)
2. Perform signal operations and evaluate system properties such as linearity and stability. (Analyze)
3. Analyze LTI systems and determine system responses for various inputs. (Analyze)
4. Apply convolution and transform techniques for signal and system analysis. (Apply/Analyze)
5. Implement sampling, correlation, and spectral analysis techniques in practical applications. (Apply)

CO–PO–PSO Articulation Matrix

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

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PSO 1	PSO 2	PSO 3
CO1	3	2	1	2	3	1	–	1	1	1	–	3	2	1
CO2	2	3	2	2	3	1	–	1	1	1	–	3	2	1
CO3	2	3	2	3	2	1	–	1	2	1	1	3	3	2
CO4	2	2	2	3	3	1	–	1	2	1	1	3	3	2
CO5	2	2	2	3	3	1	1	1	2	1	1	3	3	2

2025-26 Onwards	MALLA REDDY (MR) (Deemed to be University)		B.Tech. III Sem	
Code: 2504P04	Analog And Digital Integrated Circuits Laboratory	L	T	P
Credits:1		-	-	2

Pre-Requisites: Analog Circuit Design, Digital Circuit Design

COURSE OBJECTIVES:

This course aims to:

To understand and design analog and digital integrated circuits, including Op-Amps, timer circuits, data converters, and digital systems using standard ICs.

List Of Experiments

PART-A: Analog IC's

1. Design and verify inverting and non-inverting amplifiers using an Op-Amp, and calculate their voltage gain
2. Design and implement summing and difference amplifiers and verify addition and subtraction operations.
3. Design practical integrator and differentiator circuits using IC 741 and study their output waveforms.
4. Design comparator and Schmitt trigger circuits and determine switching characteristics (UTP & LTP).
5. To construct monostable and astable multivibrators using IC 555 and analyze their output waveforms and timing characteristics.
6. To design a voltage regulator using IC 7805/723 **or** implement an R-2R ladder DAC and determine output voltage characteristics.

PART-B: Digital Integrated Circuits

7. To verify the truth tables of basic logic gates using digital ICs.
8. Design and implement combinational circuits using multiplexer and decoder ICs and verify their truth tables.
9. Design a 4-bit adder/subtractor circuit using digital ICs and perform arithmetic operations.
10. To study and verify the operation of SR, JK, and D flip-flops.
11. To design and analyze asynchronous and synchronous counters and observe output waveforms.
12. Design and verify the operation of a shift register or study the read/write operation of RAM.

COURSE OUTCOMES:

Upon completion of this course, students will be able to:

1. Apply the concepts of operational amplifiers to analyze and design linear and nonlinear analog circuits.
2. Design and evaluate Op-Amp-based applications such as amplifiers, filters, waveform generators, and comparators.
3. Analyze timer circuits, voltage regulators, and data converters for practical applications.
4. Understand and compare different digital logic families and their characteristics.
5. Design and implement combinational and sequential circuits using standard digital ICs and analyze memory devices.

Major Equipment required for Laboratories:

Regulated Power Supply, Digital Multimeter (DMM), DSO, Bread Board/Trainer kit, Function Generator, IC Components, Passive Components.

E-Resources:

1. **Welcome to Virtual Labs**
2. **https://ade-iitr.vlabs.ac.in/List%20of%20experiments.html**
3. **https://youtu.be/9QgdNsl9qwk?si=VwF-HYJ-iNa3QQCN**
4. **Analog and Digital Integrated Circuits Lab - SRMIST**

CO–PO–PSO Articulation Matrix
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

CO/PO-PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	2	1	1	-	-	-	-	-	-	3	2	1
CO2	3	2	3	1	2	-	-	-	-	-	-	3	3	1
CO3	3	3	2	2	2	-	-	-	-	-	-	2	3	1
CO4	2	2	1	1	1	-	-	-	-	-	-	2	2	1
CO5	3	3	3	2	2	-	-	-	1	1	1	3	3	2

2025-26 Onwards	MALLA REDDY (MR) (Deemed to be University)	B.Tech. III Sem		
Code: 2500IN1	Internship	L	T	P
Credits: 1		-	-	2

Course Objectives

The student will be able to:

1. Understand the work culture and professional practices in industries, startups, research organizations, or academic laboratories.
2. Apply engineering fundamentals to solve real-world problems through internship or project work.
3. Develop technical, analytical, and documentation skills.
4. Improve communication, teamwork, ethics, and professional responsibility.
5. Present technical work effectively through reports and presentations.

Course Content

Students shall undergo an internship/project in one of the following:

- Industry
- R&D Organization
- Startup
- MSME
- Government Organization
- Academic Institution
- University-approved Online Internship Platform

The internship/project shall include:

- Identification of a practical engineering problem
- Study of existing methods
- Design/implementation of solution
- Testing and validation
- Documentation
- Presentation and Viva-Voce

Deliverables

Students shall submit:

1. Internship Completion Certificate
2. Attendance Certificate (if applicable)
3. Daily/Weekly Log Book
4. Internship/Project Report
5. Presentation (PPT)
6. Viva-Voce

COs/pos/psos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	2	1	–	–	–	1	–	–	2	3	2	–
CO2	3	2	3	2	3	1	–	2	1	1	2	3	3	2
CO3	2	3	2	3	2	1	–	2	1	–	2	2	3	2
CO4	–	–	–	–	1	1	3	2	3	2	2	1	2	2

2025-26 Onwards	MALLA REDDY (MR) (Deemed to be University)	B.Tech. III Sem		
Code: 2500M05	Environmental Science (Common for ALL)	L	T	P
Credits:-Nil		1	1	-

Pre-Requisites: Nil

Course Objectives:

This course aims to:

An interdisciplinary approach to complex environmental problems using basic tools of the natural and social sciences, including geo systems, biology, chemistry, economics, political science and international processes. The ability to work effectively as a member of an interdisciplinary team on complex problem of environment.

MODULE I:

Ecosystems: **[5 Periods]**

Definition, Scope and Importance of ecosystem, Concept of ecosystem, Classification of ecosystems, Structure and Structural Components of an ecosystem, Functions of ecosystem, Food chains, food webs and ecological pyramids. Flow of energy. Activity: Plantation.

MODULE II:

Natural resources, Biodiversity, and Biotic resources: **[9 Periods]**

A: Natural Resources: Classification of Resources: Living and Non-Living resources, Renewable and non-renewable resources. Water resources: use and overutilization 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–case studies. Energy resources: growing energy needs, introduction to renewable and non-renewable energy sources. B: Biodiversity and Biotic resources: Introduction, Definition, genetic, species, and ecosystem diversity. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic, and intrinsic values. Threats to Biodiversity (habitat loss, poaching of wildlife, man-wildlife conflicts). Conservation of Biodiversity (In-situ and Ex-situ conservation), Activity: case studies.

MODULE III:

Environmental Pollution and Control: **[7 Periods]**

A: Classification of pollution and pollutants, Causes, effects, and control technologies. Air Pollution: Primary and secondary pollutants, Automobile and Industrial pollution, and ambient air quality standards. Water pollution: Point and non-point sources of pollution, major pollutants of water and their sources, and drinking water quality standards. B: Soil Pollution, Soil as a sink for pollutants, Impact of modern agriculture on soil, degradation

of soil. Marine Pollution: Misuse of international waters for dumping of hazardous waste, Coastal pollution due to sewage, and marine disposal of industrial effluents. E-waste and its management. Activity: Field visit.

MODULE IV:

Global Environmental Problems and Global Effects: [6 Periods]

Concept of Sustainable Development, Threats to Sustainability, Population and its explosion, Crazy Consumerism, Over-exploitation of resources, Strategies for Achieving Sustainable development, Environmental Education, Conservation of Resources, Urban Sprawl, Sustainable Cities and Sustainable Communities, Human health, Role of IT in Environment, Environmental Ethics, Environmental Economics, Concept of Green Building, Clean Development Mechanism (CDM).

Text Books:

1. R. Rajagopalan, "Environmental Studies from crisis to cure", Oxford University Press

2nd Edition, 2005.

2. Anubha Kaushik, C.P. Kaushik, "Environmental studies," New Age International

Publishers,4th Edition,2012

Reference Books:

1. Erach Bharucha, "Environmental studies," University Grants Commission, and University Press, I Edition, 2005.

2. M. Anji Reddy, "Textbook of Environmental Science and Technology," 3rd Edition, 2007

3. Richard T. Wright," Environmental Science: towards a sustainable future," PHL Learning, Private Ltd., New Delhi, 2nd Edition, 2008

4. Gilbert McMasters and Wendell P. Ela, "Environmental Engineering and Science", 3rd Edition, PHI Learning Pvt. Ltd.,2008.

E-Resources:

1. Journal of earth science and climatic change (OMICS International Journal).

2. Journal of pollution effects & control (OMICS International Journal).

3. nptel.ac.in/courses/120108004/ (Principles of Environment Management Lectures).

4. http://www.nptelvideos.in/2012/12/fundamentals-of-environmental-pollution.html (NPTEL online video courses, IIT lectures).

Course Outcomes:

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

1. To enable the students to realize the importance of the ecosystem, its structure, and services. To make the students aware of the different natural functions of the ecosystem, which help to sustain life on Earth.

2. To use natural resources more efficiently.

3. To make the students aware of the impacts of human actions on the

environment, its effects, and measures to mitigate them.

4. To educate the students regarding environmental issues and problems at the local, national, and international levels.

5. To know a more sustainable way of living

CO–PO–PSO Articulation Matrix **(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak**														
COs	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PSO 1**	**PSO 2**	**PSO 3**
CO 1	2	2	–	1	–	2	3	1	1	1	1	1	–	–
CO 2	2	2	1	2	–	2	3	2	1	1	1	1	–	–
CO 3	2	3	1	2	–	3	3	2	1	1	1	1	–	–
CO 4	2	3	–	2	–	3	3	2	1	2	1	1	–	–
CO 5	2	2	1	1	–	3	3	3	2	2	2	1	1	1